Qualification Accredited

OCR
Oxford Cambridge and RSA

GCSE (9–1)

PHYSICAL EDUCATION

J587
For first teaching in 2016

Applied Anatomy and Physiology

1.1.b. The Structure and Function of the Muscular System

Learning Outcomes

BY THE END OF THIS TOPIC YOU SHOULD ……..

- **Know the name and location of major muscle groups**
- **Be able to apply each muscle's use to examples from physical activity/sport**
- **Know the definitions and roles of muscles in movement including:**
    - ***Agonist***
    - ***Antagonist***
    - ***Fixator***
        - ***Antagonistic muscle action***

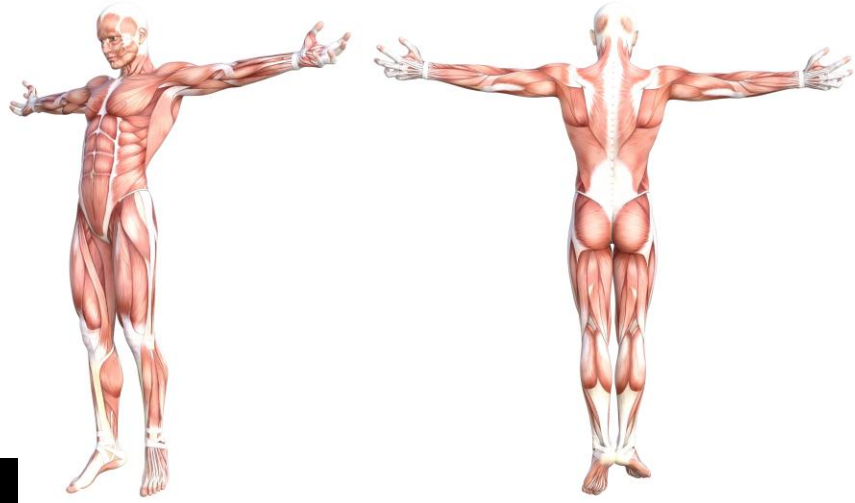
Location of major muscle groups

PRACTICAL TASK:
Using the labels and marker pen on your table.
Identify the location of the major Muscles (listed below) on your *'designated dummy!'*

- Deltoid
- Trapezius
- Latissimus Dorsi
- Pectorals
- Biceps
- Triceps
- Abdominals
- Quadriceps
- Hamstrings
- Gluteals
- Gastrocnemius

Do *NOT* use abbreviations in your exam!!

Example: **Abs** for **Abdominals**



You Have…

Know the location of the major muscles

So How did we do?!

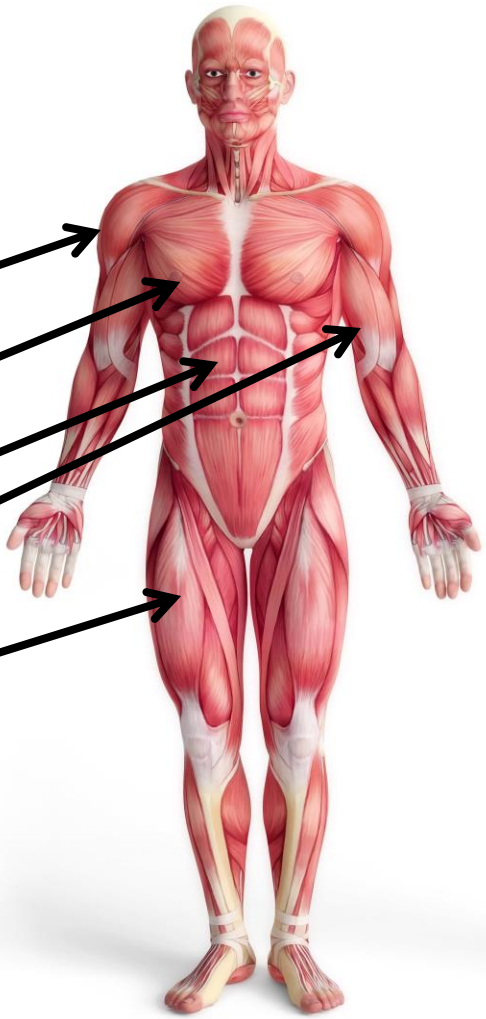
Who will be the winning table?

