

# Starter

Can you match the term with its definition and example?

Key term	Definition	Example
Non-axial	Bones slide in relational to each other – no axes of rotation	Gliding joints e.g. carpal bones
Uniaxial	Movement around one axis	Hinge joints e.g. elbow and pivot joints e.g. radioulnar
Biaxial	Two axes of rotation	Saddle joint e.g. base of thumb
Triaxial	Three axes of rotation	Ball and scket joint e.g. hip

# Learning Objectives

## **Everyone should**

**Identify** the 3 planes of movement

**State** the different axes of rotation for each type of synovial joint

## **Most will**

**Define** the following terms:

flexion, extension,

elevation, depression

abduction, adduction,

pronation, supination,

plantarflexion, dorsiflexion,

eversion, inversion

# Group thought – What is an axis of rotation?

*Now complete the table in your workbook!*

Key term	Definition	Example
Non-axial	Bones slide in relational to each other – no axes of rotation	Gliding joints e.g. carpal bones
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Biaxial	Two axes of rotation	Saddle joint e.g. base of thumb
Triaxial	Three axes of rotation	Ball and scket joint e.g. hip

**Individual Activity** – Can you draw along with the video?  
Annotate the drawings in your workbook!

***USE PENCIL!***

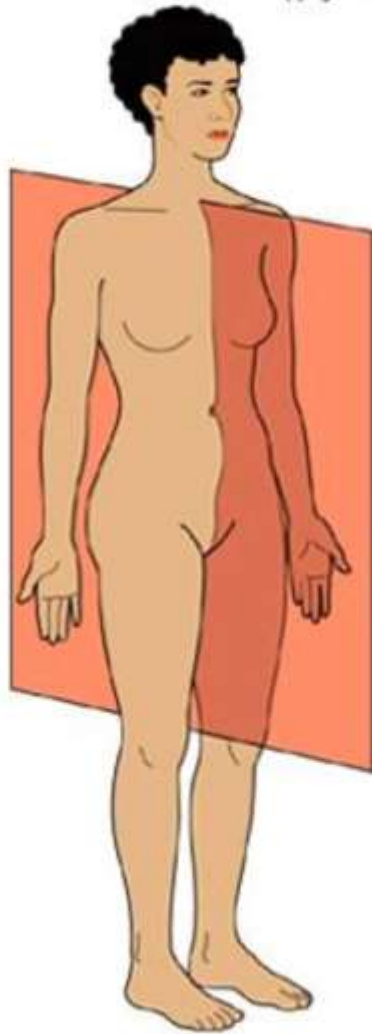


Human Anatomy Screencasts:  
Axes and Planes, Part 1  
Dr. Left Saul

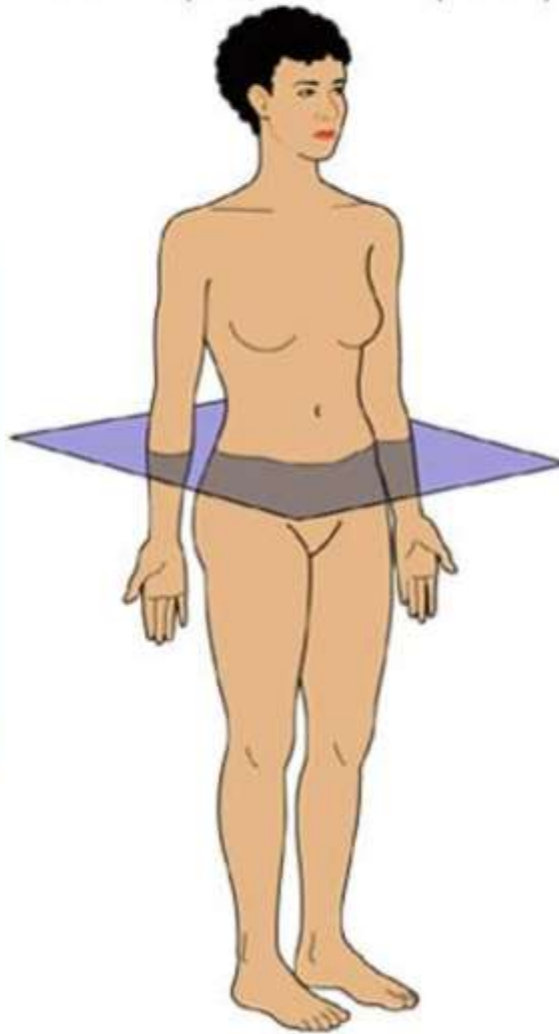


# Body sections are divided by planes

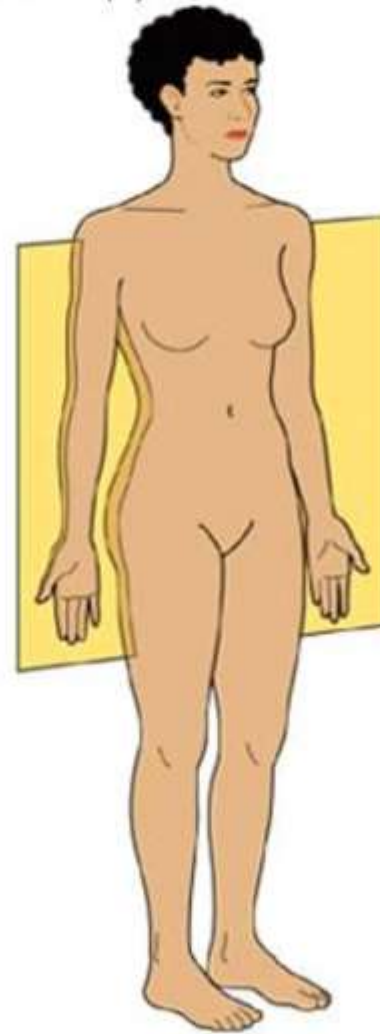
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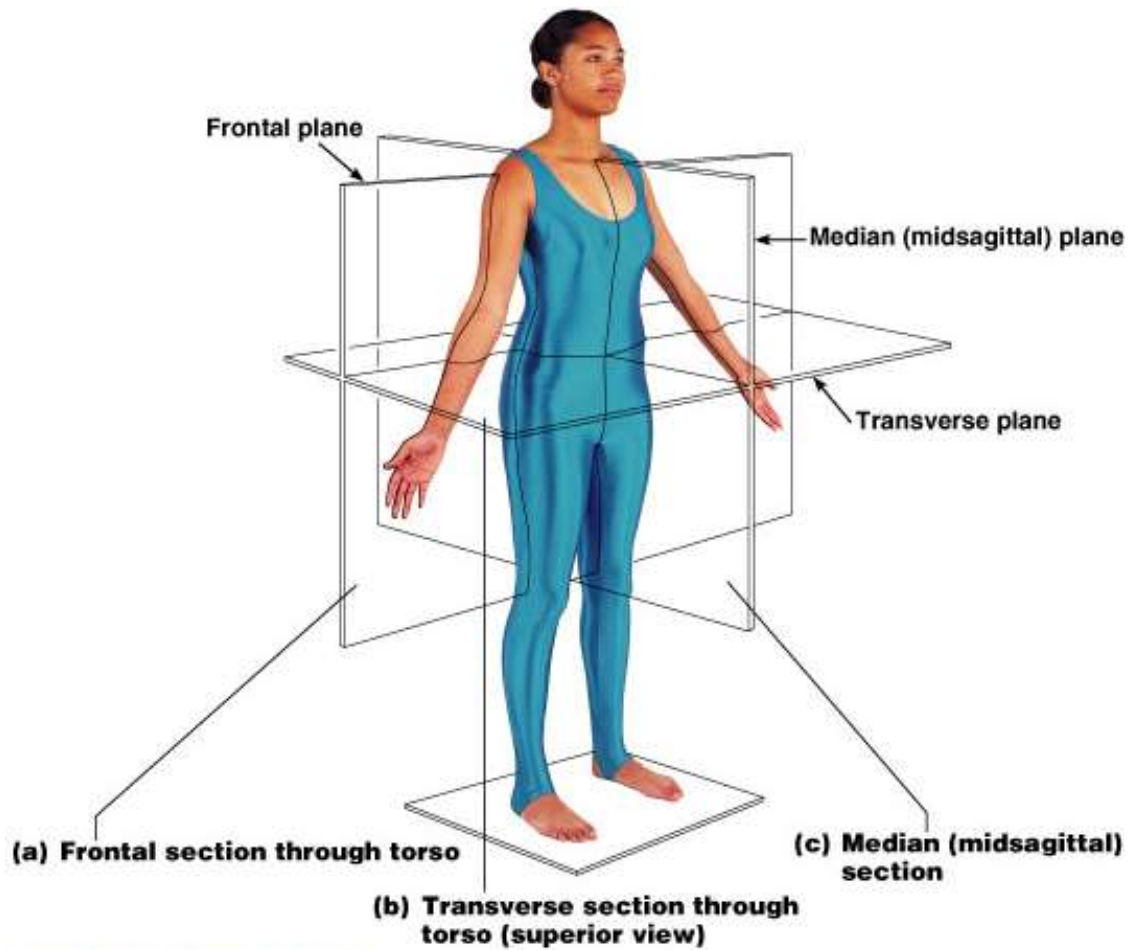
**Sagittal plane  
(median plane)**



