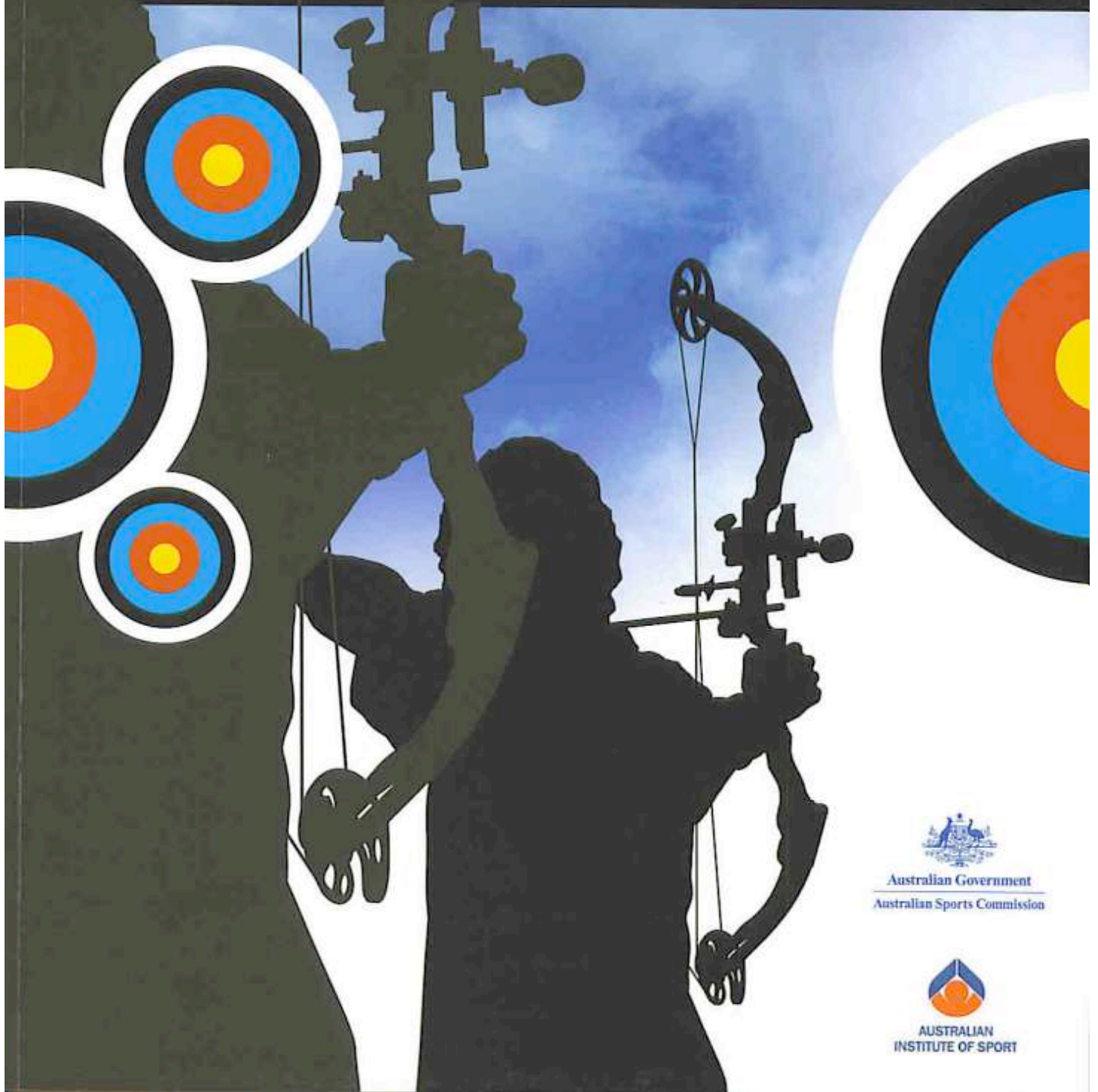




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Archery Australia Inc  
***Introduction to Archery***



Australian Government  
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# INTRODUCTION TO ARCHERY

## By Archery Australia



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First published January 2006

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ISBN 0-646-45698-9

Published by Archery Australia  
P.O.Box 54,  
Panania NSW 2213 Australia

# Preface

This manual builds on the success of the Archery Australia Coaching Manual first published in 1991, and edited by Gordon Pawson. Quoting from Gordon's preface of the 1991 manual:

*The important work done by archery instructors in the development and promotion of archery in Australia is worthy of the highest commendation.*

The success of Archery Australia, each RGB and every club in Australia is dependent on the establishment of teams of active, accredited instructors and coaches to encourage and service the development of archers at every skill level.

Archers new to our sport and those in their early years of participation make up the main group needing help and on-going attention. The importance of instructing at this level cannot be emphasised enough.

Many archers start off on the wrong foot because they have had no-one to teach them the basics of archery technique, correcting their errors, providing guidance to self-identify errors and providing them with general help and advice. The most common problem is new archers who obtain equipment that is unsuited to their physical requirements and ability.

As a consequence, many leave archery because they have been unable to achieve the satisfaction that would have kept them in the sport.

Archers who are taught correct procedures from the beginning will progress quickly and will have less trouble identifying and correcting faults that may creep into their shooting technique.

This manual has been primarily designed for use by instructors and sets out step-by-step methods of teaching archery skills but it may also be a useful tool to archers as reference material.

Instructors and coaches working at all levels should not under-rate the importance of personal example. The attitudes and personal conduct of an instructor sets the style for the students and eventually, the club and the archery body as a whole.

An active instructor should keep abreast of new developments in technique and equipment and progressively improve their teaching style and methods, personal attributes and actions which also serve both archers and archery, dignity in manner and dress, support and co-operation with other instructors, unbiased and positive assessment of archery products and encouragement for students toward a life-long interest in archery.

The 1991 manual has served Archery Australia well, but a need was identified to update it in accordance with current world best practice, and this was undertaken initially by the Archery Australia Coaching and Standards Committee and has been completed by the Chief Executive Officer James Larven.

James Park  
Chairman  
Archery Australia Coaching and Standards Committee, 2005

# ACKNOWLEDGEMENTS

## ACKNOWLEDGEMENTS

Based on the Archery Australia Inc 1991 Coaching Manual editor by Gordon Pawson

Drawing provided by James Larven and Donna Gynell

Photographs provided by James Larven, and AIS Archery

Technical Data provided by James Larven, Ki Sik Lee, Matthew Lee, James Park

Technical Illustrations provided by James Larven and Tom Jorgensen

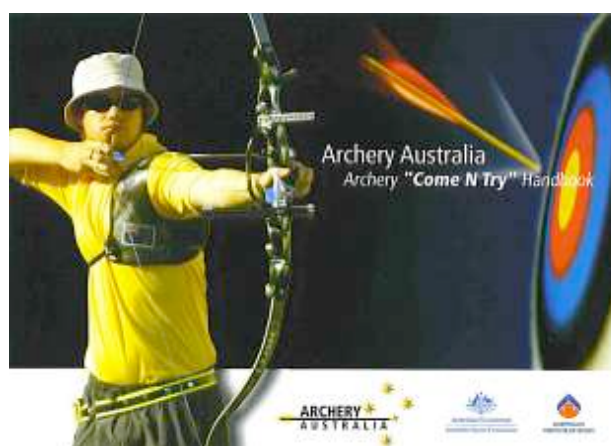
Reviewed by - Ki Sik Lee, Matthew Lee, James Park, Bruce Dillon, Murray Firth, Rod Miller, Ron Alexander, Stuart Atkins, John Hans, Wynne Martin Hughes, John Waller and Ken Birch.

## REFERENCE MATERIAL

Archery Australia Coaching Manual – 1991  
Archery Australia Orientation to Coaching  
Coaching Articles by James Larven  
*Archery Anatomy* by Ray Axford

## RECOMMENDED READING

*Total Archery* by KiSik Lee and Robert de Bondt  
*Mastering Archery Technique Analysis* by James Park  
*Mastering Bow Tuning* by James Park  
*Mastering Compound Bows* by James Park  
*Archery Anatomy* by Ray Axford  
*Archery Australia Inc National Coaching program*  
*Archery Australia Inc Advanced Coaching Handbook*  
*Archery Australia Inc "Come N Try" Handbook*



## THE EDITOR

James Larven has been involved in Archery for 41 years having held various management positions within ArcheryNSW and Archery Australia Inc.

He is the Archery Australia Inc Chief Executive Officer responsible for the day to day affairs of Archery Australia Inc.

He has represented Australia at 18 World Championships as a competitor (recurve and compound), Team Manager and Team Coach.

He obtained Level 2 Instructor status in 1982 and has been an Archery Australia Inc National Coach.

He was the Technical Operations Manager and later the Competition Manager, for the Sydney 2000 Olympic and Paralympic Games.

He has an extensive coaching background having coached a number of recurve and compound archers to National and International representative status.

# INDEX

<b>Preface</b>	<b>3</b>
<b>Acknowledgements</b>	<b>4</b>
<b>1. Introduction</b>	<b>7</b>
1.1 Who is Archery Australia?	7
1.2 About this manual	7
1.3 What is Archery “Come N Try”	7
1.4 “Come N Try”	7
1.5 Advanced “Come N Try”	8
1.6 What is an Archery Instructor Course?	8
1.7 Accreditation	8
1.8 Course duration	9
<b>2. Principles of teaching</b>	<b>10</b>
2.1 Points on Teaching Skills	10
2.2 Learning a New Skill and Assessment of Performance	10
<b>3. Psychology of Coaching</b>	<b>11</b>
3.1 Learning and Motivation	11
3.2 Psychology of Learning	11
3.3 Phases of Learning	11
3.4 The Instructor and the Learning Process	11
3.5 Some aspects of Learning in Coaching	12
3.6 The Psychology of Motivation	12
3.7 Coaching Young Archers	12
3.8 Efficient Learning	12
3.9 Some aspects of Motivation in Coaching	12
3.10 Group Management	14
<b>4. Safety and Range Etiquette</b>	<b>15</b>
4.1 Range Layout and Safety	15
4.2 Personal Safety	18
4.3 Equipment Safety	19
4.4 Range Etiquette	19
<b>5. Member Protection</b>	<b>20</b>
<b>6. The Skill of the Archer</b>	<b>24</b>
<b>7. Selecting Equipment</b>	<b>25</b>

<b>8.</b>	<b>Eye Dominance and Bow Hand</b>	<b>29</b>
<b>9.</b>	<b>Demonstration and First Shots</b>	<b>31</b>
<b>10.</b>	<b>Shooting Technique (The 10 Steps)</b>	<b>33</b>
11.	Step 1 - Stance	37
12.	Step 2 - Nocking the Arrow	39
13.	Step 3 - Drawing Hand	40
14.	Step 4 - Bow Hand, Bow arm and Predraw	42
15.	Step 5 - Drawing the Bow	45
16.	Step 6 Full Draw, Anchor and String Alignment	46
17.	Step 7 Holding and Aiming	53
18.	Step 8 Releasing	55
19.	Step 9 Follow Through	58
20.	Step 10 Relaxing and Recovery	59
<b>21.</b>	<b>Archers Attitude</b>	<b>60</b>
<b>22.</b>	<b>Instructing Archers with a Disability</b>	<b>61</b>
<b>23.</b>	<b>Stringing a Recurve Bow</b>	<b>66</b>
<b>24.</b>	<b>Removing Arrows</b>	<b>69</b>
<b>25.</b>	<b>Bow Sights</b>	<b>70</b>
<b>26.</b>	<b>Target Faces and Scoring</b>	<b>72</b>
<b>27.</b>	<b>Introduction to Archery Equipment</b>	<b>74</b>
<b>28.</b>	<b>Equipment Set Up and Maintenance</b>	<b>82</b>
<b>29.</b>	<b>Planning a Beginners Course</b>	<b>107</b>
<b>30.</b>	<b>Example Course and Lesson Plan</b>	<b>108</b>
<b>31.</b>	<b>Exercises</b>	<b>112</b>
<b>32.</b>	<b>Making Your Own Equipment</b>	<b>116</b>
<b>33.</b>	<b>Archery Language</b>	<b>119</b>
	<b>Appendix 1 – Sample Scorecard</b>	<b>127</b>

# Section 1

## INTRODUCTION

### 1.1 What is Archery Australia Inc?

Archery Australia Inc is the national governing body for Archery in Australia, catering for all archery disciplines and equipment styles. Archery Australia Inc offers various coaching and development programs which are delivered by Archery Australia Inc, Regional Governing Bodies and clubs. These programs provide a pathway for archers to develop their skills and knowledge and advance through the sport from basic beginner, through club, state and national levels, and advancing ultimately to high performance international level, competing in events at the World Championships and Olympic Games.

At the same time Archery Australia Inc also offers a pathway for instructors and coaches, starting with Archery Instructor, Club Coach, Regional Coach and ultimately to High Performance Coach.

### 1.2 About this Manual?

This manual is intended as a reference guide for instructors of “Come N Try” and Advanced “Come N Try” instruction courses and fits within the frame work of the Archery Australia Inc National Coaching Program.

It is to be used as the test book for Archery Instructor courses.

### 1.3 What is Archery “Come N Try”?

This is the first of the Archery Australia programs and is divided into two distinct programs

“Come N Try” and “Advanced Come N Try”

### 1.4 “Come N Try”

It has been identified that Archery Australia requires a basic entry level program where the general public can try archery at a low cost with a low level of commitment.

Historically, the long-established Archery Australia coaching program involves people committing to a minimum of 10 to 12 hours over a number of weeks in a formal, structured course. This program does not currently suit many people who simply want to try archery on an impulse without any long-term commitment. The “Come N Try” program is intended to provide basic archery instruction in a safe, social and fun environment.

The “Come N Try” program is principally structured for non Archery Australia organisations or groups which provide social activities to the general public such as schools, recreation camps, resorts or any organisation that provides archery instruction. Many clubs are also seeing the advantages of starting people with a basic “Come N Try” course and if the student is interested in continuing, then moving onto the next level which is the “Advanced Come N Try”.

“Come N Try” sessions should be a minimum of one hour and a maximum of three hours.

Each “Come N Try” session should include

- Safety
- Basic shooting technique
- Introduction to equipment
- Scoring and social activities



## 1.5 Advanced “Come N Try” program

The next step to the basic “*Come N Try*” is the **Advanced “Come N Try”** program.

The **Advanced “Come N Try”** constitutes a number of sessions. The program should not go any longer than 6 sessions, although most clubs prefer only 3 to 4 sessions.

The **Advanced “Come N Try”** program is intended for use by Archery Australia clubs and not other organisations or groups which provide basic archery activities to the general public such as schools, recreation camps, resorts or any organisation that provides “one off” archery instruction.

**Advanced “Come N Try”** sessions should include

- 1) Safety
- 2) Developing basic shooting technique
- 3) Refinement of basic shooting technique
- 4) Introduction to archery and club activities
- 5) Equipment use and set up
- 6) Scoring and archery rounds

Each **Advanced “Come N Try”** session should be a minimum of one hour and a maximum of three hours.

## 1.6. What is an Archery Instructor Course?

The Archery Instructor Course is the first of the four coach/instructor levels provided by Archery Australia Inc. To cater for people both within archery and outside of archery there are 2 elements of the Archery Instructor program -

**Community Archery Instructor** - – provides training and accreditation to non members of Archery Australia Inc who carry out basic archery instruction recreational camps, resorts. These courses comprise three components –

- 1) Sports General component, conducted by the respective Department of Sport and Recreation in each state, or equivalent qualification.
- 2) Sport Specific component, conducted by the RGB or accredited coaches.
- 3) Written and Practical assessments.

**Archery Instructor** is an accredited course provided to registered members of Archery Australia, providing instructors with the skills and knowledge to conduct basic archery courses. The course comprises three components -

- 1) Sports General component, which is part of the Sport Specific course.
- 2) Sport Specific component, conducted by the RGB or accredited coaches.
- 3) Written and Practical assessments.

RGBs act as agents for Archery Australia and usually conduct Archery Instructor courses although clubs which have suitably qualified coaches may also conduct these courses. Archery Australia Inc may from time to time also conduct such courses to meet industry demands. Each course must be registered with Archery Australia Inc not less than 21 days prior to the course.

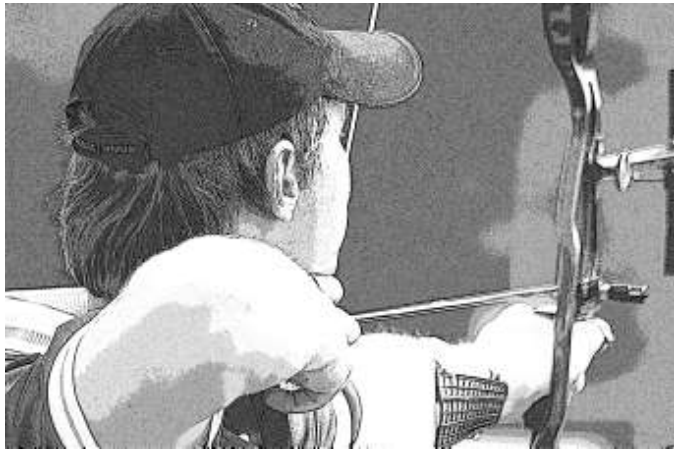
## 1.7 Accreditation

Each person undertaking an Archery Instructor course will be assessed on a written examination conducted as part of the course and on practical assessment carried out outside of the course.

Upon successfully completing all the required components of the course, the instructor will be registered with Archery Australia Inc and Australian Sports Commission as an accredited Archery Instructor.

## 1.8 Course Duration

The sport specific Archery Instructor course will be conducted over a minimum of 12 hours, ideally conducted over two consecutive days.



## SECTION 2

# PRINCIPLES OF TEACHING

The fundamental skills of any activity must be developed and mastered before the more difficult and complex advanced techniques and strategies can be effectively taught. The basic skills act as a framework for building more complicated and involved aspects of the sport. To this end the preliminary stages of teaching should emphasise the fundamental skills. It should be remembered that this process involves not only “how” the skill is performed but also “why” it is used. Thus the teaching and the practice of the skills should not be divorced from the sport itself.

### 2.1 Points on Teaching Skills

- a. Before any new skill is taught, it should be introduced by a demonstration, explanation, video or picture so that the student has a clear idea of what is required.
- b. The student should be permitted to practise the whole skill, keeping in mind the demonstration and what is to be achieved.
- c. The student should be given an assessment of their performance. Minor variations in style should not be changed. Corrections should be made where there are errors that affect the outcome of the skill. The instructor should assist the student in recognising and correcting the errors.
- d. Practice should be continued, each performance being accompanied by some commendation and praise for good achievement together with further details of the correctness or effectiveness of performance.

### 2.2 Learning a New Skill and Assessment of Performance

The process of learning a new skill may be seen to involve the following steps:

- a. The student **attempts** to reproduce the skill in terms of the idea or plan formed from the demonstration and explanation.
- b. The student has to be **aware** of the differences between the performance and what is to be achieved.
- c. The student has to then **locate** the cause of any differences.
- d. The student has to then know what **corrections** or **modifications** to make in order to improve performance.

The student may have difficulty at one or more of these stages. It is the **art** of the instructor to recognise these differences and assist in the most effective way.

In addition to these basic procedures, certain other aspects of teaching and learning should be kept in mind.

During the initial learning stages of a new skill the pressure of stress and time restriction should be reduced so that correct procedures may be developed. Any diagnostic or remedial teaching that is necessary should be firstly conducted without stress until corrections have been made.

Finally, the purpose of teaching is to provide the student with a repertoire of the fundamental skills that can be used effectively and reliably in competition. Each skill will be of little benefit unless it can be consistently and confidently performed.

The basis of all sports performance depends on the reliable use of the fundamental skills of the sport.

**The aim of teaching and coaching is to consolidate as well as to increase the repertoire of effective and reliable skills.**

## SECTION 3

# PSYCHOLOGY OF COACHING

### 3.1 Learning and motivation

Some considerations involving psychology that instructors should be aware of:

- a. All sports involve learning patterns of movement over long periods of extended practice. How can this learning be most effectively accomplished?
- b. What kind of practice is most effective, e.g. short periods used frequently or longer periods used less frequently?
- c. People learn by making slight adjustments and modifications to their response or movement patterns but they must know what modifications to make and how to make the changes. People use knowledge of results and feedback to learn.
- d. Learning is most effective if rewarded or reinforced.
- e. Learning is also dependent upon the level of motivation of the student. Motivation is related to the goals, objectives, incentives, interests, needs and drives of the student.
- f. The performance of the individual depends on the level of learning (and training) attained. The distinction between learning and performance is important for this indicates the expected level of achievement that may be reached.
- g. Performance depends also upon motivation at that particular instant. What are the incentives to win? Is the student prepared to try harder?
- h. Performance depends upon many other psychological factors such as fatigue, anxiety and emotional stability.
- i. Many of these psychological factors are closely related to the personality of the individual.
- j. Personality will influence the effectiveness of certain types of motivation and incentives (in particular the use of rewards).
- k. Personality will influence the individual's reaction to different types of instruction, e.g. authoritarian, democratic, paternal or laissez-faire.
- l. Social factors are also involved, such as the degree of co-operation and communication between individuals and the instructor.

### 3.2 Psychology of Learning

Learning is a relatively permanent, enduring change in behaviour as a result of practice or experience. The learning of skills involves the formation of new, effective patterns of movement.

### 3.3 Phases of Learning

- a. **Initial phase:**  
Movements (based on previous experience) are linked together in a trial and error sequence. There must be a model or a plan on which to base the development of the sequence.
- b. **Consolidation Phase:**  
This part involves the elimination of waste movements and muscle activity and a reduction in the amount of effort. The timing of the phases of movement becomes more accurate.
- c. **Refinement phase:**  
This part involves the precise co-ordination and timing of all movements. The performance becomes very consistent and some movements occur automatically. This phase of learning may continue over a very long period.

### 3.4 The Instructor and the Learning Process

Students can learn a skill with the assistance of an instructor through the following sequence:

- a. **The formation of a plan or model:** This involves demonstration by the instructor of the technique or style to be used.
- b. Students must **attempt** to put this plan into action. They will do this on the basis of previous movement experience plus guidance from the instructor.

- c. Students must recognise the **discrepancy** between the plan and their own attempt. The instructor can assist at this level by explaining and describing errors and discrepancies (error and information feed back).
- d. Students must make the appropriate correction. The instructor should be able to describe what changes need to be made.
- e. Students attempt the corrected skill. This process is repeated over and over.
- f. The instructor must motivate students and provide incentives so that interest is not lost during the learning stage.

### 3.5 Some aspects of Learning in Coaching

- a. The student must want to learn. This depends largely upon motivation.
- b. The student must be physically capable and mentally capable of learning skills.
- c. Do not try to teach too much at once. It is better to concentrate on one aspect at a time.
- d. Learning will only improve with specific practice.
- e. Practice sessions should be spaced fairly evenly and not too far apart.
- f. Learning proceeds most rapidly at first and then slows and reaches a plateau.

### 3.6 The Psychology of Motivation

Motivation may be regarded as those factors that direct behaviour towards some particular outcome or goal. Different people can be motivated in different ways. In sport, motivation is concerned principally with **arousal**. Arousal concentrates the state of readiness or preparedness. Asleep we are at a very low level of arousal. We are at a very high level of arousal when driving a car in traffic, when teaching or when about to start in a race.

In general, the greater the arousal level the better the performance. However, it is possible to become over-aroused and then performance will tend to fall off.

An optimum level of arousal can be developed by:

- Providing **goals** e.g. standards of performance to be reached (achievement scales, awards, club and state championships, etc.). These goals should be progressive and attainable.
- Providing **incentives** e.g. give some recognition or reward at each level or achievement, medallions, certificates, etc. Plot performance on charts and compare progress with other people and standards.
- Developing **interest** e.g. by showing films of performances, using guest speakers and demonstrators, and through the use of books.
- A wide **variety** of techniques and materials used by the instructor.

If arousal can be maintained through the use of goals, incentives and by developing interest, students are receptive to learning and boredom, monotony and “staleness” will be minimised. If, however, students are over-aroused for prolonged periods they may develop “staleness”.

### 3.7 Coaching Young Archers

The purpose of instructing juniors in a new activity is to provide them with a range of fundamental skills that can be used reliably in a consistent and confident manner in competition or just for the enjoyment of their chosen sport.

To successfully instruct juniors it is necessary to be aware of the reasons for their involvement with sport.

These reasons are: -

1. To have fun.
2. To make friends.
3. To feel good.
4. To learn new skills.

There are no fixed rules regarding the minimum age that needs to be adhered to in introducing juniors to archery but if size, strength and co-ordination are taken into account age 9 to 10 is considered to be an appropriate minimum age for formal instruction.

The bodies of young archer are still growing and developing, therefore the physical development of young archers must be taken into account before instruction, to ensure that no adverse strain is placed on the skeletal structure or joints that could cause adverse physical problems later in life.

The most important criteria in junior development is to ensure, regardless of strength, size or gender, that **the young archer is not overbowed** and instruction in correct basic form is given to ensure that the skeletal structure takes the load when shooting a bow.

The number of training periods and length of training sessions should also be considered. Frequency and length of instruction should be planned to ensure that they are not excessive. Other forms of exercise should be recommended to maintain a balance of muscular development in the young archers. Long-term exercise programs should ensure rest periods to allow the body to rejuvenate and grow.

Warm up and/or stretching exercises need to be introduced to enable the young archer to develop good habits and reduce the risk of injuries.

Good instruction for juniors is dependant upon good lesson planning and the conducting of the lesson in a clear, concise and methodical manner at a level that they can understand.

### **3.8 Efficient Learning**

Learning is most effective during a state of optimum arousal.

Learning is also dependent upon motivation, in particular through the provision of:

- **Plans**, Details of techniques, methods and skills through the use of films, demonstrations and instruction.
- **Knowledge of results**, Letting the students know what their performance was like, what was correct, what was wrong and how errors can be eliminated.
- **Re-enforcement**, Praise and compliments for a good performance, certificates, badges or medals etc. Each effort should be reinforced or rewarded.

### **3.9 Some aspects of Motivation in Coaching**

- a. Motivation is an essential part of an effective learning situation.
- b. The following incentives are effective motivators:
  - **Praise** – verbal encouragement (at the right time)
  - **Material rewards** – badges, medals, trophies etc.
  - **Individual rivalry** – competition between two persons.
  - **Self-competition** – trying to better one's own performance.

- **The presence of an audience** – the effect of the audience often depends on the personality of the individual, e.g. some people can become anxious and worried, while others lift and perform better.
- **Standards** – e.g. level of fitness to be maintained.
- c. High levels of motivation are necessary when training is prolonged or intensive.
- d. Variation in the methods of motivating is required if monotony and staleness are to be minimised.
- e. The form of motivation should be related to the individual person. For example, some people perform better under criticism rather than praise; some become very anxious if they are criticised and need lots of encouragement. The instructor must get to know the students as individuals.

### 3.10 Group Management

At the start of a class, the instructor meets for the first time a group of people of diverse personalities and abilities. As the progress of the class is affected by the interaction between the instructor and the class as a whole, instructors must manage the group by utilising proven procedures, such as;

- a. Adjust to the personality of each student
- b. As far as possible give each student the same amount of time and consideration.
- c. Use every means to convey to the class the idea that their individual development and success is important.
- d. Give recognition for achievement when appropriate and never be personally critical.
- e. Promote personal appeal by:
  - Maintaining a friendly demeanor.
  - Personal conduct and appearance.
  - Displaying a sense of humor.
  - Quickly learning the names of students. Making eye contact.
- f. Be business-like by:
  - Plan lessons properly.
  - Informing students on all aspects of the course.
  - Answering questions fully and promptly
  - Reviewing each session and making plans for improvement.
  - Developing teaching procedures and teaching aids.

## Section 4

# SAFETY AND RANGE ETIQUETTE

Archery is a safe and courteous sport, it is only the actions of individuals that make archery dangerous. Before commencing any instruction course, each student should be briefed on the safety requirements. Ideally the instructor should issue a handout which details the safety requirements





Safety has been divided into four main groups –

Range Layout and Safety  
 Individual Safety  
 Equipment Safety  
 Range Etiquette.

### 4.1 Range Layout and Safety

All shooting should be under the direct supervision of a **Director of Shooting (Field Captain)** whose duties include the control of shooting.

When conducting instruction classes always use a sound signal to control shooting. This control is achieved by use of a sound signal such as a whistle as follows:

<b>2 Blast</b>		Signals to get ready to shoot and for the archers to go to the shooting line
<b>1 Blast:</b>		Signals the commencement of shooting
<b>3 Blasts:</b>		Signals the completion of shooting. At this time archers can move forward and score and retrieve their arrows
<b>5 or more Blasts</b>		<b>Emergency Signal</b>  Signal indicates an emergency and an immediate cease to shooting. Even if the archer/s are at full draw and about to release, they must let down and wait for instructions.  <b>All shooting must stop immediately.</b>

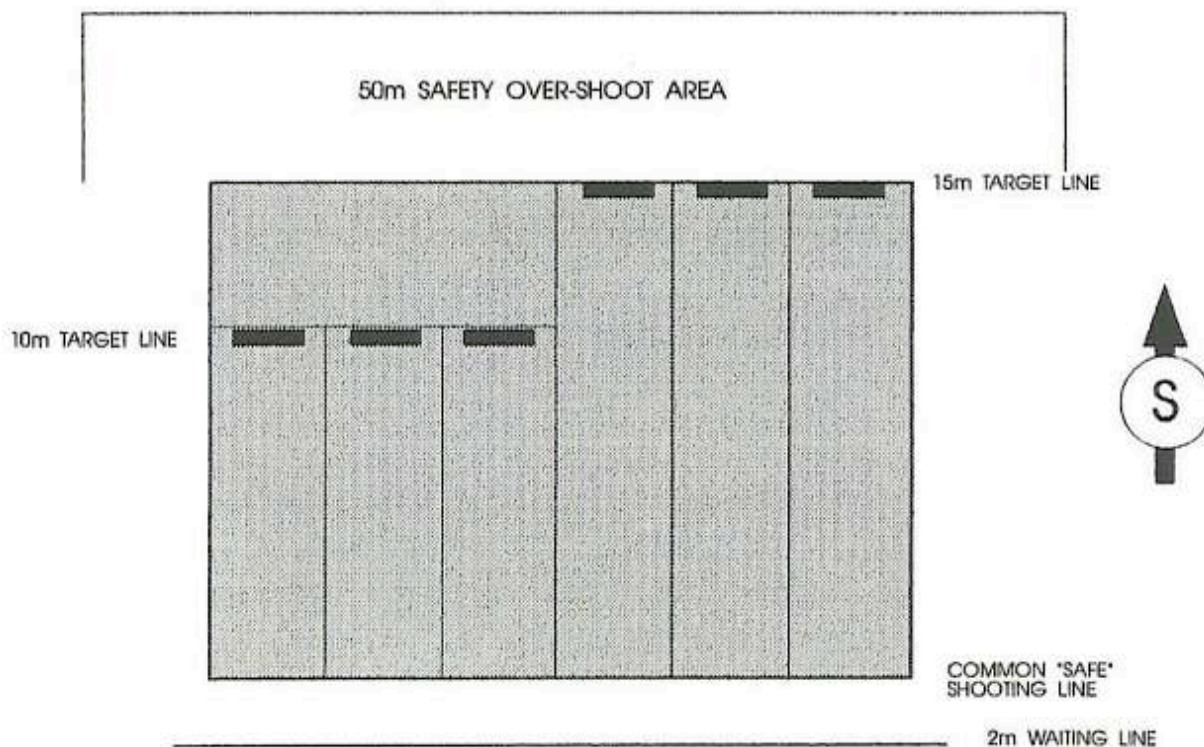




## Range Layout

The layout of the archery range (field of play) is critical for safety and the responsibility of the instructor.

### SUGGESTED LAYOUT FOR SAFE OUTDOOR VENUE

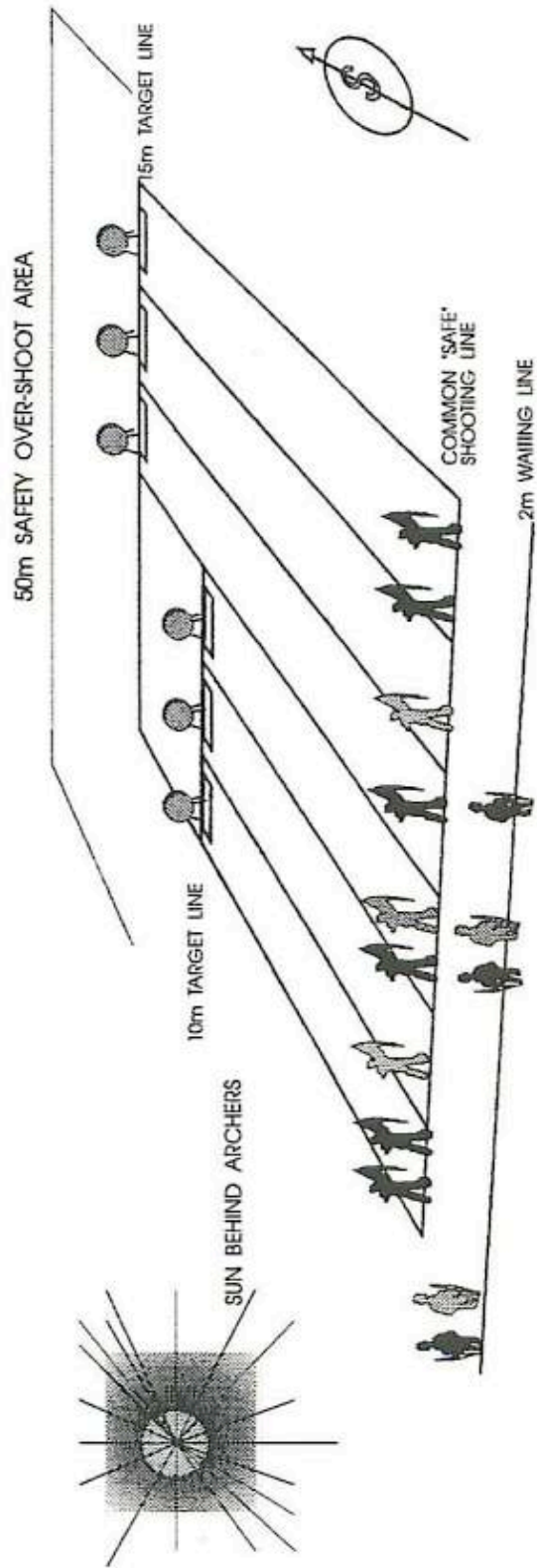


ALLOW APPROX. 1m PER ARCHER AND THREE ARCHERS PER TARGET FOR BEST CONTROL

- Ideally the target range should be set up with shooting toward the south; this will ensure the sun is always behind the students.
- Targets should be firmly anchored at all times to avoid the target butt falling forward.
- Target butts should be checked regularly during shooting to ensure they are tied down.
- The target butt and stand should be checked regularly for damage and wear.
- The field should always be set up using a common shooting line, the use of a staggered shooting line is not recommended.
- The target range should be set up with a Waiting Line positioned at least 2 metres behind the Shooting Line. Spectators must remain behind the Waiting Line at all times and when finished shooting students should wait behind this line for the signal to move forward.
- Where possible always provide a ground quiver for each student. Students can use this as a quiver as well as a stand to hold the bow when the student is not shooting.
- Always control shooting with an audible signal such as a whistle.