For each bone you correctly label you will earn 1 point!

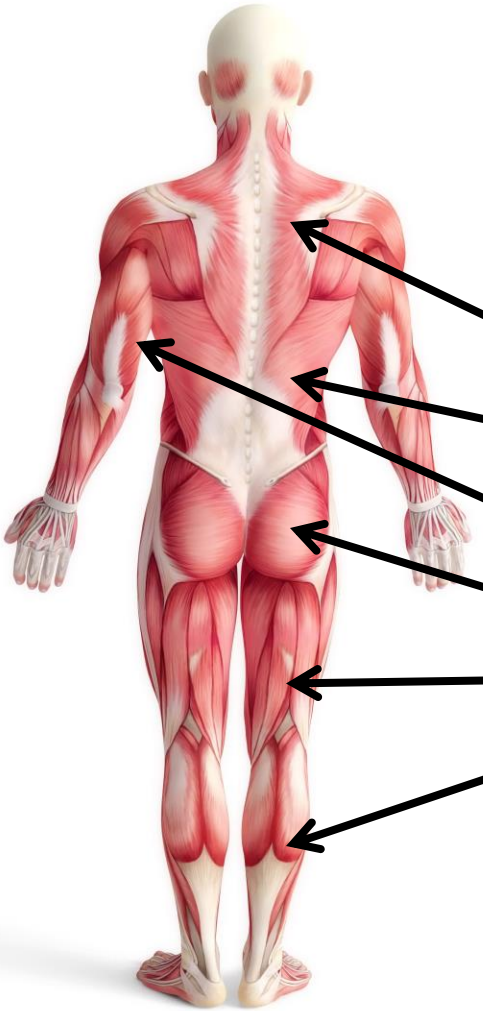
Add **1 bonus point for each correct spelling**

Most points WIN!

Know the location of the major muscles



1. Deltoid
2. Pectorals
3. Abdominals
4. Biceps
5. Quadriceps



6. Trapezius
7. Latissimus dorsi
8. Triceps
9. Gluteals
10. Hamstrings
11. Gastrocnemius

Know the location of the major muscles

THE DELTOID

- Gives a rounded shape to the shoulder
- **Abducts the upper arm from the body**
- Responsible for lifting the arm above the head

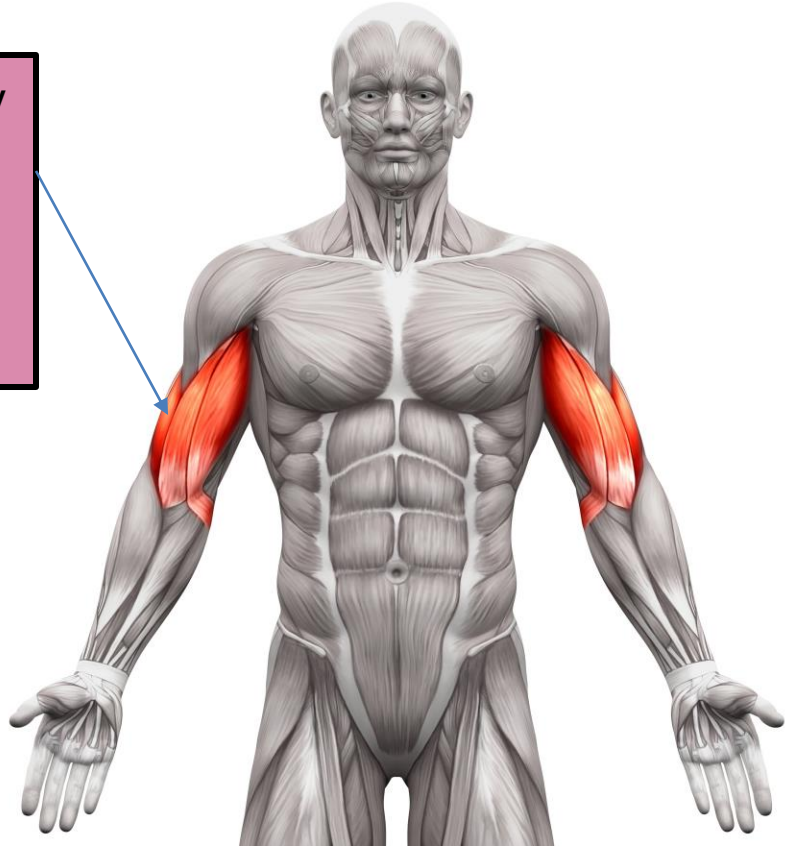
Sporting Example: Serving in tennis

http://www.youtube.com/watch?v=vcjZ5r_YHV0&feature=related

Know the location of the major muscles

THE BICEP

- One of the best known muscles in the body
- Found at the front of the upper arm
- **Contracts during elbow flexion**
- Involved in throwing actions