**Transverse plane  
(horizontal plane)**



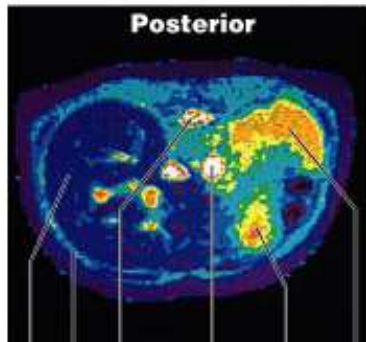
**Coronal plane  
(frontal plane)**



Left and right lung

Liver

Spleen



Subcutaneous fat layer

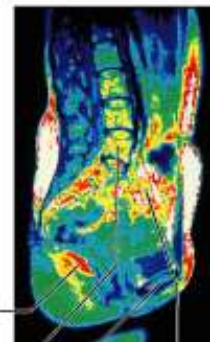
Liver

Spinal cord

Aorta

Stomach

Spleen



Rectum

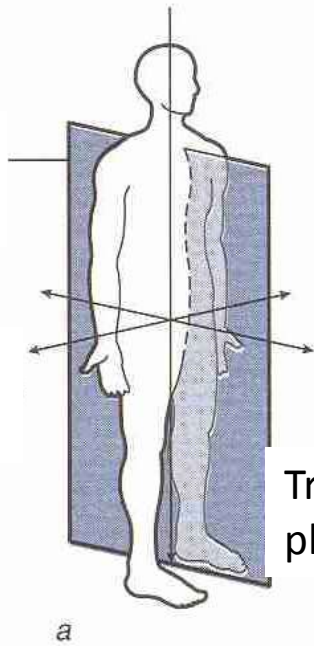
Vertebral column

Intestines

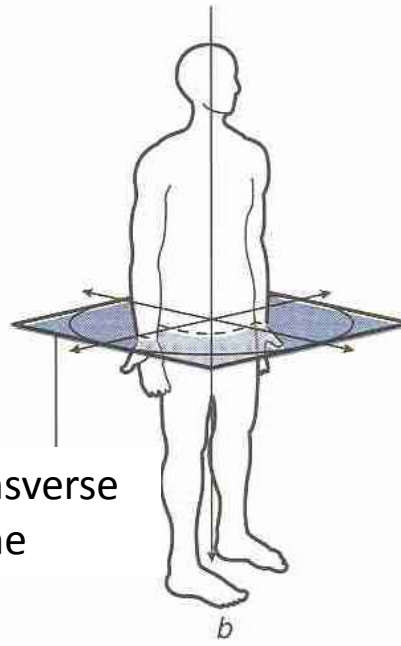
Pubic symphysis

Sagittal plane

Transverse axis

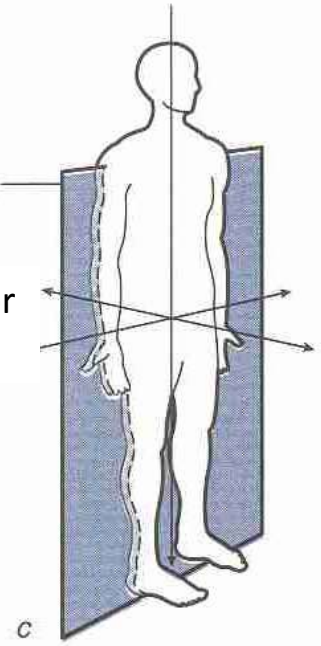


Vertical axis

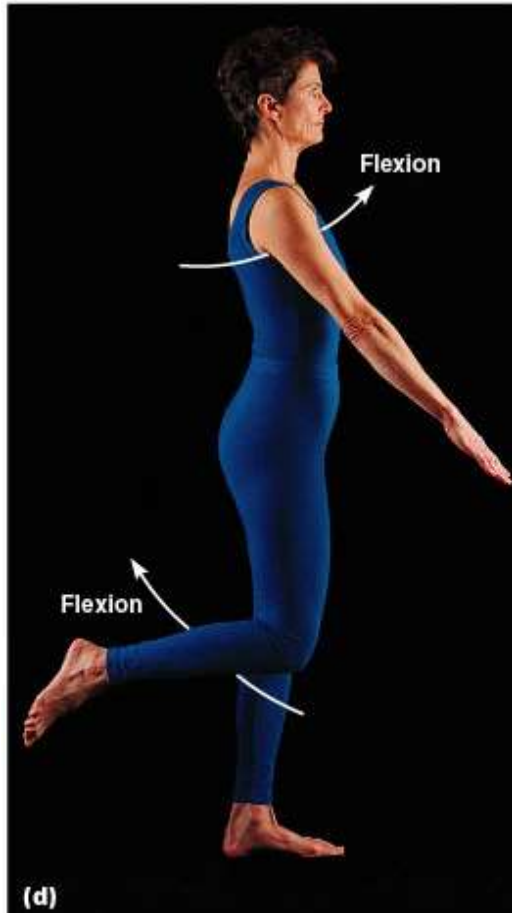


Anteroposterior axis

Frontal plane

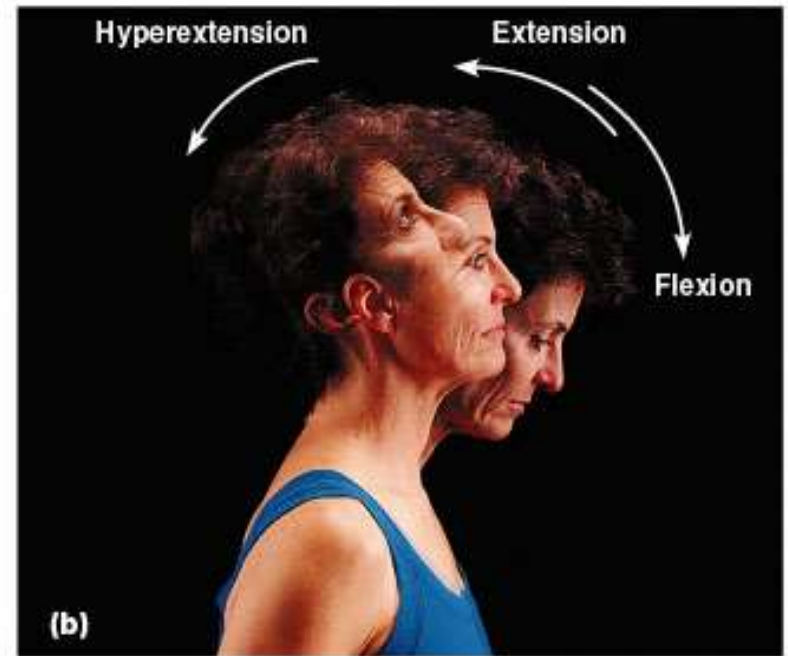
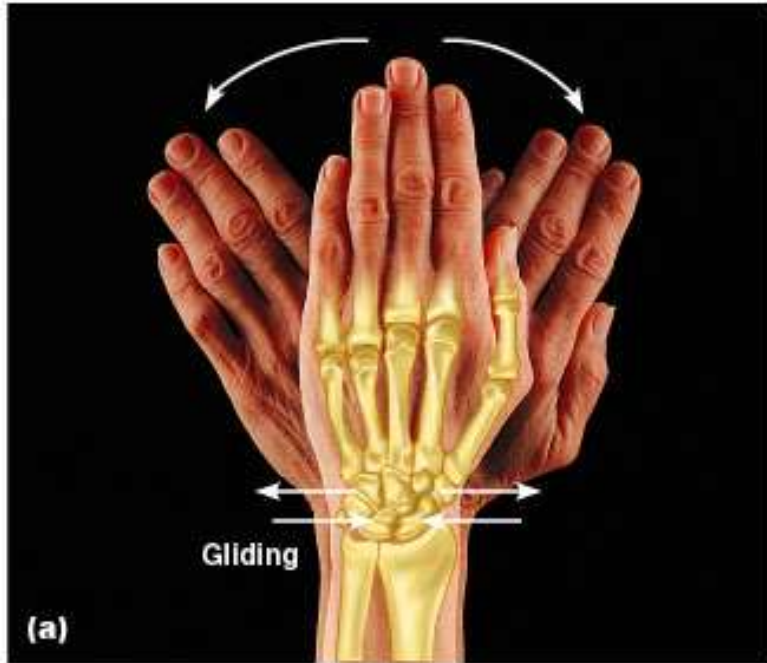


# Movements





# Movements

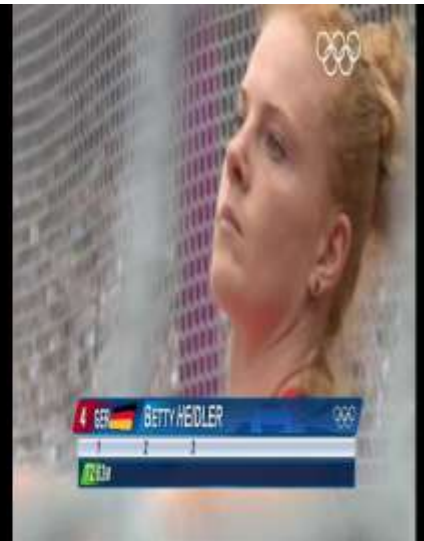
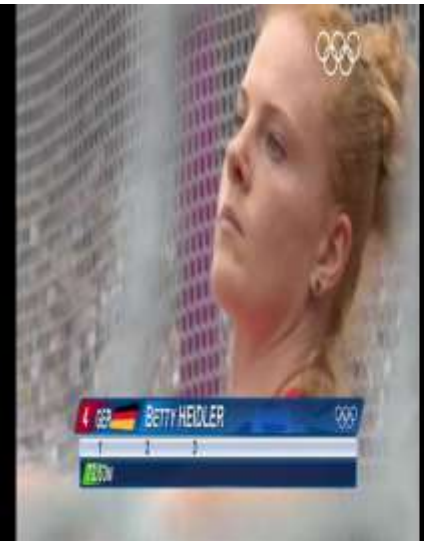
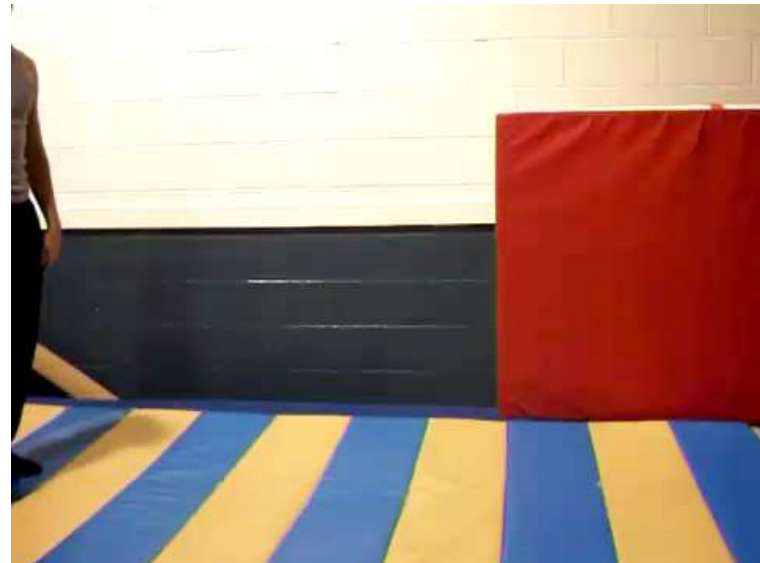


# Movement



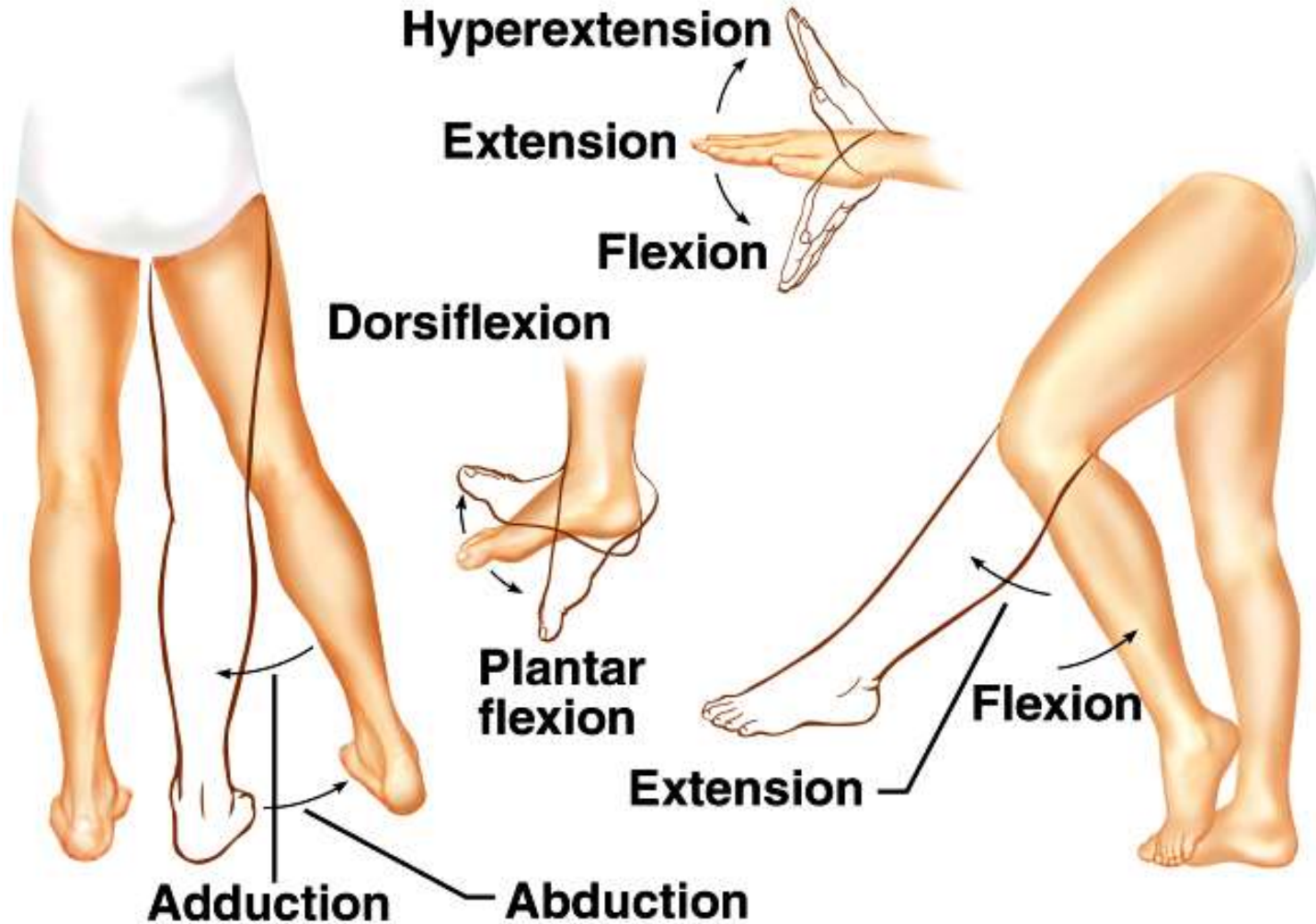
*Now go back and review your drawings – can you improve them?  
Have you used all the terms in the box?*