**ARCHERY  
COACHING  
ORIENTATION**

**SUGGESTED LAYOUT FOR SAFE OUTDOOR VENUE**



ALLOW APPROX. 1m PER ARCHER AND THREE ARCHERS PER TARGET FOR BEST CONTROL

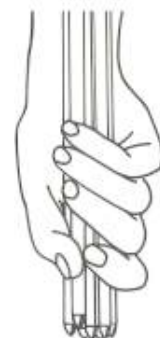
## Target Butts

- Ideally target stands should be made from Pine or any type of soft wood; this will help to prevent arrow damage if the arrows hit the stand. The most popular stand design is the A frame
- Target stands and butts should be in good condition without any excessive wear or damage.
- For safety always ensure the target butt is tied to the stand and the stand is pegged and tied to the ground. Also ensure the target face is firmly fixed to the target butt.
- Ensure you have an overshoot area of 50 meters behind the longest target unless the venue has a backstop mound. Ensure there is no vehicle or pedestrian access to the area; if necessary, erect signs and fencing.
- Space targets a minimum of 3 metres apart and assign no more than 3 archers on each target.

## 4.2 Personal Safety

The following points must be highlighted to students undertaking instruction -

- There is no place on or off the shooting line for any form of horseplay. Never touch or strike other people, throw objects or distract other people while they are shooting.
- Any bow which is drawn (*even without an arrow*) must be pointed towards the target, and only then if it is intended to be shot.
- A bow must never be drawn and released without an arrow on the string (Dry Fire). To do so could result in damage to the bow limbs, a broken string and/or injury to the archer.
- Students should only ever aim at their target. They should never shoot an arrow into the air or attempt to shoot an arrow over a distance. This is the most dangerous action an archer can do; students who do this should be immediately removed from the course.
- Care must be exercised when drawing arrows out of the target to ensure there is no one standing behind the arrows.
- Never run on an archery field, if a student trips with arrows this can become a serious hazard; always carry arrows with the points held in the hand.
- Under no circumstance is shooting permitted if there is someone on the field near or behind the targets. Everyone must be behind the shooting line before the signal to start shooting is given.
- Always take care to avoid making physical contact with other students when handling a bow and arrow. It is easy to touch a person with the bow tips or an arrow which can cause distraction to another person.
- Never distract other archers while they are shooting unless you notice a safety issue.
- If a bow or an arrow falls in front of the shooting line, the student must never go forward to retrieve the arrow. They must wait until all shooting has stopped and the signal to go forward has been given.
- Always step back behind the waiting line (*situated at least 2 metres behind the shooting line*) when finished shooting.
- Alcohol or drugs must never be consumed before or during shooting.
- Recurve bows should only ever be strung using a recommended method.
- Always approach targets from the side so as not to walk into arrows in the target or lodged in the ground.
- When approaching targets look for arrows lodged in the ground short of the target as nocks are very sharp and can injure legs.
- Students should never swap or change equipment with other students without the approval of the instructor. Equipment should have been provided to students to suit their own physical requirements. Swapping equipment with another archer may create a hazard.
- Always wear the appropriate protective equipment such as armguard, finger tab and if required, a chest guard.



- Students should be provided with matched equipment, with arrows of the same size, style, colour and most particularly, length. If a student damages or loses an arrow, they should advise the instructor who will issue a matching replacement. Beginners should never help themselves to equipment.
- Students should be advised to wear tight fitting clothes and covered footwear, not sandals or thongs. Long hair should be tied back and bulky items should be removed from chest pockets.

### 4.3 Equipment Safety

- It is the responsibility of the instructor to inspect and repair all equipment prior to a class. You should check bows for cracked or damaged limbs and handle (riser), and damaged arrow rests.
- Check strings for fraying or damaged serving, check the correct brace height is being used and that nocking points are correctly positioned.
- Check that arrows are in matched sets (*all the same size and length*). Check for cracked, bent or split arrow shafts, damaged or broken nocks and missing or loose fletching.
- It is the instructor's responsibility to regularly check equipment during the class for damage.
- Before shooting, check that the target butts and stands are in good condition, that they have been set up correctly and tied down.
- After a class, report any damaged or broken equipment or undertake repairs yourself to ensure the equipment is ready for the next class.

### 4.4 Range Etiquette

Some archers take their shooting very seriously while other archers see the sport as a leisure activity.

Due consideration should be given to those who might become upset by distracting behaviour.

Students should be made aware of Range Etiquette and be considerate of the rights and feelings of others. To this end students should be advised:

- Not to talk to or disturb other archers during shooting.
- Not to smoke or drink on the shooting line.
- When finished shooting, to quietly step back from the Shooting Line to the Waiting Line to give other archers a chance to finish without interruption.
- Never to remark on another archer's shooting during an end unless there is a safety issue.
- Never to comment on another archer's shooting as this may upset or distract them.
- Always to pass encouraging remarks and never to be disparaging.
- Always to signal the Director of Shooting (DOS) if a problem occurs and never bother another archer.
- Never to touch or remove other archer's arrows in the target unless asked to remove them.
- If asked for advice, never to presume the duties of an Instructor or Official.
- Always to pay attention to and co-operate with officials.
- Never to upset other archers on the field by complaining.
- Never to touch, move or alter equipment belonging to someone else without his or her prior consent.
- Always to exercise the greatest care when scoring.

The above information is only a summary. For more detailed information you should refer to the Archery Australia Inc Safety Policy.

## SECTION 6

# MEMBER PROTECTION

### Philosophy

Archery Australia Inc is committed to providing a sport and work environment free of harassment and discrimination. It is believed that anyone who works for or represents Archery Australia, and everyone with whom we deal, has the right to be treated with respect and dignity.

Archery Australia Inc will not tolerate harassment in our organisation. We will take all complaints of harassment seriously, and will ensure they are dealt with promptly, seriously, sensitively and confidentially.

Disciplinary action can and will be taken against a person who is found in breach of this policy.

The Archery Australia Member Protection policy applies to harassment occurring between any participants in the organisation. Harassment may occur, for example, from:

- Coach to athlete,
- Athlete to athlete,
- Administrator to employee,
- Athlete to coach,
- Administrator to coach,
- Coach to coach,
- Coach to administrator, and
- Athlete to administrator.

It is the legal and moral responsibility of all members to provide a safe, harassment and discrimination free environment

### Government Policies Archery Policies

### What instructors and coaches need to know...

#### **What is member protection?**

State governments have adopted their own legislation regarding harassment and member protection. In NSW the Dept. of Sport and Recreation defines member protection as protecting members physically and emotionally from harassment.

Some forms of harassment can be extreme and constitute a criminal offence.

Other forms of harassment may not be unlawful but they can drive away members and do not fit within the ethic of 'Fair Play' in sport.

Other forms of harassment can result in litigation long after the event/s.

#### **Australian Sports Commission states...**

***“Harassment consists of offensive behaviour, abusive, belittling or threatening behaviour directed at a person or people because of a particular characteristic of that person or people (including the person or persons’ level of empowerment relative to the harasser). The behaviour must be unwelcome and the sort of behaviour a reasonable person would recognise as being unwelcome.”***

### **Point of view**

Whether or not the behaviour is harassment is determined from the point of view of the **person receiving the harassment**.

The recipient must consider the behaviour to be **unwelcome**.

It does not matter whether or not the person harassing **intended to offend**.

It must be the type of behaviour that **a reasonable person would find unwelcome**.

### **Consider this...is this harassment?**

- Insults directed by players or spectators at the opposition or their own team members?
- Negative comments to players by other players, parents or officials?
- Practical jokes or 'initiations', which cause embarrassment or endanger others' safety?
- Coaches or administrators bullying, shouting verbal abuse and/or humiliating archers in order to 'motivate' them?
- Threats or intimidation from one person to another?
- Letters, emails, publications and even posting on public forums on the Internet?

## **REMEMBER**

**Whether or not the behaviour is harassment is determined from the point of view of the person receiving the harassment.**

### **Policies**

Clubs and RGBs should have a Member Protection Harassment policy. Archery Australia has such a policy; clubs and RGBs should adopt this policy.

Coaches and Instructors need to read and understand the Archery Australia policy and ensure they conduct their activities in line with the policy. They must ensure they provide adequate protection of those who they are coaching.

A Club or RGB cannot make a rule which contravenes a rule or law made at higher levels.

### **Reading and understand member Protection and Harassment Documents**

#### **Where can you find relevant documents?**

- The Archery Australia policy can be obtained by contacting Archery Australia or by viewing the website [www.archery.org.au](http://www.archery.org.au)
- Regional Governing Bodies will have copies of the Archery Australia policy

Government requirements can be found by contacting the –

- Australian Sports Commission
- State and Federal Government

The Archery Australia policy has been adapted for the sport from government policies.

**CLUBS AND RGBs SHOULD ENSURE ALL MEMBERS ARE AWARE OF THEIR RIGHTS AND RESPONSIBILITIES AND THAT COPIES OF THE ARCHERY AUSTRALIA POLICY IS AVAILABLE TO ALL MEMBERS.**

**Behaviour Constituting Harassment**

Harassment can take many different forms and may be explicit or implicit, physical, verbal or non-verbal. Coaches and instructors should be aware of their language, their demeanor and the way they interact with students.

Archery Australia Inc, RGBs and clubs are responsible for taking all reasonable steps to prevent harassment in our organisation by ensuring that...everyone in the organisation knows

- What harassment means,
- That it is against the law, and
- That it will not be tolerated.

**Juniors**

- Are at risk because they are in a less powerful position.
- Are more likely to be the subject of teasing, bullying, taunting and name-calling from their peers.
- Often have a trust issue, which derives from the adult/child relationship.

**Scenario**

Bill (12 years of age) has been teased and taunted for an ongoing period of time.

He shows promise as an archer but also seems withdrawn and does not interact with his peers at major competitions.

He quits the sport, no one is really sure why.

**Continuing the scenario**

12 years later Billy is watching the Olympic Games Archery event on TV and remembers his own dream of one day competing at the Olympic Games, also the teasing and taunting which resulted in his giving up the sport as it was emotionally upsetting all the time.

A decision is made to sue for harassment.

Can this happen 12 years after the teasing and taunting caused Billy to drop out of the sport?

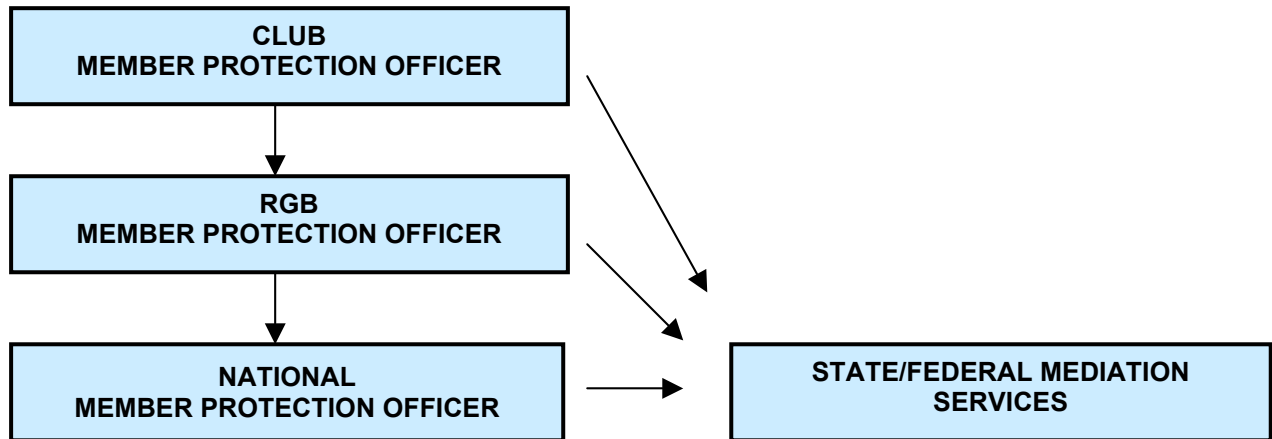
***YES !***

Junior athletes have until they turn 18 years of age plus 7 years. That is until they turn 25 years of age (although this is under review with the aim to reduce the time after they turn 18)

**Is it happening?**

**Yes and more and more law suits are being filed.**

## Who deals with complaints?



If it's a serious complaint it can end up in the courts and may result in heavy fines or jail.

### Member Protection

- Begins and ends with you/us/we/them.
- Know the law and the policies!
- Archery Australia states

**“this policy applies to behaviour occurring both within and outside the course of Archery Australia Inc business, activities, and events, when the behaviour involves individuals associated with Archery Australia Inc and negatively affects relationships within our sport and work environment.”**

### Coaches Responsibilities

Coaches are at the front line when dealing with the general public and are the public image of **Archery** and **Archery Australia**. Your attitude, demeanor and the general manner in which you conduct yourself will reflect on the entire sport.

Coaches are at the front line when it comes to complaints and you are instrumental in keeping people in the sport or chasing them away. Like it or not, you can either allow the sport to grow or hold it back. Be aware of your rights, your responsibilities and how you are expected to act.

Think about the way you coach: think about what you say and how you act. Don't be the catalyst for harassment or a complaint.

In sport, coaches and administrators have the largest number of complaints against them don't be one of them!





## SECTION 6

# THE SKILL OF THE ARCHER

In its most simple form the skill of the archer is to be able to place an arrow wherever he or she desires.

- Each shot is to be exactly the same as the preceding shot.

To achieve such a skill requires a foundation that is solid and stable. The foundation must have a framework of no loose joints and be fully supportive of each part of the archer's total structure.

To put all this together and to maintain the duplication of the shot sequence over a long period of development and practise:

- The archer must concentrate on the job at hand.
- The archer should be relaxed but focused and deliberate in action.

To reach a level of high performance the archer must undertake a fitness and strength training program, as well as be conscious of his or her diet.

### The shot process

To develop the skills of the archer the shot process has been broken down into 10 steps.

- 1. Stance.**
- 2. Nocking the Arrow.**
- 3. Setting the Drawing Hand.**
- 4. Setting the Bow Hand and Bow Arm.**
- 5. Predraw and Drawing the Bow.**
- 6. Anchor.**
- 7. Holding and Aiming.**
- 8. Release.**
- 9. Follow Through.**
- 10. Relaxing.**

By breaking the process down it is possible to isolate specific parts of a routine and practise those parts until such time as the learning or modification of the sub-routine has been perfected and becomes a habit.

The initial process can be learnt by mimicking the step or shadow shooting in front of a mirror. Ideally the student should use a "Rubber Band" to practise the process before actually shooting an arrow. The use of a "Rubber Band" should also be continued throughout the training and development process.

## SECTION 7

# SELECTING EQUIPMENT

Ideally beginners should be advised not to purchase equipment without first undertaking an instruction class.

When conducting an instruction class, it is critical that the appropriate equipment is selected for each student. This is to be done not only to ensure safety but also to provide the student with the most suitable equipment to cause positive outcomes.

It is the role of the instructor to select equipment that is suited to the physical requirements of each student.

It should also be stressed to each student that they must not swap or change equipment with other students during the class as this may cause a safety hazard.

For example they may have a 30" draw length and have been supplied with 31" arrows. During the course they swap arrows with a friend who has a 27" draw and 28" arrows. This will create a hazard as the arrows are now too short and they will pull the arrows off the rest.

### 7.1 Determining Arrow Length

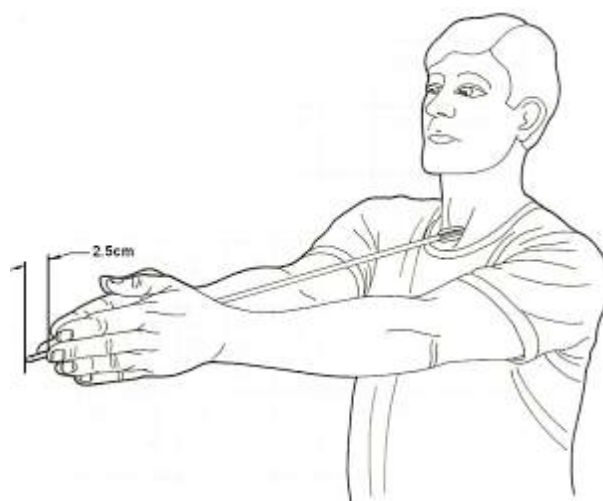
Before any equipment is issued, the students draw length should be determined. The draw length determines the safe arrow length, the bow length and bow weight that would be suitable for the student.

For beginners, the easiest method to check a suitable safe arrow length is the "Breastbone Method".

To determine the appropriate arrow length, place the nock of the arrow above the upper part of the Sternum (*Breastbone*) while holding the point end of the arrow between outstretched hands at arms length parallel to the ground. (As per diagram below)

A safe arrow length for beginners should extend at least 2.5cm past the tips of the fingers. If the arrow does not extend past the finger tips it should be considered too short and should not be used.

If an arrow is used that is too short, when the bow is drawn to full draw the arrow may be pulled off the arrow rest creating a potential danger.



Determining arrow length for a student.

## 7.2 Arrows

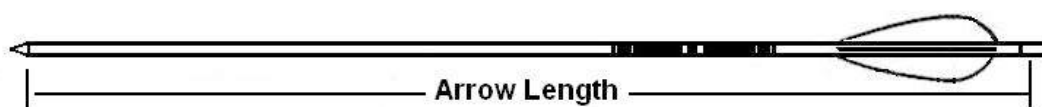
For instruction classes a set of arrows can consist of either 3 or 6 arrows depending upon how the course is programmed.

When issuing arrows, it is essential that the arrows are matched within a set i.e. all the same size, length, with the same colour fletches (*vanes*), nocks, points etc. This is to ensure a degree of consistency can be achieved by the student.

For safety and durability, the arrow size should be equal to or stiffer than recommended for a particular bow weight by the manufacturer.

For the safety of students, the length of the arrow should be greater than the students draw length. This is to ensure the archer does not pull the arrow off the arrow rest creating a dangerous situation.

The length of an arrow is measured from the hollow of the nock to the end of the arrow shaft; **the length of the point is not included in the arrows length.**



## 7.3 Selecting the Bow

Before issuing a bow you should first determine if the person is to shoot right or left handed. Refer to Section 8 of this manual.

There are two important points to be considered when issuing a bow: the bow length and the bow draw weight (*not the physical weight, but the stored energy expressed as pounds of the bow when drawn to full draw*).

## 7.4 Bow Length

Recurve bows come in a variety of lengths from 54" to 70". Usually the bow length is written on the face of the lower bow limb along with the bow make, model, and bow weight.

For instruction classes most bows should be 64", 66", 68" and 70". Shorter bows are usually used for juniors and these can be 54", 58" and 60".

The length of a recurve bow is measured between the shoulders of the bow nocks along the limbs and through the centerline of the bow handle. The bow length is always measured when the bow is unstrung.

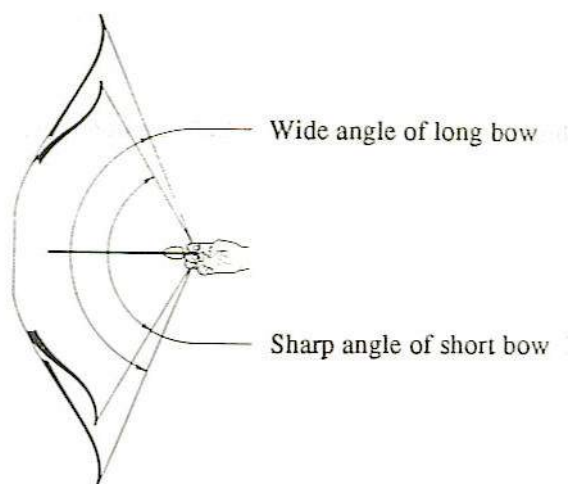


How to measure bow length

Selecting the correct bow length is critical, particularly for the archers comfort and the performance of the bow.

If an archer with a long draw length uses a short length bow, the sharp angle of the string will cause the archers fingers to pinch which will be painful. Short bows are designed for short draw lengths and using a long draw may overstress the limbs and damage the bow.

Correspondingly, if an archer has a short draw length and uses a long bow this will not create any problems such as finger pinch or overstress the bow but, as the short draw will not allow the limbs to bend fully and the bow will develop only a small amount of energy, the bow will produce poor performance.



Suggested bow lengths are –

Draw Length	Bow Length
Less than 24"	62" or shorter
24" to 26"	64"
26" to 28"	66"
28" to 30"	68"
30" Plus	70"

## 7.5 Bow Weight

The bow weight, also known as the "Holding Weight" or "Draw Weight", is not associated with the physical weight of the bow but is the measurement, usually in pounds, of the stored energy of the bow when the bow is drawn 28".

It should be noted that as the bow weight is determined at 28" from the "Back of the Bow". If a bow is drawn further than 28", the bow weight increase approximately 2lb per inch greater than the marked bow weight.

Correspondly if the bow is drawn less than 28", the bow weight will be approximately 2lb per inch less than the marked weight.

For instruction, the following are suggested bow weights for recurve bows -

Junior – Under 13	10lb – 15lb
Junior – 13 to 18	12lb to 20lb
Adult Women	12lb to 20lb
Adult Man	15lb to 20lb

The bow weights suggested are at the students draw length

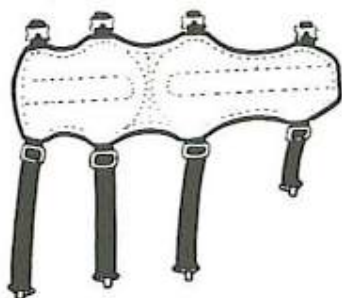
## 7.6 Other Equipment

Students should also be provided with other equipment such as an armguard and finger tab. Ideally, other equipment that should be available for an instruction class include finger or wrist slings and chest protectors.

## Armguard

Each student must be provided with an armguard to protect the forearm from the bowstring.

Armguards come in a variety of styles and sizes. The instructor should select an armguard that will provide suitable protection. The instructor should fit each armguard, making adjustments to ensure a suitable fit.

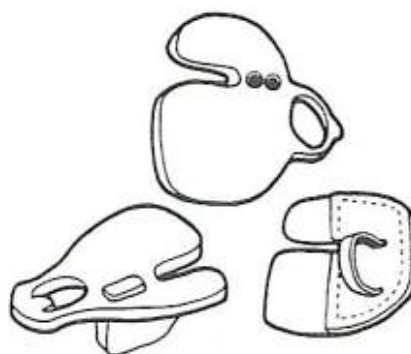


Armguards

## Finger Tab

The finger tab provides protection to the drawing fingers.

Tabs come in a variety of sizes and the instructor should select a size that provides suitable coverage to the fingers when the fingers are bent in the holding position. Tabs come in right and left-handed. Instructors should ensure the correct tab is provided.

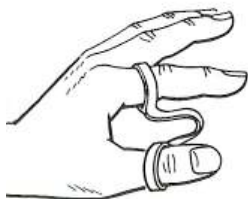


Finger Tabs

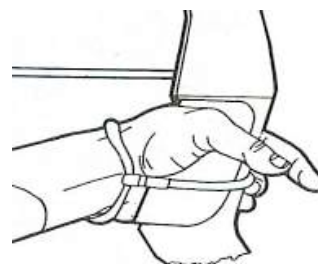
## Finger or Wrist Sling

Finger or wrist slings are essential equipment for the experienced archer as they prevent the bow from falling to the ground upon release from a relaxed and open bow hand.

Students should be encouraged to use slings after they have mastered the basic shooting techniques and have gained confidence with the bow. For instruction shorter than usual slings should be used.



Finger Sling

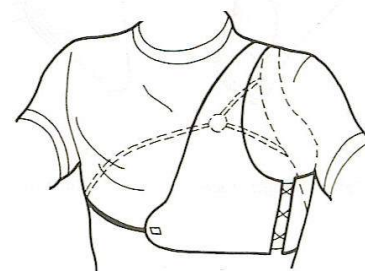


Wrist Sling

## Chest Protector

These are worn around the chest to prevent injury from the string although this is not its main purpose.

Chest Protectors provide a smooth surface to eliminate interference to the string and to hold down loose clothing



Chest Protector

## SECTION 8

# BOW HAND AND EYE DOMINANCE

Before allocating equipment, decide whether the student is to shoot right or left handed.

There are two criteria to consider; the student's eye dominance and their natural handedness. The first option is to set up the student with the equipment according to their natural handedness. This usually allows them to more easily co-ordinate the actions of using the bow and arrow. The handed ability chosen is that hand which is used to draw the string. The instructor must be sure that the student uses the eye that is above the string hand for sighting, i.e. right hand at jaw for anchor, right eye for sighting.

If the student has a problem with aiming and co-ordinating their anchor, eye dominance is the next factor to consider.

Of our two eyes, one eye is usually a dominant eye and we use this eye to focus on objects, while the other non-dominant eye gives depth of field.

Ideally the correct process in shooting is to have the nock of the arrow placed directly below the dominate eye when at full draw to allow automatic alignment with the target.

When conducting "Come N Try" classes, firstly determine if the person is right or left handed. This should be done by simply asking the students who are "Right" handed and who is "Left" handed.

The modern practice is to use the preferred "handedness" of the archer where possible, regardless of which is their dominant eye.

It is usual that right-handed people are right-eye dominant and left-handed people are left-eye dominant. However, this is not always the case, so it is essential that an archer's eye dominance be established at the beginning of the first lesson.

Most importantly you need to be aware if the students are "Right" or "Left" handed to allow you to issue the appropriate equipment to the students.

In some cases you may find a person whose dominant eye does not correspond to the hand they usually use, for example a right handed person with a left dominant eye.

In most cases this will not be an issue and the person will quickly adapt their eyes to allow them to shoot the bow.

However, in a small number of cases, the student is not able to adapt and you may need to have them either wear an eye patch over their dominant eye or close their dominant eye (although this is not a desirable alternative) or in the worst case, have them change to shooting the other hand. Only ask the archer to change to the non-preferred handedness if it proves impossible to deal with the non-preferred eye dominance.

When conducting an instruction class, as part of the introduction when you ask the students if they are right or left handed, you should separate them into two groups. This makes it easier when issuing equipment.

For your own interest you should also conduct an eye dominance test, this provides you with confirmation of each student's eye dominance as well as pre-warns you of any potential issues with students.

### **Eye Dominance Test**

There are a number of methods of determining eye dominance. The method below is considered the best when conducting instruction classes; it is quick, simple and gives instant feedback to both you and the student.

When conducting the eye dominance test it is important for an instructor to closely supervise each student as some will tend to either use only one eye or shift their hands about.

- 1) Extend both arms directly in front, shoulder height with hands flat, fingers together and palms facing away from the body.
- 2) Link the hands together so that a 'V' formed by index fingers and thumbs forming a small opening.
- 3) With **both eyes open**, the student looks at a distant object through this opening Diagram A.
- 4) To double check you can also have the student bring their hands in towards their face, all the while keeping both eyes open and looking at the object. Diagram B
- 5) The eye at which the hands come to rest is the dominant eye.

When testing groups of students, particularly young students, it is best for the instructor to stand in front of the students, and have the student look at the instructor through the small hole (*with both eyes open*) created by their hands. Have the student look through the hole at the instructor while bringing their hands to their face. When the student does this, the instructor can instantly see which is the student's dominant eye.



Diagram A

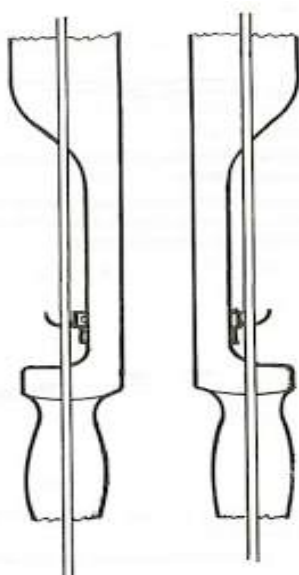


Diagram B

### Bow Hand

It is difficult for many students to fully understand the difference between a right hand and left hand bow. In simple terms this indicates the cut out for the bow window and the hand and eye to be used.

- **Right-handed** – sight window cut on the left hand side of the bow.
- **Left-handed** – sight window cut on the right-hand side of the bow.



Right

Left

### Right Hand

If the student is right eye dominant, they use a bow with the cut out (sight window) on the left hand side of the bow; the arrow is to be drawn with the right hand to the right eye.

### Left Hand

If the student is left eye dominant they would use a bow with the cut out (sight window) on the right hand side of the bow, consequently the arrow is drawn with the left hand to the left eye.

Some people may have equal strength in either eye and they can be taught to shoot with either hand, depending on their personal preference. They will usually shoot right hand because of the predominance of right-handed equipment.

## SECTION 9

# DEMONSTRATION AND FIRST SHOTS

When starting a class the instructor should demonstrate the technique they are teaching to the class. To do this, gather the students behind the Shooting Line and slightly off to the side, **never in front of the Shooting Line**. This will allow them to observe the demonstration with an uninterrupted view. Usually the instructor demonstrates by shooting 3 arrows but additional arrows may be shot if the instructor considers this necessary.

It is important to emphasise the need to relax and not to tense up any part of the body when drawing and shooting. It is a common for people to believe that they must tense their muscles to allow them to draw the bow.

The instructor should at this time demonstrate the “Ten Steps” of shooting and emphasise the key points.

The instructor shoots the first and maybe a second arrow, explaining each step and then shoot another shot or, if considered necessary, additional shots without comment to allow the students to observe the shooting process.

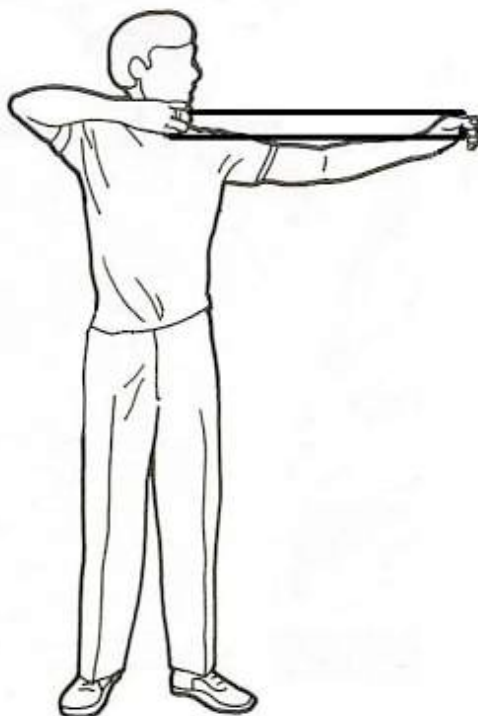
After conducting the safety talk it is now time to allow the students to shoot; it is highly recommended to have students first use either a “Rubber band” or “Elastic String” to develop the basic skills.

If rubber bands or elastic strings are not being used, shooting should never be done initially en masse (in a group) but should be done one person at a time under direct supervision from the instructor. Have each student shoot their 3 arrows and step back behind the Waiting Line; this allows the instructor to progress the next person to shoot.

This process may be carried out for two or three ends or until the instructor is confident that all archers have developed the ability to shoot together.

This process can take some time but it is the proven method of initially instructing students when not using rubber bands. Ideally, an instructor should never instruct any more than 5 students at a time.

### TRAINING AIDS



Students should initially commence shooting without a bow or arrow.

#### Rubber Bands

The rubber band is used initially to replace the bow and arrow and allows the person to draw, anchor and release without shooting an arrow. The rubber bands are light in draw weight and the person learns the shooting sequence without fighting the initial nerves and fear associated with trying something new, as well as the weight of the bow.

This also allows all students to safely shoot together, making the role of the instructor easier.

The instructor observes each student using the rubber band for about 24 to 36 shots. It can then replace with a bow.

Allow the students to draw and anchor the bow **without an arrow**. This allows the student to feel the weight of the bow and allows them to gain an interaction with the bow. An emphasis is to be placed on the drawing of the bow and that the string at this stage is not to be released (which may damage the bow).

Archer using a Rubber Band for training



This also allows the instructor to introduce the bow gradually to the students depending on their ability and confidence.

When the student has developed a level of confidence, the instructor then introduces arrows and allows the student to shoot.

### **Elastic String**

Another aid that can be used is the "Elastic String". The elastic string is similar to a normal bow string with loops on either end, except fitted into the top and bottom portions of the string is a piece of light weight rubber. The elastic string attaches to a strung bow over the top of the bow string.

As mentioned when instructing it is important that the student experiences the feel of drawing, holding and releasing ideally without the weight of the bow or the need to shot an arrow.

The elastic string allows the student to draw, hold and release the bow without an arrow. The other important advantage of the elastic string over the rubber band is the student is using a bow and experiences the feel of the bow in their hand without actually shooting an arrow. Again allow the student to have about 24 to 36 shots with the elastic string before allowing them to shot an arrow.



Elastic String

This use of a rubber band or the elastic string may appear drawn out but it allows the student to gain confidence and develop an understanding of the correct technique before shooting an arrow.

**NOTE - The instructor can also use the rubber bands and elastic string at later times during the class to introduce change to the shooting style or to correct errors.**

### **Key Points**

There are two steps in the shooting sequence that most students have difficulty understanding and executing. These are the anchor and release.

Extra time should be spent discussing and demonstrating these two steps of the shooting sequence.

### **Anchor**

Ideally we want a student to anchor by placing the index finger of the drawing hand firmly under the jaw bone with the string making contact with the nose and chin, giving three contact points.

Many students find this step very difficult, believing they have achieved anchor but in fact they are some distance from their face. This can be very frustrating for the instructor as the student believes they are doing it correctly.

In truth we are asking the student to perform a task they have never done before and in many cases, they have a subconscious fear they may injure themselves if they bring the string all the way back to their face.

Also check that the weight of the bow they are using is not beyond their ability. This is a very common reason for not achieving anchor, as they are unable to handle the bow weight.

Use a rubber band as the initial instruction tool. This problem does not appear as the person quickly develops the confidence to draw and anchor the bow.

It is highly recommended to use a rubber band to demonstrate the anchor position. If not available or not practical, suggest to the student to simply draw the string back and make contact with any part of their face, if possible the nose. After a few shots they should gain enough confidence to have them achieve the preferred anchor position.

## Release

This is an action most people have never done before and the body can not understand the process. Also, like the anchor, there can be an element of fear of injury when they release.

The use of a rubber band is highly recommended but you can easily demonstrate the release using one of three methods.

The important point of these methods is to demonstrate the concept of relaxing the hand and forearm allowing the weight of the bow to pull the string from the fingers. The release should never be forced but should be a reflex action associated with relaxing the hand and forearm.

**Method 1** – Have the student hook their three fingers together and exert pressure on the fingers, by increasing back tension. Then, relax and notice how the hand they release from each other.

**Method 2** – This involves using a bow. Have the student hook their fingers around the string and have them draw the bow (without an arrow) 30 to 40 millimeters allowing a slight amount of pressure on the fingers. Now have them relax and allow the weight of the bow to pull the string from the fingers.

**Method 3** – Have a bag or bucket available and have them hook their finger around the handle lifting the bag or bucket off the ground. Have them relax their hand and notice how the weight of the bag or bucket pulls itself out of the fingers.



Method 1

## SECTION 10

# SHOOTING TECHNIQUE (The 10 Steps)

To obtain any degree of excellence in the sport of archery, each step must be made with controlled strength and consistency. To maintain consistent form it is essential for archers to adopt a cycle of ten major steps, each having a direct bearing on the end result of every shot. The ten basic steps are:

1.       **Stance**
2.       **Nocking the Arrow.**
3.       **Setting the Drawing Hand.**
4.       **Setting the Bow Hand and Bow Arm.**
5.       **Predraw and Drawing the Bow.**
6.       **Anchor.**
7.       **Holding and Aiming.**
8.       **Release.**
9.       **Follow Through.**
10.      **Relaxing.**

### 10.1 Shooting Form

Consider a few points that relate to the execution of good basic archery form.