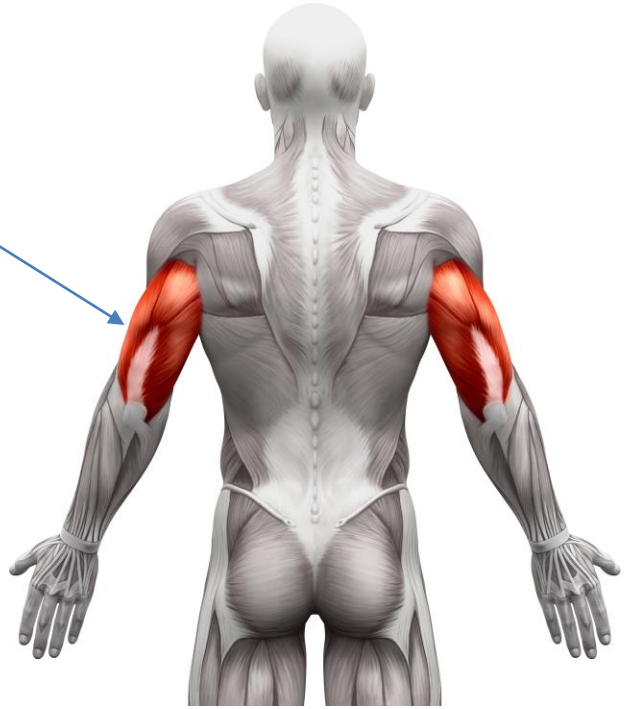
Sporting Example: Throwing a Javelin

http://www.youtube.com/watch?v=rOfDaRB2LFY&feature=related

Know the location of the major muscles

THE TRICEP

- Found at the back of the upper arm
- Works in harmony with the Bicep
- **Contracts during elbow extension**
- Involved in throwing actions