**Group activity** – which planes are the following movements occurring in?



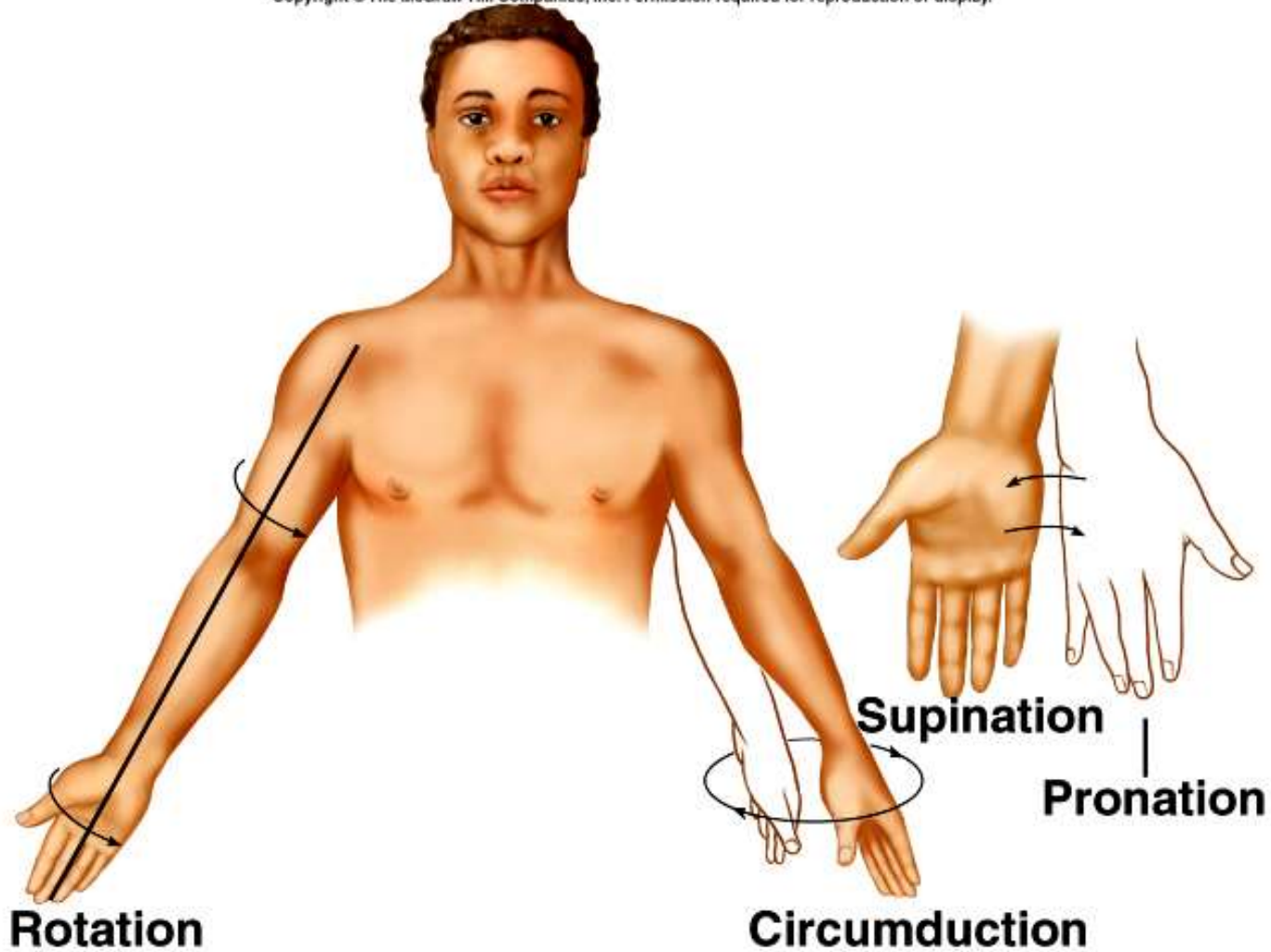
# Types of Joint Movements

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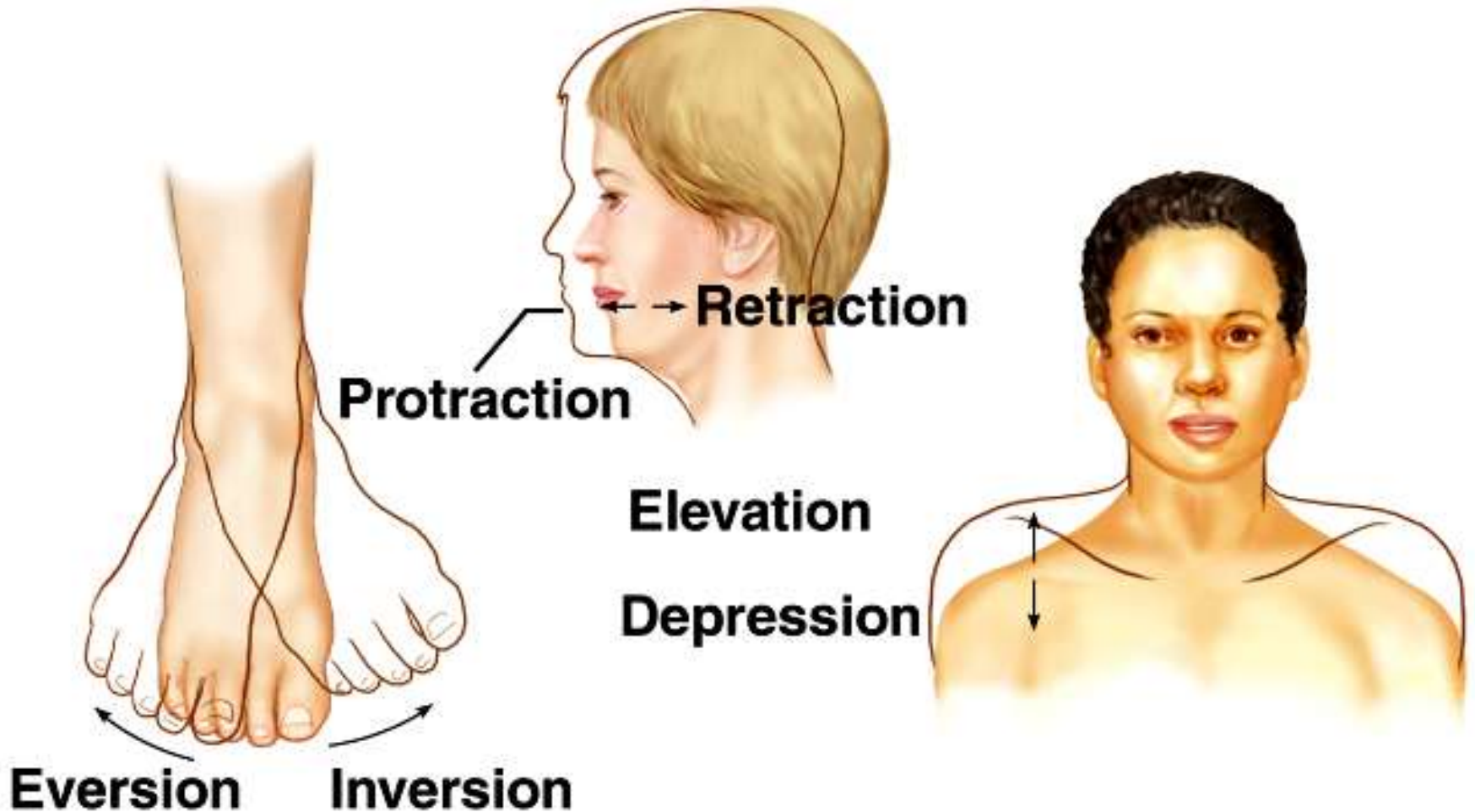


# Types of Joint Movements

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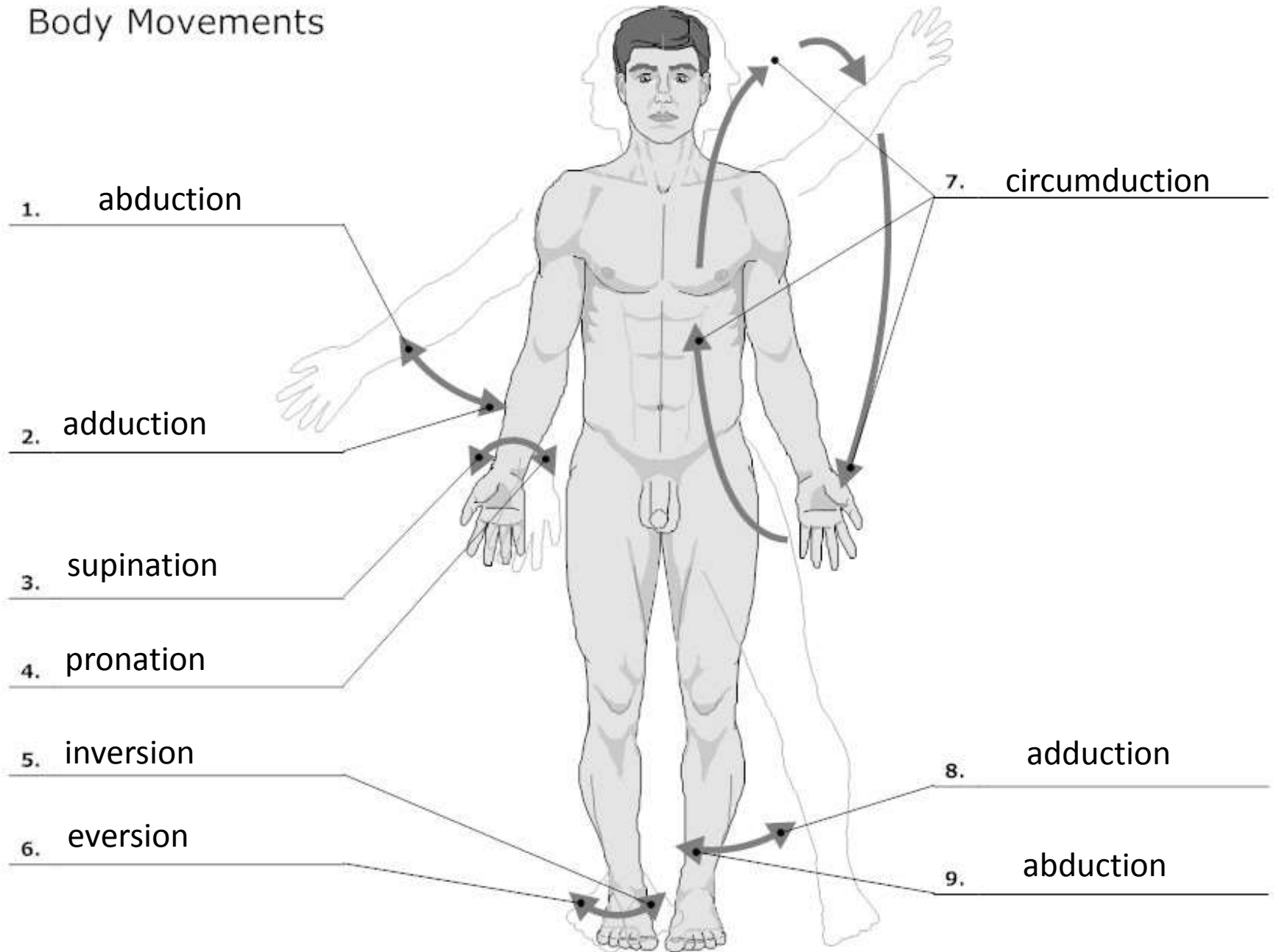


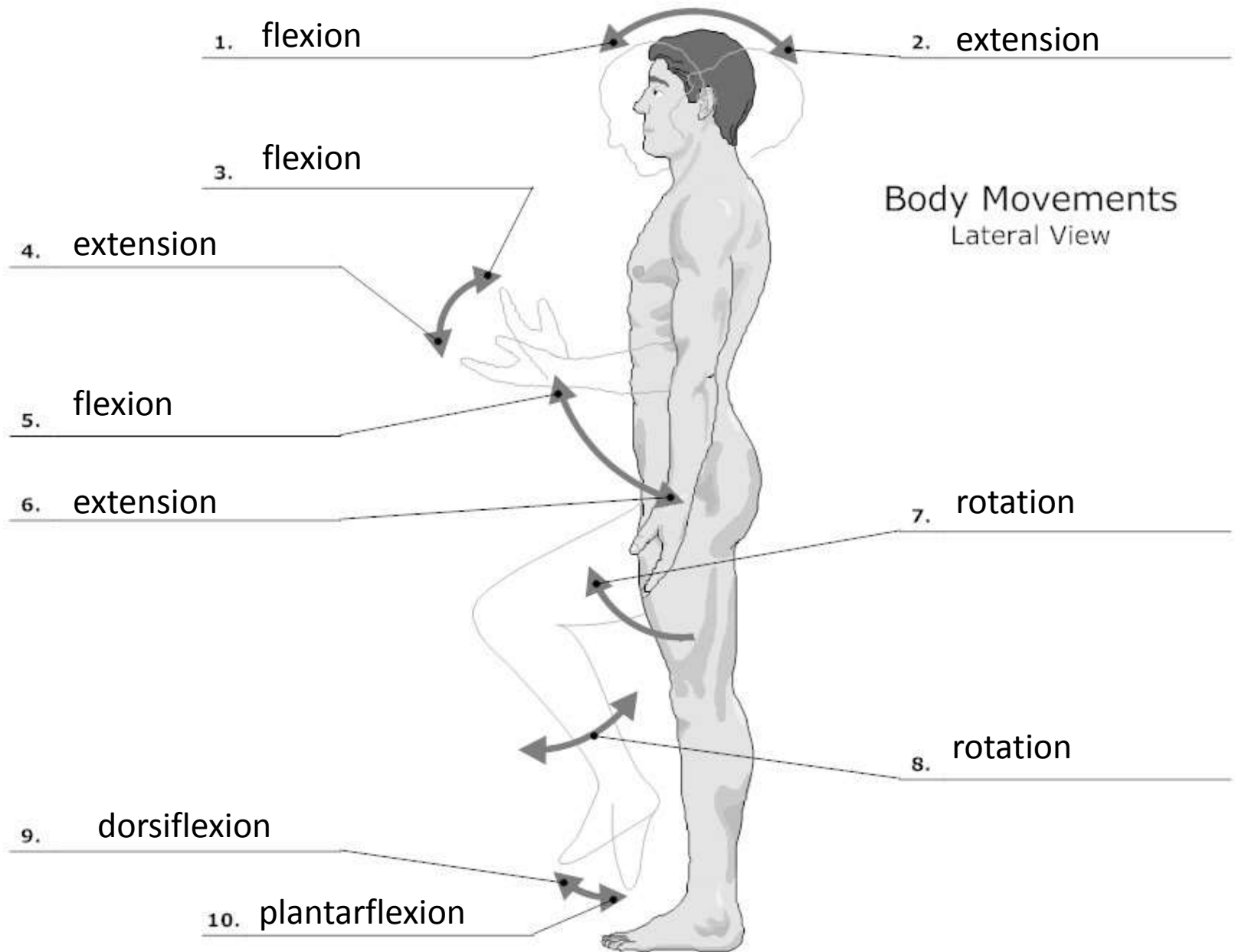
# Types of Joint Movements



*Now try and label the diagrams in your workbook*

# Body Movements







## STARTER:

Work out the joint action of this runner, focussing on his:

- Shoulder
- Elbow
- Hip
- Knee
- Ankle



# Learning Objectives

**Everyone should**

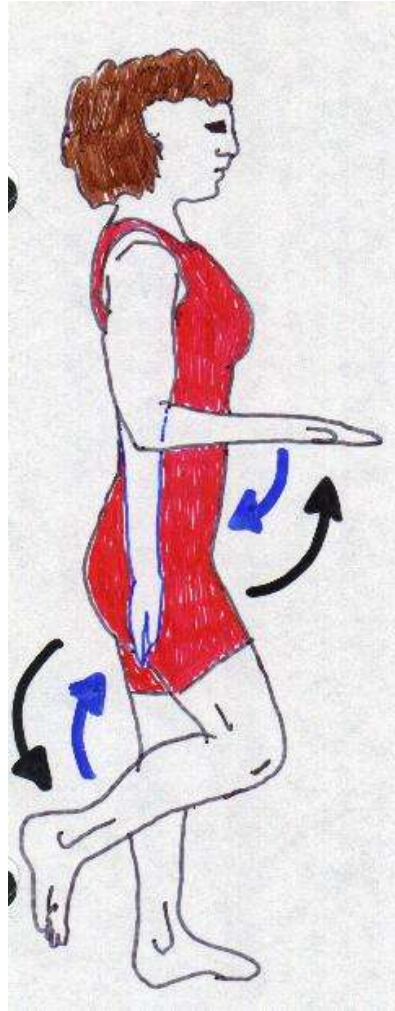
**Define** the following terms:

flexion, extension,  
elevation, depression  
abduction, adduction,  
pronation, supination,  
plantarflexion, dorsiflexion,  
eversion, inversion