The bow is essentially a mechanical device designed to store energy by the bending and flexing of the limbs and which upon release, delivers energy through the bowstring to propel the arrow.

The amount of energy stored is directly related to the degree of bending of the limbs and to the distance the string is drawn (draw length).

From this it can easily be seen that to have a consistent force propelling each arrow, **a consistent length of a draw is essential.**

### 10.2 The Human Body

The body works most efficiently when in balance. For example, it is easier to carry two loads, one in each hand, than to carry two in one hand, because the muscular effort is distributed symmetrically.

When the human body uses muscular energy, fatigue will occur when the energy used in a given time is greater than the body's capacity to replace it from existing reserves.

The greater the number of muscles in use at any one time, the greater the drain on the body's reserves of energy and the sooner the onset of general fatigue.

When a specific set of muscles is employed in a repeated movement, fatigue in those muscles will be induced at a rate depending on:

- The amount of energy consumed in one movement.
- The rate at which the movement is repeated.
- The amount or rate at which the body can transfer energy from existing reserves to that set of muscles.

A muscular movement broken into steps with a stop between the steps consumes more energy than the same movement made as a continuous action.

### **10.3 Biomechanics**

Biomechanics is the sport science field that applies the laws of mechanics and physics to human performance and examines the internal and external forces acting on the human body and the effects produced by these forces.

It is a diverse interdisciplinary field, with branches in Zoology, Botany, Physical Anthropology, Orthopaedics, Bioengineering and Human Performance. The general role of Biomechanics is to understand the mechanical cause-effect relationships that determine the motions of living organisms. In relation to sport, Biomechanics contributes to the description, explanation, and prediction of the mechanical aspects of human exercise, sport and play.

Ideally we should develop a shooting style that relies on the use of our skeleton as the foundation with the muscles relaxed and simply supporting the skeleton to achieve a process.

The human body is a collection of levers with the skeleton as the base of these levers, the muscles providing the strength required to achieve a particular action.

The process of drawing and holding the bow should be the process of engaging various levers to achieve an outcome.

### **10.4 Bio-Mechanical Efficiency**

Maximum effectiveness of the use of the archer's bone structure and muscles is gained when the forces are as much as possible directly along the bones and through the joints. This minimises the amount of muscular effort required from the archer. However, it is not possible to achieve this perfectly (for example it is not possible to have the force of the bow exactly in line with the bones of the archer's bow arm). Nevertheless, the smaller the angle between the bones and the forces the more efficient will be the archer's use of his muscles and energy.

### **10.5 Control**

Control of movement depends on muscular energy in excess of the minimum necessary for that movement being immediately available in the muscles employed.

Apply this to the archer. If, in drawing the bow, the muscles on one side of the body constantly exert more force than the muscles on the other, control is reduced by the asymmetrical movement. The fatigue rate is increased in the muscles employed leading to a further reduction of control.

However, if in drawing the bow movement is kept symmetrical and relies on the use of the body's natural levers, control is increased with a reduction in the work done by the muscles. This reduces fatigue and maintains control of the movement over a longer period.

To reduce fatigue and maintain control, the efficient use of biomechanics with a strict economy of movement is essential.

### **10.6 Essentials**

The essentials of the perfect target archery technique can be summarised as:

- Constant length of draw.
- Constant line.
- Balanced control.
- Economy of effort.

On the basis of these four essentials, the ideal position at full draw will be:

- Stance - upright, balanced and comfortable position.
- Constant draw length.
- Balanced control - maintained by the balanced forces from the forward pressure of the bow arm and the equal traction (pull) through the drawing hand.

- Alignment - The point and nock of the arrow, the bow and drawing hand, the wrist and elbow of the drawing arm in the same straight line (“Line of Force”).

Ideally the drawing shoulder should also be behind this “Line of Force” with the bow shoulder forward of the drawing shoulder

This is the ideal position to commence the aiming and release sequence.

## 10.7 Summary

The drawing sequence must be economical, systematic and repeatable. This demands that the shooting sequence be systematic, with each action kept under strict control to ensure that it is made accurately.

It must be a smooth flowing process of planned physical movement resulting from a practiced technique.

Tension, both physical and mental, is the archer’s greatest enemy – the archer must learn to relax throughout the entire shooting process.

## 10.8 The Ten Steps

To learn the shooting process it has been broken down into ten steps. These are:

1. **Stance.**
2. **Nocking the Arrow.**
3. **Setting the Drawing Hand.**
4. **Setting the Bow Hand and Bow Arm.**
5. **Predraw and Drawing the Bow.**
6. **Anchor.**
7. **Holding and Aiming.**
8. **Release.**
9. **Follow Through.**
10. **Relaxing.**

As an archer develops the skill and masters the shooting sequence these steps are reduced to maybe 3 steps.

No matter how experienced an archer is, they should always remember the “Ten Steps” as they can revert back to them to identify errors and overcome slumps in performance.



## Section 11

# STEP 1 STANCE

Stance or the standing position on the shooting line is the foundation of the shot and students should develop a consistent and repeatable position that is comfortable.

Ideally both feet should be shoulder width apart. When the archer has achieved full draw the body weight should be evenly distributed on both feet with 60%-70% of body weight taken on the balls of the feet and 30%-40% on the heels.

The student should be upright with leg and knee muscles relaxed but not locked.

There are principally two common stance positions: the Square and Open stance.

### SQUARE STANCE

This is the best stance to instruct when first starting students. It is easy to achieve and requires the student to have feet, hips and shoulders square to the target.

For students with a large frame or large chest there may be clearance problems with the bow string. If this is the case you may need to try the open stance.

As students develop their skills it may feel more comfortable for them to open their stance. This is acceptable but they should remember they must be able to repeat the stance from shot to shot and day to day.



Square Stance – Rear View



Square Stance – Side View

## OPEN STANCE

Open stance is the recommended position for most people although it is best to teach the square stance first. The rear foot is positioned in front of the centre line to the target, and this opens the body to the target.

The angle of the stance should be somewhere between 15 and 35 degrees from the target centerline depending on the student's preference and comfort levels.

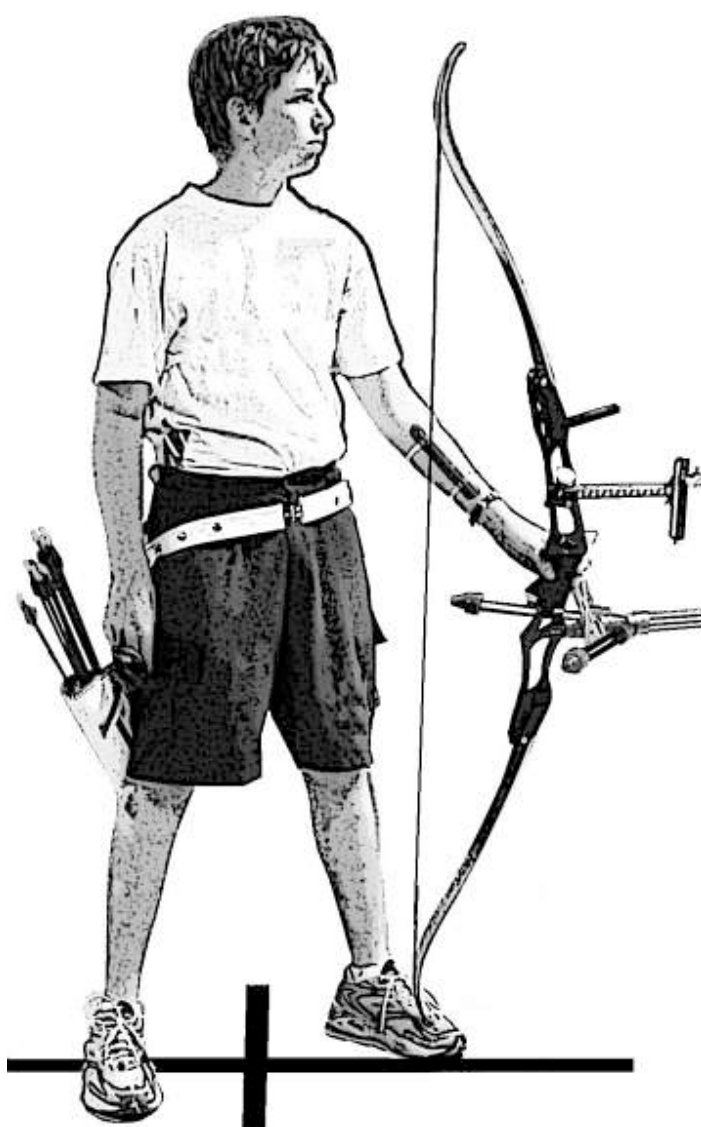
What is important is that the feet must remain in a constant position until the completion of the shot/s.

There is a certain amount of flexibility required to achieve this position as everyone is different. Each person should develop a stance which suits their own posture.

For many people having an open stance also gives them greater stability when shooting.



Open Stance – Rear View



Open Stance – Front View

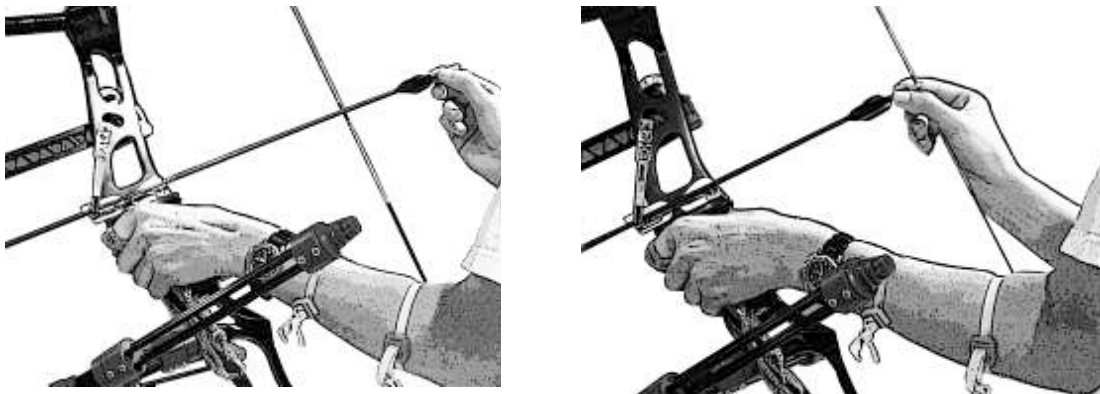
## SECTION 12

# STEP 2 NOCKING THE ARROW

The arrow is placed on the string at the Nocking Point, which is positioned slightly above the centre of the string. For recurve bows the index vane or fletch is placed so that it is pointing away from the bow.

### Suggested Method

1. Hold bow across body, canted at a slight angle.
2. Draw the arrow from the quiver, holding the arrow by your thumb and index finger between the nock and fletch.
3. Place the arrow onto the arrow rest.
4. Rotate the arrow until the index vane or fletch is square to the bow string. Carefully draw the arrow back against the string until the nock engages the bow string between the nocking points.



**Always nock the arrow on the same point on the string.**





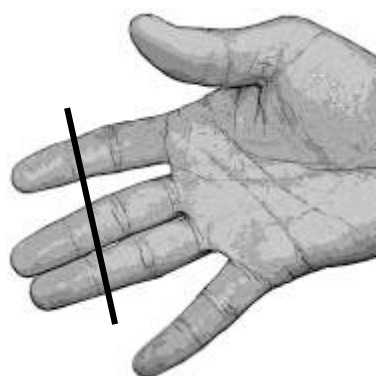
## SECTION 13

# STEP 3 THE DRAWING HAND

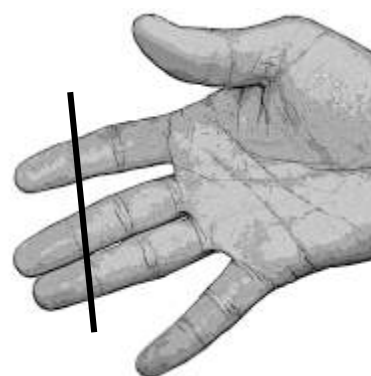
The first three fingers of the drawing hand are placed on the string, the index finger above, and the second and third fingers below the arrow nock.

The student must be taught to take a deep hook; this ensures the hand is relaxed and most importantly, the back of the hand and wrist is kept flat. The knuckles must not be poking out and are flat. The wrist is also flat and stretched straight along the arm - there should be a straight line from the elbow to the fingers.

Initially the string should be positioned behind the first joints of the fingers (*Diagram A*). The student takes a deep hook. As the bow is drawn the string will roll forward settling in or just behind the first finger joints (*Diagram B*); this position will prevent soreness and calluses in the fingers. As the middle finger is usually longer than the top and bottom fingers, the string should sit behind the first joint of this finger. The middle finger takes about 50% of the overall pressure of the string, the top or index finger takes 40% with the third or lower finger taking only 10%.



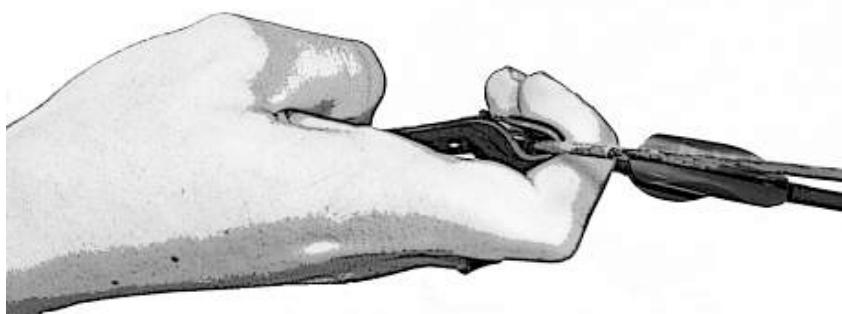
**Diagram A**



**Diagram B**

If the student was to commence in front of or in the first joints, when the bow is drawn the string will roll toward the finger tips. This will create tension in the finger, hand and wrist and will lead to soreness and calluses.

The finger tips should be curled around the string to form a deep hook. You will note when looking at the Diagram C that the three finger tips are set at 3 different angles. This is representative of the differing amount of pressure on each finger. The middle finger, holding the highest percentage, is more around and then comes the top or index finger and the lower or third finger. Note also, that the back of the hand, though it is flat, it is not vertically straight.



**Diagram C**

This is to allow proper and solid contact with the lower jaw bone with the index finger. Note also that the index finger tip does not touch the jaw bone. The finger tips should be curled around the string to form a deep hook, with the fingers tips pointed back toward the wrist, this helps to flatten the back of the hand and straighten the wrist.

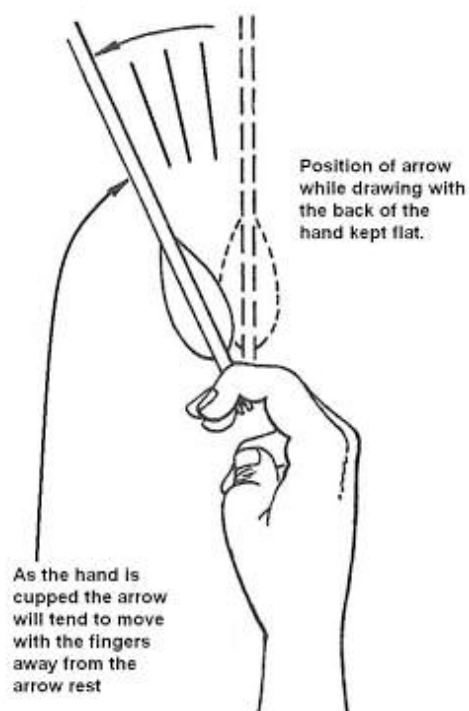
Some students assume that to obtain a good release, they should hold the string on the tips of their fingers. This is incorrect. If a student holds the string by their finger tips, the fingers and hand must be

under excessive tension to hold the weight of the bow, making it almost impossible to achieve a clean, smooth release. If the student holds the string on the finger tips, the back of the hand will be cupped and the wrist usually bent

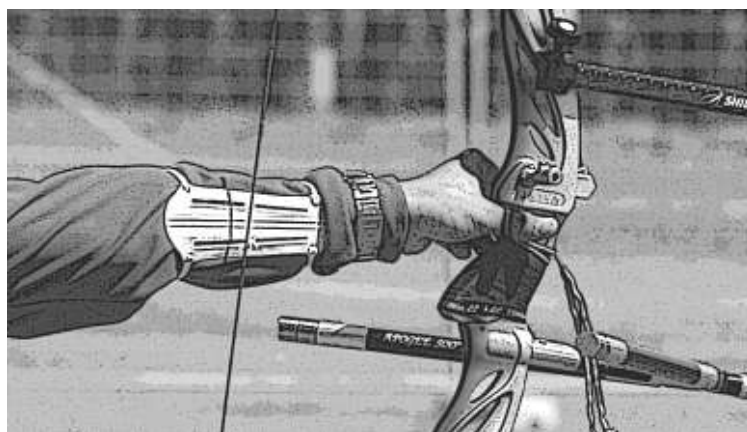
To demonstrate to students the correct way to hold a bow string, have them pick up a bucket or bag. They will automatically grip the handle with the first three fingers in or behind the first joints, with the finger tips pointing toward the wrist.

To achieve the feeling of release, have the student relax their fingers and release the bucket allowing it to fall to the ground, mimicking the release. In comparison, have them pick up the bucket with their finger tips and feel the tension in their fingers, hand and wrist. To allow them to experience how difficult it is to hold the bucket on their finger tips, have them let go of the handle.

Take care not to pinch the arrow nock between the index and middle finger as this may cause the arrow to rotate off the rest during drawing, ideally to prevent this and keep the hand relaxed archers should be encouraged to use a finger space between the first and second finger.



This problem can also develop if the student cups the hand during set up and draw.

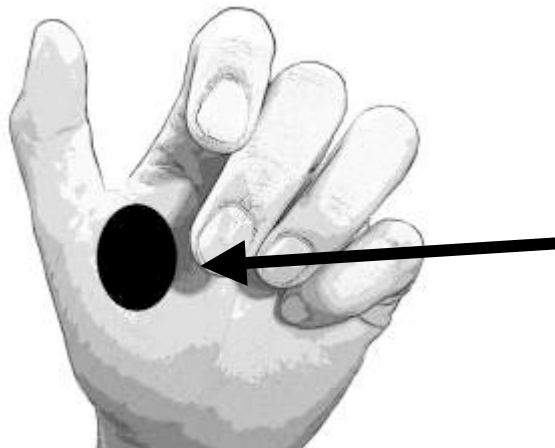


## SECTION 14

# STEP 4 BOW HAND, BOW ARM and PREDRAW

### Bow Hand

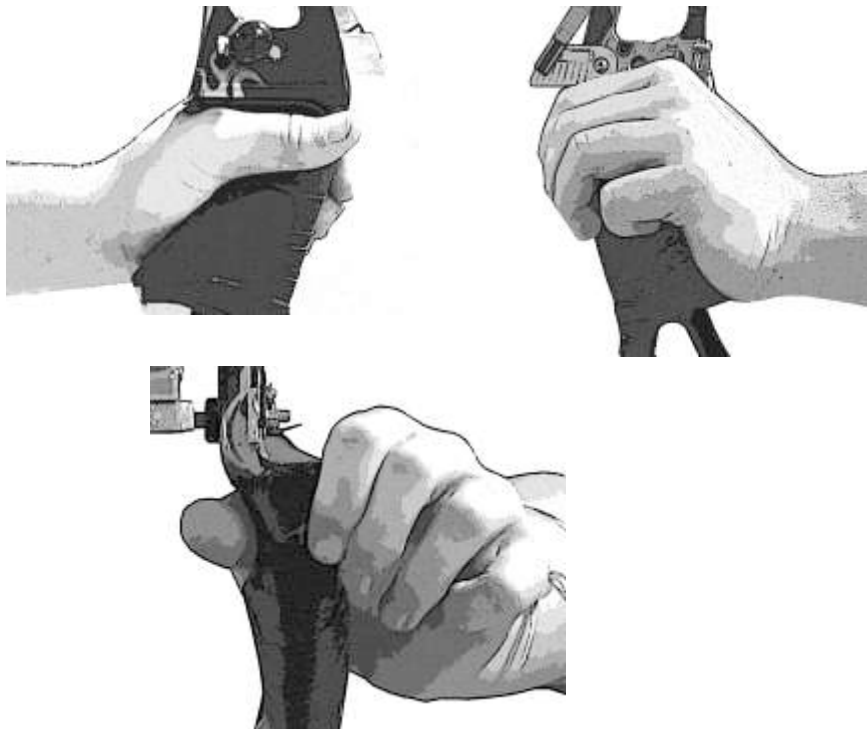
**Hand Position:** The hand is placed on the bow handle so pressure is along the Thenar Eminence – otherwise known as the thumb muscle. Ideally all fingers should be relaxed, slightly curled over in a natural position, not tucked in and curled right around. Having the fingers open but not straight reduces tension in the hand, and removes the temptation to grab the bow upon release. This requires the use of a wrist or finger sling. For beginners a short sling is preferable until they have mastered correct bow hand follow through.



The bow hand should be positioned directly behind the centreline of the bow.

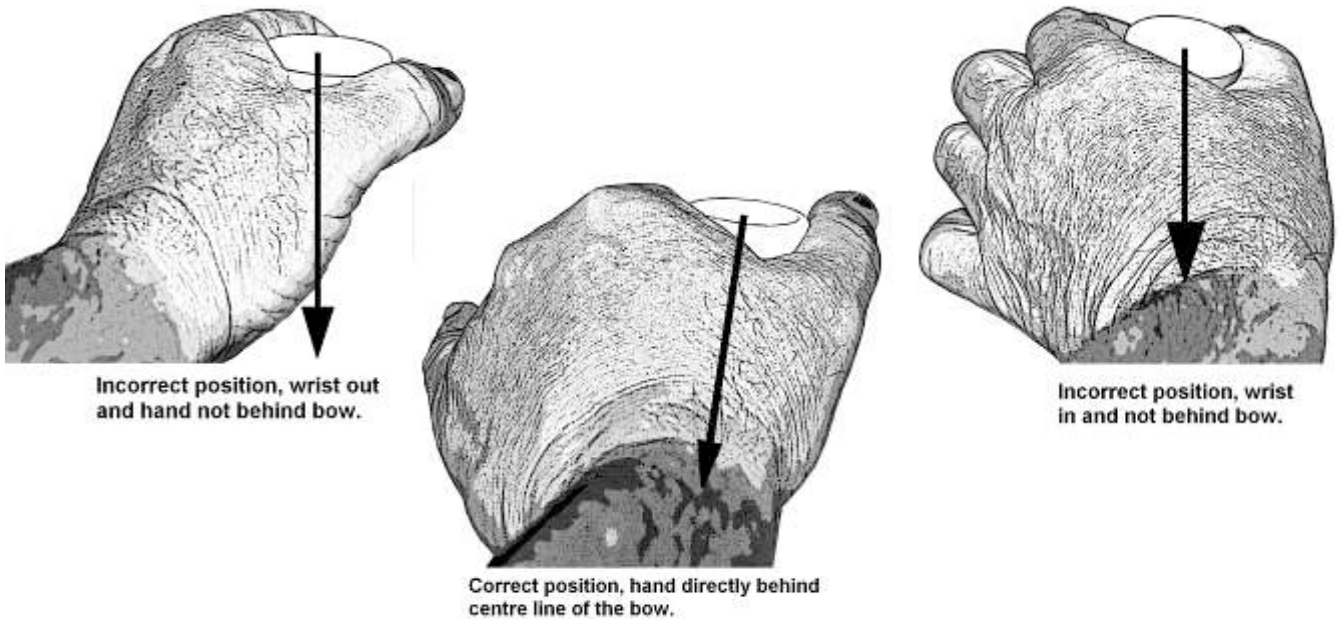
Place hand on the bow grip so the pressure point is as high as possible into the pivot point of the bow.

**The student should never grip the bow; consider using finger or wrist slings.**



**NOTE:** The knuckles of the bow hand should be angled at 45°; this assists in providing elbow clearance and correct position of the bow shoulder.

**The bow hand** should remain fully relaxed during the entire shooting sequence to avoid introducing side pressures (torque) on the bow which will affect the flight of the arrow. The hand should be positioned directly behind the centre line of the bow.



### Preparation Position

Once the fingers have been positioned on the bow string and the bow hand positioned, a slight tension is taken up on the string. The student begins to focus for the shot and enters a relaxed state. This is known as the preparation position.

The student should stand with their head held upright directly over spine. The head is turned to look directly at the target.

The student uses the preparation position to begin to focus and to ready themselves for the shot about to be taken.



## Focus and Concentration

At the preparation stage the student should develop a system that allows them to “Switch On” and focus.

Being able to switch on and focus is important as it narrow the archer's concentration removing external distractions and allows them to only think of the task at hand.

Many archers see this as staring at the target (or where they want the arrow to land). Students should learn to develop the technique of focusing which commences at the preparation stage. This must not be confused with aiming which comes later in the shooting sequence.

During the shooting sequence they should maintain their focus on the target until the arrow has struck the target. In Step 7 Holding and Aiming we describe the aiming process even during this step the student's principle focus must remain on the target with the sight pin only a secondary image in their vision.

The student must learn to focus at all times on where they want the arrow to go and never move the principle focus to anything else such as the sight pin.

Having the sight pin as the principle point of focus will create major problems and there is the temptation to attempt to hold the sight pin as steady as possible before releasing. This is not necessary and in all case will increase stress and tension in the archer body during the shot.

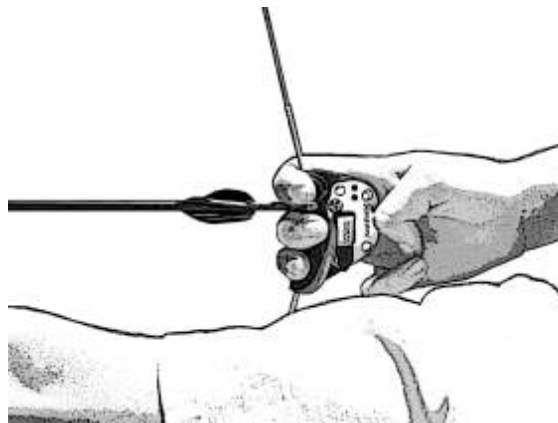
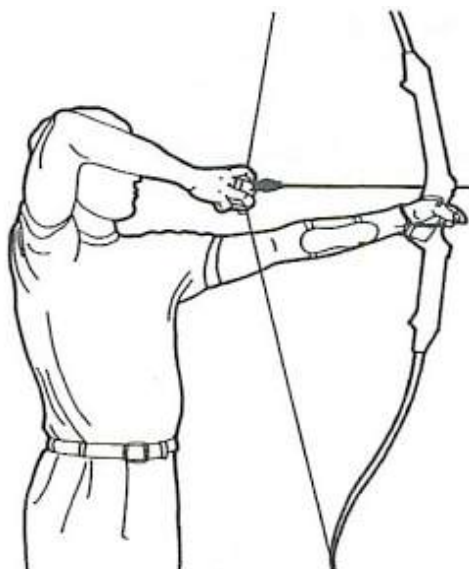
The correct technique is to relax, allow the sight pin to float on the target and allow the subconscious mind to shoot the shot. It can not be stress enough that the archer should never try to hold the sight pin still. There will always be movement in the body due to breathing and the heart beating which causes the movement of the sight pin.

As the archers skill develops this movement is reduced although it is never eliminated.

## Bow Arm and Predraw.

The bow arm and drawing arm are raised together leaving the bow arm shoulder sitting down in its natural position.

The bow shoulder is raised up and rolled over. The drawing arm elbow should be kept above the line of the arrow and as near as possible behind the bow and the string hand. The drawing hand should be relaxed with the back of hand flat and in behind the string. The bow arm is kept elbow firm and turned down and out to give good string clearance



Pre-Draw- Rear View

## SECTION 15

# STEP 5 DRAWING THE BOW

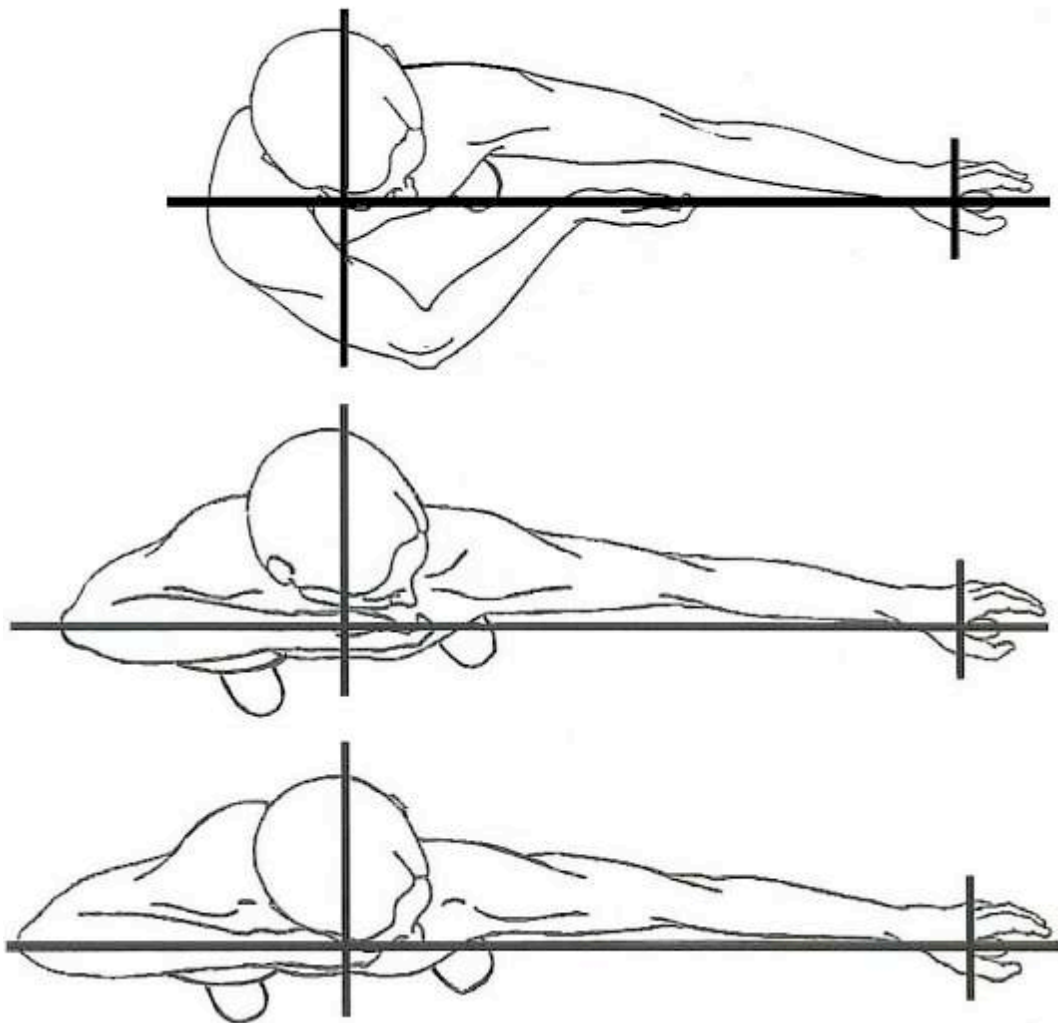
Commence the draw by rolling the drawing arm shoulder down and back, bringing the elbow around and in line with the bow. Draw the bow string back to the chin, keeping the back of the hand as flat as possible and allowing it to slide in under the jaw bone with the top finger making firm contact under the jaw.

As the drawing arm is moving back, the bow arm is held firmly extended with the shoulder down, pushing the bow directly toward the target while the head is held as still as possible, allowing the string to be drawn firmly to the head, without the head moving toward the string.

Once the drawing action has commenced, most of the work must be done by the muscles in the back and shoulders, with very little tension remaining in the biceps and forearm.

Remember, the draw must be along as straight a line as is physically possible, finishing with bow and hand, arrow and draw arm elbow in line behind each other.

Ensure that a woman draws the bow to the side of the breast not into or past the breast.



## SECTION 16

# STEP 6 FULL DRAW, ANCHOR and STRING ALIGNMENT

### FULL DRAW

At full draw, the elbow of the drawing arm should be in line with the shaft of the arrow, the back of the drawing hand flat, three fingers in contact with the string and the bow arm straight with the elbow rotated away from the bowstring.

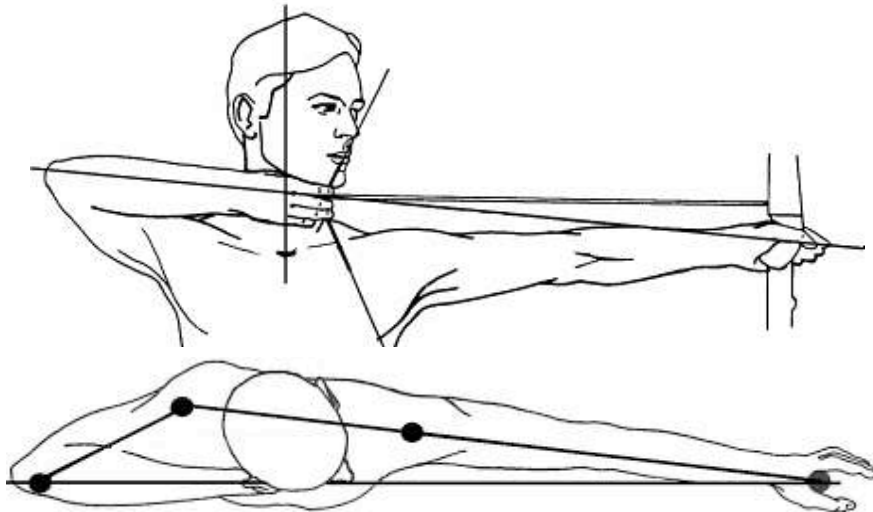


### BODY ALIGNMENT

The student should be standing upright, with 60% to 70% of their body weight distributed forward on the balls of their feet and 40% to 30% on their heels.

**From a front view** the student should be standing upright and should not be leaning back or forward. It is common for students to lean back, taking the majority of their body weight on their back foot.

Their spine should be straight and their head directly over their spine.



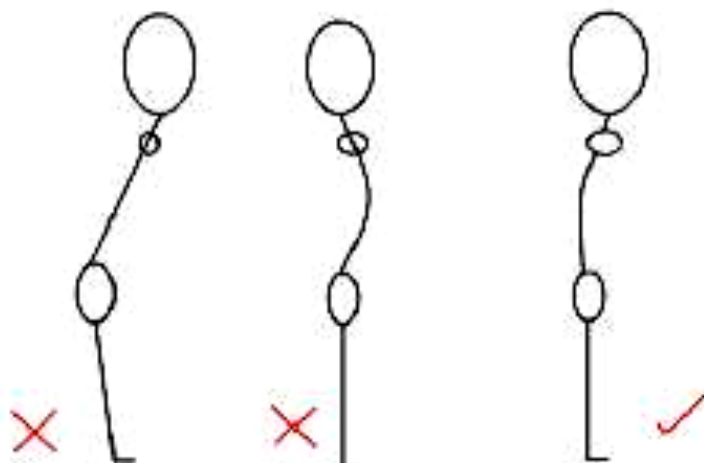
**From a rear view** the student should be standing upright with a straight spine.

It is common for students to have the majority of weight on their heels. This will cause the lower back to be arched backwards, causing a hollow back.

Ideally the body's centre of balance should be centred in a line below the archer's spine toward their feet

By not standing straight and keeping the spine straight, long term this can cause injuries as well as affect the archer's development.