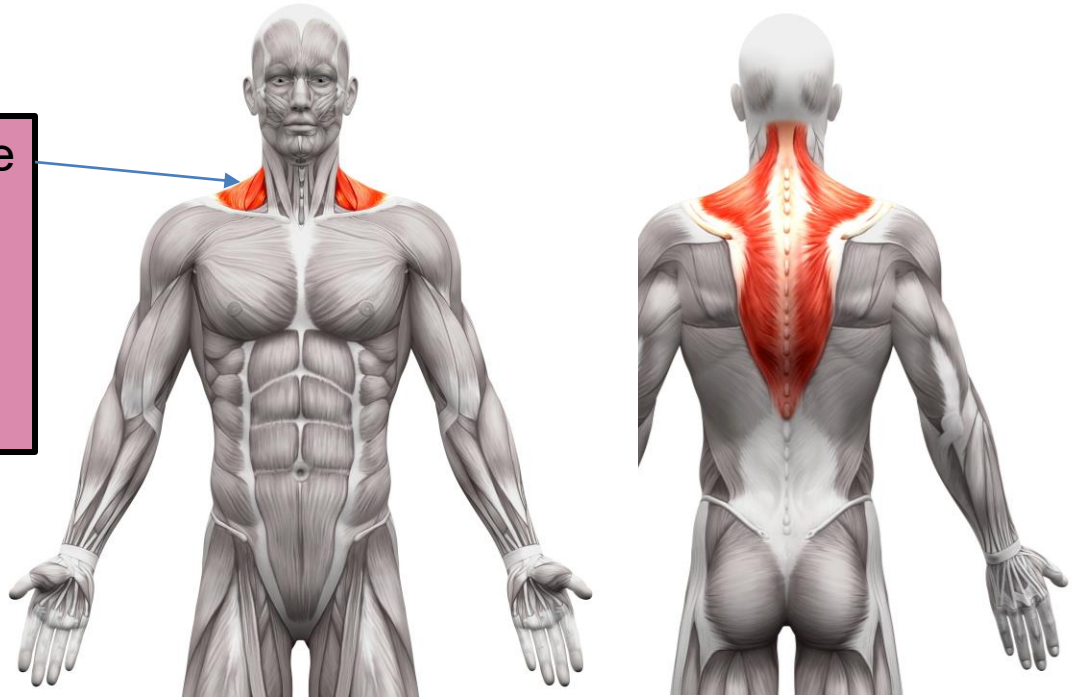
Sporting Example: Shooting in netball

http://www.youtube.com/watch?v=OrUoSoRdWqk&feature=related

Know the location of the major muscles

THE TRAPEZIUS

- Attached to head and neck at the top and shoulder below
- **Lifts and braces the shoulder (Adduction)**
- **Rotates the shoulder blade**



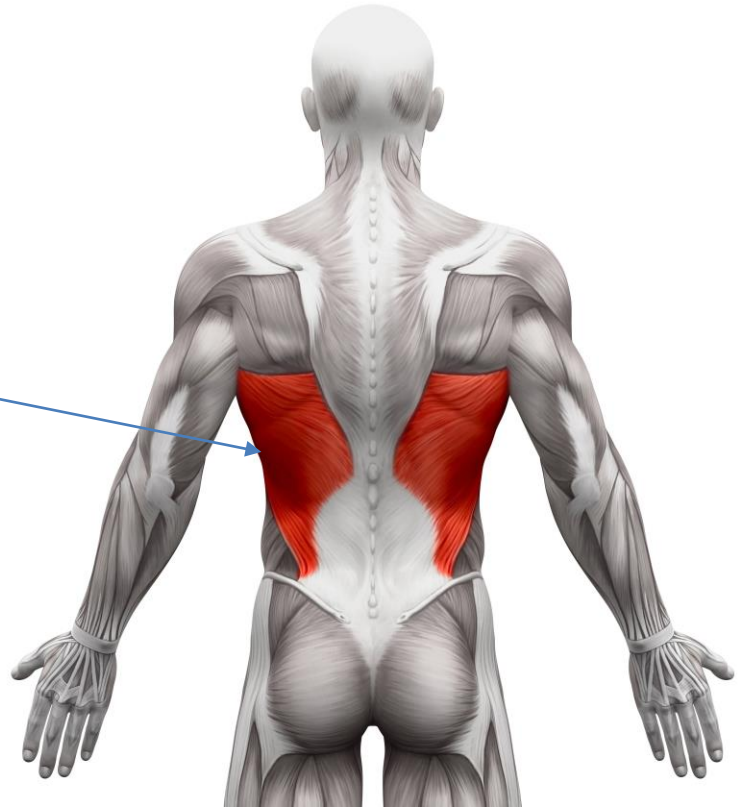
Sporting Example: Rowing / Serving in tennis

http://www.youtube.com/watch?v=T19a0bRzp1Q&feature=related

Know the location of the major muscles

THE LATISSIMUS DORSI

- A broad sheet of muscle extending from the lower spine to the humerus in the upper arm
- **Abducts the arm and draws it forwards to rotate it inwards**