**Most will**

**Identify** which movements listed above occur at named joints

# Movements Possible at the Elbow



**Flexion**

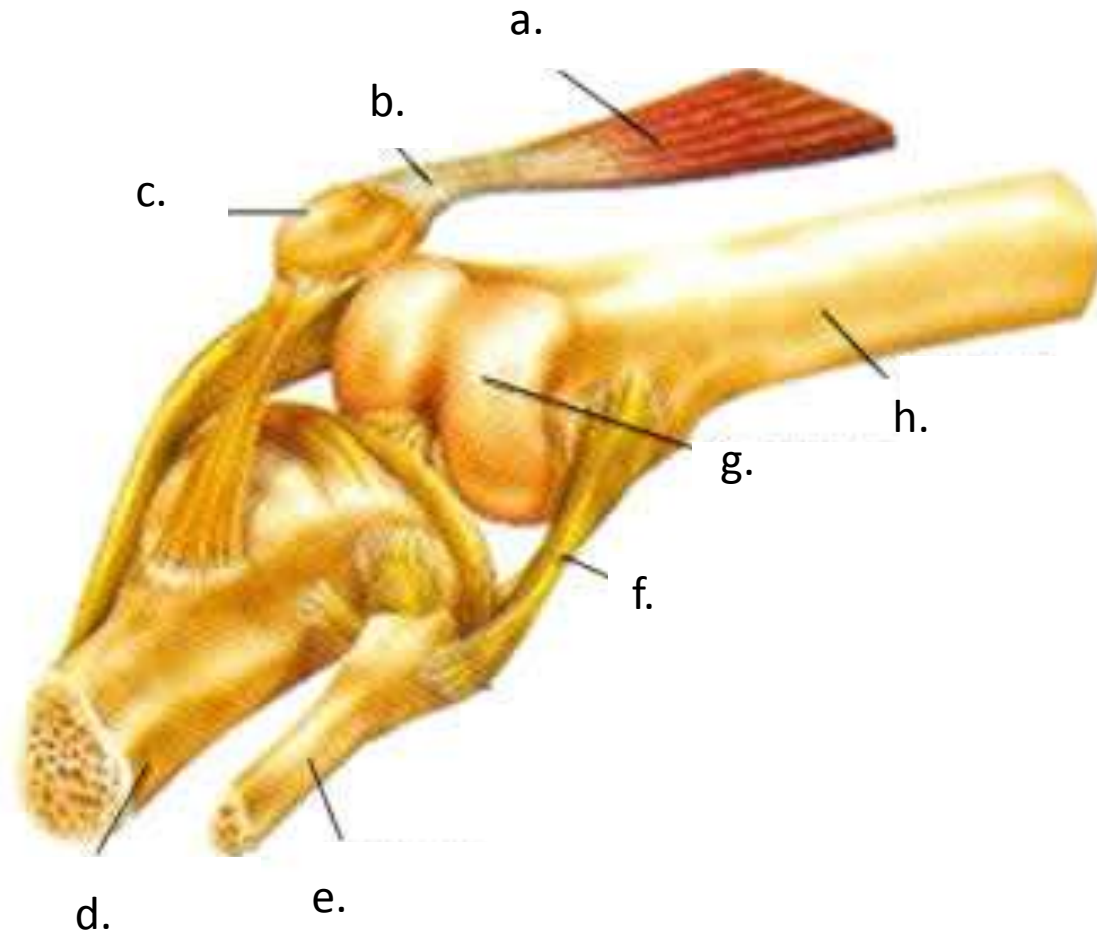
**Extension**

# Group Thought: Basketball Set Shot

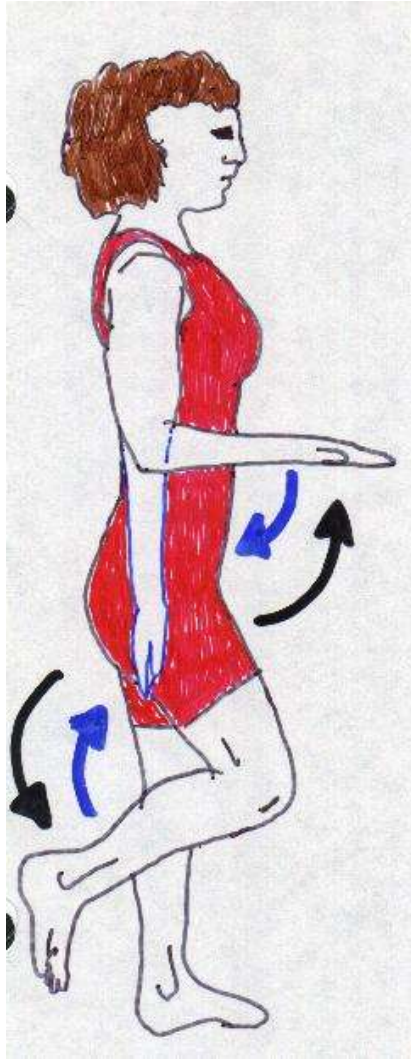


- What is the movement at the elbow?
- In which plane does this movement occur?

# Group Activity – Label the The Knee Joint



# Movements Possible at the Knee



**Flexion**

**Extension**

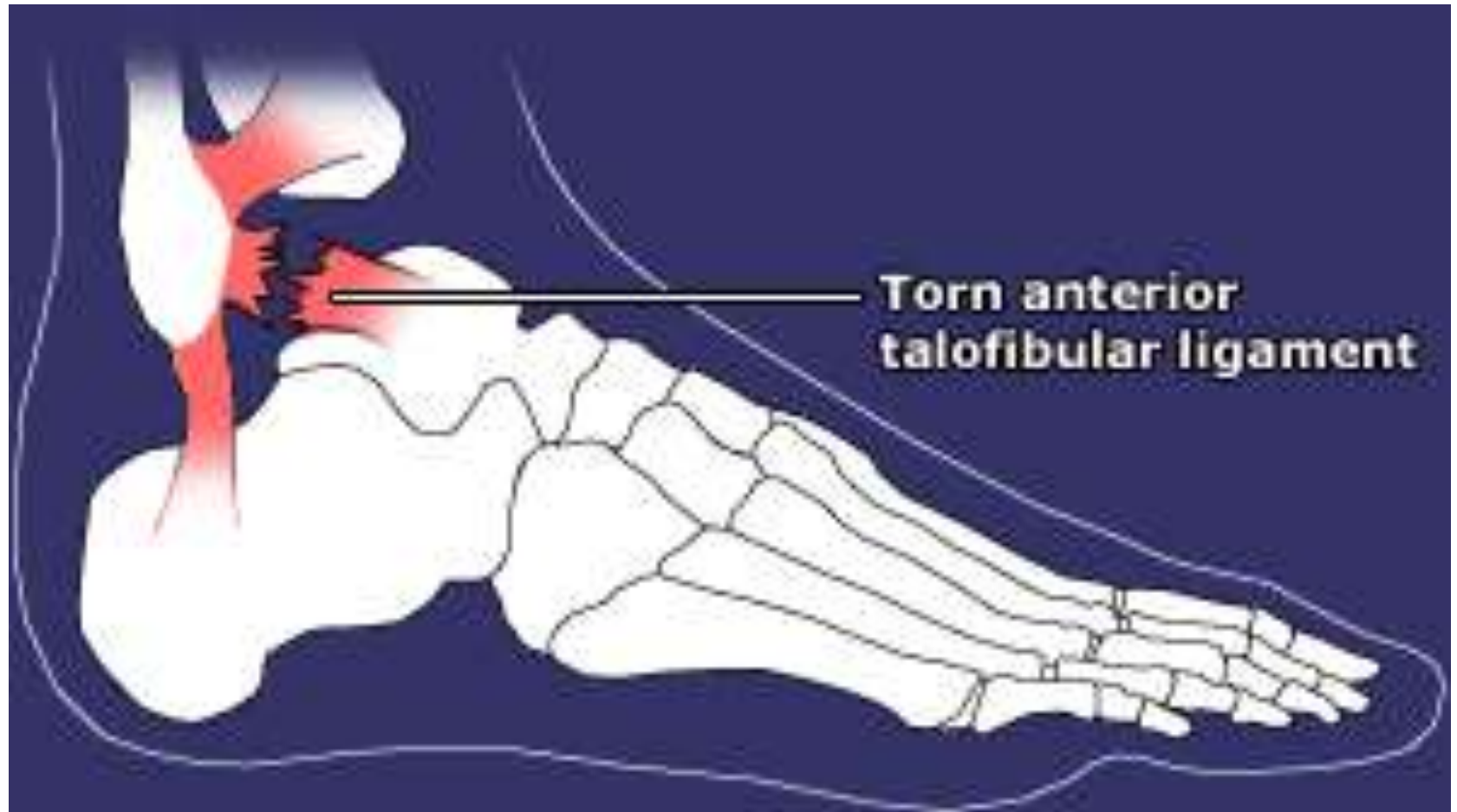
*Try and fill in the table in your workbook as we go through the following slides*

# Group Thought Kicking a Football



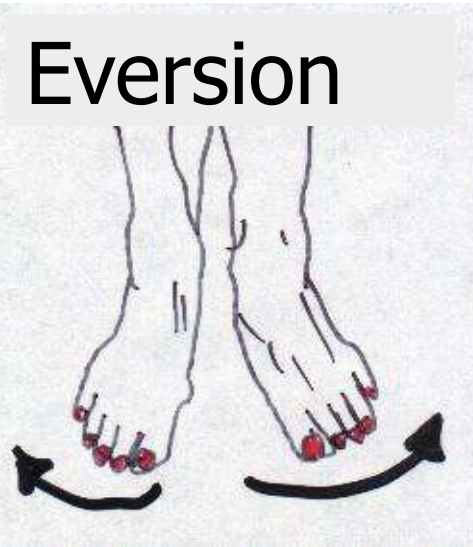
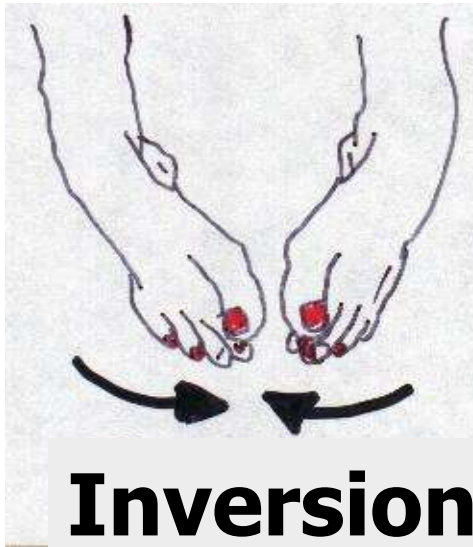
- What movement occurs at the knee?
- In which plane does this movement occur?

# The Ankle Joint

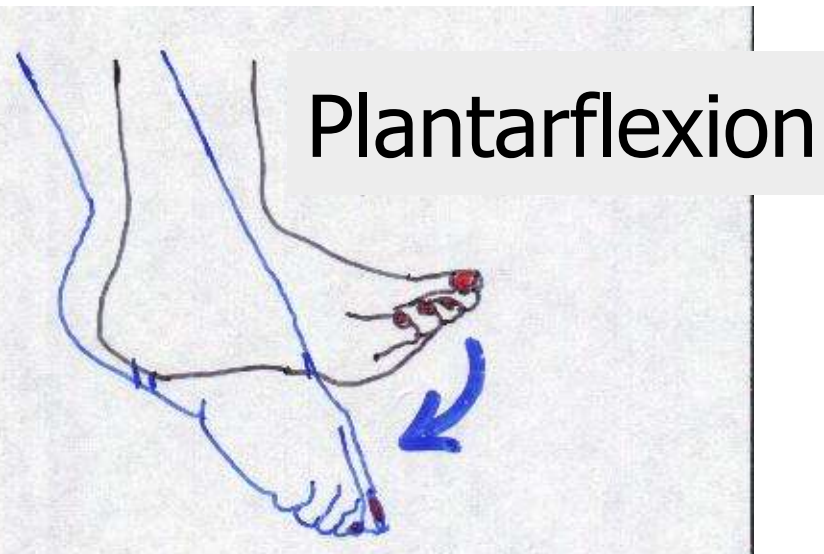
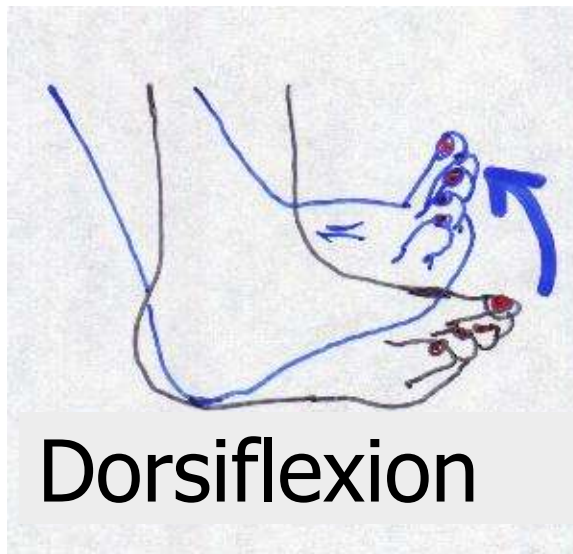




# Movements Possible at the Ankle



Name the plane – for each movement



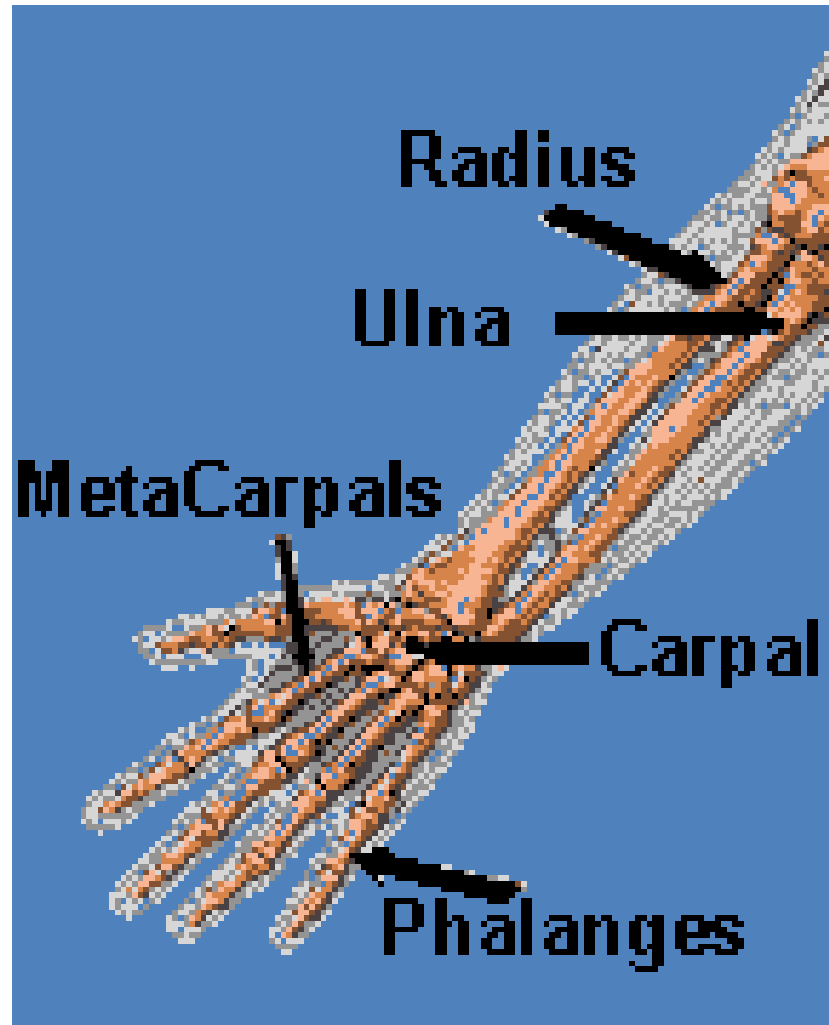
# Group Thought

## Take Off in the Long Jump



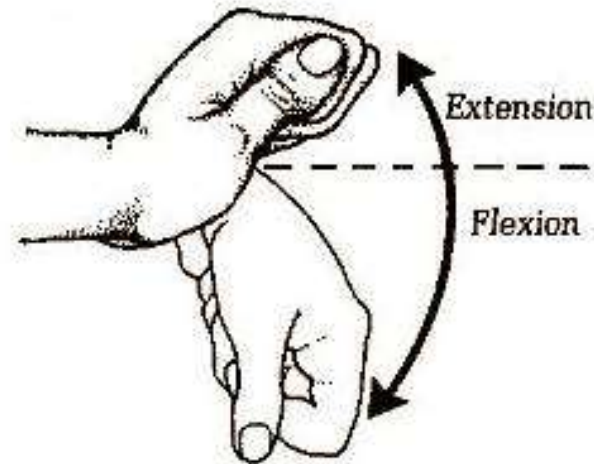
- What movement occurs at the ankle?
- In which plane does this movement occur?