**Looking from behind the archer** – so that you are looking directly at the target that the archer is shooting at, the lower spine should also be straight. This should not be confused with standing straight. The spine has a natural curve as it comes from the upper body into the waist and then joins the hip. This natural curve needs to be straight throughout all phases of shooting. See diagram below.



The correct posture is the one on the right with the tick. This is also as the chest-down technique. It is using the abdominal muscles to pull the chest down to the hips. Not to be confused with sucking the stomach in, rather, just flexing the abdominal muscles, this technique straighten the lower spine.



## ANCHOR

The anchor is the term used to describe the position where the drawing hand makes contact with the face.

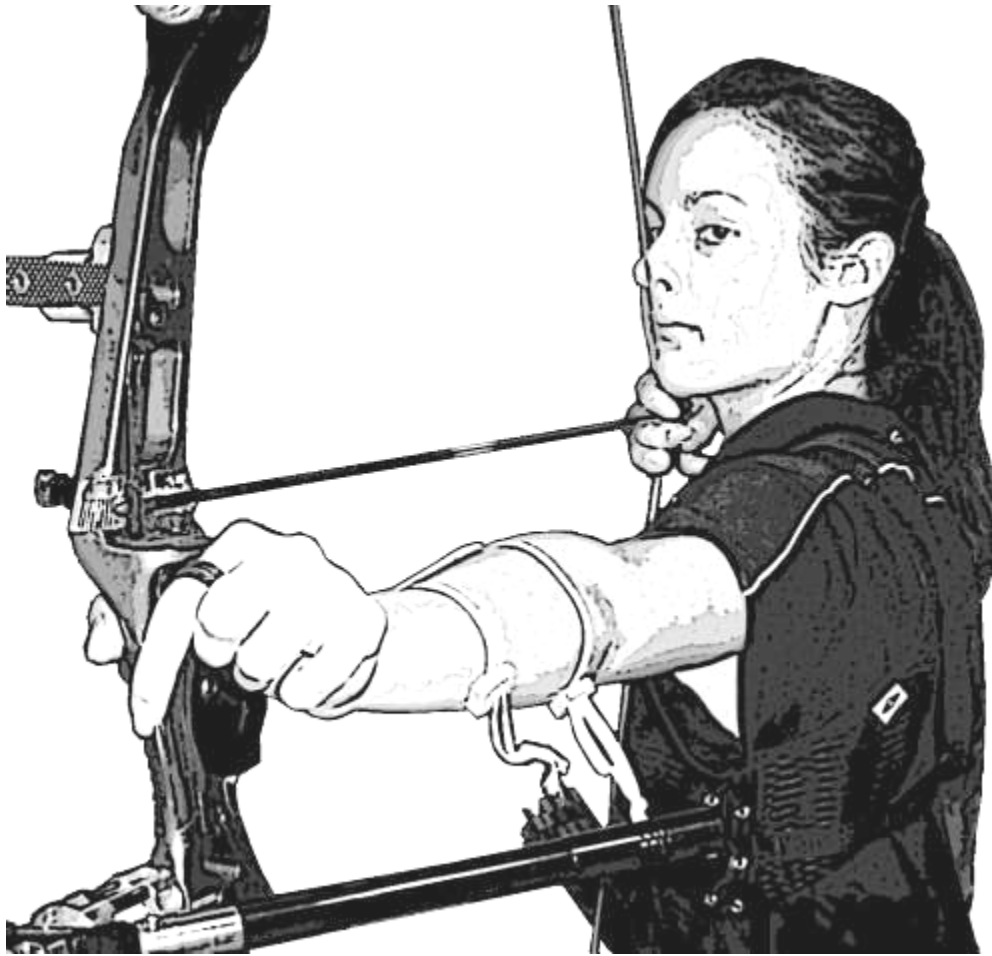
A consistent anchor-point is vital and, along with many other aspects of correct archery technique, plays an important part in accuracy and should be considered as a rear sight. The anchor is where the index finger of the drawing hand makes solid and full contact under the jaw from the second joint onwards to the palm area of the hand. The tip of the index finger does not usually touch the jaw as the string is being held in the first joint of this finger. The string then makes solid contact with the side of the chin (side of the face/jaw anchor – not centre of the chin anchor) and then lightly touches the tip of nose. This gives you three contact points to keep a consistent anchor from shot to shot.

Note – The back of the hand should be flat so that the knuckles are not protruding outwards. The wrist and forearm should be straight and relaxed.

The hand itself will be slightly angled outwards away from the neck and not held totally vertically. If the archer holds the hand totally vertically this will immediately cause tension in the hand, wrist and forearm. Long term this may cause shoulder and rotator cuff injury.

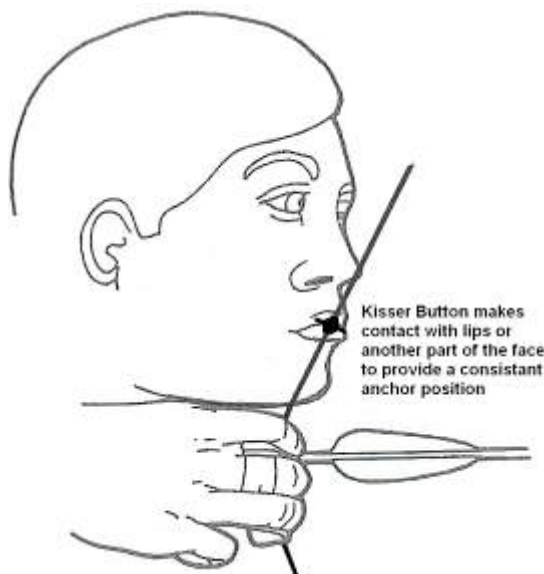
**Archers should also avoid excessively twisting or rolling the drawing handed. This will create inconsistent pressures on the fingers, increase tension in the forearm and wrist and cause string torque. Instructors should identify students who shoot with a rolled or twisted hand and wrist and ensure the correct position is taught as early as possible**





## KISSER BUTTON

If the student cannot maintain a consistent anchor then try using a “Kisser Button”. This is an attachment to the string which makes contact usually with the lips, hence the name “Kisser Button”. A Kisser Button should be used as a last resort as it can become a crutch and lead to variations in draw length if not used correctly.



**Kisser Button**

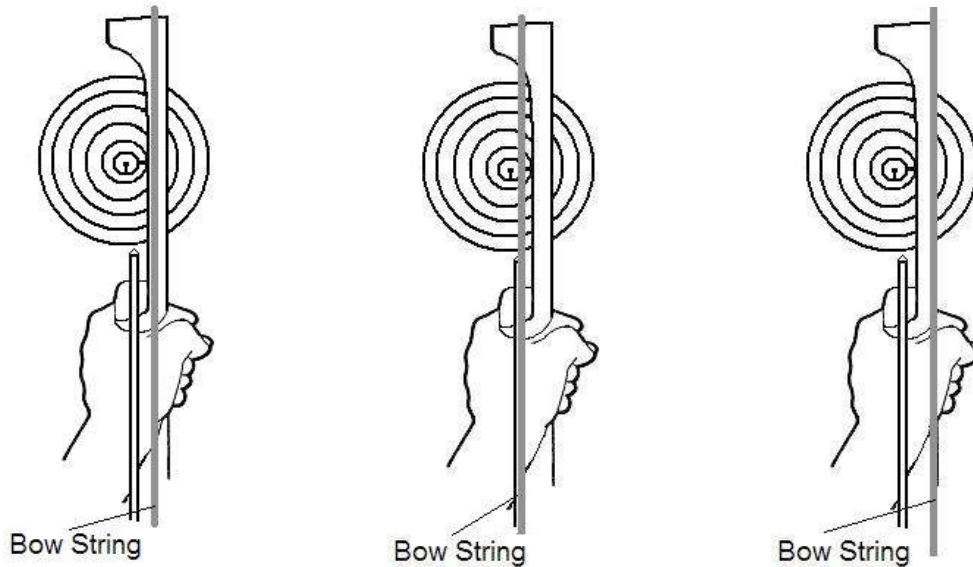
## STRING ALIGNMENT

A consistent string alignment must be maintained during aiming. String alignment is the relationship between the blurred image of the bowstring and the bow or sight pin. The student can align the string with the bow handle, or sight pin which ever feels comfortable. The student can change the angle of their head by changing the string alignment position.

Any variation in string alignment will show as a change in left/right arrow placement.

If all is correct and a consistent anchor and string alignment has been obtained, the line of sight (aiming) may be established

### VARIATIONS IN STRING ALIGNMENT



## PROBLEM SOLVING

During the draw and anchor process students can encounter problems

### 1. Bow shoulder high and out of line

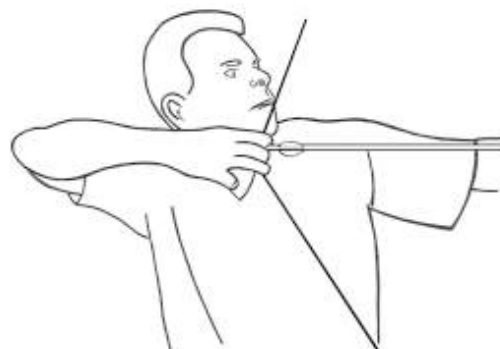
This is an important problem and a great deal of effort should be used to overcome the problem. In the long term this will cause fatigue and possible shoulder injuries.

At full draw, the bow shoulder should be in a horizontal plane to the bow arm. It is common to see archers raise their bow arm shoulder because

- The bow draw weight is too heavy.
- They may not be standing up straight.
- They are not setting up correctly at pre-draw.

#### Solution

- Have a partner stand behind the student and place a hand on the bow shoulder. This allows the student to feel the partner's hand as they rotate their shoulder forward and up.
- The repositioning of the bow hand on the grip may also assist in overcoming this problem

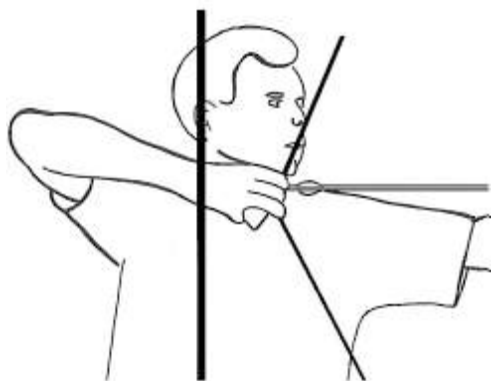


### 2. Leaning Forward - Not Standing Upright

The student may be using the wrong set-up and technique to draw or using the arm to draw the bow instead of rotating their shoulder blade to draw the bow.

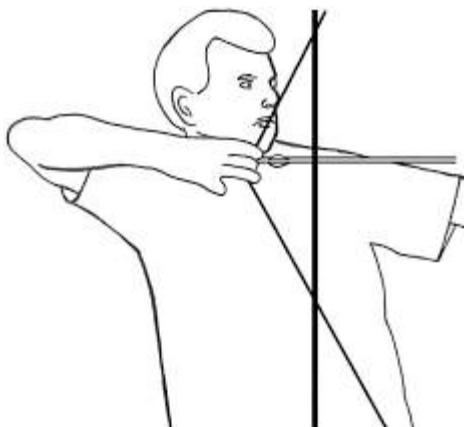
#### Solution

- The bow may be too heavy, provide a lighter bow.
- Ensure the student is standing upright and holding head up.



### 3. Leaning Back at Full Draw.

Very common problem usually caused by the student transferring their body weight onto their back foot and not having their body weight evenly distributed over both feet



#### Solution

- At pre-draw, have the archer exert most of their body weight on the front foot. As they draw the bow, their body weight will be evenly distributed and assist them to stand up straight at full draw.
- The bow's draw weight may also be too heavy and the student is struggling when drawing the bow.
- If the fault is not corrected and becomes established, it will be difficult to correct.
- When attempting to correct and having the student stand upright, they may feel they are leaning forward when in fact they are standing up straight. This is because they have become used to leaning back. This feeling will quickly disappear with practice.

### 4. Drawing with a Low Elbow at Full Draw

Drawing with a low elbow is another very common error with new students.

#### Solution

- Have the student train using a rubber band to ensure they understand the correct technique in drawing a bow.
- You should also look at the way they set up for the shot and ensure at Pre-draw the drawing elbow is square to or above the line of the arrow.



## Section 17

# STEP 7 HOLDING AND AIMING (LINE OF SIGHT)

Holding is the short time frame between the anchor and the start of the expansion step which will ultimately result in the release of the arrow. If the holding step is not taken, then a forward release will result, as well as possible over-aiming, if the process begins before holding.

The internal muscle mechanics of holding can be described as the act of flexing the muscles when full draw and anchor has been attained. The lower trapezius of the drawing side is flexed as well as the bow arm – as if you want not to move at all, like you have become a statue for that short period of time. Holding, if done correctly, is like shooting a rifle as compared to shooting a pistol. In the proper alignment of drawing elbow, arrow and bow hand, we try to duplicate the idea of a long barrel rifle using the body's skeletal structure.

If holding is done correctly, the archer's body is maintaining resistance against the natural forces that would cause the form to collapse. (That is, the drawing arm that wants to be pulled forward and the bow arm, that wants to be pulled back toward the archer's body).

Aiming should only commence once the draw and holding steps have been completed. Once the archer has gone through the process of drawing and holding they may then start the process of aiming and expansion to ultimately shoot the arrow. If aiming is started too early, then the archer becomes more focused on the outcome rather than keeping the focus on maintaining a consistent technique that must always feel the same. It is this consistency that will allow them to hit the gold.

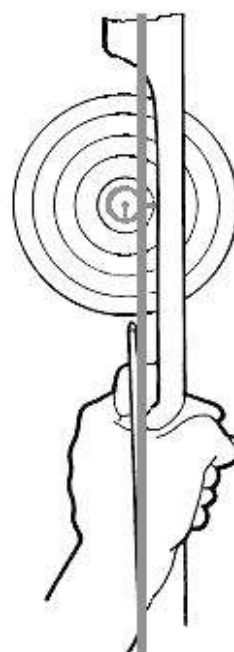
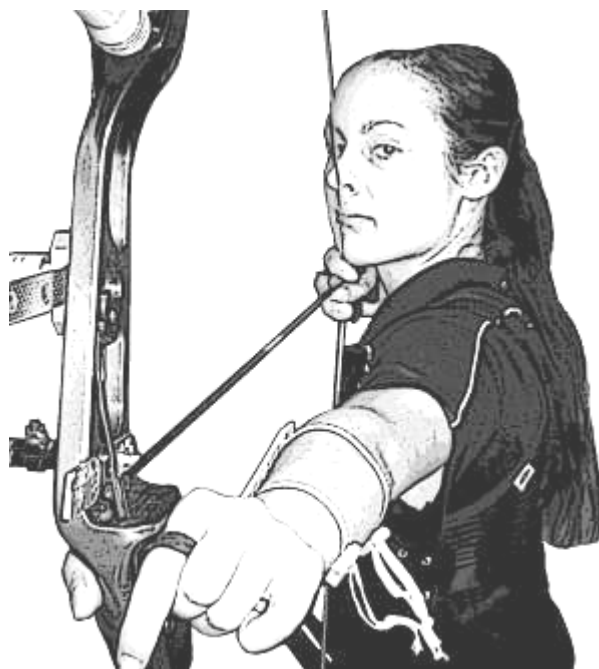
The archer must never be tempted to hold the sight pin as still; this is a sign of over-aiming. The archer must remain relaxed and allow the sight pin to float on the target. The subconscious mind will take care of the aiming process.

It is almost impossible to hold the sight pin steady; there will always be movement usually caused by breathing and heart beat. The student should be aware of this and learn to simply relax and allow the pin to float.

In time with practice and confidence the movement of the pin is reduced to the point where it is minimal.

The sight should only be changed to make changes to the arrow groups; never adjust the sight to correct a single arrow.

**The student should be reminded to maintain a consistent string alignment.**



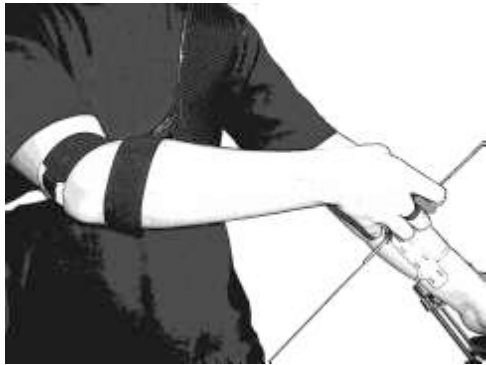
## FORMMASTER

The easiest way for an archer to correctly learn the process of drawing, holding and release is by using a "Formmaster".

When the "Formmaster" is correctly fitted and sized to the archer, the archer draws the bow, holds and releases without an arrow nocked.

If the archer does not correctly carry out the process, the Formmaster causes the archers form to collapse upon release.

If the archer uses the correct technique they maintain form after release.



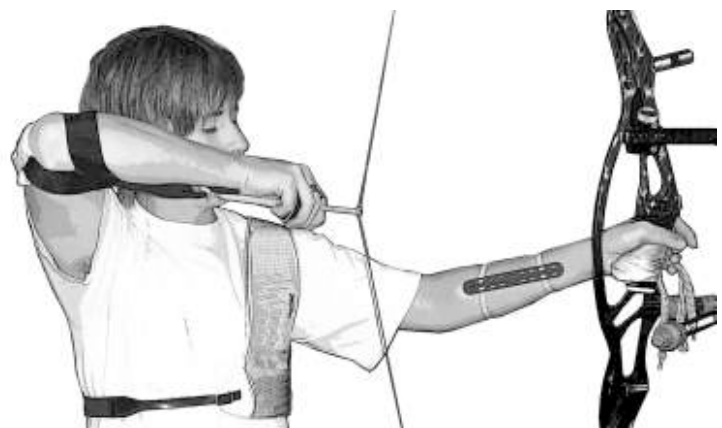
The "Formmaster" fits around the elbow and attaches to the bow string.



Archer at full draw



Following release the archers form has not collapsed indicating the use of the correct



Archers form has collapsed upon release indicating the use of incorrect muscles.

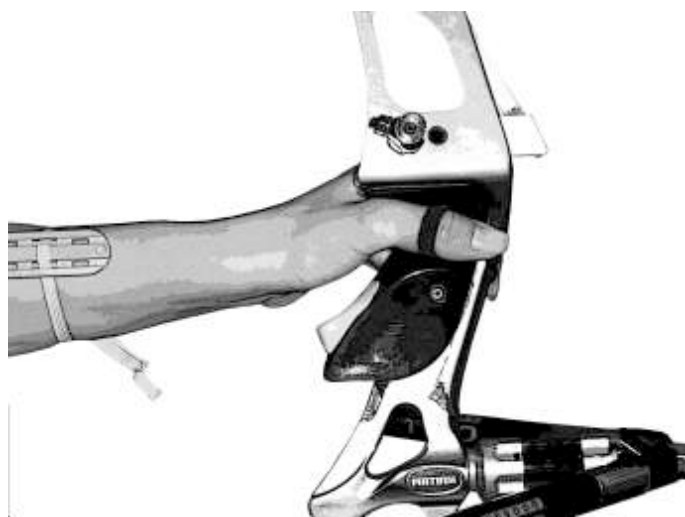
## SECTION 18

# STEP 8 RELEASING

The release, also called the loose, is the most critical and the most important step in achieving good arrow flight. The release is achieved by relaxing the muscles in the drawing forearm and drawing fingers, allowing the weight of the bow to pull the string from the fingers; the resulting reaction being that the drawing hand moves slightly backwards.

When releasing the arrow, it is recommended that back tension be maintained which will ensure the release hand stays close to the face.

**The release should not be forced but should be a natural reaction to the weight coming off the relaxed fingers**



Ideally, during release the bow should move forward without any interference or side to side pressure on the grip.

The bow hand should be relaxed during release so it is advisable to use a bow or finger sling to prevent the bow's falling to the ground.



## PROBLEM SOLVING – HITTING THE FOREARM

During instruction watch for painful expressions as a reluctant student may not mention they are hitting their arm with the bowstring. Initially have long armguards available or use two armguards to protect the arm.

There are a few simple exercises that can assist in overcoming this problem as well as a simple test to determine if a student may have a problem.



### TEST



To determine if the person may hit their elbow before they shoot you can conduct a simple test.

Have the student extend their bow arm toward the target (Diagram 1) and then bend the arm toward their chest in a line parallel to the ground.

If the student's arm moves toward their chest (Diagram 2) most likely the student will not have elbow problems and will not hit their arm.

If the student's arm moves toward their face (Diagram 3) special attention may be given to the student, as the bowstring will most likely hit their arm upon release.



Diagram 2

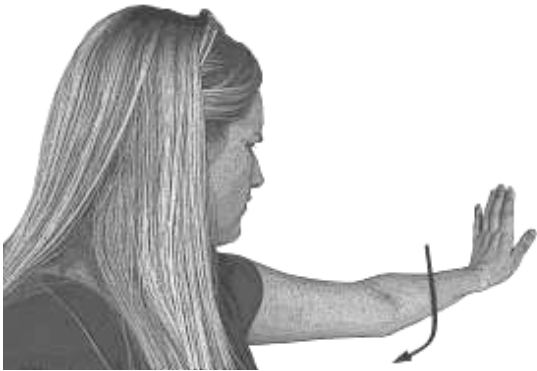


Diagram 3

### DEMONSTRATION

To demonstrate the correct elbow position have the student extend their bow arm toward the target with their palm down.

Without moving their elbow, have the student rotate the hand so the knuckles are at a 45° angle. This produces the correct elbow position.



## EXERCISE

Student can be given an exercise they can do at home to assist them in learning how to rotate their elbow upon drawing the bow.

Have the student place the palm of their bow arm on a wall with their fingers pointing up.

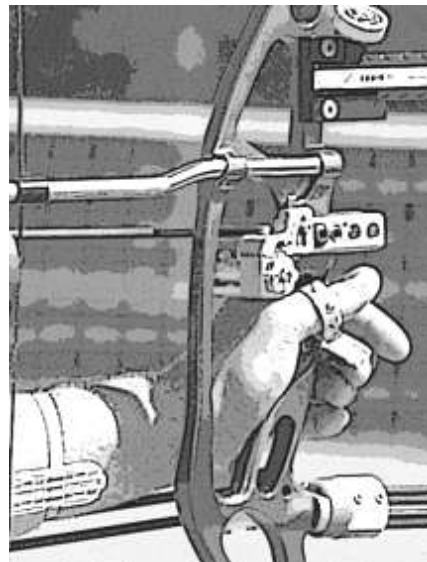
While exerting pressure on the wall with their bow arm have them rotate their elbow in a clockwise direction (right hand archers, anticlockwise for left hand archer) (Diagram 1). They will quickly learn how to rotate the elbow (Diagram 2).

The instructor should ensure the student does not roll the shoulder up and forward as the elbow is being rotated.

At first this may feel uncomfortable but with practice the student will learn to rotate the elbow during the drawing process.



Diagram 2



## SECTION 19

# STEP 9 FOLLOW THROUGH

The follow through occurs after the arrow has left the bow and is travelling toward the target. Focus should be kept on the target while allowing the bow to roll forward as a reaction to the shot.

Keep the string hand up close to the line where it was when you released the arrow. This position is held until the arrow hits the target (about 2 seconds is all that is needed).

It is important to hold the bow arm in the same shooting position during the follow-through and to maintain focus by looking at target until the archer hears the arrow has strike the target.



## SECTION 20

# STEP 10 RELAXING and RECOVERY

After the arrow has hit the target, lower the bow arm so that the bow is across the front of the body or with the limb tip resting on the foot, and the drawing hand is down at your side. This is the time to relax and recover from the shot, analyse the shot and prepare to shoot the next arrow. This time should take longer than the act of shooting the arrow.

**The student should learn to relax after shooting each arrow and analyse the shot.**



## SECTION 21

# ARCHER'S ATTITUDE

Consideration must now be given to the repetition of the shooting sequence in order to maintain consistency of shooting form.

The mind must have control of the muscles and has to be conditioned to adhere strictly to the sequence of shooting.

If a deviation occurs, the sequence should be discontinued before the release is made and recommenced from the Pre-Draw step. The student must learn to "let down" if any step in the shooting sequence does not feel correct.

To this end, the student should develop a "One Arrow" attitude. The temptation is to simply shoot arrow after arrow with little thought of the process or the outcomes. Ideally students should learn to shoot each arrow individually, analysing each arrow, attempting to identify errors or faults.

The student should develop a process where full concentration is required to complete the shooting of each arrow. If the mind is involved with thoughts of past failures or successes, it cannot be fully focused on the process at hand.

By developing a "One Arrow" attitude, the archer is able to cope with almost everything that occurs on the shooting line; a distraction is only a problem if allowed to be.

### Summary

Each arrow is shot in a short period of "High Concentration", followed by a period of "Relaxation".

Once this practice is adopted, the correction of faults or the implementation of new techniques becomes a simpler and more productive operation.



# SECTION 22

## INSTRUCTING THE DISABLED ARCHER

As an archery instructor you will encounter students with a disability. Archery is a sport that anyone can undertake irrespective of their disability. Archery offers an excellent opportunity for the disabled as a recreational and competitive activity; it places on an equal basis with the able-bodied. As an instructor you need to be aware of the challenges and rewards of teaching the disabled.

### Types of disabilities

Within competitive archery, there are three recognised type of disabilities, these divisions are contested at World Championships and Paralympic games.

#### AR1

These people have severe upper spinal injury, or suffer from a medical condition that allows them only limited or no use of the lower body, allowing only limited use of their arms and neck. Usually, restricted to a wheelchair they may have an assistant due to their limited mobility.

#### AR2

These people have mid or low spinal injury, giving them no use or limited use of their lower back and legs. They usually have full use of the upper body. Usually restricted to a wheelchair they may have limited use of their legs, but this depends upon the severity of their disability.

#### AR3 (also know as Standing)

This is a wide encompassing disability that includes amputees, polio, birth defects and other conditions that do not fully restrict mobility but limits balance and stability.

The explanations above are for established competitive categories, as a coach you may also encounter disabled athletes who do not fit into these established categories.

Instructing these people can be challenging but also very rewarding not only for the student but also the instructor.

These other disabilities could be –

#### Physical

People with a physical disability.

#### Sensory

Usually the vision impaired but will also include the hearing and speech impaired.

#### Intellectual

Various forms on intellectual disability.

#### Medical Condition

A disability developed following a medical condition may also fit into one of the other categories.

### Meeting the Person

People take up archery for many reasons they may wish to do archery for the social and personal achievement aspects of the sport, or they may wish to be competitive with aspirations for the World Championships and Paralympic Games.

When you first meet the person you should spend sometime talking to them to find out their goals. The person may have limitations which you will need to be aware of, such as they may tire quickly and you may have to tailor the lesson for the personal requirements.

The person's condition may also limit their ability to use the bow and you may need to vary the way you instruct, it may be necessary to be "creative" in your method of instruction.

It may even be necessary to go outside of the established shooting rules for the disabled to allow them to shot, be inventive. You may need to create shooting aids to allow them to take part. This should not be issue, the important point is to allow them to shoot.

It may even be necessary to make contact with the doctor of the student, to ensure that archery will not be detrimental to their condition, as well as get a better understanding of their limitations.

## Wheelchairs

A high proportion archers with a disability are in wheelchairs, the wheelchair should be placed on the shooting line with the wheels on either side of the line. The student's shoulders should be positioned in line with the target, with the feet positioned at 90° to the target, the same as the square stance for the able-bodied.

Similarly to able-bodied archers, it may be necessary to angle the chair to the target like an open stance on order to obtain better clearance.

The brakes of the wheelchair must be on, and you must check that the four wheels of the chair are firm and stable on the ground.

It is very important to ensure the student has a comfortable and consistent seating position, use cushions if necessary. The students balance is critical as they may have only limited, or no use of the upper body making balance difficult, this will become worse when drawing and shooting the bow.

It may be necessary to strap the person into the chair, this is very common with people who fit into the AR1 category.

This can be achieved by using a lap strap which provides added upper body support.

It may also be necessary to provide additional upper body support by using a chest strap which fits either around the chest and attaches to the back of the chair or fits over the shoulders and attaches to the back of the chair.



AR2 Wheelchair Archer



AR2 Wheelchair Archer

## Use of Arms

### Limited use of Bow Arm

These archers may be in a wheelchair, or may fit into the AR3 (standing) category.

They may be fitted with a prosthesis which has a device to hold the bow, or they may have one designed for day to day use which can be adapted for this purpose.

They may have limited use of their fingers and a strap may need to be fitted to hold the bow.

It may also be necessary to add a splint to the elbow to assist with holding up the bow.

### Limited use of Drawing Arm

If the drawing arm is missing, a prosthesis may be fitted which can be fitted with a hook that attaches to the string. Twist to release the hook.

Alternately the archer may draw with their teeth. A piece of leather is attached to the string on either side of the nocking point. The archer holds the string in their teeth and opens their mouth to release.

Some archers use a modified release aid used by compound archers.

### Archers with Balance Problems

If the archer chooses to stand either with their leg, or an artificial leg they may use a wooden block to compensate for differences in leg length.

They may also choose to sit on a standard chair or stool placed on the shooting line.



AR3 Standing Archer using a stool for support and balance.



AR3 Standing Amputate Archer using a stool for support and balance.



## **Vision Impaired**

Although not common in Australia the vision impaired have shot quite successfully. The level of vision impairment can vary some may be able to shoot the same as able-bodied while others have no vision at all and will need to use assistance.

You should check if the person was born blind or have lost their sight at a later date. This will make a difference to the way they perceive the world. For example a person who has never seen will have no understanding of colours.

When instructing the vision impaired during the first lesson allow to them feel all the equipment so they can obtain a mental picture of the equipment.

Early shots may need to be undertaken with the instructor have a "Hands on Approach", this allows them to get the feeling of shooting. You should also consider using "Rubber Bands" or the "Rubber String" for early shots.

The vision impaired develops the ability to recognise how accurate the shot was by the sound the arrow makes when it hits the target.

To allow the archer to obtain a consistent position on the Shooting Line place large horseshoe shaped makers on the ground which act as foot markers.

## **Sighting**

There are two main types of sighting methods used by the vision impaired.

1. Use a tripod with a standard bow sight fitted. The standard sight pin is replaced with a large pin. The back of the bow hand makes contact with the large pin. This pin provides elevation for the bow. The archer has an assistant who spots the arrow and makes adjustments to the bow sight, the adjustment is made the same as a standard sight.
2. Another variation to this method is to replace the large pin with a large V point down. The archer can use a stabilizer when they draw and raise the bow they raise the bow into the V, raising the bow until it reaches the top of the V then archers can shoot. Again the assistant makes adjustments if required.
3. Another method is the use of an electronic device that sends a signal to a receiver worn by the archers as an earphone. The sound changes as the signal changes as it passes over the various colours of the target.

## **Assistant**

As mentioned the archer may have an assistant to make sight adjustments and to score the arrows.

## **Scoring**

It is not recommended that the archer goes to the target during scoring. Usually the assistant takes a rubber device cut in to raised circles to the target, the scorer places pins into the foam to indicate the position of the arrows. When scoring is completed, the rubber target is returned to the archer who can then feel the position of the arrows in the target.

## **Equipment**

Archers with a disability can use either recurve or compound equipment. For international competitions AR1 archers may use a compound bow, but accessories such as the bow sight must comply with recurve rules, they can not use a peep sight although they may use a release.

The AR2 and AR3 division use only recurve bows which must comply with standard FITA rules.

The compound bow division is open to all disabilities but they compete in the one category. In the compound division FITA compound bow rules apply.

## **Shooting and Scoring**

In all cases, shooting is conducted the same as able-bodied, usually the disabled archers have an assistant who goes to the target to score and collect their arrows. This is due to the uneven grassy terrain on most venues.

## **String Clearance**

One of the issues that should be considered is string clearance experienced by archers in a wheelchair; the major issue is clearance from the wheel of the chair.

The use of shorter bows or compound bows is recommended. Also try removing the armrest of the chair, or the hand rim of the wheel. You can also try canting the wheels slightly or placing a board (13mm) under the cushion of the chair to raise the archer slightly.

## **The Wheelchair Back**

The archer may need support from the back of the chair if they have poor balance. The fabric back of the chair should have slight sag in the back of the chair. The height of the back support must provide support but must not restrict movement of the shoulders. Under international rules the archer must not support their arms using the back of the chair.

## **Communication with Disabled Archers**

Instructors should communicate with wheelchair archers at eye level, kneel or bend down.

Do not raise your voice when talking to disabled archers; it is common for people to raise their voice when talking with the disabled. Unless they have hearing problems this can offend.

## **Shooting Rules**

Archery Australia and FITA have specific rules for archers with a disability. For detailed shooting rules consult the International Paralympic Committee (IPC) at [www.paralympics.com](http://www.paralympics.com)

Shooting rules allow disabled archers to remain on the shooting line during scoring. Care should be taken to ensure protection from the elements, such as sun and heat.

Disabled archers shoot at the same events and same formats as able-bodied archers.

## **Classifications**

Disabled archers wishing to compete in national or international events must be medically classified. This involves being examined by an approved classifier; the archers will be classified into their appropriate division.

They will receive a classification card which also indicates the various sub division the archer may fit into. Sub division may also allow the archer to use additional aids.

## **Information**

For further information consult

**International Paralympic Committee**  
[www.paralympics.com](http://www.paralympics.com)

**Australian Paralympic Committee**  
[www.paralympics.com.au](http://www.paralympics.com.au)

**Archery Australia Archers with a Disability Committee**  
[www.archery.org.au](http://www.archery.org.au)

Email: [awdc@archery.org.au](mailto:awdc@archery.org.au)

# Section 23

## STRINGING A RECURVE BOW

When conducting instruction all equipment should be set up ready to conduct the class, this includes stringing recurve bows.

When conducting advanced classes that are programmed over a number of weeks one of the later sessions should have a section dedicated to stringing a recurve bow.

Incorrect stringing methods can result in archer injury from the recoil of the limbs if control is lost during the stringing process, or in damage to the bow in the form of twisted or splitting the limbs due to misaligned pressures.

There are many methods of bracing a bow but the use of a bow stringer is the method which is considered safe for both the archer and the bow.

### **The Bow String**

The modern bow string is made from a number of strands of either Dacron or a non stretch material.

Usually on recurve bows used for instruction, only Dacron strings are used as the non stretch string material will damage the lower quality bows.

Modern bow strings are made from various lengths of bow string material; the ends are bound into loops which fit onto the bow's nocks (notches) fitted to the ends of the bow limbs.

Usually the top loop is larger than the bottom loop as the top loop needs to be slid down the bow limb for storage and stringing of the bow. The larger top loop makes it easier to identify the top and bottom of the string which is important when stringing a bow.

The centre of the string is bound with serving which protects the string from wear. Nocking points are fitted to the serving to provide a consistent point to place the arrows prior to shooting.

If the top and bottom string loops are manufactured the same size you can determine the top of the string by folding the string in half. The upper loop is that loop which is on the side of the string-half to which nock points are applied.

### **The Bow Stringer**

A bow stringer is a device designed to string bows.

Bow stringers come in two basic designs, double pocket or saddle type. Both types have a strong nylon cord which has on one end a large leather (or rubber) pocket which fits over the bottom limb tip and at the other end, in the case of the "Double Pocket Type", a smaller leather (or rubber) pocket or in the case of the "Saddle Type", a saddle made of rubber or leather having a dimpled rubber surface.

With both style of bow stringers, the larger pocket fits onto the bottom limb tip over the string and helps in keeping the string in place.