Sporting Example: breaststroke, front crawl and butterfly swimming strokes

http://www.youtube.com/watch?v=KieW204RveU&feature=related

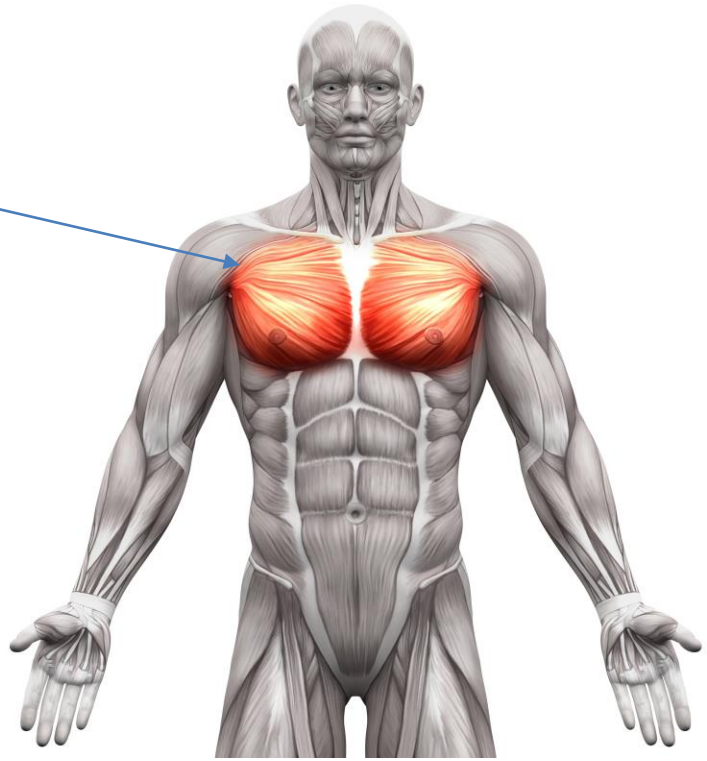
Know the location of the major muscles

THE PECTORALS

- Covers the chest
- **Works to adduct the arm and draw it forwards to rotate it inwards**

Sporting Example: front crawl and butterfly swimming strokes

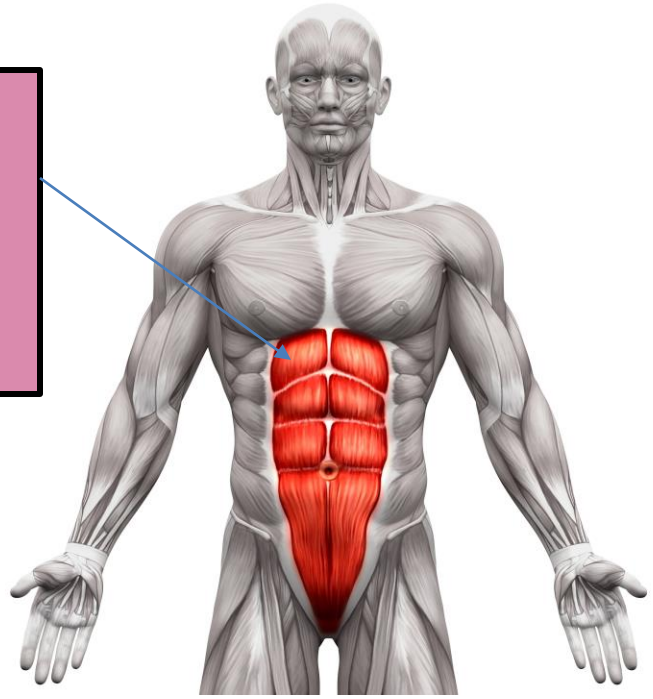
http://www.youtube.com/watch?v=ax77_hHq9Dc&feature=related



Know the location of the major muscles

THE ABDOMINALS

- Hold the stomach in
- **Causes flexion and rotating at the trunk & Hip**
- Help good posture
- Can be strengthened by performing sit-ups



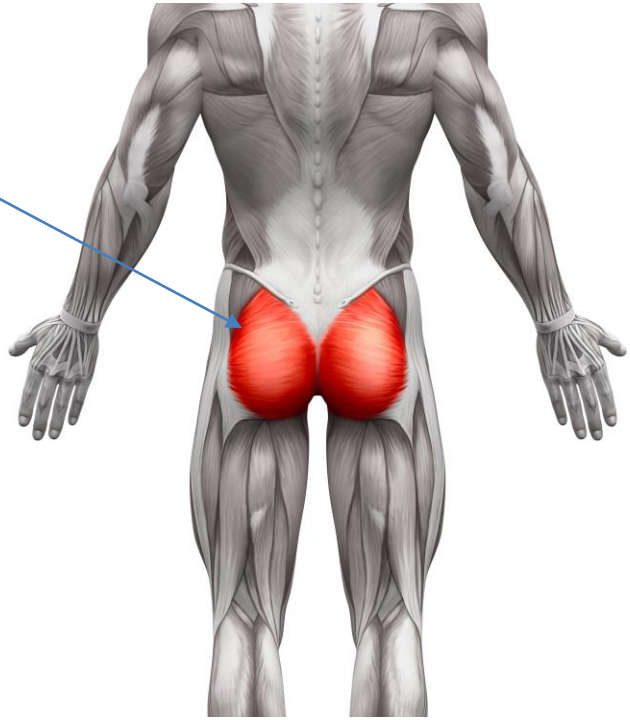
Sporting Example: Rowing

http://www.youtube.com/watch?v=T19a0bRzp1Q&feature=related

Know the location of the major muscles

THE GLUTEAL MUSCLES

- Form the buttocks
- Lies beneath the skin and is attached to the femur
- **Pulls the leg backwards (extension at the hip)**