# The Wrist Joint



# Movements Possible at the Wrist

- Flexion
- Extension



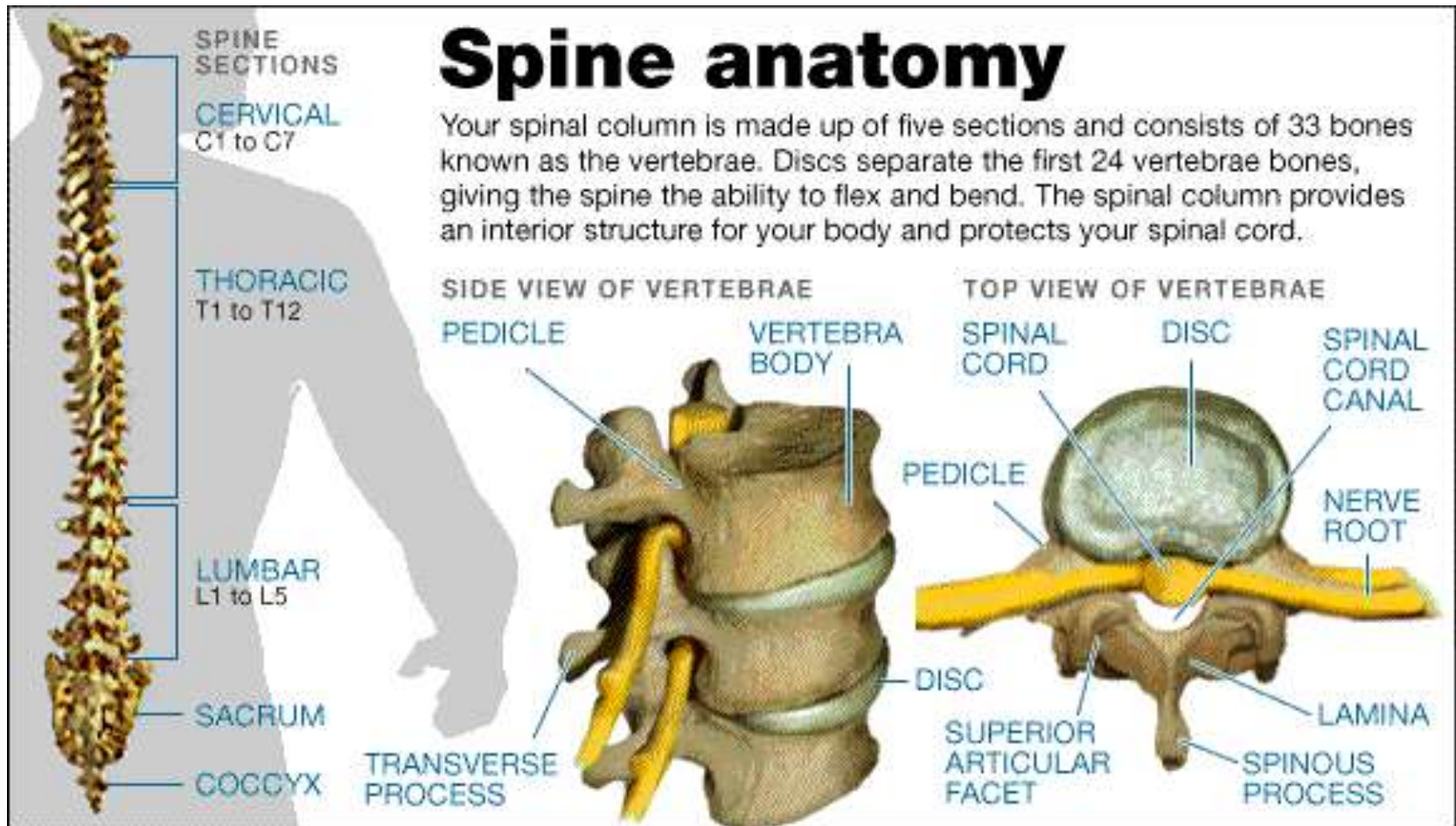
# Group Thought

## Basketball Slam Dunk

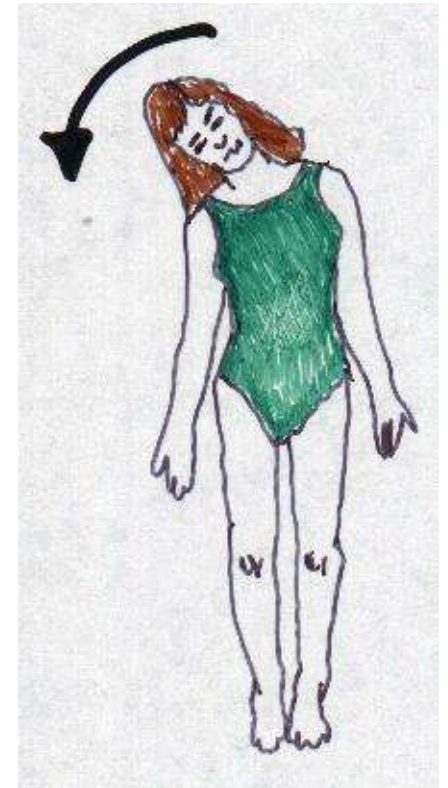
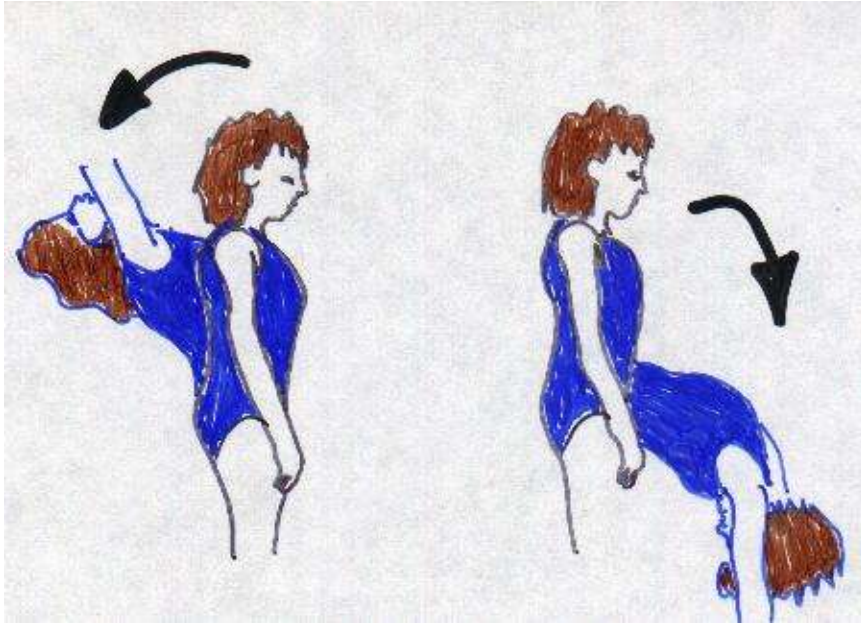


- What movement occurs at the wrist?
- In which plane does this movement occur?

# The Spine



# Movements Possible in the Spine



In which plane do each of these movements occur?

# Group Thought Gymnast



- What movement is occurring in the spine?
- In which plane does this movement occur?



# The Radio-ulnar Joint



# Movements Possible at the Radio-ulnar Joint



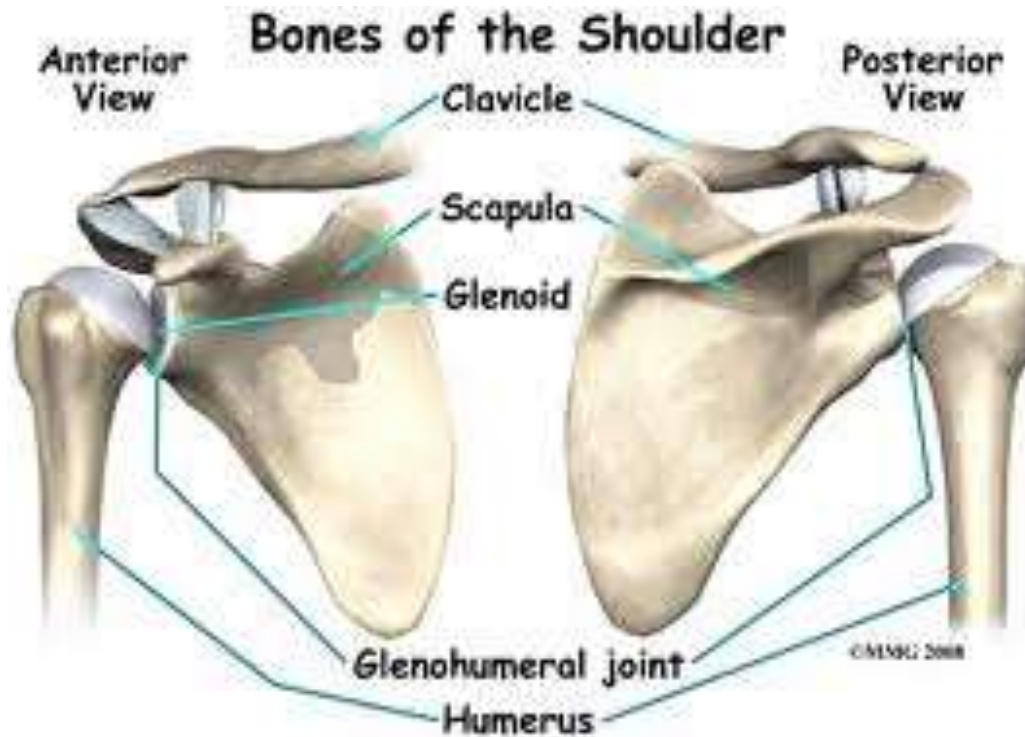
# Group Thought

## Top Spin Forehand

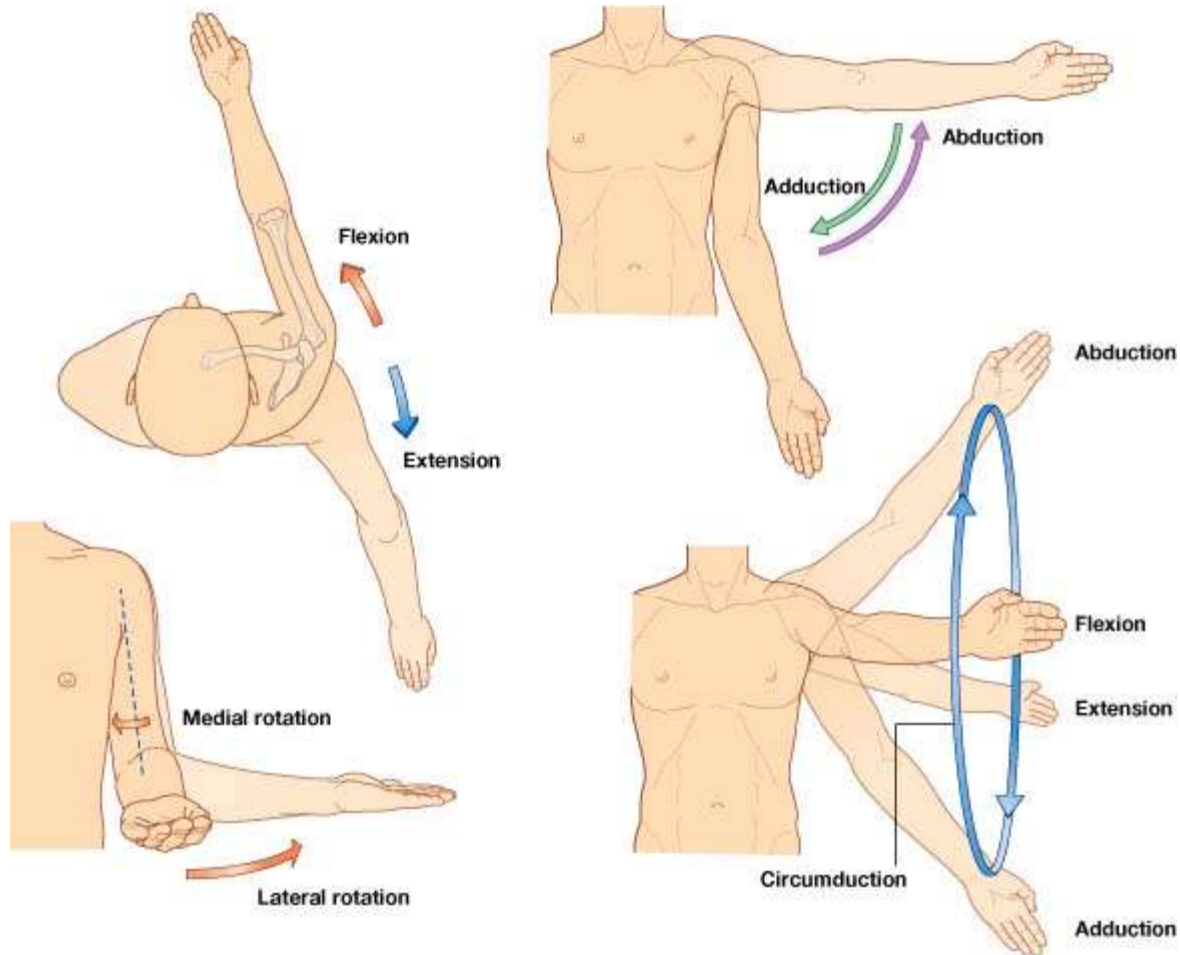


- What movement occurs at the radio-ulnar joint?
- In which plane does these movements occur?