The smaller pocket on the "Double Pocket" type fits over the top limb tip and allows the string to be placed into the string groove of the upper limb.

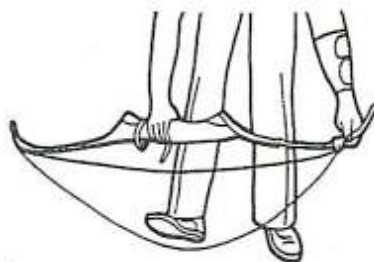
The Saddle of the "Saddle" type stringer fits just behind the string which should be looped around the upper limb.

### **Procedure to string a recurve bow**

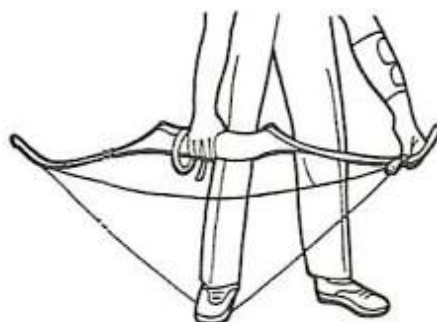
- a. Firstly identify the top string loop and slide the top loop over the upper limb of the bow and locate the lower loop in the lower string-nock.

- b. Check the position of the bottom loop ensuring that it is located in the string groove of the limb and then slide the large pocket of the stringer over the bow tip and string loop.
- c. With the bow held horizontally and the string underneath, place the small pocket of the bow stringer over the top bow tip. If using the saddle type bow stringer place the dimpled saddle of the stringer over the upper limb and below the bowstring loop. Slide the dimpled saddle of the stringer along the upper limb of the bow and locate it directly behind the upper string loop.
- d. While holding the bow by the handle around the grip with one hand (if using the saddle type stringer) position the dimpled saddle with the other hand.

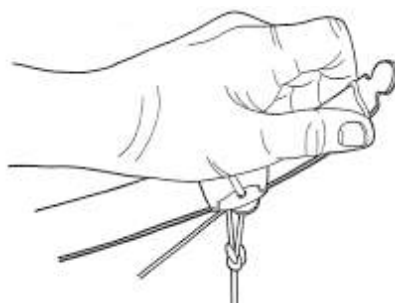
Allow the cord of the stringer to touch the ground and place the ball of **one or preferably both feet** onto the cord. Under no circumstances should the cord be located under the arch of the foot, as this will allow the cord to slip when the tension is taken up. It is recommended that children use both feet.



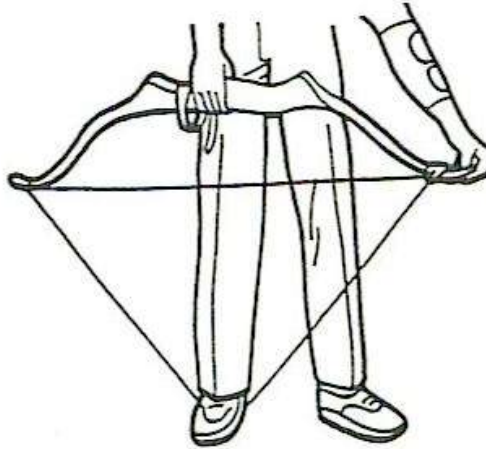
- e. Take up the slack in the cord and place the thumb and index finger of your free hand on each edge of the bow limb located just behind the string loop and take up the slack in the bow string.



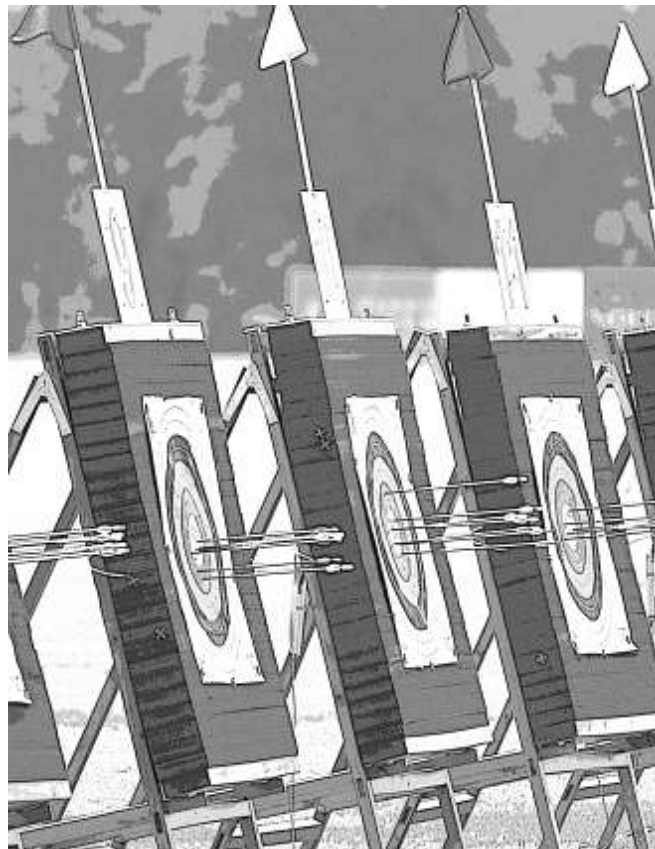
- f. In one action draw up using the hand holding the bow. This causes the limbs to bend downwards. At the same time, slide the string up the limb with the other hand until it engages with the string nock.



- g.** Using your finger, check that the string is seated correctly in the bow nock.



- h.** Step off the cord and, at arm's length, rotate the bow, string away from the body and parallel to the ground. Inspect the upper limb nock to check that the bowstring is correctly seated in the nock groove.
- i.** If correct, remove the bow stringer and check that the lower string loop has not moved and is still seated correctly.
- j.** Now check the brace height and nocking point height before shooting.



## SECTION 24

# REMOVING ARROWS

During a class the instructor should provide instruction as to how to correctly remove arrows from the target butt.

The use of the correct technique in removing arrows from the target butt is very important as it prevents damage to arrows such as bending, and damage to the target face, as well as reducing fatigue to the archer caused by struggling when attempting to remove arrows. The technique is quick and simple, requiring little effort on the part of the archer. The technique incorporates the use of the archer's weight and natural levers.

Grasp the arrow shaft with one hand as close as possible to the entry point into the target. The other hand is held flat against the target with the shaft between the thumb and index finger. This helps to support the target butt when withdrawing the arrow.



Now withdraw the arrow with a slight twisting motion along the line of entry into the target butt, remembering to support the target with your other hand.

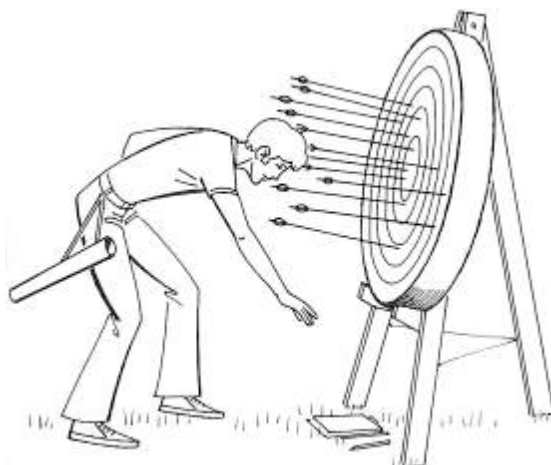
Some butts are very tight and it may be necessary to lean the body against the butt and use both hands gripping the arrow shaft at the point of entry to remove the arrow. In this case the archer rests their forearm against the butt and uses their elbow as a lever to exert additional force onto the arrow. It may even be necessary for two archers to work together to remove arrows.

The important point is to remember to support the target butt to ensure it does not pull forward when withdrawing arrows. Never hold the arrow along the shaft or at the fletched end of the arrow; this may cause the arrow to bend, but most importantly, you will not be able to exert enough force to easily remove the arrows from the target butt.

### SAFETY

Removing arrows is where the majority of injuries happen in archery.

1. Never run towards the target.
2. When approaching the target, walk to the side of the target to avoid any arrows in the ground or the arrows protruding from the target.
3. When scoring beware of arrows protruding from the target butt.
4. Ensure no one is standing in line with the arrows when they are being withdrawn from the target butt.



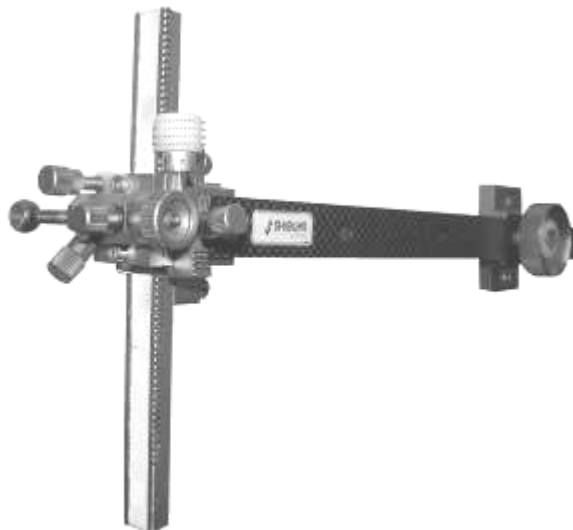
## SECTION 25 BOW SIGHTS

Bow sights come in a variety of designs; simple sights for beginners bows to precision engineered sights for competition bows.

Strict rules govern the use of bow sights, the type of sight pin and accessories that can be used. Recurve bows can only use standard sight pins, while on compound bows you may use a magnifying scope sight fitted with a bubble level to assist in keeping the bow vertical.

It does not matter what type of sight is being used, the same principles apply when making adjustments and it's quite simple. To make adjustments and change where arrows are landing, simply move the sight pin in the direction of the error (the arrow). For example, if an arrow is going low the sight pin is moved down, if the arrows are going to the right the sight pin is moved to the right.

Bow sights usually come with graduated scales although this scale does not refer to any established distances or settings; it is simply a scale. Sight settings vary depending upon a range of variables such as bow weight, arrow weight and size and where the archer anchors in relation to their eye. Instead of using the scale it is best to place a plain piece of white tape on the sight and directly mark sight marks onto the tape. Sight marks are obtained by shooting arrows at each distance so this gives a range of accurate sight marks that can be used.



**Recurve Bow sight with Standard Sight Pin**



**Compound Bow sight with Scope**

## **INSTRUCTION EQUIPMENT**

For many groups conducting instruction, costs must be a consideration and sights can be an expense that may not be necessary. Simple sights can be made that are quite suitable for instruction from material that is readily available.

The sight is made from tape, felt, foam or similar which is attached to the back of the bow in front of the sight window. Dressmakers pins with large coloured heads are used for the sight pin.

Adjustments are made the same as for any other type of sight.



## SECTION 26

# TARGET FACES AND HOW TO SCORE

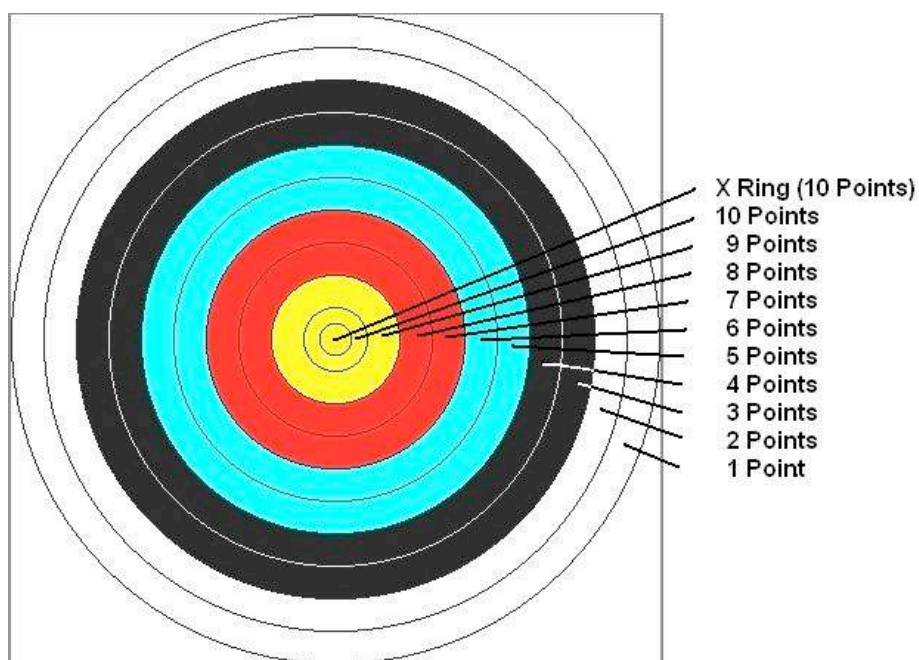
### Target Faces

Although there are a variety of target faces, styles and sizes, outdoor target archery uses coloured targets which are either 122cm or 80cm in diameter.

The target face is attached to the target butts with the centre usually 130cm above the ground. The target butt is also angled back about 10 degrees off vertical.

Target faces are divided into 5 colours: Gold, Red, Blue, Black and White. Each colour is divided into half by a thin line to give ten scoring zones. The scoring values for each colour from the centre out are – 10, 9, 8, 7, 6, 5, 4, 3, 2, and 1. The 10 zone has an additional ring called the X Ring; arrows in the ring still score 10 points but the score is written on the scorecard with an X. The Xs are used to break ties in all events except for Match Play, where ties are only broken after having a single arrow shoot out.

If an arrow misses the scoring zones it is recorded on the scorecard with an M which indicates a miss.



### Scoring

Target archery events are called rounds and these consist of a number of ends at different distances. Either 6 or 3 arrows are shot in an end and there are a specific number of ends shot for each distance. There can be up to 4 distances shot for a round. A round may also see different target face sizes used at different distances.

To score, the archer calls out the value of their arrows in descending order of score for that end, such as 10, 10, 9, 8, 8 and 6. These scores are then written by the scorer onto the scorecard in the area provided. The score total for that end is then added up (i.e. 51) and written in the area provided. If a running progressive total is being used, the end score is then added to the progressive score.

This process is continued until all arrows for the archers on the target are scored; the arrows can then be removed from the target butt. Prior to all arrows being scored, the target face and arrows must not be touched or moved in any way. Under no circumstances should another archer's arrows be withdrawn without their prior consent. During tournaments scoring is usually done by "Double

Scoring"; this is where two score cards are used and two archers on the target score. There should not be any comparing of scores until all scoring has been completed for that end and prior to any arrows being removed from the target butt. If arrows have been removed from the target butt and an error is found, it can not be corrected. The lowest arrow value will stand.

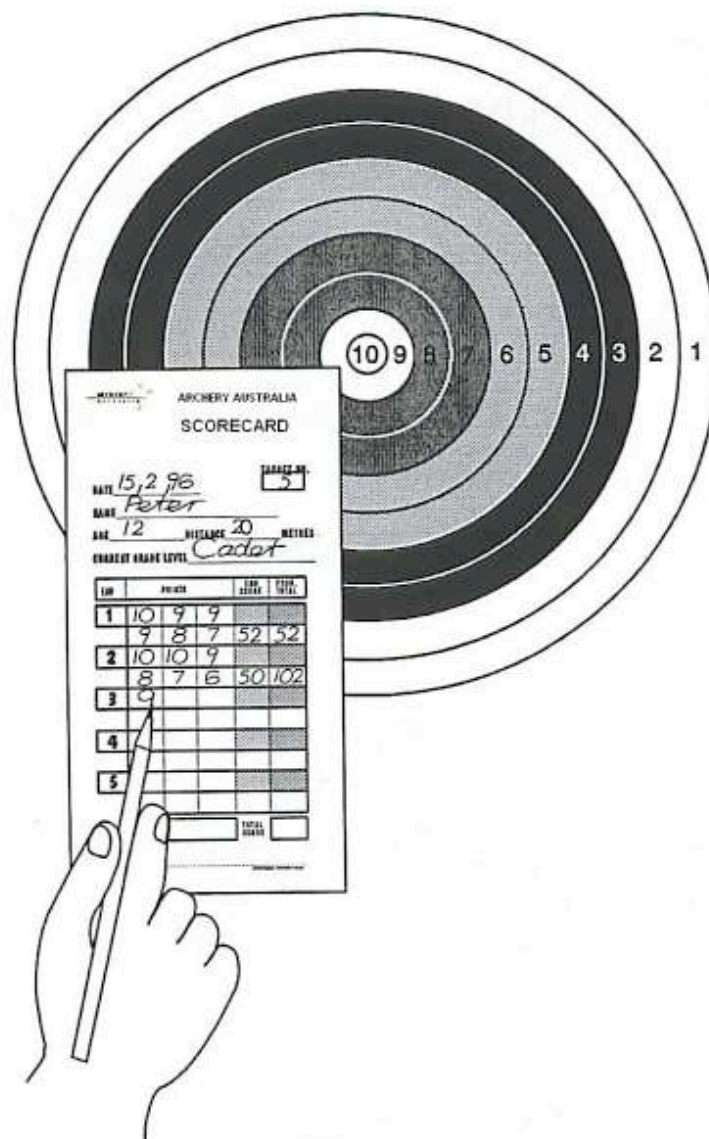
At the completion of the round the archer must sign the scorecard to confirm the value of the arrows. When double scoring the archer should check to confirm that both of the scorecards match; if they don't, the lower score will be used. A witness, usually another archer on the target, must also sign the score to confirm they also agree with the scores.

## SCORING

When conducting instruction over a number of sessions, to keep the students interested, program into either the second or third session the introduction of a simple round and scoring. This allows the student to learn about scoring but also allows them to start and keep a record of their performances.

The round could be 30 arrows at the distance they are shooting. As the session progresses, the distance can be increased.

A sample of the scorecard can be found in Appendix 1 of this manual.



# SECTION 27

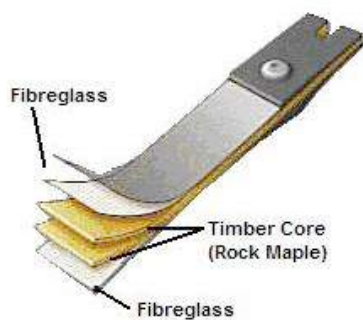
## INTRODUCTION TO ARCHERY EQUIPMENT

### 1. The Recurve Bow

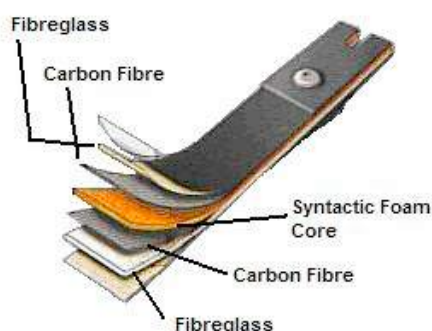
Modern recurve bows are of three-piece (Take down) construction, with limbs made of a composite of wood and fiberglass laminations, or with wood or synthetic, and carbon or carbon-fibre reinforced glass laminations. The riser or handle section can be made of wooden laminations in budget priced bows or cast or machined alloy in the more expensive bows.

#### Limbs

The limbs have a rectangular cross section comprising laminations of different material which gives greater stability and makes it possible to store the energy created during drawing.



**Standard Recurve Limb**



**Carbon Fibre Recurve Limb**

#### Risers or Handles

Risers or handles will in nearly all circumstances have a centreshot design, that is to say the sight window is cut past the centre of the handle. This cutout or sight-window allows the arrow to lie in the direct centre of the handle in direct line with the string path.

The ability to set the arrow in centreshot and to adjust centreshot is critical when attempting to achieve a high degree of accuracy.

#### Bow Length

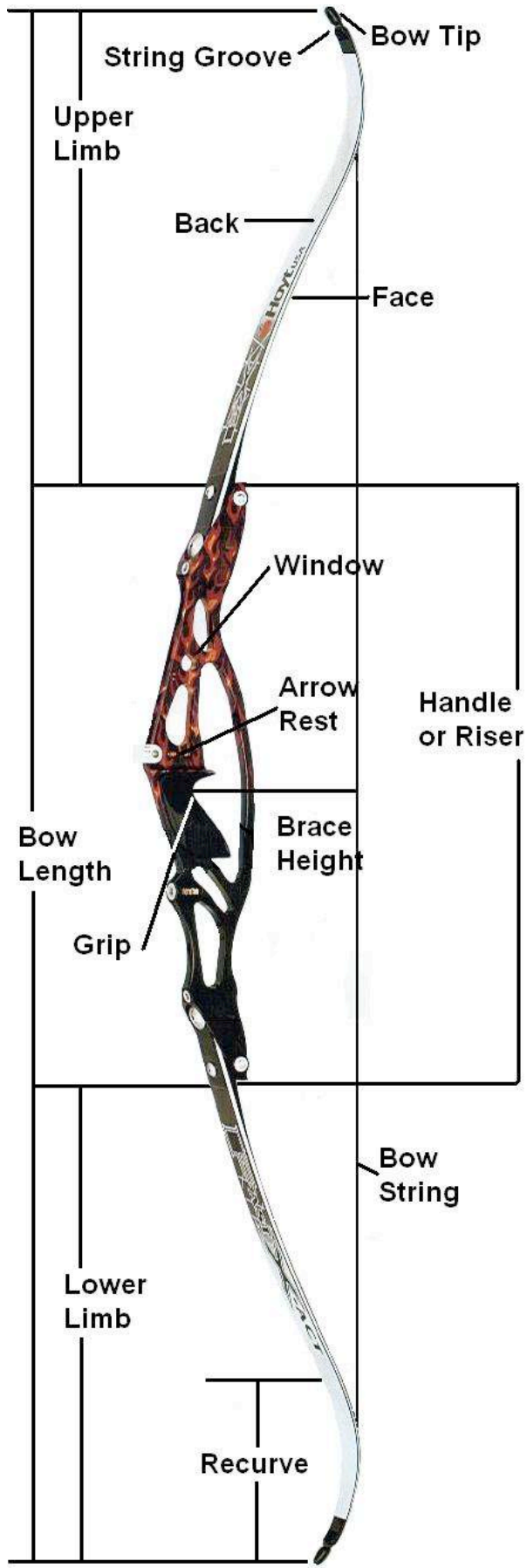
Care must be taken to ensure the archer shoots with a bow which is of an appropriate length for their height and draw. The bow length is measured between the shoulders of the bow nock where the string contacts the bow when it is strung. This measurement is taken with the bow unstrung. When measuring the length of a bow, any riser or handle design shapes must be discounted by taking a line from the end of the limb through the riser or handle. Most bows are marked, usually on the bottom limb, with the bow's length.

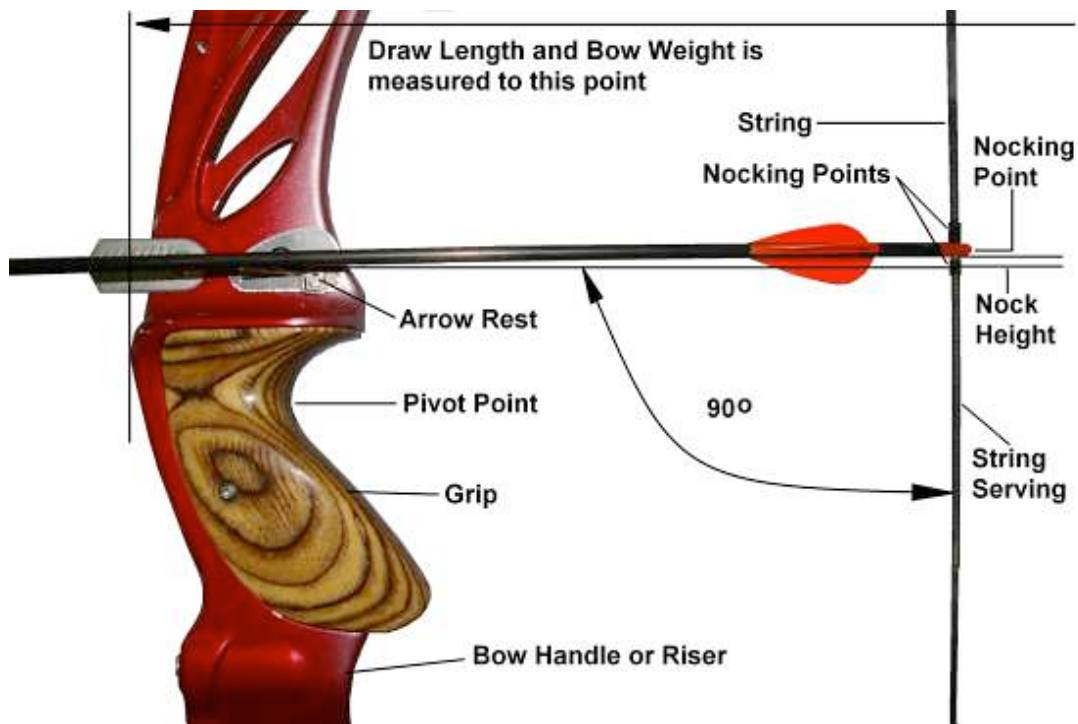
The length of a bow determines, to a large degree, the string angle at the fingers which, if the bow is too short in length will cause too sharp an angle on the fingers. This will produce pinching on the fingers which will result in sore fingers and poor release.

The length of the bow also determines the amount of energy stored in the limbs at a particular draw length. Using a bow that is too long in length will reduce the amount of stored energy and will result in poor performance of the bow.

#### Bow Weight

When teaching, only light draw weight bows should be used. The bow should never be too heavy in draw weight, as this will affect the student's ability to control the bow at full draw and will quickly cause fatigue. As a rule of thumb the bow weights on page 27 should be used for beginners.

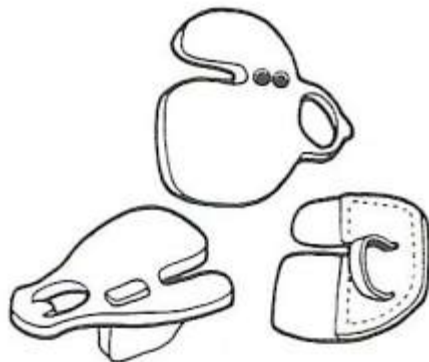




## Accessories

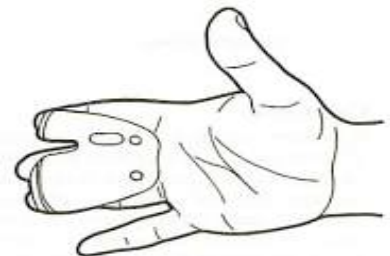
Recurve archers use a number of personal accessories such as Finger Tabs, Plunger Buttons, Kissers Buttons, and Clickers.

**Finger Tabs** are worn on the fingers of the drawing hand to protect the fingers from the string.



**Finger Tabs**

Finger tabs come in a variety of designs and styles. Always use a tab that feels comfortable but also fully covers the three drawing fingers.



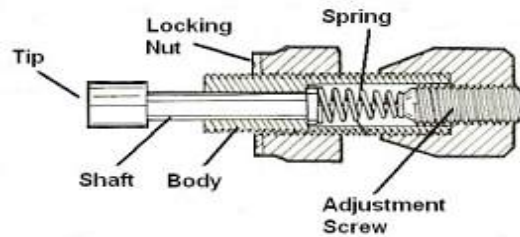
**Finger Tab**

**Kisser Buttons** are fitted to the bow string and are used as a reference point when the bow is drawn to full draw. The kisser button touches a point on the archer's face such as the lips, to indicate a consistent position on the face.



**Kisser Button**

**Plunger Button** is a spring loaded device which screws into the bow with its tip protruding from the arrow rest. The arrow which sits on the arrow rest also sits against the tip of the plunger button. The tension on the spring is adjusted to help achieve clean arrow movement out of the bow upon release. Generally the spring tension is adjusted using Allen keys.

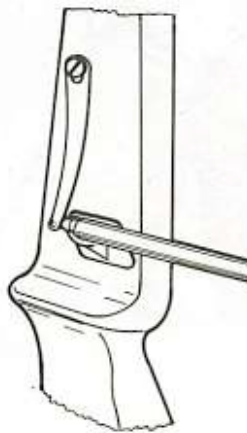


**Plunger Button**



**Arrow rest with Plunger Button tip**

**Clickers** are fitted to the front of the bow window to ensure consistent draw length and also to act as a trigger to assist with the release.



**Clicker**

To use a clicker all arrows must be cut to exactly the same length.

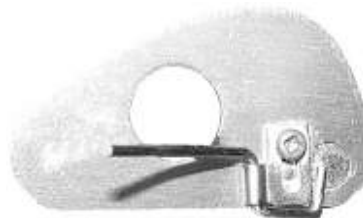
The arrow is placed under the clicker and drawn. When at full draw there should be about 1mm to 2mm of the arrow point under the clicker. The archer sights the bow while maintaining backward tension. When ready to release the archer increases back tension and the arrow comes through the clicker making an audible clicking sound. This is the signal to release the arrow.

The clicker ensures consistent draw length which must be maintained to ensure consistent stored energy from the bow.

### **Arrow Rests**

All recurve bows are fitted with arrow rests. These can be simple as found on instruction equipment or very technical equipment as used by advanced archers.

Arrow rests for recurve bows have a supporting arm to hold the arrow and either a side plate to support the arrow or a hole for the Plunger Button.



**Arrow Rest**

Bows used for instruction should be fitted with a sturdy basic arrow rest. The use of plunger buttons is not recommended.

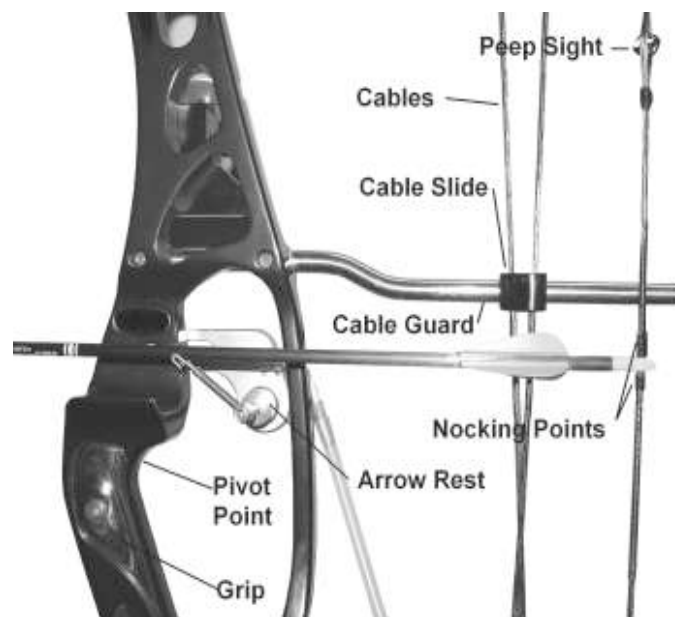
## 2. The Compound Bow

The compound bow is a relatively new bow type which appeared in Australia in the mid 1970's and only gained in popularity in the 1980s. Today, Compound Bows are used for all archery activities and shot in all competitions except for the Olympic Games, which are open currently only to recurve bows.



From an instruction aspect, the compound bow should not be used; ideally only recurve bows should be used. Unlike recurve bows, compounds must be set to the specific draw length of the user and are designed for use with release aids and not the fingers. Most coaches agree that it is easier to instruct with a recurve bow and if the student wishes then they move on to a compound bow.

Setting up the compound bows to the specific draw length of the user can be an involved process and may require the replacement of modules in the wheel or cams, or adjustments to the wheels or cams. These adjustments should only be carried out by experienced coaches or technicians, to ensure the bow is not damaged.



Compound bows usually have a wide bow weight adjustment range (usually 15 lb). This allows a new archer to shoot at a relatively low weight and increase the draw weight as they develop their strength and ability.

Compound bows have wheels or cams fitted to the ends of each limb. The wheels or cams rotate or turn over on their axes when the full power or "Peak Weight" is achieved, which will usually be at about two thirds of the draw length. When the

wheels or cams turn over, "Let Off" is achieved. Modern compound bows have a Let Off, or holding weight, of about 65% of the peak weight. That is to say, a bow with a 50lb peak weight will have a let off, or holding weight, of 16lb.

## Accessories

Compound archers are also allowed to use accessories not permitted with recurve bows. These include the Peep Sight, Scope Sights and Release Aids.



Peep Sight

A **Peep Sight** is a small attachment to the bow string which has a hole through the centre. At full draw, the archer brings the peep sight to the eye and looks through the hole, aligning the string with the front sight and target.

**Scope Sights** have a single magnifying lens and are fitted to the bow sight. Scope sights come in a variety of magnifications depending upon a person's preference and requirements. These sights are also fitted with a spirit level to ensure correct vertical alignment of the bow.



Compound bow sight fitted with Scope Sight



**Release Aids** - Instead of using the fingers to draw and release the arrow, release aids are permitted to be used with compound bows in Freestyle competition.

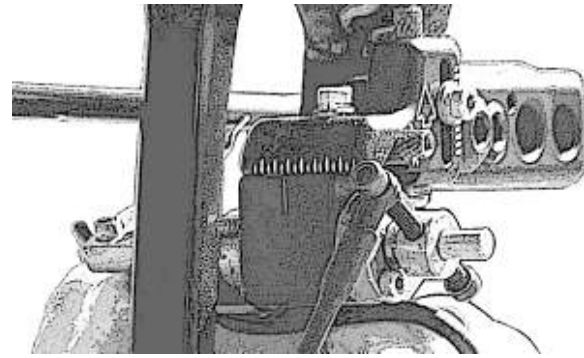
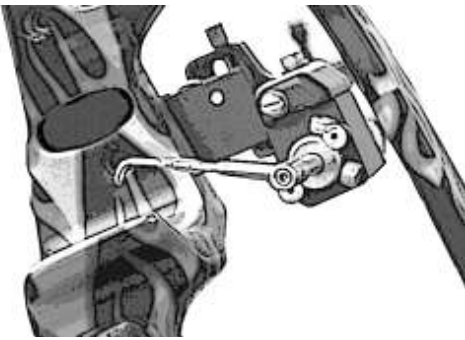


Release aids are a trigger device either worn around the wrist or held in the hand. Usually a rope loop is fitted around the string and attached to the trigger. At full draw, pressure is exerted on the trigger when ready to release and execute the shot.





**Arrow Rests** for compound bows shot with a release aid are different to those for recurve bows. The movement of an arrow shot from a compound arrow rest is up and down as opposed to an arrow shot from a recurve rest which is from side to side.



There are many different designs of arrow rests for compound bows, from the very simple to the very technical. Which one is used is a personal choice.

### **Cable Guards**

Compound bows have Cable Guards fitted; these protrude from the handle or riser. The cables fit behind the cable guard. Cable guards are used to keep the cables under tension and away from the path of the arrow when the bow is shot.

To reduce friction and to prevent wear and flattening of the cables due to the pressure against the cable guard, plastic or Teflon cable guard slide blocks are used. These clip onto the cables and are placed over or against the rod of the cable guard. Dry lubrication may be needed to ensure smooth free movement.

### **Bow Strings/Cables**

There is a variety of string materials used on bows; low quality bows used for instruction only use Dacron while higher quality bows use non stretch materials.

Dacron is very elastic and best suited to the low quality bows, Dacron string also has a long life lasting up to 30,000 shots.

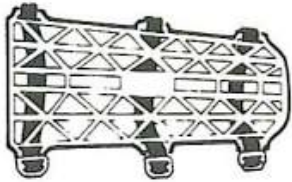
The non stretch string materials, as the name implies, have no or very little stretch. Although giving greater performance and more consistency, they should only be used on bows constructed to take this type of string.

The same string material can be used on both recurve or compound bows, although modern compound bows usually only use the non stretch material. Compound cables are made of the same material as the bow string.

