BUILD YOUR OWN ELBOW JOINT

- Stand up and hold your right elbow with your left hand.
- Without moving your upper arm swivel your right forearm through its full range of motion.
- Can you feel how your elbow joint moves?

Take a look at the diagram to the right and see if you can identify the bones you can feel in your arm. Your elbow joint is a hinge joint. It consists of two knobs at the bottom end of the humerus which fit into two grooves at the top of the radius and ulna.

Your task now is to build your own simple version of an elbow joint and carry out some tests on it.

Your teacher will give you an elbow joint kit which should contain the following pieces:

- A forearm
- An upper arm
- Two long balloons
- Some string
- Two plastic cable ties
- A piece of split PVC tubing
- Two thick elastic bands
- A set of slot masses
- Some electrical tape

Now follow the steps below:

1. Take the piece of PVC tubing and slip it over the bottom of the upper arm.

What part of the elbow joint does this tube represent? Write your answer in the box below.

NAME
2. This step is a bit tricky. Cut four 3 cm lengths of elastic band and use them to hold the joint together. They need to be tightly fastened onto the forearm and upper arm with the cable ties. You can use the electrical tape to hold them in position while you tighten the cable ties.

![Diagram of elastic bands and tape on the elbow joint]

What part of the elbow joint do the elastic bands represent? Write your answer in the box below.

3. Cut the closed ends off two long balloons so that you have two 20 cm lengths of balloon. Tie off the end you have just cut. Make the knot nice and tight as you will now need to inflate the balloons.

![Diagram of balloons with knots and tape]

4. Inflate each balloon so that one is about 8 to 10 cm in diameter and the other is about 5 or 6 cm in diameter. Tie the other ends off. Then cut four 10 cm lengths of string and tightly tie them to the ends of the balloons, just behind the balloon knots.

![Diagram of balloons with string]

What do you think the balloons and strings will represent in your elbow joint? Write your answers in the box below.
5. Connect the balloons to the rest of the model as shown in the diagram below. Your arm joint is now complete. Try moving the joint about to get a feel for the range of movement.

Look at the balloons and cross out the incorrect words in the sentences below.

The diagram on the right might help you with this.

The balloon marked ‘A’ in the diagram below represents the biceps / triceps muscle. When the forearm is raised this muscle contracts / relaxes. As it does this it gets shorter / longer and thinner / fatter.

6. Now use a retort stand to hold your arm in position, as shown in the diagram, below and hang a few light slot masses on the end of the forearm.

Now that the muscles are under tension use a pair of scissors to cut one or two of the elastic bands.

What kind of joint injury do you think this represents? Write your ideas in the box overleaf.
How do you think you could receive an injury like this in real life? Write your ideas in the box below.

How has this affected the joint? Make a rough sketch of what has happened to the joint then try taking the joint through its full range of motion. Do your sketch and write a description of what you see in the box on the next page.
Now imagine that someone with this kind of injury has just been admitted to an Accident and Emergency (A&E) department. Use the flowchart below or draw out your own version to show how you think the injury would be diagnosed and treated. The first box has been filled in to help you get started.

Try to separate each box into an action where you describe what is happening and a seen by section where you describe which member of staff at the hospital has been involved in that action. You might want to use Student Resource Sheet 1.2 – Torn Ligament Patient Journey to help with this.

If you want to draw your own flowchart use another sheet of paper.