# The Shoulder Joint



# Movements Possible at the Shoulder Joint

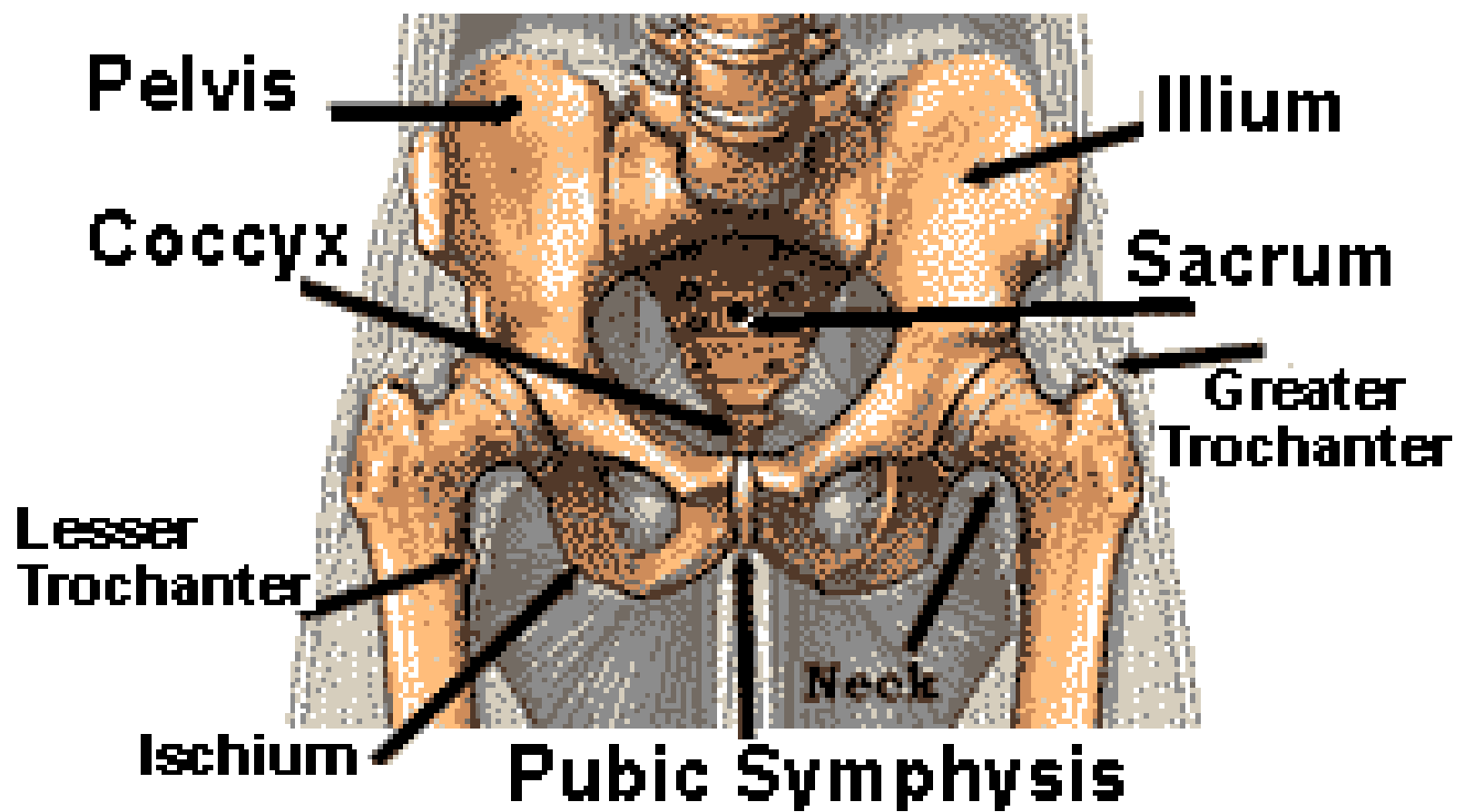


# Group Thought Backhand in Tennis



- What movement occurs in both shoulders?
- In which plane does this movement occur?

# The Hip Joint



# Movements Possible at the Hip Joint





# Group Thought Sprinting



- What movements occur at the hip joint during sprinting?
- In which plane does this movement occur?

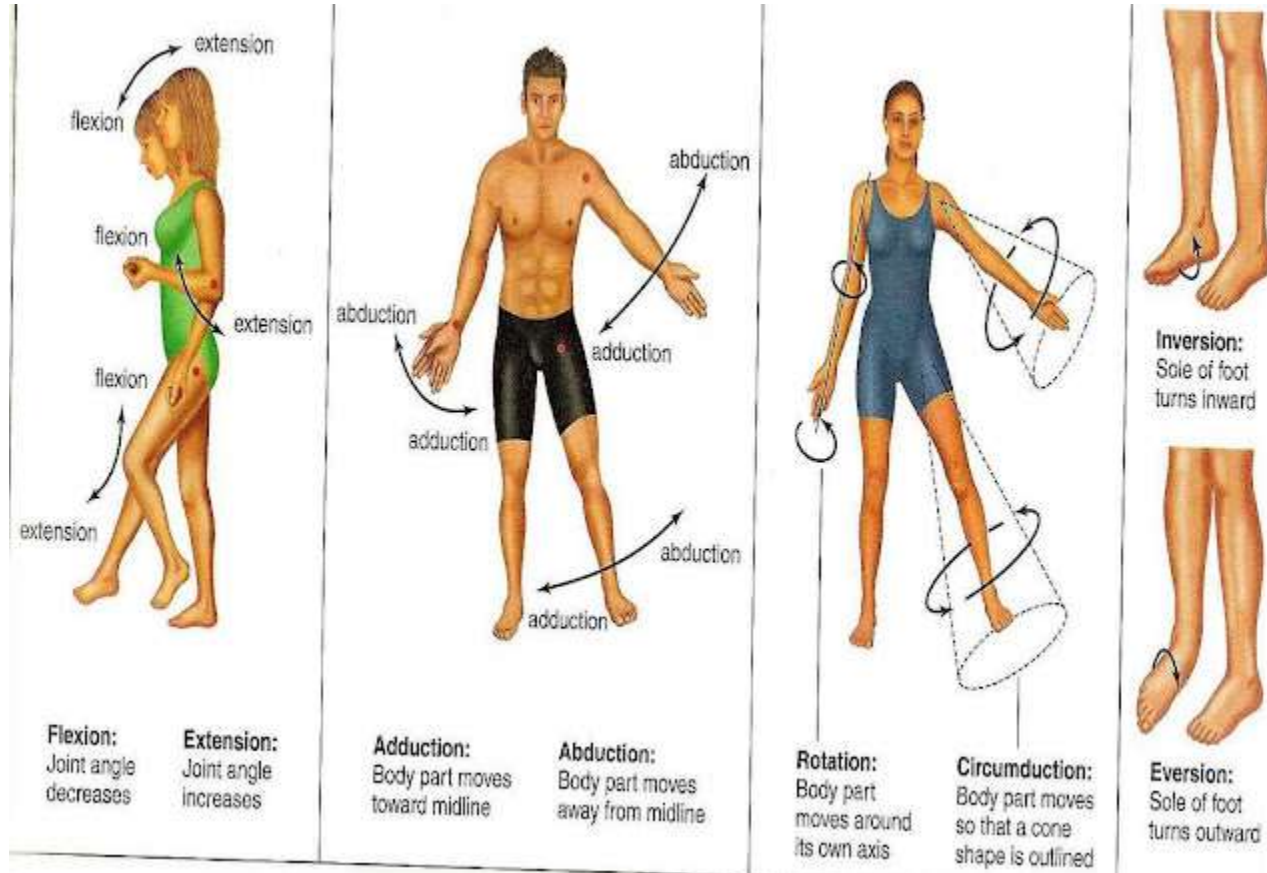
# Individual Activity

- Complete the table in your workbook
- Try the practical activity



# Starter: Individual Activity

Try the Joints and movements matching exercise!



# Learning Objectives

**Everyone should**

**Describe** the movements associated with the following terms in sporting examples:

flexion, extension,  
elevation, depression  
abduction, adduction,  
pronation, supination,  
plantarflexion, dorsiflexion,  
eversion, inversion

# Tasks for the rest of the lesson..

## Pairs Activity

- Complete the sporting movements in your workbook
- Discuss the answers in pairs but everyone must write their own answers!

## Whole class activity

- Speed dating muscles and movements review!
- 1 min with each partner and then you move on!
- Answer the questions in your workbook

# Answers for the speed dating review quiz!

What movement does iliopsoas produce?

**Hip flexion**

Label the 4 parts of quadriceps

**Rectus femoris, vastus intermedius, vastus lateralis, vastus medialis.**

What movement does the quadriceps produce at the knee?

**Extension**

Label the 3 parts of the hamstrings

**Biceps femoris, Semitendinosus, semimembranosus.**

Which muscles produce plantarflexion – pointing toes?

**gastrocnemius and soleus**

Which muscle produces inversion?

**Tibialis anterior.**

What are the movements of the Trapezius?

**Raise the head, pull shoulders back, raise the scapula, drop the scapula**

When you turn your head to look at someone next to you – what is this called?

**Rotation**

Which are the only two joints that can perform circumduction?

Why?

**Shoulder/ Hip – Ball and socket.**

What muscle is being used as you straighten out from a pike dive?

**Erector Spinae**

What two movements does the Triceps Brachii produce?

**Elbow and shoulder extension**

In knee flexion which muscle is working?

**Hamstrings**

In hip extension which muscle is working?

**Hamstrings**

Describe the six key parts of the spine? How many vertebrae are at each section

**Cervical (7), Thoracic (12), Lumbar (5), Intervertebral Discs, Sacrum, Coccyx**



# Starter – Paired discussion

What factors affect the Range of Motion (ROM) at a joint?

- Shape of the surfaces of the articulating bones in the joints
- Position and length of the restraining ligaments
- Effects of the muscles and the tendons at a joint
- Amount of soft tissue, (skin, fat, muscle) at the joint

*Now copy this into your workbook.*

# Learning Objectives

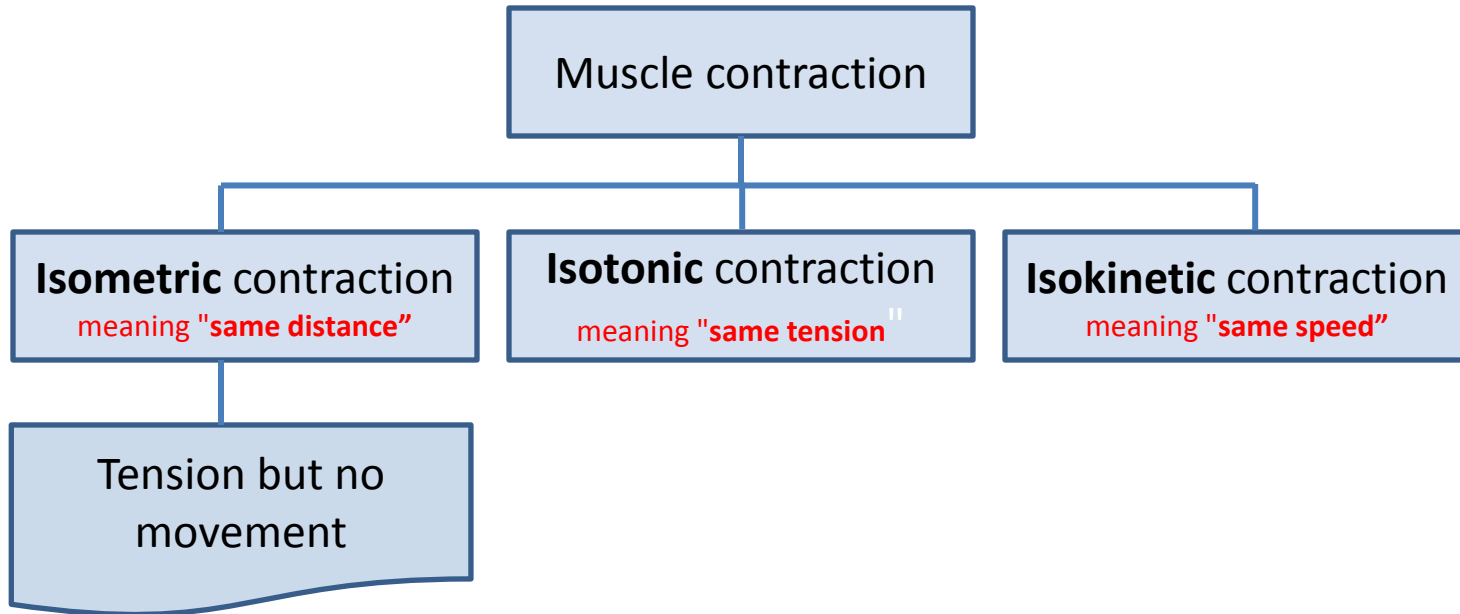
## Everyone should

**Outline** the different types of muscle contraction

## Most will

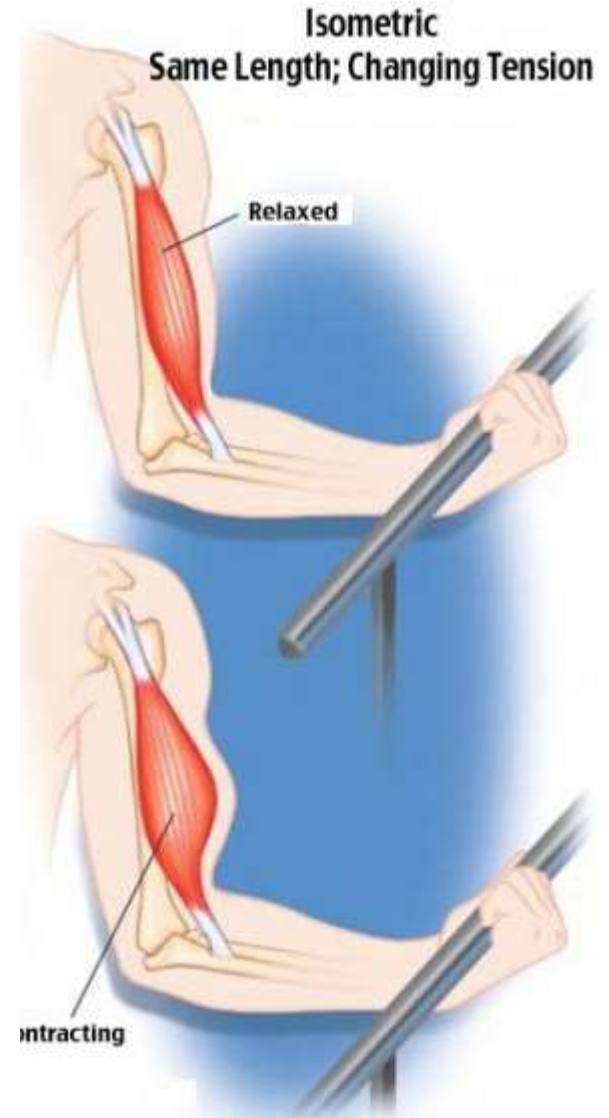
- **Identify** which muscle contraction are related to specific joint movements
- **Explain** the concept of reciprocal inhibition