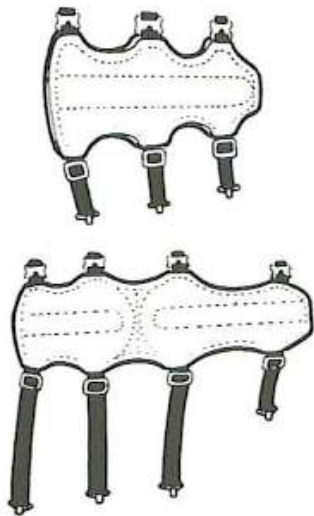


### 3. General Accessories

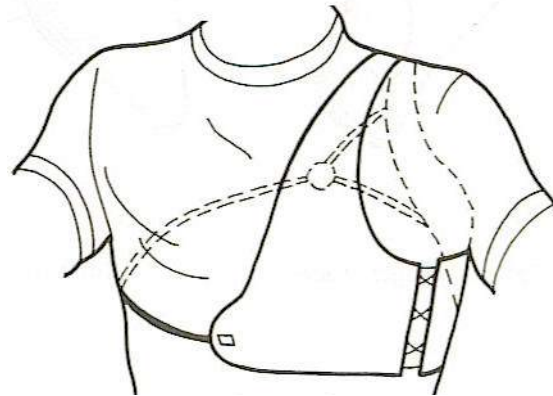
There are a number of accessories that can be used by archers. These accessories provide either protection or assist in the easy storage and carrying of equipment. These accessories include: Armguards, Chest Protectors, Bow or Finger Slings, Quivers and Stabilizers.



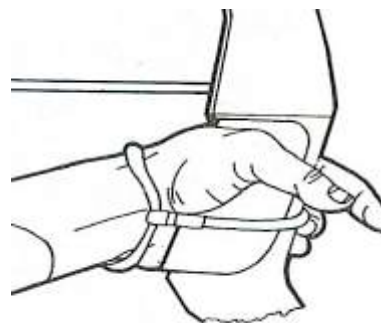
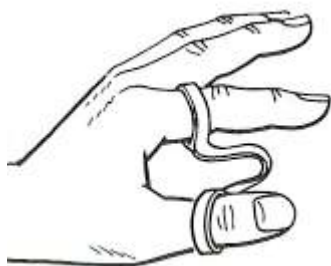
**Armguards** are used to protect the archer's forearm from the bow string. Hitting the forearm is the most common injury in archery. It is mandatory that all students wear armguards for protection.



**Chest Protectors** are used not only to protect the chest from being hit by the string, but in fact to keep loose clothing out of the way of the bow string when at full draw.

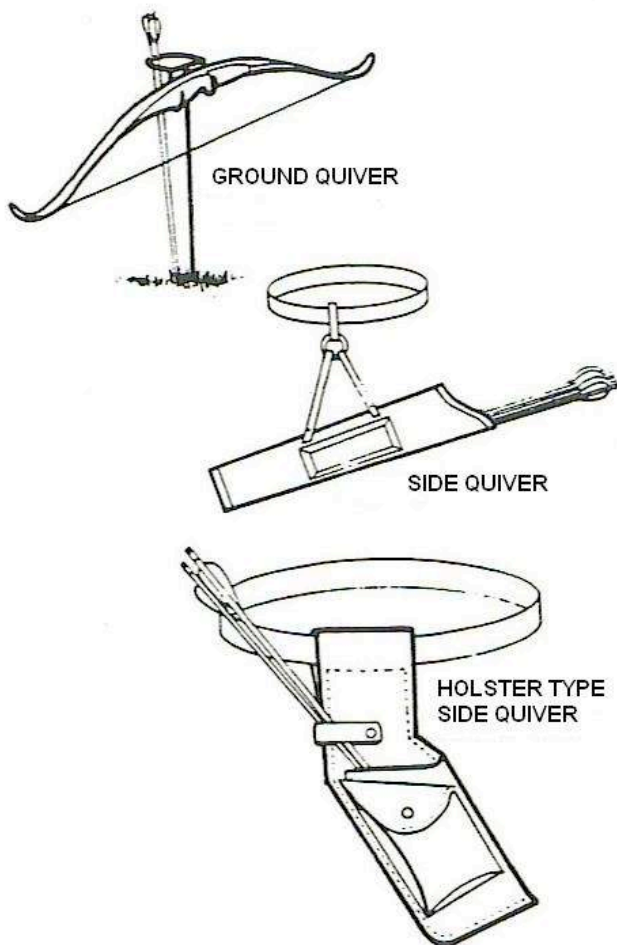


**Finger or Wrist Slings** are designed to prevent the bow's falling to the ground upon release while the archer maintains a loose and relaxed grip on the bow. There are a number of designs and which one to use is a personal choice.



**Quivers** are used to carry the arrows safely and are convenient while shooting. There are three basic types: Ground, side and holster quivers.

**Ground Quivers** are usually used for instruction. They have a point which allows the quiver to be placed in the ground, a hoop for the arrows and a bracket to hold the bow when it is not being shot.



**Side or Belt Quivers** are used by the more experienced archer. The side quiver is the most common. Both quivers fit around the waist using a belt.

The side quiver allows the arrow to sit by the archer's side with the arrows pointing forward. This allows the archer to see the arrows and check for any visible faults prior to their being shot.

**Holster Quivers** sit to the side and are usually used in field archery. The arrows point back behind the archer which is an advantage when walking through bush.

**Stabilizers** are not used during instruction but are commonly used by the more experienced archer. They are usually a long hollow metal or carbon rod attached to the bow handle and extending toward the target. Additional stabilizers can be used which are fitted to the side of the bow. Stabilizers can also be fitted with additional weights at the end of the rod.

Principally, stabilizers are used to balance a bow so that the bow will sit comfortably in the archer's hand. Stabilizers also have the tendency to resist any side to side motion of the bow caused during the release.

More than one stabilizer can be used. The design, material, number, position, length and weight of each stabilizer can be varied according to the archer's personal preference.

Stabilizers also assist in removing vibrations and residual energy from the bow during release. Although most of the stored energy in a bow is transferred to the arrow upon release, residual energy in the form of vibrations can damage the bow, but most importantly, can cause fatigue and may cause long term personal injury.

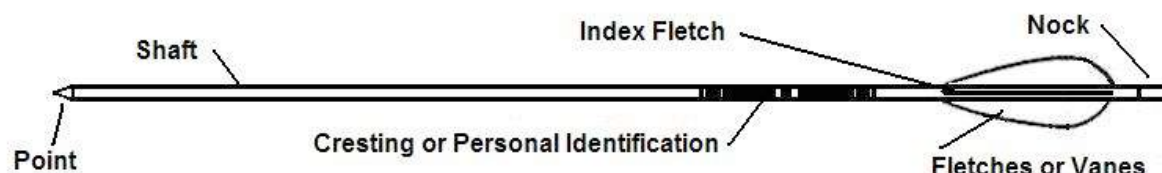
Before a new archer starts to use any stabilizers, the archer must have a consistent style, since stabilization affects the tuning of the bow and the archer must be able to recognise the advantages or disadvantages of different configurations. It should also be recognised that stabilizers add additional weight to the bow so a new archer should not rush into using stabilizers.



# ARROWS

## 1. The Arrow

Arrows have been unchanged in design for centuries, although we have seen significant changes since the 1960s, moving from primarily wooden shafts to aluminium, carbon fibre, and various mixtures of these. They comprise a shaft, a nock at the rear to fit onto the string, a point at the front, and fletches or vanes at the rear to stabilize the arrow's flight.



## 2. Arrow Flex

Following the release, the arrow accelerates very rapidly indeed up to its velocity as it leaves the bow.

The force from the bow is applied to the nock, and the mass of the shaft and point means that the arrow flexes quite markedly as it leaves the bow. It is critical to the arrow's accuracy that it flexes at the correct rate and by the correct amount so that it does not strike the bow as it moves past the riser.

The important aspect of the arrow for this is the frequency at which it flexes, and this depends upon a number of parameters of the arrow, such as its stiffness, mass, point weight and length.

However, the archery world commonly concentrates on just one of these – the arrow's stiffness, which is referred to as its "spine". The "spine" is measured by suspending the arrow between two points, placing a weight on the centre, and measuring the resulting deflection (bend). This was quite sufficient a parameter to measure when just about all archers used Aluminium arrows, but is now somewhat lacking with the diversity of arrows in current use. Nevertheless, "spine" is what is used in just about all cases.

A further term commonly used is the arrow's "dynamic spine" which is used to refer to the arrow's behaviour as it flexes in leaving the bow, as modified by such things as the point weight.

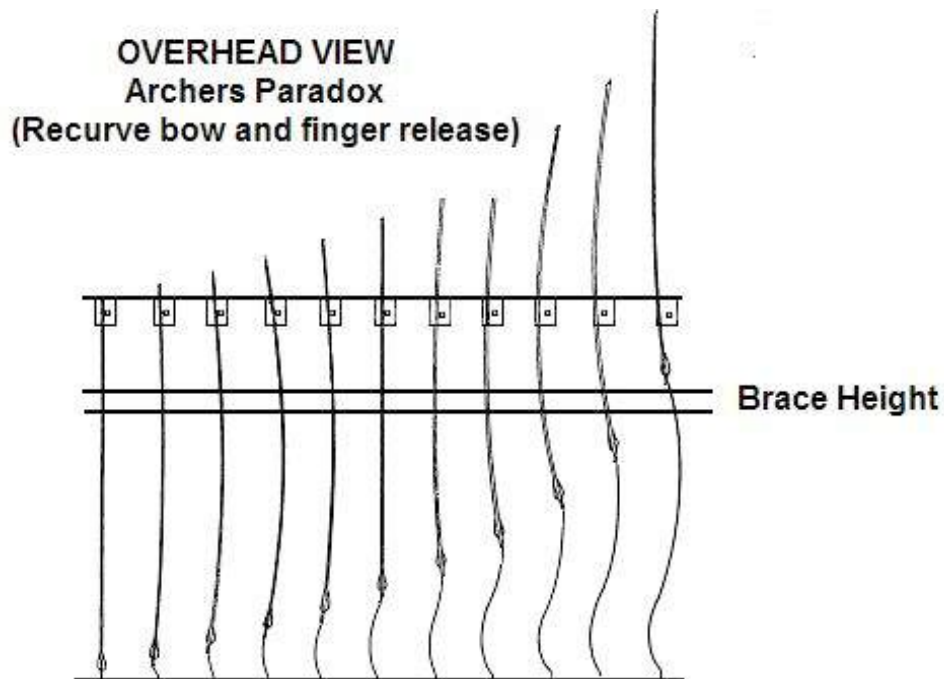
This, however, can be quite a misleading concept (as the shaft's stiffness does not actually change).

In selecting arrows for a new archer, the most reliable approach is to use the arrow selection charts supplied by the major arrow manufacturers, for example in the Aluminium Shaft Size Chart.

ALUMINIUM SHAFT SIZE CHART							
Arrow Length (inches)							
Bow Weight	24	25	26	27	28	29	30
15-20	1413	1416	1516	1518	1616	1618 1713	1716 1813
20-25	1416	1516	1518	1614 1616	1616 1618 1713	1716 1813	1718 1814
25-30	1516	1518	1518 1614	1616 1618 1713	1714 1716 1813	1716 1718 1814	1816 1913
30-35	1516	1518 1614	1616 1618 1713	1618 1714 1716	1716 1718 1814	1816 1913	1818 1914
35-40	1518 1614	1616 1713	1618 1714	1716 1718 1813 1814	1718 1816 1913	1818 1914	1820 1916 2013 2014
40-45	1616	1716 1813	1716 1718 1813	1718 1816 1913	1818 1914	1820 1918 2014 2016	1918 2016
45-50	1618 1714	1716 1813	1718 1814 1816 1913	1818 1914	1818 1916 2013	1820 1918 2014 2016	1920 2114 2016
50-55		1718 1814 1816	1816 1818 1913	1818 1916 2013	1820 1918 2014 1026	1920 2016 2114	2018 2020 2115 2213
55-60		1816 1818	1818 1914 1916	1820 1918 2014 2016 2114	1920 2016 2018 2114 2113	2018 2115 2117 2213	2020 2117 2216

### 3. The archer's paradox

Why must the arrow flex? If the arrow did not flex, it would strike the arrow rest (or launcher for a compound bow) for much of its length as it leaves the bow, significantly disturbing its accuracy. The "archer's paradox" is that, by selecting the arrow appropriately it will bend at just the correct time and by the correct amount that it will pass around the bow without touching it, as shown in the following diagram



### 4. Points

There are many different types of points available but only one type should be used for target archery, "Target Points", although some people use "Field Points". Hunting points are unsuitable for target shooting and should not be used.



Points for Aluminium Arrows



One Piece Point for Carbon Arrows



Point for Carbon Arrows with screw in tip



Field Point

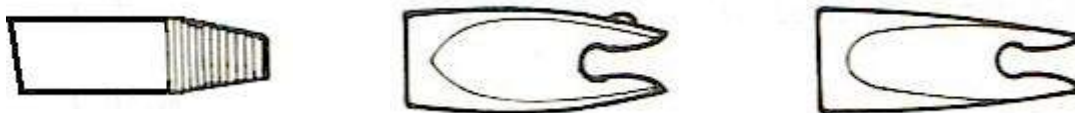


Hunting Point

The flight characteristics of an arrow will be altered by using heavier or lighter weight points, as this will change the flex of the arrow.

## 5. Nocks

There are many different brands of nocks on the market with slight variations in design, but the same principle always applies. Nocks are designed to “Snap” onto the bow string. This ensures arrows do not fall off the string when the bow is being drawn.



**Glue on Nocks**



**Over Nock**

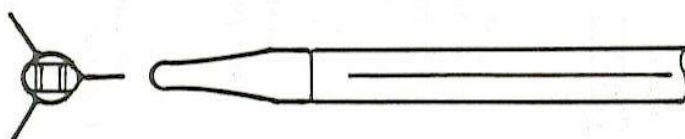


**Insert Nocks**

Care must be taken to ensure the nocks snap onto the string. Check the diameter of the string to ensure the nock fit is not tight or loose. To check correct nock fit, the nock must snap onto the string but be loose enough to freely move up and down the string. The arrow should not fall off the string when the bow is being drawn.

## 6. Fletchings and Vanes

Fletchings or vanes fit to the rear of the arrow shaft and keep the arrow straight in flight by creating controlled drag on the back of the shaft.



Generally, three fletches are fitted to the arrow, symmetrically spaced around the shaft.

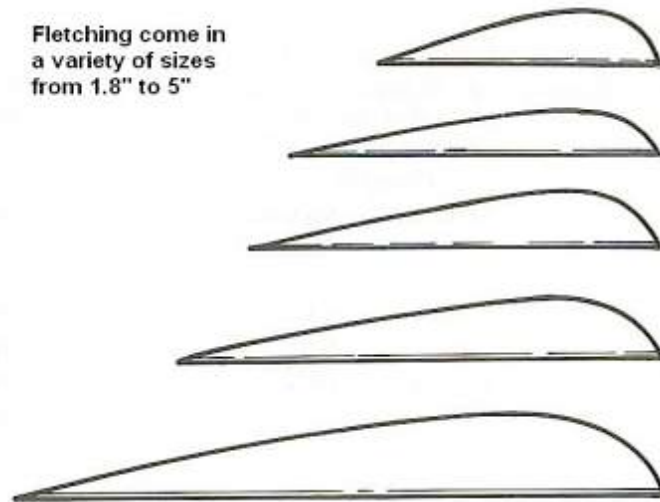
In the past, turkey feathers were used and still are used for some activities, such as Indoor Archery, and by traditional Field archers and hunters. Today, most people use vanes made of “Polyethylene”.

Vanes are more consistent than feathers and have reduced drag over longer distances. Vanes are also more durable and not affected by the elements such as water and most importantly, they retain their shape in flight.

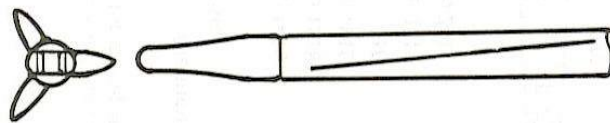
Vanes come in a variety of styles and sizes. The smaller sizes are generally used for outdoor “Target” archery while “Field” archery and hunting tend to use larger Vanes.

The arrows used for "Target" archery only use small points which are flush with the shaft and require little control, unlike the arrows used for "Field" archery or hunting that use much larger points and require greater control.

Fletching come in a variety of sizes from 1.8" to 5"

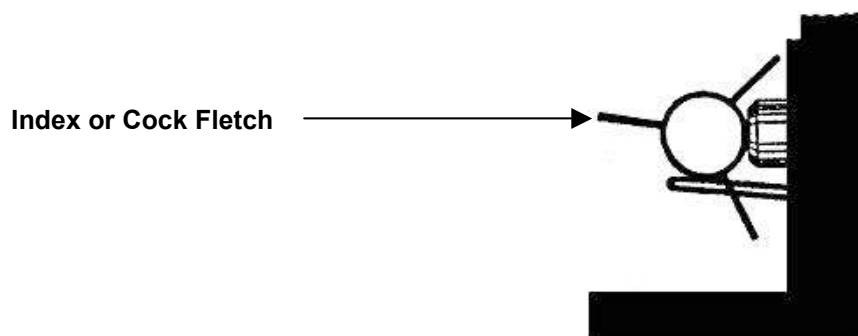


For the experienced archer it is best to have the fletches set at a slight angle on the shaft to allow the arrow to develop a rotation in flight. This rotation helps to stabilise the arrow.



For instruction equipment, this is not necessary, and setting the fletches on the shaft straight is recommended.

To ensure adequate clearance for the fletch as the arrows move forward past the bow, students should be instructed to place the arrow on the string so the "Index" or "Cock" fletch is pointing out from the bow.



**Index fletch points away from the bow (Right Hand)**

## **SECTION 27**

# **EQUIPMENT SET UP and MAINTENANCE**

It is important that equipment to be used for instruction classes is set up correctly and that instructors are able to identify faults and carry out necessary repairs and maintenance.

### **1. The Bow**

The bow is the most important piece of equipment and should be set up correctly and be available to students ready to be used safely.

Prior to each class, the instructor should carry out a visual inspection of the bow, arrows and any other equipment attached to the bow.

Bows should be inspected for

- Cracked or damaged limbs particularly splintered fiberglass.
- Twisted limbs.
- Cracked or damaged bow handle.
- Damaged, worn or broken arrow rests.
- Frayed, damaged or broken strings. Also inspect the serving for damage and wear.
- The nocking points should also be checked to ensure they have not moved or are loose.
- Check the brace height of the bow string against manufacture's specifications.
- Ensure any sight to be used is firmly attached and operational.

### **2. Arrows**

Inspect all arrows to be used during the class. Inspect arrows for the following –

- All sets of arrows are matched, being the same size and length with the same colour nocks and fletches.
- Ensure the arrow shafts are not cracked or split and the shafts are not bent.
- Check to ensure there are no loose or damaged fletches and no broken nocks.

### **3. Venue and Venue Equipment**

It is the instructor's responsibility to check the venue and venue equipment before commencing the class.

#### **Venue Equipment**

- Ensure target stands and butts are in a suitable condition without any excessive wear or damage.
- Ensure the target butts are tied to their stands and the stands are pegged and tied to the ground.

#### **Venue Set Up**

- Ensure there is a safety mound behind the targets or there is an overshoot of 50 meters behind the longest target.



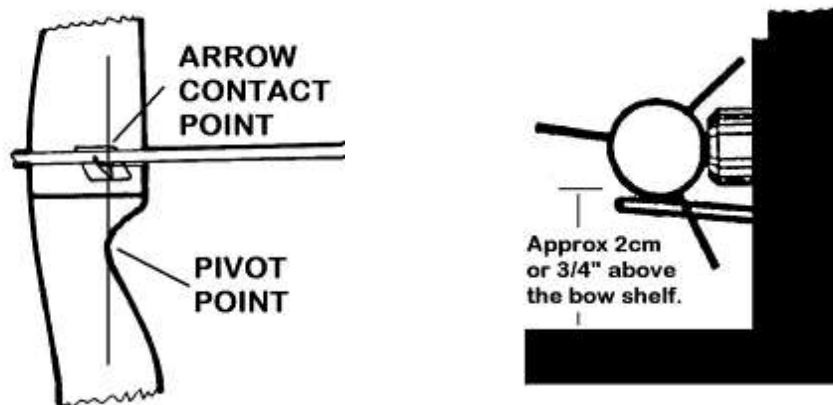
- Ensure there is no vehicle or pedestrian access to the area; if necessary, erect signs and fencing.
- Ideally shooting should be toward the south; if not, take appropriate steps to ensure the sun will not affect the students and cause a hazard.
- Ensure the venue has a common Shooting Line and Waiting Line.
- For the safety and comfort of students, set up the venue providing a minimum of 80cm for each student on the Shooting Line.

#### 4. Arrow Rests

Arrow rests should be fitted to the bow window so the contact point of the arrow on the rest is directly above the “pivot point” of the bow. The arrow should sit about 2cm above the bow shelf.

Always install the arrow rest before installing the “nocking points”.

For instruction equipment it is always a good practice to mark around the rest with a permanent pen to allow for the quick and consistent replacement of damaged or worn rests.



#### 5. Brace Height

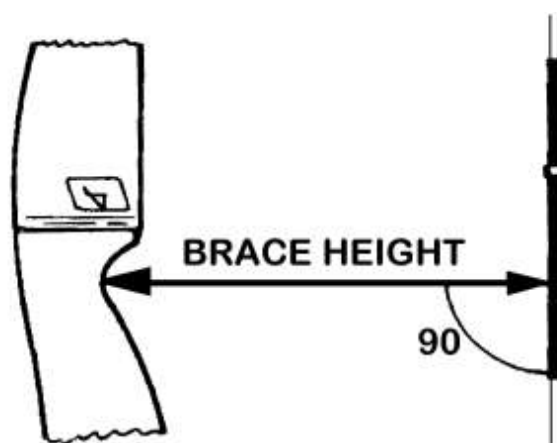
The brace height of recurve bows is measured using a bow square. The brace height is the measurement between pivot point of the bow and the string measured at 90°.

The process for checking and adjusting the brace height is –

- Place the bow square into the pivot point of the bow (the throat or narrow part of the bow grip) and measure the distance to the bow string, keeping the bow square at right angles to the string for this measurement.
- Check the brace height.
- If the brace height is too low (most common) unstring the bow and increase the brace height by putting 5 to 10 turns in to the string in a clockwise direction.
- Restring the bow and recheck the brace height. Repeat this procedure until the minimum recommended brace height is reached. Never put more than 30 to 40 twists into a string. If greater than this number is required, then you will need to replace with a shorter string.
- If the brace height is too high and the string has a large number of twists, you can lower the brace height removing 5 to 10 twists thereby increasing the strings length. If the brace height is too high you will need to replace it with one which is longer.

**NOTE** – As most bows used for instruction use Dacron string, the bow string will need to be initially stretched each time the bow is strung. To do this, string the bow, sit down and place the handle on

your lap with the string up. Stretch out your arms and place your palms on either tip of the bow and push down on the tips. This will stretch the string. Now check the brace height.



Bow manufacturers recommend a brace height for each model and length of bow, but as a guide most bows have the following tolerances in brace height.

<b>62"</b> Bow	73/4 to 81/4	197mm to 210mm
<b>64"</b> Bow	8" to 81/2"	203mm to 216mm
<b>66"</b> Bow	81/4" to 83/4"	210mm to 223mm
<b>68"</b> Bow	81/2" to 9"	216mm to 229mm
<b>70"</b> Bow	83/4" to 91/2"	223mm to 242mm

Another method to determine the appropriate brace height is to measure the length of the bow and divide by 8.

Never use a bow with a brace height lower or higher than the tolerances specified. If you use a low brace height, this can damage the bow but most importantly can cause the string to hit the bow arm around the wrist. A bow with a high brace height can over stress the bow and cause damage.

## 6. Nocking Points

To obtain consistent arrow flight, a point on the bowstring must be found at which the force of the string will act directly along the shaft of the arrow.

For recurve bows nocking points are set above square due to the difference in stiffness between the upper and lower limbs of the bow. Generally this point is about 1/4 (6mm) above 90 degrees to the arrow rest.

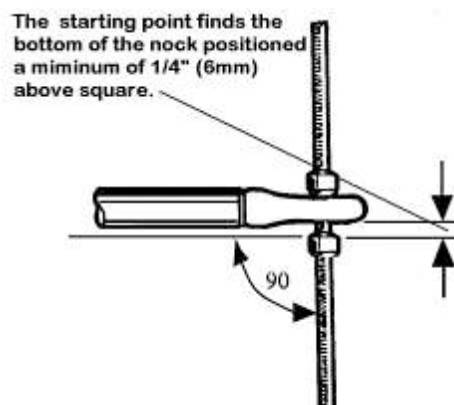
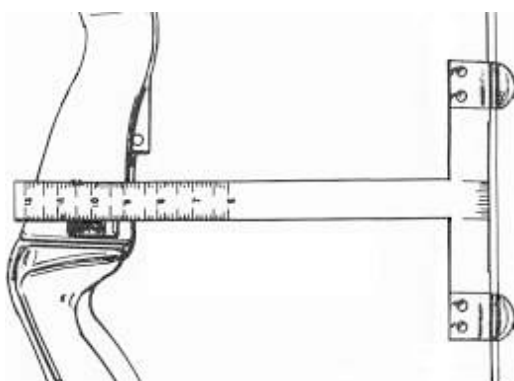
The archer holds the bow in the grip which is generally around centre of the bow with the arrow rest mounted above center of the bow. For this reason the bottom limb is usually heavier than the top limb. So the nocking points are positioned slightly above square to the arrow rest to balance the stresses on the limbs.

If the points are positioned too low the arrow will be forced down on the arrow rest upon release and cause the passage past the bow to be further complicated and cause undue wear on the arrow rest. It is therefore desirable to have a nocking point slightly higher than the arrow rest to avoid interference.

### Setting the Nocking Points

- a. String the bow and set the brace height to within the recommended tolerances.
- b. Place a "Bow Square" onto the string and arrow rest.
- c. Using a marking pen, place a mark on the serving which is about 1/4 or 6mm above square with the arrow rest. This represents the bottom of the arrow nock.

- d. Place an arrow on the string, locating the bottom of the nock on the pen mark and, using the marking pen, make another mark at the top of the nock. This represents where you will place the top nocking point.
- e. Now attach a top nocking point to the string.
- f. Remove the arrow and place a second nocking point onto the string at the square position. This allows for movement of the nock as the string closes up when drawn back to full draw. You do not want the bottom nock making excessive contact with the arrow nock.
- g. It is highly recommended that a top and bottom nocking point is used for all instruction equipment. If you are using only one nocking point, students may become disorientated and place the arrow above the single nocking point, there can be no confusion when using two nocking points.



There are two common types of nocking used in archery, a commercially available product called "Nok Sets" and a tie on type that only requires a length of bowstring serving.

For most instruction classes, the Nok Sets are the best option. They do require a set of special pliers to attach the nocking points to the string and prevent movement.



**Nok Sets**



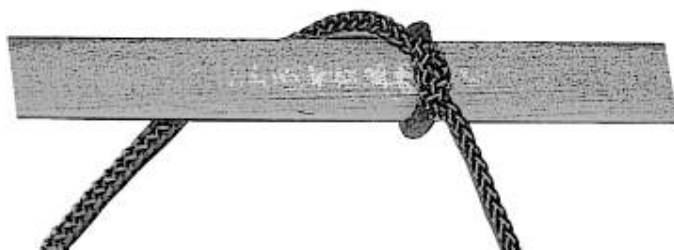
## “TIE ON” NOCKING POINTS

Another method of attaching nocking points is “Tie On” nocking points. These are very popular with experienced archers but work just as well for instruction equipment. They are easy to apply, long lasting and most importantly, don't move when secured.

All that is required is a piece of bowstring serving thread, a knife and matches or a lighter.

The process for attaching “Tie On” nocking points is –

- 1) Cut a piece a bowstring serving about 150mm (6 inches) long. Any bowstring serving will do although Braided Nylon serving works best.
- 2) Mark where you want the nocking point and tie a half hitch knot.



- 3) Then tie another half hitch knot on the other side of the string to the first knot, pull tight.



- 4) Continue to tie half hitch knots opposite to the last on either side of the string until you have tied 6 to 8 knots.



- 5) To finish off tie a hitch knot which is two half hitch braided knots. Finish and seal by melting the serving by using matches or a lighter (*this is why Braided Nylon is best as it melts where other types of serving burn*). If you do not wish to melt the serving to finish you can cut loose ends with a knife and glue.

**WARNING:** Melted nylon is very hot and can burn; care should be taken.

## 7. WAXING THE STRING

To protect the string from wear it should be waxed regularly. Bow string wax can be purchased from Archery Shops or you can make your own.

To make your own wax mix 60% Paraffin Wax (*Surf Board Wax*) and 40% Bees Wax.

To wax a bow string simply rub the wax along the strands of the string, **DO NOT WAX THE SERVING.**

Once you have spread the wax over the string take a small piece of leather about 50mm square and wrap around string and vigorously rub up and down the string heating the wax and working the wax into the strands.

Strings should be waxed regularly, about every two or three weeks.

## 8. CENTRESHOT

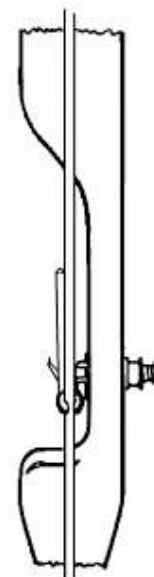
The arrow rest should be set up so the arrow sits in the centreline of the bow. Most modern bows have the sight window cut slightly past centre; this allows the arrows to move cleanly past the bow without interference although if you simply attached a rest the arrow will sit inside centre.

Recurve bows can be fitted with "Plunger Buttons" which allow the centershot to be adjusted. Bows used for instruction usually do not have Plunger Buttons. The arrow sits against the side plate of the arrow rest.

To achieve centershot with basic bows used or instruction, it may be necessary to pack up the back of the arrow rest with double sided tape until centershot is obtained.

To set centreshot -

- 1) Stand the bow up with an arrow on the string and rest.
- 2) Standing in front of the bow line the string down the centre of the bow, it may be necessary to measure centre and mark on the bow limbs. To do this place a piece of tape on the top and bottom limb just above and below the handle. Measure the centre of the bow and mark.
- 3) Lining up the centre lines with the string, observe the position of the arrow point in relationship to the string.
- 4) To achieve centershot, the arrow point should be half to one arrow width outside the bow string.
- 5) This places the arrow slightly outside of centre but establishes a consistent path for the arrow when it is shot.



**RECURVE BOWS  
USUALLY HAVE THE  
ARROW SET  
OUTSIDE OF CENTER**

## 9. Arrows

### Fletching Arrows

Arrows can be purchased pre made or you can make your own from the various parts. To make your own arrows, a fletching jig is required. This is a tool that holds the arrow in place while fletches are glued onto the shaft. Fletches are held in a clamp for ease and the arrow can be rotated to ensure even spacing of the fletches around the arrow shaft.



**To make arrows or carry out repairs you will need a fletching jig.**

### Making and Repairing Arrows.

Making your own arrows can save money; arrow making materials can be purchased from Archery Equipment Shops. Maintenance of equipment is also an ongoing part of conducting archery instruction.

Every instructor should have the skills and knowledge to make arrows and replace fletches.

Before you start you need to get to know your "Fletching Jig". There are many different designs on the market, some very simple while others are very elaborate. Most attach one fletch at a time although some can do 3 or 6 arrows at once.

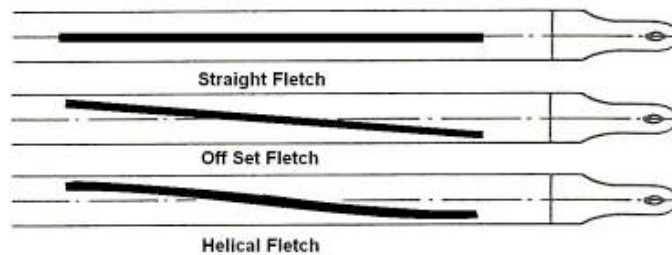
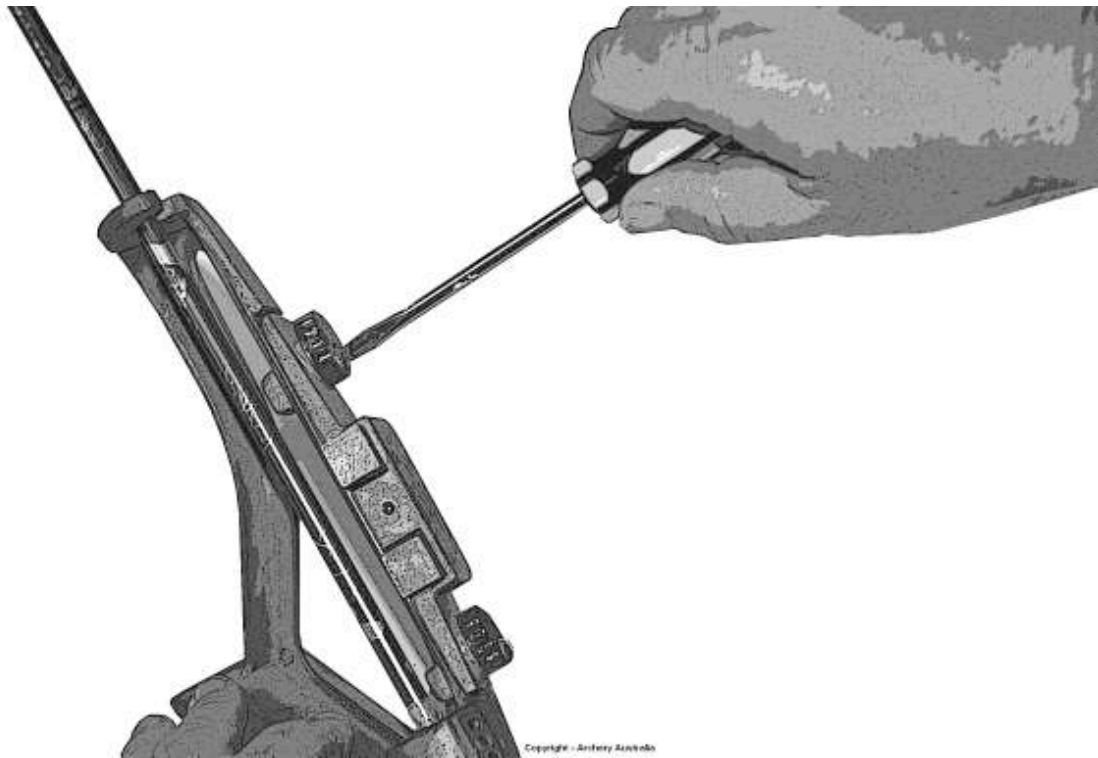
It does not matter what style or brand you use, the principles are the same.

The jig is a frame that holds the arrow shaft, the nock fits into an indexed nock holder which can be rotated to allow fletches to be evenly spaced around the shaft.

The fletch is held in place by a clamp, the clamp attaches to the jig with slots or magnet fittings. Either way the principle is the same. The clamp is held in place on the shaft to allow the glue to dry.

Most fletching jigs are adjustable to allow the fletch to be glued either "Straight" or "Off Set". Some brands of fletching jigs also have available "Helical Clamps" which glue the fletch on with a twist.

Fletches attached either Off Set or Helical have an increased rotation when in flight, assisting in keeping the arrow straight over long distances.