Sporting Example: Squats, leg press and lunges

http://www.youtube.com/watch?v=v7AcXeNVC2U

Know the location of the major muscles

THE QUADRICEPS

- Found on the front of the upper leg
- Group of 4 muscles
- **Extension at the knee joint**

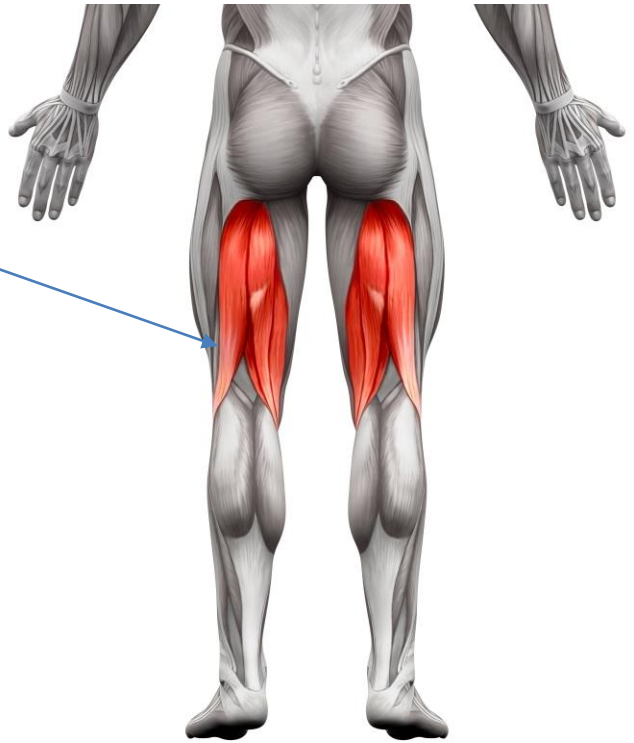
Sporting Example: Used in kicking actions

http://www.youtube.com/watch?v=9A62G24E87g&feature=related

Know the location of the major muscles

THE HAMSTRINGS

- Found on the back of the leg
- Stretch from the pelvis to the tibia
- **Causes flexion in the knee**



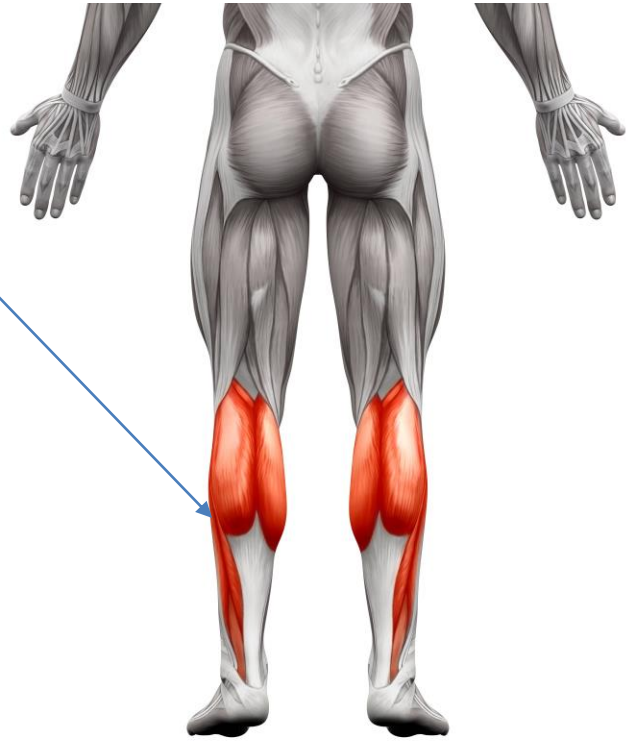
Sporting Example: important when sprinting

http://www.youtube.com/watch?v=7OwWS8aagiE&feature=fvsr

Know the location of the major muscles

THE GASTROCNEMIUS

- Part of the calf muscle along with the soleus
- Come together to form the Achilles tendon
- **Used to point the toes (plantar flexion)**