# Types of muscle contractions



# ISOMETRIC:-

- Muscle contracts but it doesn't end in movement e.g. a rugby scrum





## Strength tests in competitions such as world strongest man



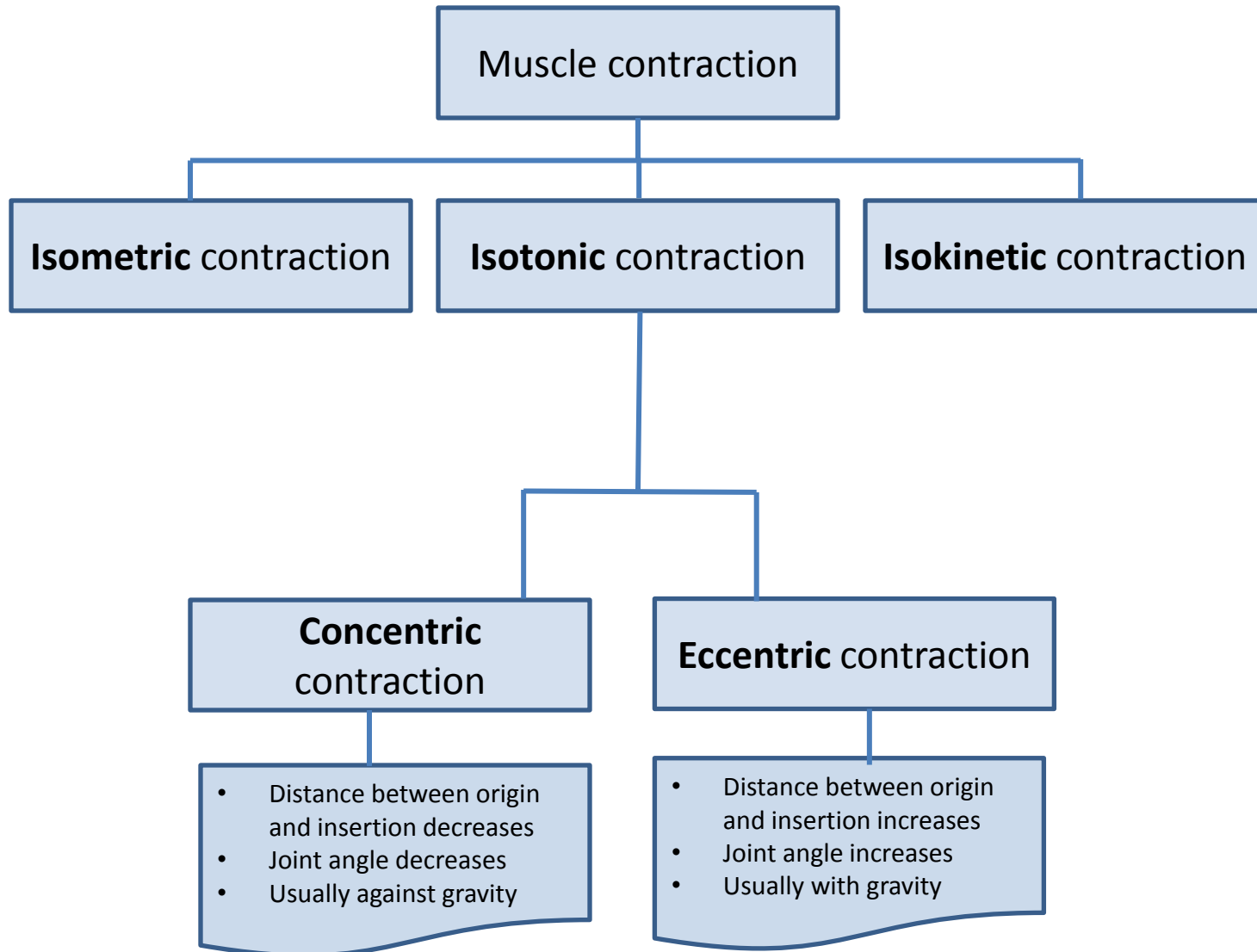
### Disadvantages:

- Increase blood pressure in head (dangerous!!)
- Not “specific” to many sporting events since there no muscle movement involved.

### Advantages:

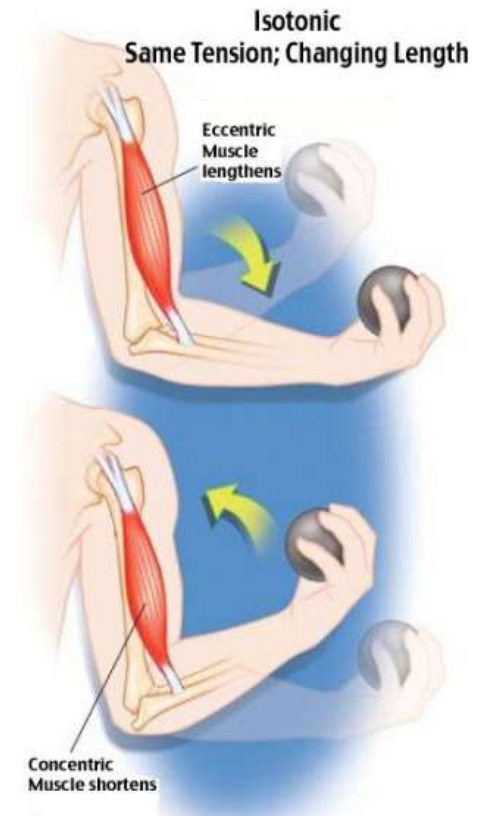
- \* A proven way of increasing muscle size quickly.

# Types of muscle contractions



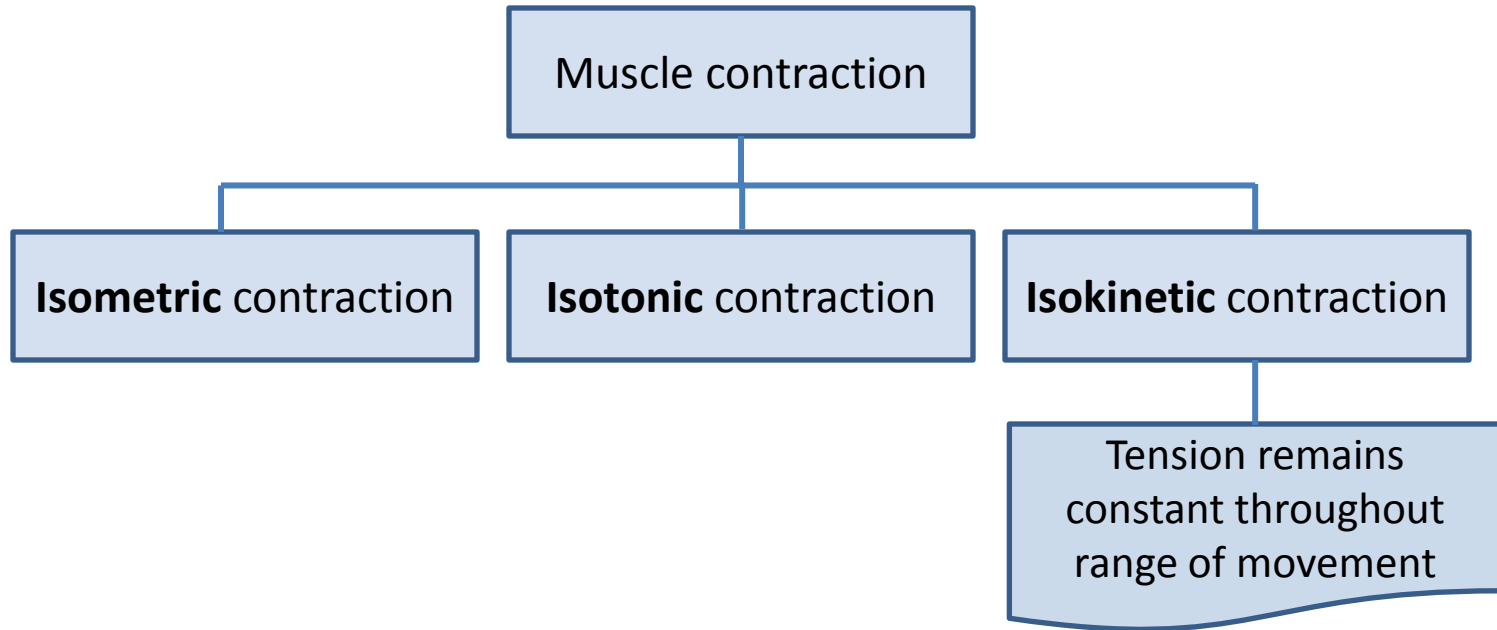
# ISOTONIC.

- Muscle length shortens under tension ie concentric.
- Muscle changes from “long +Thin” to “Short + Fat”.
- (Press ups or bench pressing using weights).





# Types of muscle contractions



# ISOKINETIC

- Muscle tension remains constant (the same) throughout the full range of movement.

i.e Outer – mid + inner range



Outer



mid



inner range

Disadvantages: developed only available on hi-tech expensive machines

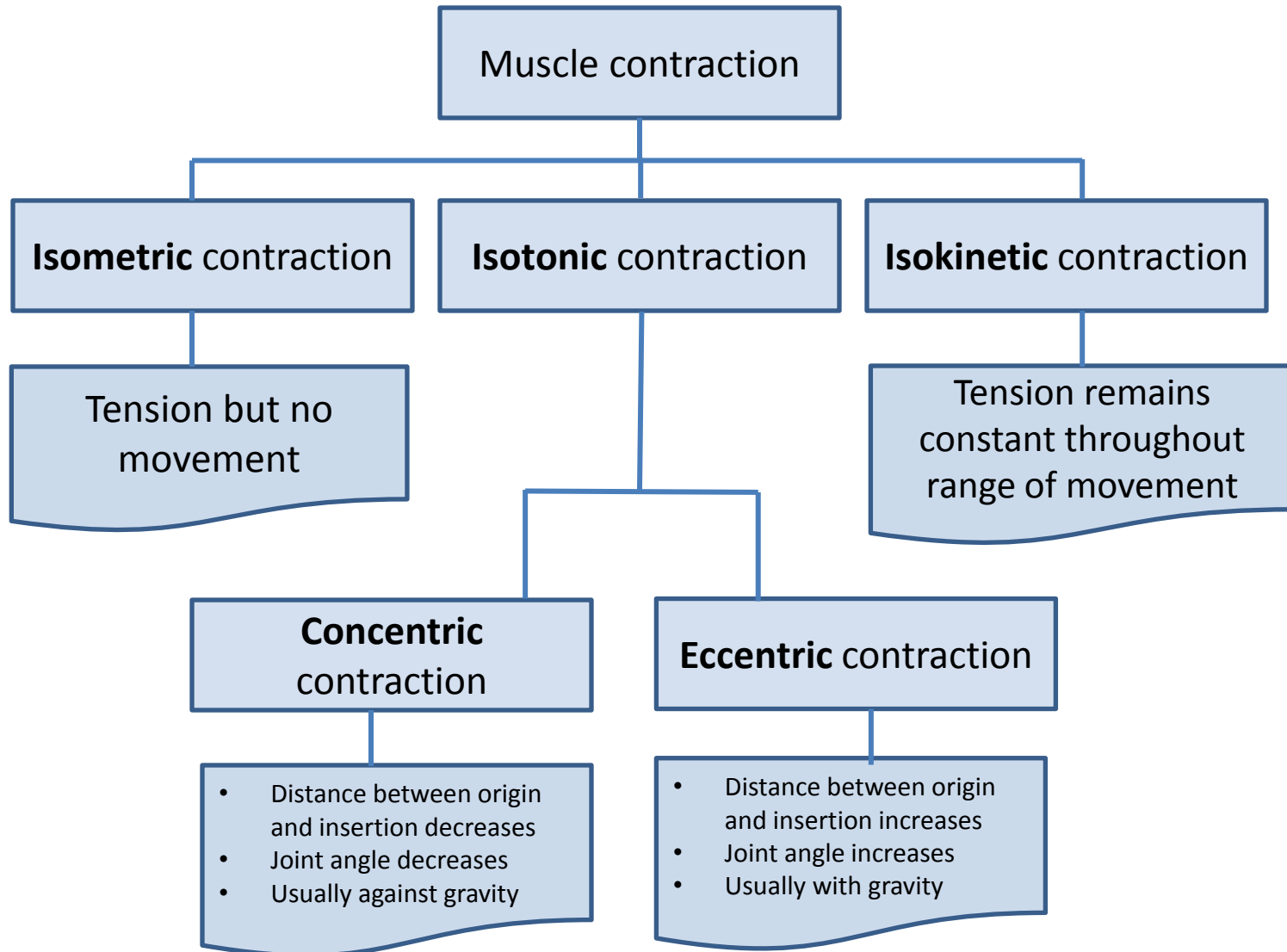


***Matt Carpenter***

***3B, St. Louis Cardinals***

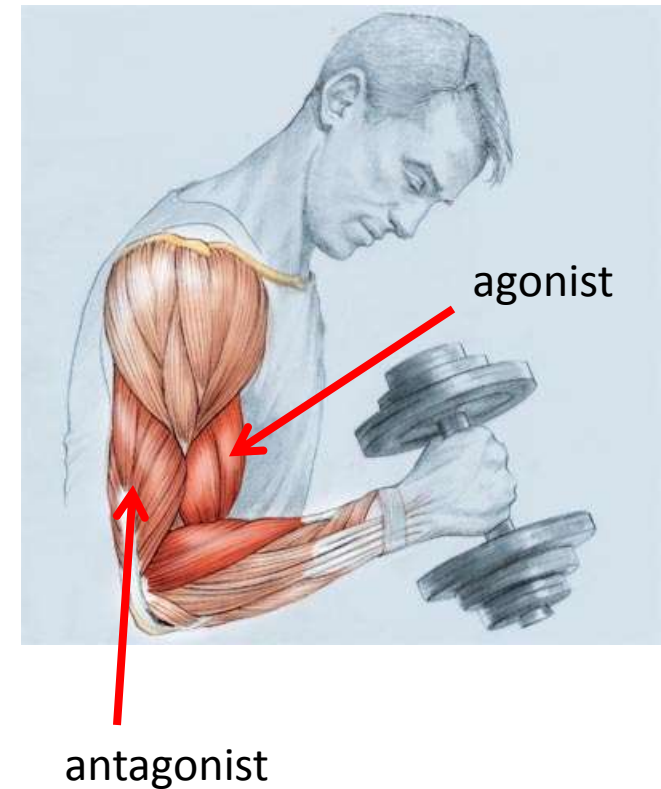
# Types of muscle contractions

*Now copy this into your workbook and add an example of the movement for each one*