## ATTACHING FLETCHES

- 1) Attach the nock to the arrow shaft using the instruction provided in this manual if using aluminium arrows.
- 2) Before gluing fletches to the shaft you need to clean the shaft to remove any oil, grease or wax. Using a white unscented paper towel (*Note – Do not use printed, scented or coloured paper or a piece of cloth as these may contain oil residue from printing, scenting, colouring or washing which can be transferred to the shaft*) scrub the end of the shaft using an oil free solvent such as “Acetone”. Care should be taken when fletching Carbon arrows as Acetone may damage the shaft. In this case you can use “Rubbing Alcohol” or “Ajax” cleaner.

**Note – Do not use nail polish remover which is Acetone because it contains oils which are designed to prevent the skin from drying out. (Acetone is not the best for Carbon Arrows)**

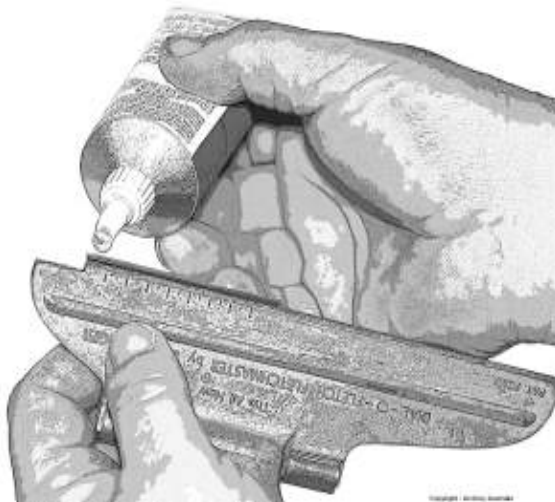


When the shaft is clean, place it into the fetching jig with the indexed nock holder set in the index fletch position.

- 3) Some brands of fletches need to have the base cleaned with a solvent such as Acetone to remove oil or grease or mould release agent left over from the manufacturing process (refer to manufacturer's instruction which are usually printed on the packaging). Place the fletch in the clamp and using a white paper towel and a solvent, wash the base of the fletch.

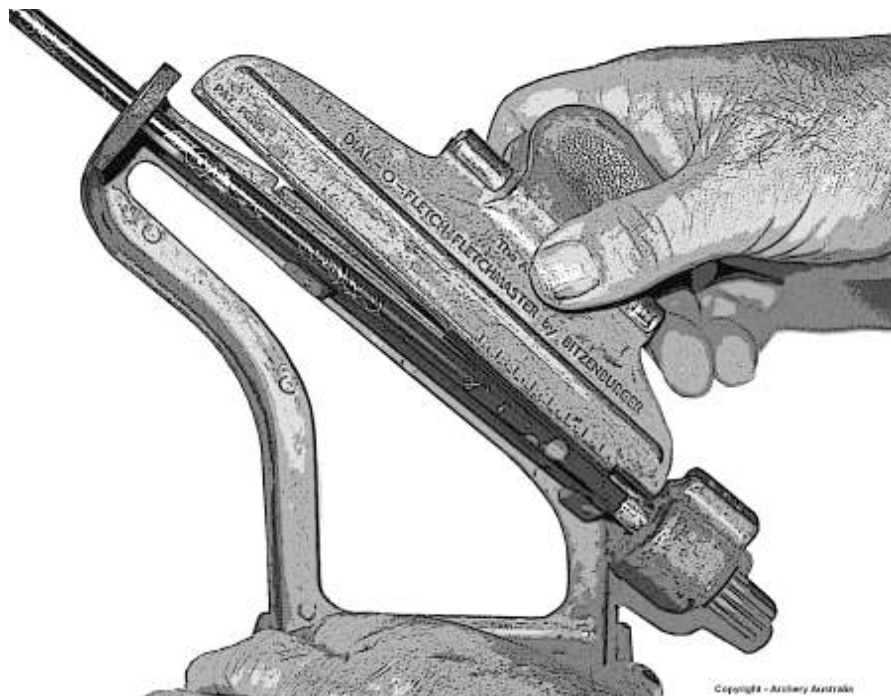


- 4) When the solvent is dry run a thin line of glue along the base of the fletch. Don't use large amounts of glue; only a thin line is required.

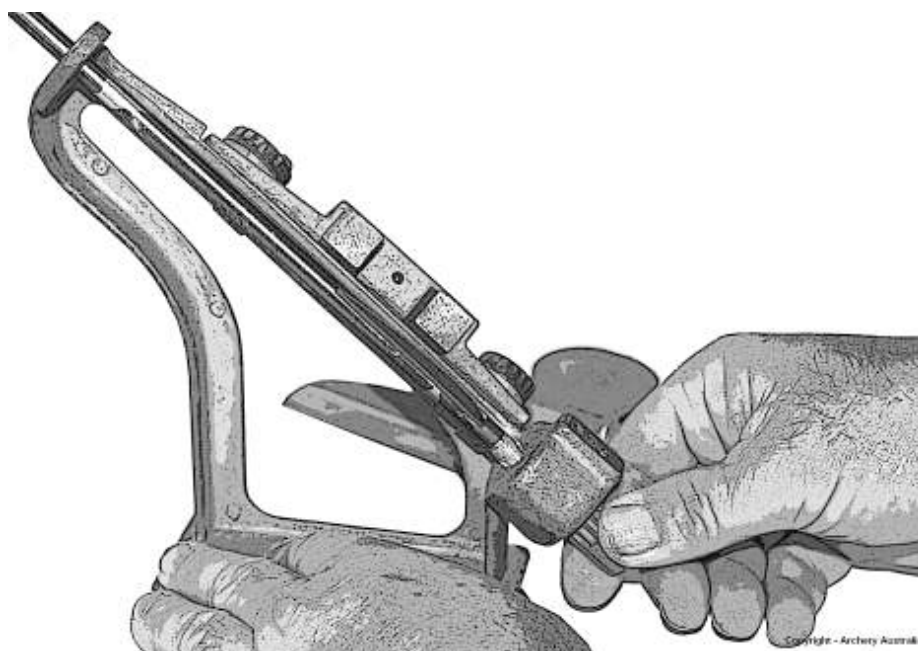




- 5) Place the clamp on the jig and locate onto the arrow shaft. For best results, make initial contact with the rear of the shaft and slowly push the clamp down as you move forward. This will force any air out and help spread the glue.



- 6) Wait until the required time for the glue to dry (refer manufacturer specifications) and remove clamp.
- 7) Turn nock holder to next location and repeat process for the second and third fletch.



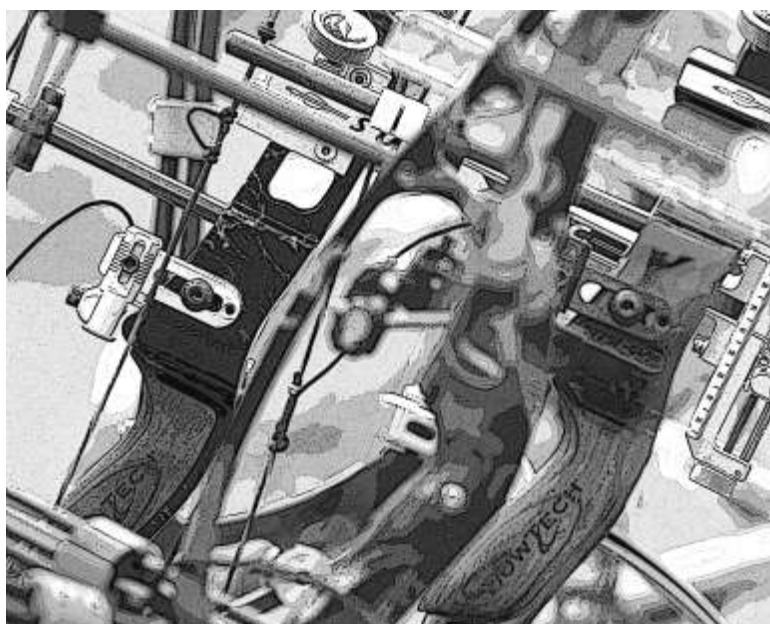
- 8) When all three fletches have been attached, remove arrow from jig and place a small amount of glue on the end of each fletch for added strength, this is called Tip and Tail.



- 9) Repeat process for all arrows.

#### Helpful Hints

- 1) For aluminium arrows always use fletching cement such as "Arrow Mate" or "Fletch Tite". You can use "Super Glue" but it is not as good as specific fletching glue on aluminium shafts.
- 2) For "Carbon" and "Fibreglass" arrows, "Super Glue" works best. "Super Glue Gel" works better than standard Super Glue as it is thicker and does not run as much, although it takes slightly longer to dry.
- 3) When using "Super Glue" it is usually not necessary to wash the base of the fletch with solvent but check manufacturers comments supplied with the packaging.



## ATTACHING NOCKS

Nocks attach to the end of arrows by either gluing the nock onto a taper at the end of the shaft or by inserting the nock onto the end of the arrow tube.



**Glue on Nocks**



**Insert Nocks**

Aluminium arrows usually take glue on type nocks. It is important that instructors understand the process of removing damaged nocks and replacing with new nocks.

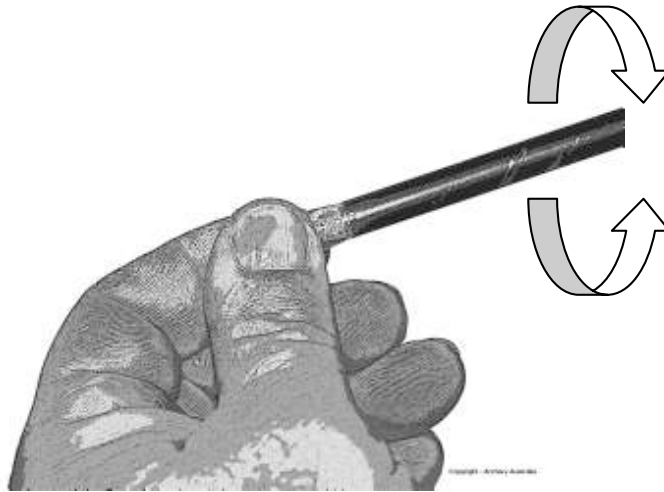
Attaching nocks is a simple process but it is critical for accuracy that it is carried out correctly.

- 1) Using an oil free solvent such as Acetone remove any damaged nock from the aluminium taper. Never use a knife or blade as this can damage the taper. Use the solvent and a paper towel to melt and remove glue and residue plastic. If making new arrows wash any oil or grease from the taper using Acetone and a paper towel.
- 2) Using appropriate glue for nocks such as Arrow Mate, place a small amount of glue on the nock taper of the shaft as in Diagram 1. **NOTE: Glues such as Fletch Tite, Super Glue and Araldite are not suitable for nocks.**



**Diagram 1**

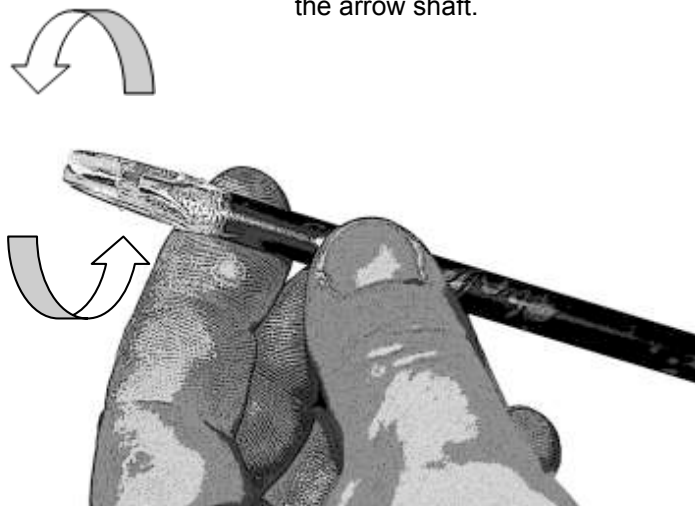
- 3) Do not use a large amount of glue as this can cause the nock to float on the taper and the nock will not be straight.
- 4) Firmly push the nock onto the arrow. Gripping the nock with the thumb and first finger rotate the nock as in Diagram 2 two or three times to spread the glue around the taper. This also allows the course aluminium taper to bite into the nock and give a better hold.



**Diagram 2**

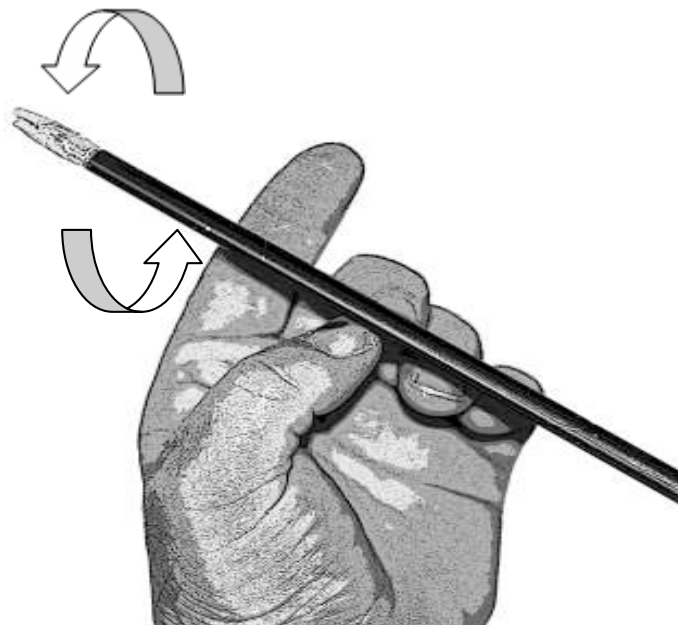
- 5) With rotating

your finger, remove any excess glue as in Diagram 3 by the arrow shaft.



**Diagram 3**

- 6) Spin the arrow between your thumb and index finger as in Diagram 4 observing that the nock is straight. Stand the arrow upright until the glue is dry which should be approximately 15 minutes.



## Diagram 4

## INSTALLING AND REMOVING POINTS

### Installing Points into Aluminium Arrows

Aluminium arrows come with insert points, which are usually installed using hot melt cement. The process for installing points is –

- 1) Clean the inside of the shaft with solvent to remove oil and grease or metal dust residue from cutting. Allow the solvent to dry.
- 2) Using a small gas flame, heat the end of a hot melt cement stick and the end of the shaft to melt the hot melt cement to the inside of the shaft. **CAUTION: Do not overheat aluminium tube.**
- 3) Push the point into the shaft about 6mm.
- 4) Heat the hot melt cement and the exposed portion of the shank of the point; apply a small layer of hot melt to the shank of the point.
- 5) Ensure the hot melt is fluid and slowly push the point into the shaft until it seats against the end of the shaft. Wipe off excess adhesive.

**NOTE – Do not overheat aluminium shafts or points. Excessive heat over 200°C (400°F) will cause recrystallisation and permanent damage to the aluminium tube.**

### Removing Points from Aluminium Arrows

To remove points from aluminium arrows –

- 1) Lightly heat the exposed end of the point over a small gas flame. **CAUTION: Do not overheat.**
- 2) Grip the tip of the point with a pair of pliers.
- 3) Twist and pull out the point.
- 4) If the point can not be removed, reheat again for a few seconds and try to remove point again. Repeat if necessary, until adhesive becomes soft enough to remove point.

**NOTE – Do not overheat aluminium shafts or points. Excessive heat over 200°C (400°F) will cause recrystallisation and permanent damage to the aluminium tube**

### Installing Points into Aluminium/Carbon Arrows

Usually points are fitted to Aluminium/Carbon arrows using hot melt cement. Care must be taken as Aluminium/Carbon arrows will not accept as much heat as aluminium shafts. As a test, if you can not hold the heated point in your fingers it is too hot. The process for installing points is –

- 1) Clean the inside of the shaft with solvent to remove oil and grease or metal dust residue from cutting. Allow the solvent to dry.
- 2) Using a small gas flame, apply heat to the end of a hot melt cement stick and apply hot melt cement to the inside of the shaft. **CAUTION: Do not apply heat directly to the shaft; this will damage the carbon shaft.**
- 3) Hold the end of the point with your fingers (not pliers). This will prevent accidental heating of the point.
- 4) Heat the shank of the point until you can feel it getting warm and completely apply hot melt cement to the shank.

- 5) Reheat the hot melt if necessary, without delay, slowly push the point into the shaft until it seats against the end of the shaft. Wipe off excess adhesive while still hot.

**NOTE – If the point becomes too hot to hold in your fingers, it is too hot to put in the shaft. Overheating Aluminium/carbon arrows shafts can destroy the carbon fibre/epoxy matrix.**

#### **Removing Points from Aluminium/carbon Arrows**

To remove points from Aluminium/carbon arrows –

- 1) Lightly heat the exposed end of the point over a small gas flame. **CAUTION: Do not overheat or apply heat directly to the shaft; this will damage the carbon shaft.**
- 2) When you feel the shaft is warm under your fingers grip the tip of the point with a pair of pliers.
- 3) Twist and pull out the point.
- 4) If the point does not move, continue to heat the point in 5 second increments and twist the point with pliers after each heating period until it rotates and can be pulled free from the shaft.

#### **Installing Points into All Carbon Arrows**

The use of hot melt adhesive is not recommended for all carbon shafts. Ideally two part epoxy glue is recommended. Hot melt adhesive can be used, but extreme care must be taken not to allow heat to the shaft which will damage the carbon fibre/epoxy matrix.

- 1) Clean the inside of the shaft with solvent to remove oil and grease or metal dust residue from cutting. Allow the solvent to dry until.
- 6) Place as small ring of two part epoxy glue into the end of the shaft.
- 7) Push the point into the shaft about 6mm.
- 8) Apply epoxy glue to the exposed portion of the shank of the point. Do not use too much glue as this can add undesirable weight to the point.
- 9) Rotate the point as pushing into shaft, to ensure it is evenly covered with the glue.
- 10) Wipe off excess adhesive and stand up shaft on the point end, in a vertical position. Allow epoxy glue to fully cure before use. This may take up to 24 hours.

#### **Removing Points from All Carbon Arrows**

If you have used epoxy glue to attached points they can not be removed and are permanent. If you have used hot melt adhesive they can be used following the same method as Aluminium/Carbon arrows but extreme care must be taken not to heat the shaft as this will destroy the carbon fibre/epoxy matrix.

## 10. Bow Strings

Bow strings can be purchased from most archery dealers or you can learn to make your own. At some stage it will be necessary to repair a string which usually involves replacing the serving (usually the centre serving) on bow strings.

To do this you will require a "Serving Jig" and a spool of serving thread. Serving thread comes in a variety of types from standard nylon serving to high tech non stretch material. For beginner's bows, the best material is standard nylon serving size 4.

To replace the centre serving firstly remove the nocking points and the old serving. Using a pen, mark the position of the old serving, then using a sharp knife carefully remove the current serving from the string.

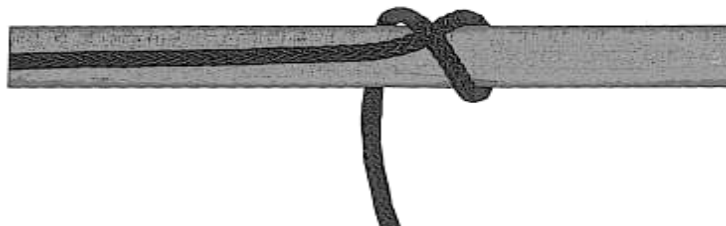


**String Serving Jig**

To make a string you will require a string jig. Full instructions for string making can be found on the Archery Australia website [www.archery.org.au](http://www.archery.org.au)

**STEP 1:** To commence lay an end of serving along the string. Wind the serving thread so it starts to cover the end that has been laid along the string.

### STEP 1





**STEP 2:** After about 6 to 10 rotations over the serving laid along the string tighten up the serving tool and begin to serve along the string. You can vary the tension on the string by adjusting the tension on the serving tool. To reduce the risk of the serving moving, serve over the piece of serving you have laid along the string.

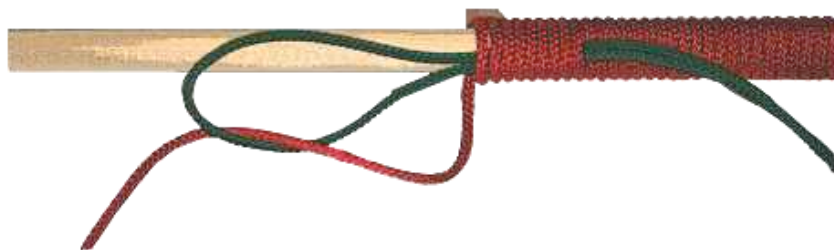


Continue to serve along the string until about 1 cm from the pen mark you have placed on the string.

It is now time to finish off the serving. There are two methods of finishing serving –

#### **METHOD 1**

**STEP 1** - Lay a loop of serving thread along the string and serving over it about 8 to 10 rotations.



**STEP 2** - Holding the serving tight cut a length of serving about 150mm long and insert the loose end through the loop and pull the loop and serving through and under the serving pulling the loop and serving out.



**STEP 3** - Pull tight and cut off excess serving. If required, apply glue for extra strength.



## METHOD 2

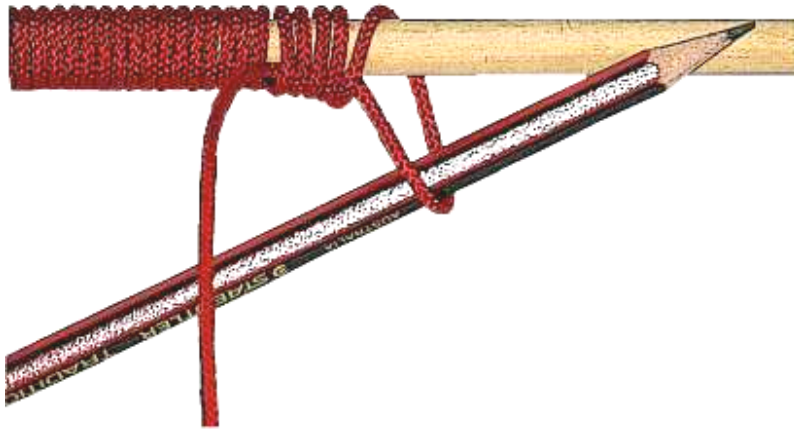
**STEP 1** - Hold the end of the serving tight. Reposition the serving jig and serve in the opposite direction about 8 to 10 rotations creating a large loop with the serving.



**STEP 2** - Wind the thread from the big loop around the string to continue serving. As you do this, the serving you bound opposite to the main serving will unwind.



**STEP 3** - When you have completed the winding over the serving the 8 to 10 rotations pull the end of thread through and under the serving to taking up slack of the loop.



**NOTE** – As the loop is pulled through it may twist and knot. To prevent this use a pencil or similar to control the flow of the thread under the serving.

**STEP 4** - Pull tight and cut off excess serving. If required apply glue for extra strength.



## SECTION 29

# PLANNING A BEGINNERS COURSE

The four essentials needed for an instruction course are:

- Students
- Instructor/s
- Venue
- Equipment

### Students

Once people express an interest in taking lessons, it is important to maintain their interest by organising a course as soon as possible. If possible, have no more than five students to each instructor. When a large number of people are interested in taking lessons, divide them into groups of similar age to facilitate teaching.

### The Instructor

An instructor organising an instruction course, perhaps with the assistance of other instructors must, before the actual lessons start, do some groundwork to ensure the course will run smoothly by:

- Notifying applicants when the course is to start, what time, where, what to wear (loose clothing is not advisable, long hair to be tied back) and what to do in case of poor weather.
- Preparing lecture notes, instructional aids, allocating responsibilities and rehearsing lessons.

It is very important that there be good interaction between the club secretary (the initial contact with applicants) and the club instructor/s so that there is an instructor ready to meet the beginners as they arrive at the venue.

### Venue

The usual venue would be a club ground. An instruction class should not interfere with the shooting calendar of the club. There should be sufficient clear space beside and behind the beginner's target for safety. Have an alternative venue available for use in case of an emergency.

### Equipment

Prepare lecture notes and other instructional aids.  
Provide nametags for the beginners and the instructors.  
Make sure that there is sufficient equipment available.

A guide to select bows of suitable draw-weight for beginners would be:

Men	15-20lb	Women	12-20lb,
Juniors 13-18	12-20lb	Junior under 13	10-15lb

There must be a sufficient assortment of arrow sets available to suit the beginners, arm guards, finger tabs, sights or pins fitted to the bows, chest protectors, finger or bow slings and ground quivers.

Plan to issue equipment as quickly as possible.

Finalise any payments before commencement of the class. After delivering safety and basic theory to the students issue equipment and move the students quickly onto the field and shooting.

# SECTION 30

## EXAMPLE COURSE AND LESSON PLAN

### “Come N Try” Course

Archery Come N Try is designed to be a quick (usually one off) archery instruction session. They are conducted between 1 hour and 2 hours and provide students with an introduction to the sport.

It has been found that a lot of people are interested in archery and before undertaking an extensive instruction course want to simply have a try.

Other groups, like schools, camps and resorts require a simple basic course to provide archery as an activity to students or customers.

The Archery “Come N Try” course is designed for just these purposes.

A typical lesson plan for an Archery “Come N Try” course can be –

Activity	Comments
<b>Introduction and Welcome</b> Safety	Time – 5 to 10 minutes
<b>Issuing Equipment</b> Eye Dominance Draw Length	Issue equipment
<b>Shooting Technique</b> Demonstrate and detail the Ten Steps	Time – 5 minutes
<b>Introduce Shooting to Students</b> One student at a time	Time 5 to 10 minutes depending up size of class
<b>Shooting</b> Allow students to shoot under supervision	Time from 40 minutes to an hour and 40 minutes depending upon planned duration of class.
<b>Shooting Activities</b> Introduce games and activities	If time permits introduce shooting games

### SHOOTING GAMES

As students develop the basic skills to add to the experience you can add some archery shooting games.

#### Game 1

Place balloons on the target and reward students who hit a balloon.

For more excitement and effect, you can place “Talcum Powder” into the balloons (*which give a cloud of powder when the balloon burst*) or rewards such as snack bars.

#### Game 2

Have all students shoot one arrow, students who score anywhere on the target continue, anyone who missed the target drops out. Archers who remain shoot another arrow. Any archer who shoots 2 points or higher continue anyone who shoots a one or a miss drops out.

This continues until you have a winner.

#### Game 3

Allocate students into teams of 3 members or more. Each archer shoots 3 arrows but they score as a team. After a set number of arrows the team with the highest score is the winner.

### Advanced “Come N Try” Course

Advanced “Come N Try” Courses are usually conducted by Archery Clubs and are conducted over about 8 hours in 4 sessions of two hours a session. Instructors should develop a course lesson plan. An example can be found on the pages following.

**Session 1:**

Introduction and Welcome  
Safety  
Issue Equipment  
Introduce: the 10 Steps.

**Session 2:**

Review safety  
Review the Ten Steps  
Introduce: scoring, pulling arrows from the target and use of equipment such as bow sights.

**Session 3:**

Refine the Ten Steps  
Introduce: stringing a recurve bow, equipment care and maintenance  
Shoot a scoring round

**Session 4:**

Refine the Ten Steps  
Introduce: student to club activities; determine appropriate equipment for each student and detail local archery dealers.  
Shoot a scoring round

Following the class, clubs should encourage students to use club equipment prior to purchasing their own equipment.

Students should be encouraged to shoot rounds each time they visit the club. The rounds should be at a distance of 20 metres. Students should not advance to longer distances until they develop confidence and proficiency at shorter distances.

Clubs are encouraged to undertake the Archery Australia OzBow Program which recognises and rewards archers as they advance from distance to distance. For details on the OzBow system refer to the Archery Australia website [www.archery.org.au](http://www.archery.org.au)



## A beginner's course lesson plan

Plan the class group and equipment requirements prior to beginning the course.

### Session 1

This session is an introduction to archery and combines two sections, theory and practical.

<b>Theory</b>	<b>Comments</b>
Welcome and Introduction Course program and outcomes Determine student's personal requirements Safety Discussion Introduction to Equipment Overview Ten Steps Review session	Determine students' handedness and eye dominance  At the end of the session conduct a review
<b>Practical</b>	<b>Comments</b>
Demonstration Introduction to Ten Steps Issue Bow Introduce bow (without arrows) First Arrows Shooting	Carried out by instructor Using Rubber Band for 10 to 15 minutes  Draw and hold bow without releasing Allow students to shoot arrows General instruction

### Session 2

This session is a reinforcement session, safety and the ten steps are reviewed and reinforced. New subjects are introduced.

<b>Theory</b>	<b>Comments</b>
Review of Previous Session Introduce new items  Review session	Safety and Ten Steps Scoring, use of bow sights and removing arrows from the target At the end of the session conduct a review
<b>Practical</b>	<b>Comments</b>
Reinforcement of the Ten Steps Practical demonstration of scoring Use of bow sights Removing arrows from the target Introduce a scoring round	Review each person's progress Include the target face and scoring  Have each person shoot a scoring round such as 30 arrows at 15m

### Session 3

Theory	Comments
Review of Previous Session Introduce new items  Discussion about bow types recurve vs compound Review session	Ten Steps, scoring, bow sights and removing arrows String a recurve bow and equipment care and maintenance Have a recurve and compound bow available for discussion At the end of the session conduct a review
Practical	Comments
Reinforcement of the Ten Steps Practical demonstration Stringing a Bow Shoot a scoring round/s	Review each person's progress Demonstrate stringing a recurve bow Have each person shoot a scoring round such as 30 arrows at 15m and compare score to result from last session.

### Session 4

Theory	Comments
Review of Previous Session  Introduce new items  Review session	Ten Steps, and stringing a recurve bow; have each student string their own bow Discussion on the structure of the sport including club activities. Introduce students to club officials and members, make them welcome to the club. At the end of the session conduct a review
Practical	Comments
Reinforcement of the Ten Steps Practical demonstration Stringing a Bow Shoot a scoring round/s	Review each person's progress Have each student string their own bow. Have each person shoot a scoring round such as 30 arrows at 20m

Finish each session with a review of all the points covered.

#### Hints for instructors

- Know your subject. If in doubt ask.
- Be confident, friendly and interesting.
- Keep it simple and relevant to the subject.
- Encourage questions, confirm each step and never assume.
- Instruct the correct method of removing arrows from the target.
- Ensure long hair is tied back and loose clothing contained.
- Be patient and understanding with shy or awkward students.
- Dress appropriately. The student will follow your example.
- Give each student equal time as far as possible.
- Give advice and direction confidently.
- Praise and encourage.
- Don't stare overlong at a student.
- Adapt your technique to suit the student's age.
- Be approachable and friendly.
- Invite questions and encourage discussion.
- Refrain from demonstrating with your personal equipment. If it is necessary to shoot, use instruction equipment.



## SECTION 31 EXERCISES

### Warm Up Exercises

All archers should be encouraged to do stretching and warm up exercises before commencing shooting to help prevent damage to muscle tissue and elbow and shoulder joints.

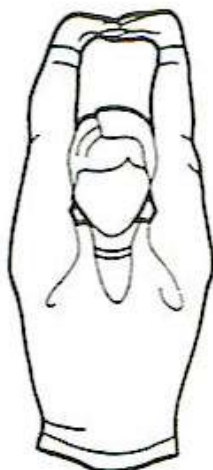
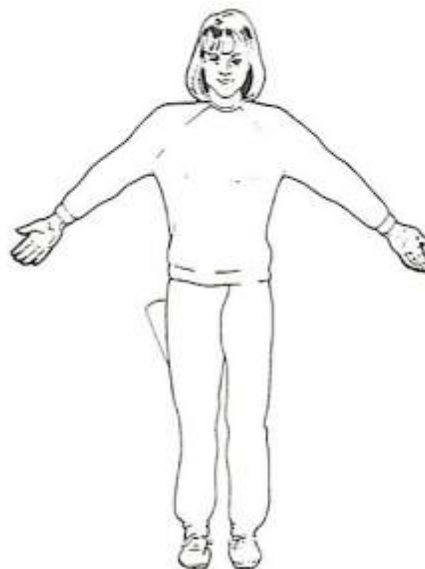
Illustrated are some simple exercises that can be carried out 5-10 minutes prior to shooting.

General stretching, exercise, hold out arms just below shoulder height.

Bring both arms together in front of chest and then bring back to shoulders.

Repeat 20 to 30 times

**Loosens chest and shoulder muscles.**



Interlock the fingers with palms out.

Extend arms above head keeping fingers locked and palms pointing upward.

Stretch upwards and hold for 10 seconds.

**Loosens upper arm and chest muscles.**

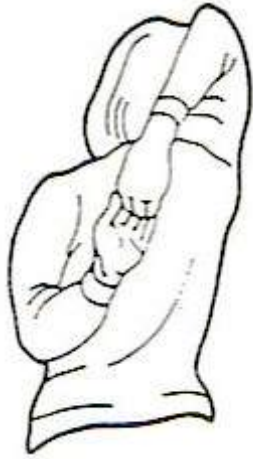
Cross arms in front of your chest and put your hands on your shoulders.

Slowly stretch the hands around the shoulders as far toward the middle of the back as possible.

Hold for 10 to 15 seconds.

**Stretches back muscles**





Bend the right arm over the head and down the back.

Bend left arm up behind back and attempt to grasp fingers of right hand.

Hold for 10 seconds then reverse arms.

Keep spine straight while doing exercise.

**Loosens chest muscles, top of shoulder and lower arm.**

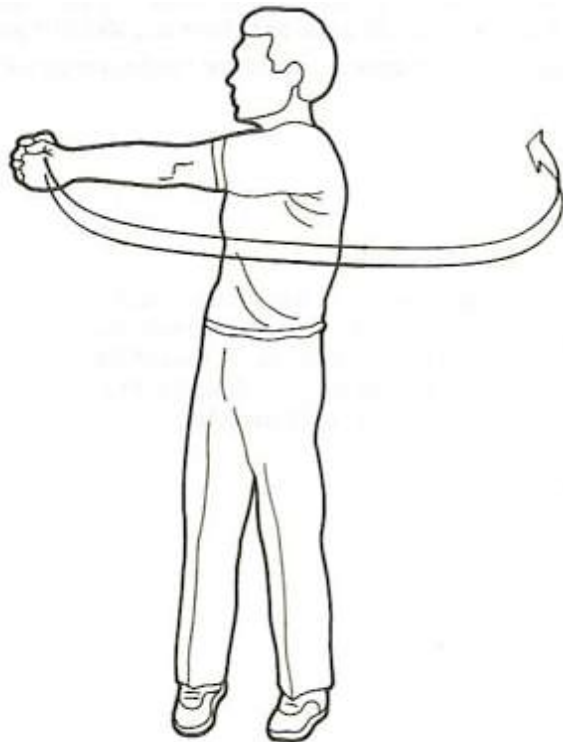
Interlock fingers with palms together.

Twist shoulders and trunk as far to the right without exceeding 90 degrees from frontal outstretched arms position.

Hold for 10 seconds then twist to the left and hold for 10 seconds.

**Do not jerk, twist slowly.**

**Stretches trunk muscles**



Shoulder rotation, while in standing position, with arms down at sides, raise shoulders as high as possible then rotate shoulders forward, down and back up to starting position.

Do this slowly for approximately 10 seconds and then reverse the motion.