Sporting Example: Gives a spring in the step when running or approaching a high jump

http://www.youtube.com/watch?v=F6-xk9VyzwI

Know the roles of the major muscles

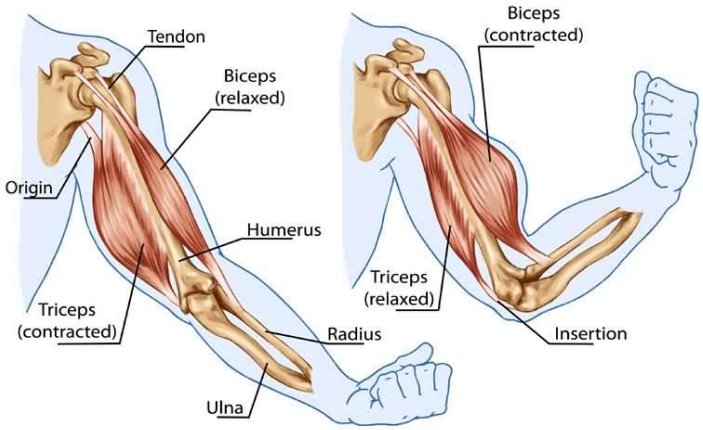
ANTAGONISTIC PAIRS OF Muscles – working to produce movement.

How Muscles create Movements at joints:

Muscles are Arranged in **PAIRS**.

As one muscle (***PRIME MOVER or AGONIST***) **contracts** (shortens)

its partner (***ANTAGONIST***) on the opposite side of the joint **relaxes** (lengthens).



But how do they cause movement?

Muscles are attached to bones by **TENDONS**.

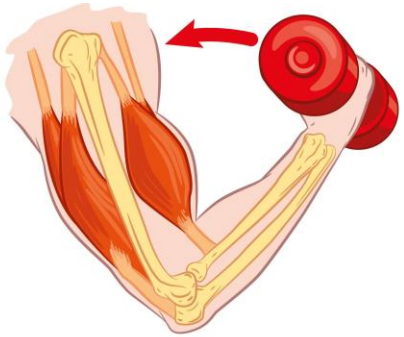
Muscles **PULL on tendons attached to bones** by contracting / getting shorter.

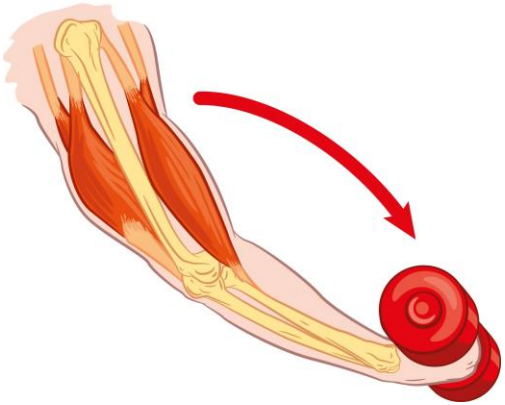
When the muscles contract they pull the tendon which in turn pull bones they are attached to causing movement at the joint.

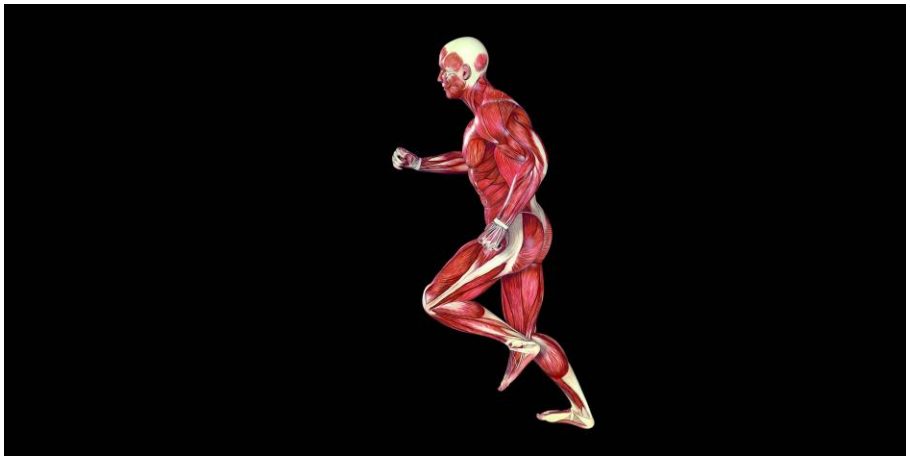
Therefore, in order to allow the body to move in opposing directions muscles are arranged in antagonist pairs.