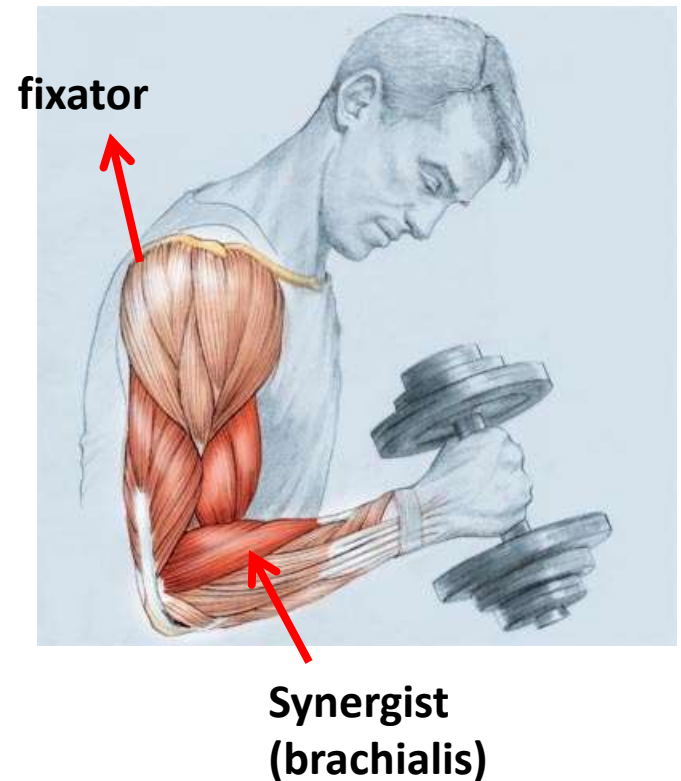
# Role of muscles in joint movements

- Muscles work **in pairs**
- The muscles on the front of a limb are usually matched by muscles on the back
- The main muscle that contracts to bring about a movement is called the **prime mover** or **agonist**
- the opposite muscle that relaxes as the prime mover contracts is called the **antagonist**



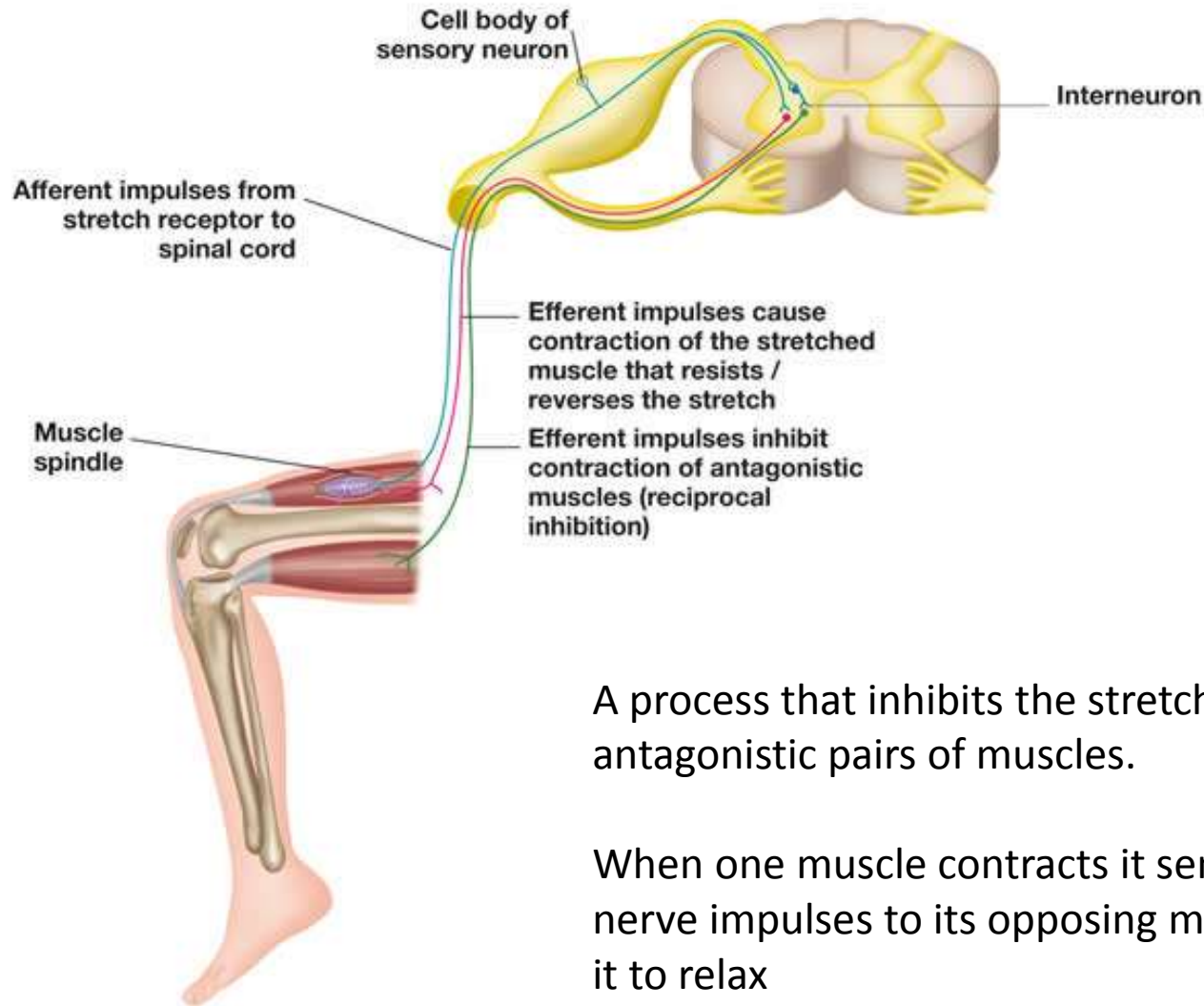
*Write definitions for the terms in bold above and then try the Antagonistic Pairs exercise in your workbook*

- When performing an exercise, other muscles may join in and **assist** the prime mover
- These muscles are called **synergists**
- Muscles can also **contract isometrically** to **fix** parts of the body in order to maintain a correct or stable position
- When a muscle performs this function it is called a **fixator**



*Write definitions for the terms in bold above*

# Reciprocal inhibition



A process that inhibits the stretch reflex in antagonistic pairs of muscles.

When one muscle contracts it sends inhibitory nerve impulses to its opposing muscle causing it to relax

# GROUP THOUGHT

## **Core Stability**

Core stability muscles contract to act as stabilisers, prior to movement.

## **Which are the core stability muscles?**

### **A strong core stability gives you:**

A more stable centre of gravity/mass

Reduced risk of injury/pain (especially lower back)

Improved posture and body/spine alignment

Creates a more stable platform allowing more efficient movement

**Weak core muscles** can make you susceptible to poor posture, muscular instability/injuries, nerve irritation & lower back pain

**Give some examples of training you can do to help improve core stability.....**



# Group Task

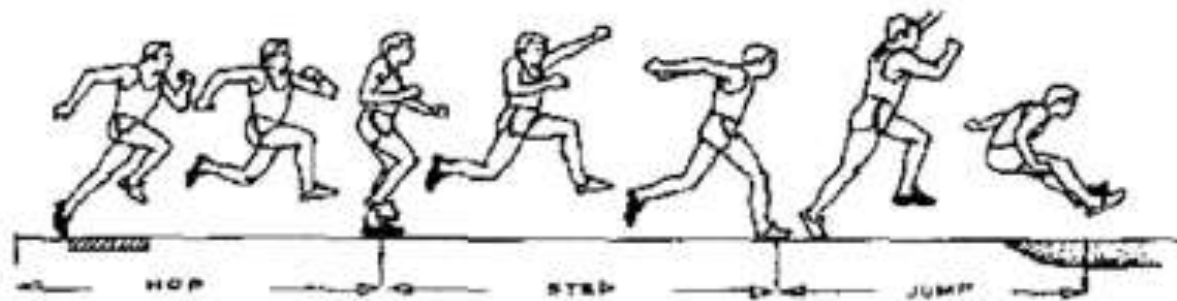
- Try and fill in the table in your workbooks looking at specific sporting movements
- Discuss the answers in your group but complete your table **individually**



# STARTER – Individual Activity

## Matching exercise

Complete the Movement at Joints – matching exercise on your desks



# Learning Objectives

**Everyone should**

**Define** DOMS

**Most will**

- **Evaluate** the effects of stretching before exercise

# Individual Activity



- Which muscles is Penny stretching?
- Why is stretching before you run good for you?

# DOMS reading – individual activity

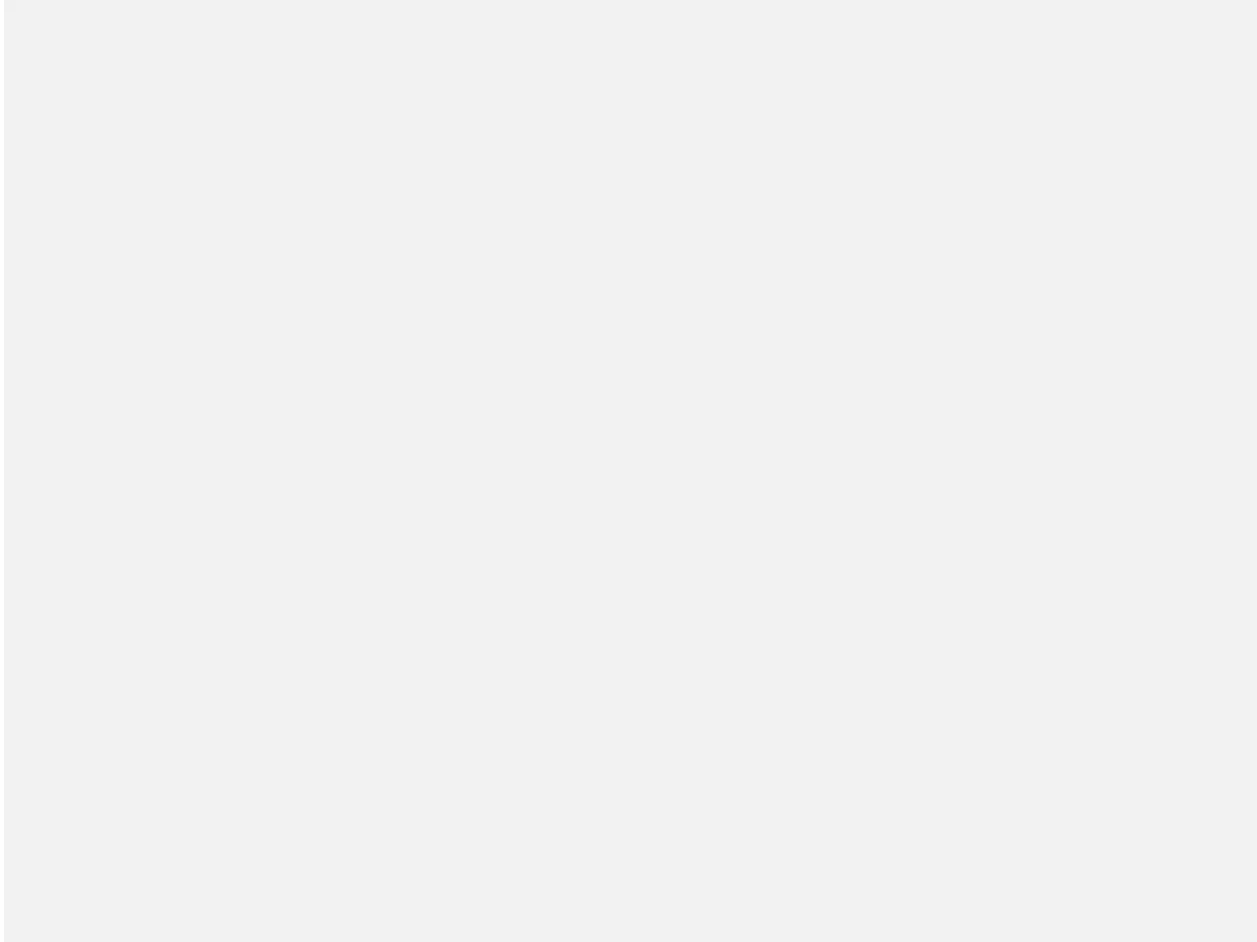
1. Read the article about DOMS individually
2. Highlight any key terms that you have met in the SEHS course so far
3. Divide the text mentally into 4 main themes
4. Using the graphic organiser, give each theme a main heading
5. In the space below the heading, summarise the information from the text that fits into your theme using no more than **3 BULLET POINTS**
6. To finish your analysis, write 3 full meaningful sentences that summarise the text in the final box provided

# Group activity – True or False?

1. Stretching is a good way to warm up before exercising
2. Cardio burns the most calories
3. The more exercise – the better!
4. Sit ups (crunches) are not very effective at toning abdominal muscles
5. Muscle and fat weigh the same
6. Women will develop big bulky muscles if they lift weights

1. Muscle and fat weigh the same -*True. 1 kg of muscle is the same as 1 kg of fat but muscle is more dense*
2. Stretching is a good way to warm up before exercising –*False. You should never stretch cold muscles. Stretching cold muscles can cause injury, and several studies have shown that stretching cold muscles slightly decreases muscle strength and power for up to an hour after stretching.*
3. The more exercise – the better! – *False. Too much exercise can lead to injury and/or burnout. When it comes to exercise, you need an appropriate balance of training and rest.*
4. Sit ups (crunches) are not very effective at toning abdominal muscles – *True. Sit-ups are actually one of the more ineffective ab exercises you can do because they work the hip flexor muscles more than the ab muscles.*
5. Women cannot develop big bulky muscles if they lift weights – *True. Women don't have enough of the hormone testosterone (a key hormone for building muscle) to develop big, bulky muscles.*
6. Cardio burns the most calories –*False. If you want to burn more fat overall -- and keep burning it long after your workout is over -- weight training is the way to go.*

# ToK in SEHS



List all the benefits of stretching before exercise as you watch this video clip



# ToK in SEHS

## Individual Activity

- Read the article in your workbook about the benefits of stretching
- Make sure you know the meanings of the words in bold
- Underline/highlight any points of interest

## Group Activity

Discuss the following statement..

***“Stretching is an essential part of any warm up routine before exercise”***

Using the notes you made from the video and the article, try and fill in the table in your workbook.