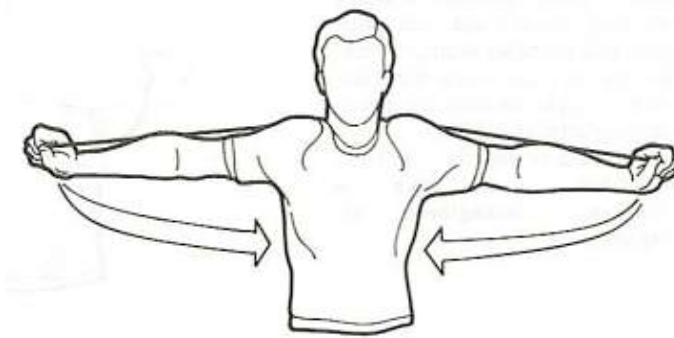
**Stretches neck muscles and loosens shoulder joints**

Using a piece of spear gun rubber or rubber tubing approximately 122cm (*four feet*) long grasp the ends in each hand, raise arms to shoulder level and keeping elbows straight extend arms outwards and backwards by squeezing shoulder blades together.

Relax forward.

Repeat four to six times.

**Strengthens the muscles used to draw the bow.**



Grasping the rubber in each hand swing the rubber over the head and behind the back. Hold arms straight out at shoulder level then swing forward stretching tubing across the back.

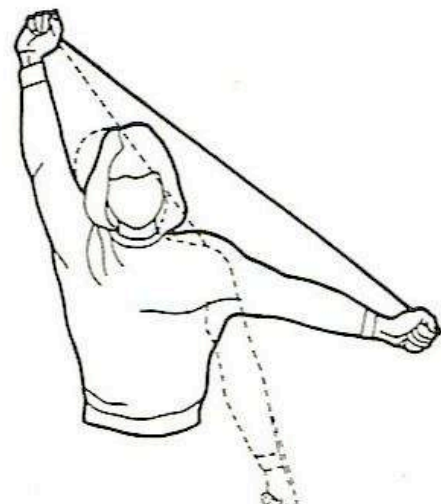
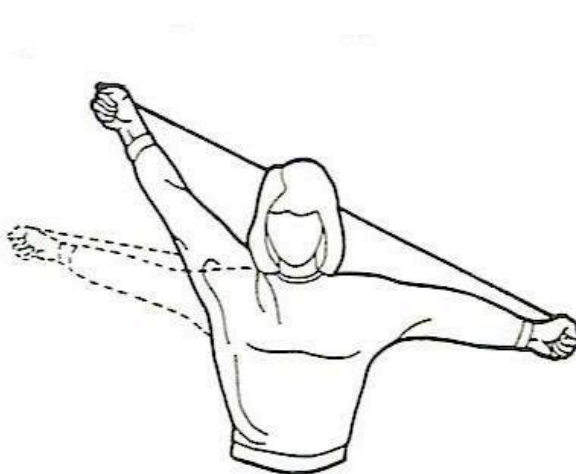
Repeat four to six times.

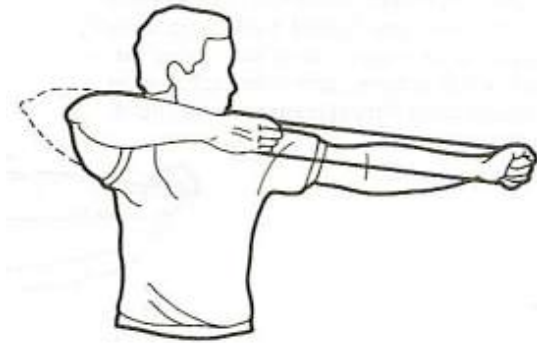
**Strengthens muscles opposing draw.**

Holding the rubber in each hand, raise arms straight overhead. Keep right arm firm and pull down with your left arm as far as possible.

Tilt head forward slightly to allow rubber to pass behind. Return left arm to shoulder level and pull down and around with right arm. Repeat 4-5 times and then reverse, pulling down with right arm.

**Strengthens shoulder muscles which raise and lower arms in frontal plane.**





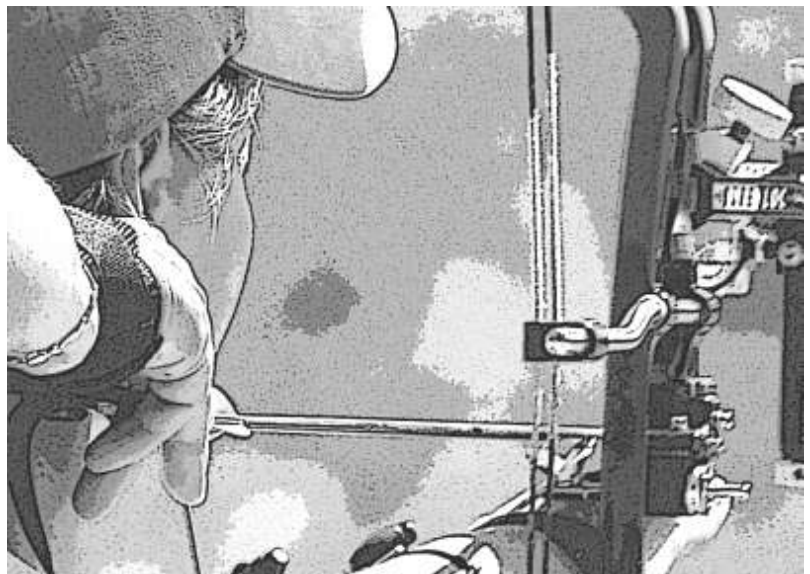
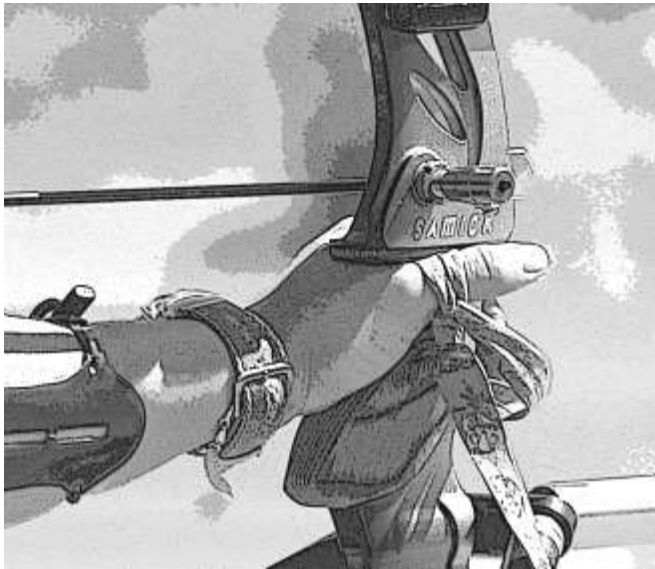
Grasp back end of rubber with bow hand to form loop, raise bow arm to shooting position and with string hand pull to anchor position.

Relax biceps and use back muscles.

Repeat approximately 10 times, relaxing after each pull.

**This exercise should be done both left and right-handed to balance muscle development.**

**Strengthens shooting muscles.**



## SECTION 32

# MAKE YOUR OWN EQUIPMENT

You can easily make your own accessories; this saves funds as well as providing an activity for members.

### Armguards

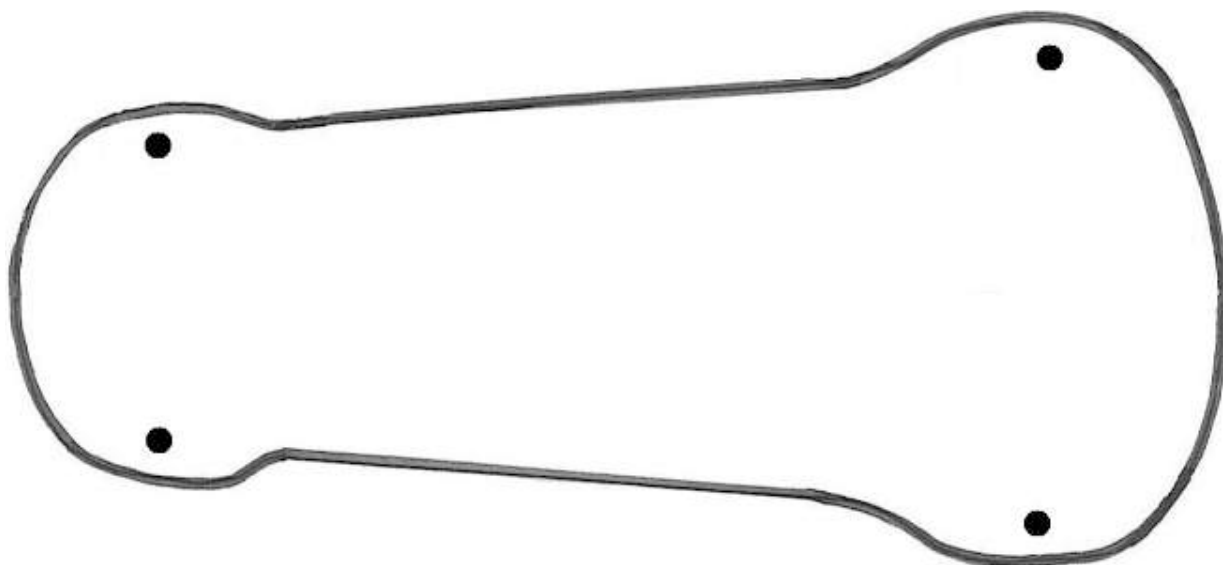
Armguards are easily made using empty plastic Milk containers (*you can use 1.25 litre soft drink bottles but the material is thinner and does not provide the same level of protection*).

You will also require "Round" elastic about 2mm to 3mm in diameter, 2 "Push Locks" for each armguard. The elastic and push locks can be purchased from any haberdashery store.

You will also require a marking pen, heavy duty scissors and a hole punch.

### DIRECTIONS –

- 1) Mark out the armguards on the plastic from the design below and cut out with scissors.
- 2) Using a hole punch make 4 holes as indicated in the design.
- 3) Cut 2 pieces of elastic about 200mm long.
- 4) Push each end of the elastic through the front holes, A so you a loop. Repeat with the back holes, B.
- 5) Next push the ends of the elastic through the "Push Locks".
- 6) Once the elastic is through each "Push Lock" tie off each end of elastic to prevent it coming back though the lock.
- 7) To adjust the armguard push the button on the "Push Locks" and pull the elastic through until you achieve the correct fit.



**"Elastic inserted through Push Locks"**



**"Push Locks"**

## Finger Tabs

You can also make your own finger tabs. You will require a piece of soft cowhide (about 2mm thick is the best.). You can also use vinyl although this is a softer material and will require additional layers.

Mark out on the leather (or vinyl) using a pen ensuring the smooth side of the leather (vinyl) will be the side that will contact the string. Use design below, reverse for Left hand tabs. You should have about 20% of your tabs left hand.

For added protection you can use two pieces of leather glued together.

## Bow Stand

Bow stands are easy to make and require a piece of plywood and 50mm plastic pipe. Cut the plywood into pieces 300mm x 300mm. You can bevel the edges for looks; paint or stain if required.

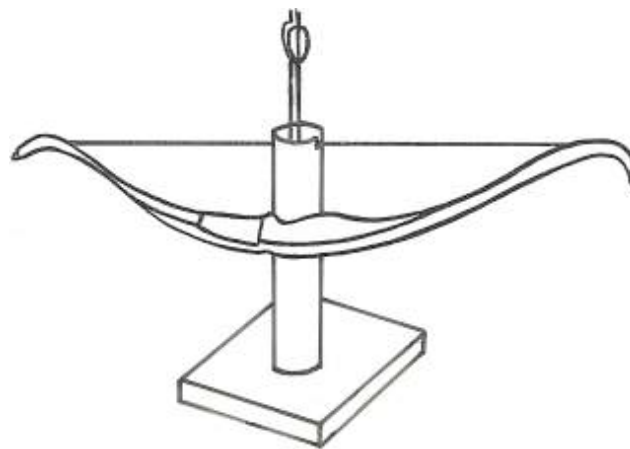
Using a "Hole Saw" cut a 50mm hole through the centre of the piece of plywood.

Cut the plastic pipe 500mm long and, on one end, cut two slots opposite each other 5mm wide and 20mm long.

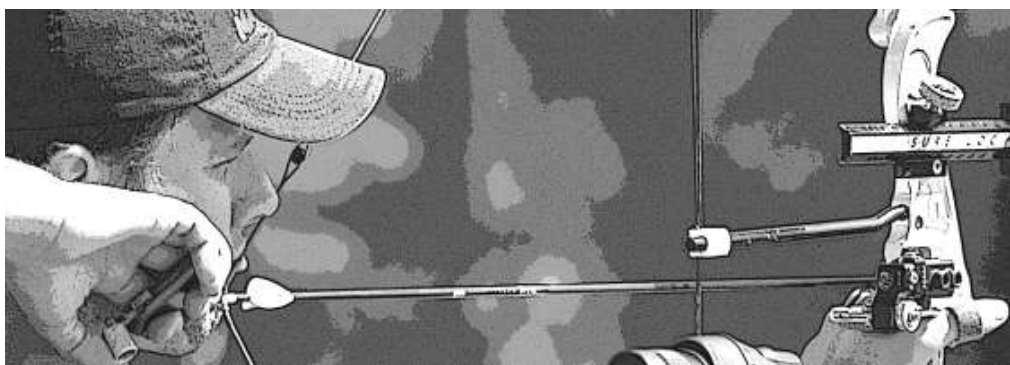
Using high strength builder's glue such as "No Nails", glue the end of the pipe without the slots into the hole on the plywood.

Using the piece left over when you cut the hole in the plywood to glue into the base of the plastic pipe.

The plywood acts as a base, the plastic tube holds the arrows and the bow string fits into the slots allowing the bow to hang from the tube.



For a full list of specification on equipment such as Target Stands, Target Butts etc go to the Archery Australia Inc website – [www.archery.org.au](http://www.archery.org.au)



## SECTION 33

# ARCHERY LANGUAGE

Archery, like any sport, has a vocabulary all of its own, with many terms defined in a unique manner. This is necessary so archers can communicate with each other very succinctly and precisely.

The following is a list of the common archery terms and their meanings:

<b>ACE ARROW</b>	A brand of arrows manufactured by Easton Aluminium being made of aluminium and carbon fibre
<b>ANCHOR</b>	The term used to describe the placing of the drawing hand against the face when at full draw.
<b>AIMING</b>	The term given to the act of aiming the bow.
<b>ALL GOLD</b>	Shooting 6 arrows in the gold (9 and 10 scoring zones).
<b>ALUMINIUM ARROWS</b>	Easton is the principle manufacturer of aluminium arrows. Sizes are identified with 4 numbers, which are etched onto each shaft. The first 2 numbers indicate the outside diameter in 64 <sup>th</sup> of an inch. The second 2 numbers indicate the shaft wall thickness in thousandths of an inch. Example 1816 is 18/64" in diameter with a .016" (or 16 thousandth of an inch) wall thickness.
<b>AMO</b>	Archery Manufacturers Organization (based in the USA) which sets manufacturing standards for archery equipment.
<b>ARBLIST</b>	A person who shoots a crossbow.
<b>ARCHERS PARADOX</b>	The name given to the side-to-side bending motion of an arrow as it leaves the bow.
<b>ARCHERY AUSTRALIA or AA</b>	The national archery association of Australia.
<b>ARM GUARD</b>	Protection worn on the bow arm, designed to protect the arm from the bowstring.
<b>ARROW</b>	The projectile shot from a bow.
<b>ARROW REST</b>	A device mounted on the bow window just above the bow shelf, designed to support the arrow during the shot.
<b>ARROW SHELF</b>	A horizontal projection from the bow window upon which the arrow can lay in the absence of an arrow rest.
<b>ARROW STRAIGHTENER</b>	A mechanical device used to detect and remove bend in aluminium arrows.
<b>AXLE TO AXLE LENGTH</b>	This refers to the length of a compound bow which is measured between the axles e.g. 42".
<b>BACK TENSION</b>	The use of the scapula (shoulder blades) and back muscles to draw and release the bow string.
<b>BACK OF BOW</b>	The side of the bow away from the archer when the bow is drawn.
<b>BARE SHAFT</b>	An arrow without fletching used for tuning the bow.
<b>BAREBOW SHOOTING</b>	An aiming technique whereby the archer estimates the distance (gap) between a selected point and the target (also called Gap Shooting).
<b>BARRELLED ARROW</b>	An arrow that has a greater cross section in the middle and tapers down at the ends.
<b>BELLY OF BOW</b>	The side of the bow facing the archer when the bow is drawn. Also know as the face.
<b>BERGER BUTTON</b>	The generic name given to a Plunger Buttons, named after the inventor of the Plunger Button, Vic Berger, in the early 1960's.
<b>BEMAN</b>	Refers to a brand of carbon arrows.
<b>BLANK SHAFT TEST</b>	A method of bow tuning where unfletched and fletched arrows are shot, adjustments are made by comparing the positions of the fletched and unfletched arrows. Commonly used by recurve archers.
<b>BLUNT</b>	Flat point used for shooting small games.
<b>BODY ALIGNMENT</b>	The relationship of the archers legs, hips truck shoulders and arms.
<b>BOUNCER</b>	An arrow rebounding from the target butt when shot.
<b>BOW ARM</b>	The arm which holds the bow.
<b>BOW EFFICIENCY</b>	The ration of kinetic energy received by the arrow upon release from that stored by the bow at full draw.





	of the string during shooting.
<b>CLICKER</b>	A device which attaches to the bow, the arrow is placed under the clicker and gives an audible indication when the arrow has been drawn to the archers draw length.
<b>CLOUT</b>	Competition where archers shoot arrows into the air, attempting to score using a target laid on the ground. Also an old English word for “cloth”; small white flag or circular target for long distance shooting.
<b>COACH</b>	A tutor or teacher of sporting activities.
<b>COCK FLETCH</b>	The fletching on the arrow at right angles to the nock. Also called the Index fletch is usually a different colour to the other fletches for easy identification.
<b>COMPOSITE BOW</b>	A bow made of more than one material such as wood, fibreglass and metal.
<b>COMPOUND BOW</b>	A modern style of bow incorporating the use of wheels or cams.
<b>CREEPING</b>	Allowing the arrow to move forward while at full draw and before release.
<b>CRESTING</b>	Identifying marks or pattern on the arrow, usually positioned in front of the fletches.
<b>CROSSBOW</b>	A bow fitted to a rifle stock.
<b>DEAD RELEASE</b>	The term used to describe a release without any motion. Usually occurs when the interphalangeal joints of the fingers gripping the bowstring extend due to the kinetic energy of the bow instead of any muscular reaction.
<b>DEFLEX</b>	Describes the design of a bow handle with a forward grip.
<b>DIRECTOR OF SHOOTING or DOS</b>	The person responsible for the conduct of a competition or shoot.
<b>DRAW</b>	The process of moving the bowstring from brace height to the archer's anchor point on the face.
<b>DRAW LINE OF FORCE</b>	The line between the pressure point of the bow hand on the bow, the string fingers and the drawing elbow.
<b>DRAW WEIGHT</b>	The force measured in pounds required to draw a bow. For recurve and longbows the measurement is determined by drawing the bow 28" e.g. 36lb @28". The bow force of compound bows is the maximum weight achieved when drawing the bow. This position will vary depending upon draw length and cam/wheel design.
<b>DRAWING ARM</b>	The arm used to draw the bow.
<b>DRAWING HAND</b>	The hand used to draw the bow.
<b>DOMINANT EYE</b>	The master eye used for aiming.
<b>DRIFT</b>	The movement of an arrow while in flight due to crosswinds.
<b>DROP AWAY REST</b>	Used on compound bows an arrow rest that drops away clearing the path for the arrow as the string is released.
<b>DYNAMIC SPINE</b>	Dynamic spine (also called Column Load) describes the amount an arrow bends when the string is first released and the bow's stored energy is applied to the arrow. The amount the arrow bends is determined by a number of factors and can be varied using these factors. Factors that will affect dynamic spine are – shaft length, shaft diameter, point weight, weight of shaft, weight of nock and weight of fletches.  Point weight added to the front of a shaft decreases the spine while weight added to the rear of the shaft (vaner, nock etc) increase spine. Shortening the arrow shaft increases stiffness and using longer shaft (of the same size) results in a softer arrow. The heavier a shaft is in physical weight decreases the stiffness; a lighter shaft (physical weight) will increase stiffness.
<b>ECCENTRIC WHEEL</b>	The wheel or cam used on compound bows.
<b>END</b>	A term used to describe the number of arrows shot before the score is recorded. An end is usually made up of 6 or 3 arrows.
<b>FACE</b>	The printed coloured paper or cloth attached to the butt for scoring.
<b>FIELD CAPTAIN</b>	The old name for a person in charge of an archery tournament. The modern term is Director of Shooting (DOS).
<b>FIELD OF PLAY</b>	The designated shooting area.
<b>FINGER SLING</b>	A piece of leather or string with loops at each end which is designed to fit around the archer's thumb and index finger during shooting. It allows the archer to keep a relaxed grip and helps prevent the bow from falling to the ground after release.

<b>FINGER TAB</b>	A device usually made of leather worn on the fingers for protection.
<b>FISTMELE</b>	Old term used to describe the measurement between the bow handle (grip) and the string measured at right angles. Also called Brace Height.
<b>FITA</b>	The international archery federation, Federation Internationale DeTir a L'Arc.
<b>FLETCHING</b>	The term used to describe the vanes (plastic or feather) placed on the rear of the arrow to stabilize the arrow in flight.
<b>FLIGHT SHOOTING</b>	An archery event where the object is to shoot an arrow the greatest distance.
<b>FLINCH</b>	An undesired and sudden motion of the bow arm and/or drawing hand prior to or at release. Usually created by a loss of concentration or the anticipation of the shot .
<b>FLU-FLU</b>	A special arrow with large or spiralled fletching designed to increase the drag coefficient in order to shorten the distance the arrow can travel.
<b>FOLLOW THROUGH</b>	The act of holding the release position until the arrow has struck the target.
<b>FORCE DRAW CURVE</b>	A graph showing the increase in bow weight as the bow is draw to full draw.
<b>FORMMASTER</b>	A device which once correctly fitted to the archer, allows the archer to draw the bow and then release without loading an arrow. If the holding process is not done correctly, the "Formaster" will cause the archer's form to collapse.
<b>GAP SHOOTING</b>	An aiming technique whereby the archer estimates the distance (gap) between a selected point and the target, also called Barebow Shooting.
<b>GOLD</b>	The name for the centre of an archery target.
<b>GOLD SHYNESS</b>	The term used to describe the archer's inability to aim on the centre of the target. Usually caused by a lack of confidence or fear of performing poorly. A common problem experienced in archery.
<b>GRIP</b>	The position on the bow handle where the bow is held or the term used to describe holding the bow.
<b>GROUND QUIVER</b>	A quiver used to hold arrows and sometimes the bow which sits on the ground.
<b>GROUPING</b>	The proximity to each other of the end of arrows in the target after they have been shot.
<b>HANDLE</b>	The middle section of a bow; also can be called the riser.
<b>HANGING ARROW</b>	An arrow, which has not penetrated the butt but is held by the target face, the arrow hanging across the target.
<b>HEEL</b>	Placing excessive pressure on the bow grip by the palm of the hand.
<b>HELICAL</b>	The term used to describe the spiral method of attaching fletches to an arrow, helical fletching is intended to cause the arrow to spin in flight.
<b>HIT</b>	The term which describes an arrow which has embedded into one of the scoring areas of a target face.
<b>HOLDING</b>	The pause between drawing and release before the aiming process takes place.
<b>INDEX FLETCH</b>	For recurve and longbows, the feather or vane at right angle to the groove in the nock of the arrow, usually a different colour. The index fletch points out from the bow and allows for a clean path for the arrow to pass the bow upon release. This term replaces the older term "cock fletch".  For compound bows the index fletch points either up or down when the arrow is on the arrow rest. The position depends upon the style of arrow rest used.
<b>INSTINCTIVE SHOOTING</b>	The term used to describe a shooting method without the aid of a sighting device.
<b>JIG</b>	FLETCHING – A tool used for making or repairing fletches on an arrow. STRING – A device used for making bowstrings.
<b>KISSER BUTTON</b>	Small attachment on the string usually felt by the lips at full draw and made of plastic; helps with consistency in draw and elevation.
<b>LET DOWN</b>	The act of slowly releasing tension at full draw without releasing the arrow.
<b>LET OFF</b>	The term used to describe the reduction in weight when a compound bows is drawn past the peak weight and the cam/wheel turn over.
<b>LIMBS</b>	The flexible upper and lower parts of the bow which bend when the bow is drawn.
<b>LONG BOW</b>	An old style simple bow with straight limbs.
<b>LOOSE</b>	The English term used to describe the release.
<b>MASS WEIGHT</b>	The physical weight of the bow.
<b>NOCK</b>	The plastic attachment on the rear of the arrow which allows the arrow to be attached to the string.

<b>NOCK TAPER</b>	The taper at the rear of some arrows which is at 11° designed to allow the nocks to be glued onto the shaft.
<b>NOCKING POINT</b>	The position on the string where the arrow locates. Usually identified with 2 small attachments.
<b>OPEN STANCE</b>	Type of standing position, relative to the target.
<b>OVERBOWED</b>	An archer shooting a bow, which is too heavy in draw weight for their ability.
<b>OVERDRAW</b>	1. Term used to describe drawing a bow past the usual draw length position.  2. An attachment fitted with the arrow rest or a particular type of arrow rest that allows the archer to shoot shorter arrows giving greater arrow speed.
<b>OVERSTRUNG</b>	A bow with a brace height which is too high.
<b>PAPER TEST</b>	A method of bow tuning where arrows are shot through paper. Adjustments are made by reviewing the tear patterns. Commonly used for tuning compound bows.
<b>PASS THROUGH</b>	The term used to describe an arrow's passing through a target butt. These usually happen when the butt is worn and does not have enough material to stop an arrow.
<b>PARABOLIC</b>	The term used to describe the flight path of an arrow or the curve shape of fletches.
<b>PEAK WEIGHT</b>	The maximum weight achieved when drawing a compound bow.
<b>PEEKING</b>	An undesired movement of the archer's head at the time of release in an attempt to follow the arrow trajectory to the target.
<b>PEEP SIGHT</b>	Rear sight fitted into the bowstring and used with compound bows.
<b>PERFECT END</b>	Shooting 6 arrows in the 10 ring.
<b>PILE</b>	A term used to describe the point of the arrow, usually refers to a target point.
<b>PINCH</b>	The undesired action of squeezing the arrow nock tightly between the fingers during draw or at full draw, causing the arrow to move (fall) off the arrow rest.
<b>PIVOT POINT</b>	The pivot point is the deepest part of the bow grip where the bow normally rests and pivots against your bow hand.
<b>PLUCKING</b>	Undesired forced sideways motion of the drawing hand and arm from the face upon release as a result of little or no tension.
<b>POINT OF AIM</b>	A method of aiming where you use marks on the ground or a position on or near the target to aim, used by Barebow and Gap shooters.
<b>POWDER TEST</b>	A test carried out using spray powder to check for arrow clearance. The powder is sprayed on the bow window and arrow rest. As the arrow is shot, if there is any problem with clearance, a mark will show in the powder. Appropriate adjustments can then be made.
<b>POWER STROKE</b>	This is a term used for compound bows and it refers to the forward movement of the bow string when released.
<b>PULL</b>	The term used to describe drawing the bow.
<b>QUIVER</b>	From the French word "Cuivre", a container for holding arrows. Usually worn around the waist.
<b>REBOUND</b>	An arrow which does not penetrate the target face or butt and bounces off the target. Also called a Bouncer.
<b>RECURVE BOW</b>	A bow manufactured so the limbs bend toward the target to increase power when the string is released.
<b>REFLEX</b>	Describes the design of a bow handle with a backward grip.
<b>RELEASE</b>	The act of releasing (letting go) the bow string when at full draw and allowing the arrow to fly toward the target.
<b>RELEASE AID</b>	A mechanical device for releasing the string, usually used with compound bows.
<b>RGBs</b>	State Governing Bodies of the sport in Australia, ArcheryNSW, ArcheryACT, Archery Victoria, Archery Society of Tasmania, Archery SA, Archery Society of WA, North Queensland Archery Association and South Queensland Archery Association.
<b>RISER</b>	The middle section of a bow also can be called the handle.
<b>ROUND</b>	The term use to designate the number of arrows to be shot at specific distances at specific target face.
<b>SCATTER</b>	Arrows distributed unevenly over a large portion of the target face and / or ground

<b>SCOPE SIGHT</b>	The magnified sight used for compound bows.
<b>SELF BOW</b>	A bow made entirely of one piece of wood, as opposed to a composite bow.
<b>SERVING</b>	The protective thread wrapped (bound) around the bowstring at the tips and in the centre where the arrow is nocked.
<b>SHAFT</b>	The body of the arrow upon which the nock, fletching and point are attached.
<b>SHOOTING GLOVE</b>	A three finger protective device used to protect the fingers from the bowstring instead of a finger tab.
<b>SHOOTING LINE</b>	The line straddled by the archers when shooting.
<b>SIGHT LEVEL</b>	The bubble level used in conjunction with the scope sight for compound bows.
<b>SIGHT WINDOW</b>	The cut out section (usually past centre) of the bow handle (riser) which has the arrow rest fitted and allows for clearance for the arrow.
<b>SPINE</b>	The amount of bend (deflection) of an arrow measured in thousands of an inch when suspended at both ends is depressed by a 2 pound weight placed at its centre.
<b>STABILIZER</b>	Rod/s protruding from the handle (riser) usually with weights attached. Designed to reduce torque and absorb shock upon release.
<b>STACKING</b>	For recurve and longbows, this is the disproportionate increase in bow weight during the last few inches of the draw.
<b>STATIC SPINE</b>	Describes a method of categorizing the stiffness of arrow shafts. Static spine is measured using a spine meter and determines the amount of deflection (bend) a shaft has when suspended between 2 points and then has an 880gram weight (approx 2 pound) hung from the centre. The measurement is taken in thousandths of an inch. Some arrow shafts like ACEs use this measurement to identify the shaft size e.g. ACE 670 indicates that the arrow has a deflection of 670 thousandths of an inch. To standardize these measurements, aluminium and carbon shafts are measured using a 29" shaft with the 2 points of contact 28" apart. For wood shafts the 2 contact points are 26" apart.
<b>STRING FINGERS</b>	The fingers of the drawing hand used to hold and release the string.
<b>STRING LENGTH</b>	For recurve bows, the length of a bow string is determined by subtracting approximately 3" from the marked bow length e.g. a 66" bow requires a 63" string.
<b>STRING NOTCH</b>	The grooves at the end of the limb of recurve and longbows where the string attaches.
<b>TACKLE</b>	The term used to describe archery equipment.
<b>TARGET FACE</b>	The coloured paper or cloth placed on a target butt and used for scoring.
<b>TARGET PANIC</b>	The term used to describe the archers inability to come to full draw and aim on the centre of the target. Usually caused by a lack of confidence or fear of performing poorly. A common problem experienced in archery and results in uncontrolled release of the arrow.
<b>TIP</b>	Another name for a point of the arrow.
<b>TORQUE</b>	The undesired twisting of the bow and / or bowstring during any part of the shooting process.
<b>TOXOPHOLITE</b>	From the Greek, one who practices archery and is interested in all its aspects, including its history.
<b>TRAJECTORY</b>	The parabolic flight pattern of an arrow following release
<b>TUNING</b>	The process of setting up the equipment for maximum performance and accuracy.
<b>UNDERSTRUNG</b>	A bow with a bowstring too long which results in a low brace height and reduced efficiency.
<b>VALLEY</b>	The reduction in weight during the draw process of a compound bow.
<b>VANE</b>	The name for plastic or synthetic fletches.
<b>WAITING LINE</b>	A line parallel to the Shooting Line where archers wait before and after shooting.
<b>WAND</b>	Traditional event where the target is a piece of wood 6 feet long and 2 inches wide.
<b>WAX</b>	A mixture of bee and paraffin wax used to protect and bind the bow string together.
<b>WALK BACK TEST</b>	A bow-tuning test where arrows are shot at various distances and the pattern of arrows provides an indication as to adjustments that need to be made.

<b>BOW WEIGHT MARKINGS</b>	<p>The weight marking on a bow provide an indication as to the draw weight of a bow. The weight of a bow for recurve and longbows is measured 28" from the back of the bow. Some Asian manufacturers measure the weight of bows using a measurement of 26" from the pivot point.</p> <p>Compound bows are marked based on the peak weight with the bow set at the middle of its draw length range. As you vary the draw length of most compound bows you change the bow weight. Usually by increasing draw length you increase bow weight and by decreasing draw length you decrease bow weight.</p> <p>To better catalogue and control stock, some manufacturers group bows in predetermined weight ranges e.g. a bow marked 35lb could be a heavy as 38lb or as light as 33lb.</p>
<b>WHEEL TIMING</b>	<p>A term used for compound bows to describe the balance between the wheels or cams. Ideally the wheels/cams should rotate (be in time) the same during the draw and most critically at full-draw. If the wheels/cams are out of time at full-draw this will cause an up and down motion on the nock of the arrow upon release. Difficulty will also be experienced holding the sight steady when at full draw.</p>
<b>WINDAGE</b>	<p>Horizontal correction of the bow sight adjustment to compensate for wind.</p>
<b>WRIST SLING</b>	<p>Leather or string with loops around the wrist and the bow during shooting. It allows the archer to keep a relaxed grip and helps prevent the bow from falling to the ground after release.</p>
<b>X10 ARROW</b>	<p>A brand of arrow manufactured by Easton Aluminium being made of aluminium and carbon fibre. The shaft has an aluminium core tube and wrapped in carbon fibre.</p>
<b>YAW</b>	<p>Unstable action of the arrow during its flight.</p>

# APPENDIX 1 SAMPLE SCORECARD

## Archery Australia SCORECARD

Date: \_\_\_\_\_

Name: \_\_\_\_\_

Age: \_\_\_\_\_ Distance \_\_\_\_\_ Metres

Current Grade Level: \_\_\_\_\_

End	Score			End Score	Prog Total
<b>1</b>					
<b>2</b>					
<b>3</b>					
<b>4</b>					
<b>5</b>					

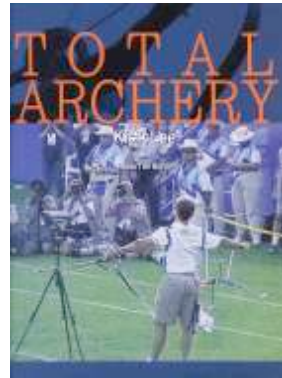
**Total Score**

\_\_\_\_\_  
Archer's Signature

## NOTES

## SUGGESTED READING

**TOTAL ARCHERY**  
By Ki Sik Lee and Robert DeBondt

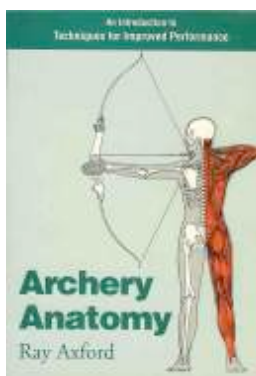


**MASTERING ARCHERY TECHNIQUE ANALYSIS**  
By James Park

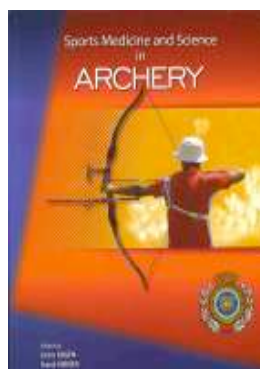


**MASTERING COMPOUND BOWS**  
By James Park

**MASTERING BOW TUNING**  
By James Park



**ARCHERY ANATOMY**  
By Ray Axford



**SPORTS MEDICINE and SCIENCE in ARCHERY**  
By Emin Ergen and Koral Hibner







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