Know the roles of the major muscles

TASK: Can you explain these movement actions and the muscles involved?







Know the roles of the major muscles

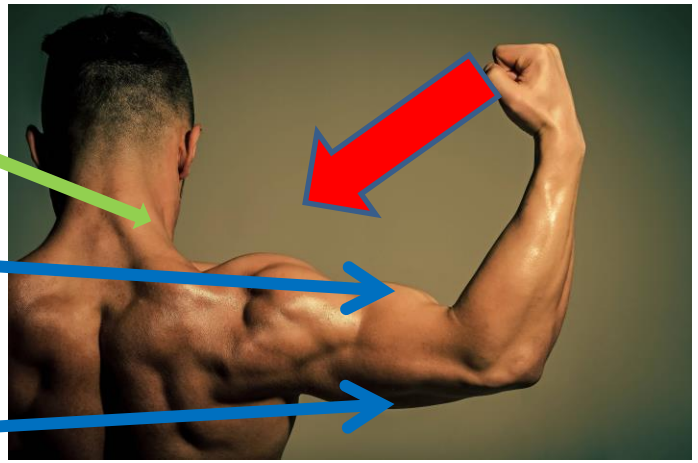
Antagonistic pairs

As one muscle contracts and shortens to pull the limb/bone on one direction it's antagonist relaxed and allows itself to be lengthened. The reverse happens when the limb/bone moves back to it's original position.

The **FIXATOR**

This is a muscle that works to stabilise the origin of the Prime Mover (Agonist).

[e.g. the Trapezius contracts to stabilise the origin of the biceps.]



The **AGONIST**

This is the working muscle that produces / controls the desired joint movement.

[Agonist muscle shortens]

The **ANTAGONIST**

The movement caused by the agonist is countered by the action of the opposing muscle, called the antagonist.

[Antagonist muscle lengthens]

The roles of muscle in movement

Muscle pairs

Watch the video https://www.bbc.com/bitesize/guides/zct2hv4/revision/2

Agonistic pairs create movement at joints

One way to remember which muscle is the ***agonist***

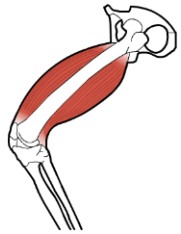
It's the one that's in 'agony' when you are doing the movement as it is the one that is doing all the work.

One way to remember which muscle is the ***antagonist***

It's the one that goes against/opposite the agonist.

Just like antagonising someone by going against their beliefs/wishes.

KNEE/ELBOW MODELS SHOWING ANTAGONISTIC MUSCLE ACTION



Using the plasticine provided make two models (you will be assigned either the elbow or knee):

Model 1 – Elbow/knee flexion

Model 2 – Elbow/knee extension

Label each model to include:

Grade 4-5
- Bone names
- Muscle names
- Identify the agonist and antagonist muscle
- Draw an arrow to indicate the direction of movement on each model

Grade 6-7
- Joint name
- Identify the fixator muscle
- Draw an arrow to indicate the direction of movement and name the type of movement being produced at the joint

Grade 8-9
- All of the other boxes
- Provide a clear verbal explanation of how antagonistic muscle action occurs at this joint.

Know the roles of the major muscles

THINK OF A SPORTING EXAMPLE…

Explain which muscle is doing what? Which is the prime mover? Which is the antagonist?

Example: **When a darts player prepares to throw a dart he decreases the angle at his elbow joint (flexion). When his elbow is bent the biceps are the agonist and triceps are the antagonist.**

When he releases the dart he increases the angle at his elbow joint (extension). When his arm is straight the triceps are the agonist and the biceps are the antagonist.

4-5 MTG – use the above example as a template but link to performing a chest pass.

6+ MTG – use the above example as a template but link to kicking a football.

Extension task

For each antagonistic pair of muscles can you produce a 'Facebook' profile using the following headings:

- **Name:**
- **I live in:**
- **Photo/Diagram:**
- **About me:** (joint action that can occur)
- **In a Relationship with**: (Other muscle)
- **Friends**: (bones and joint type)
- **Likes**: (example – helping to kick a football).