1 Hip joints can sometimes wear away causing pain and discomfort when moving. The joint can be replaced using a metal structure which is shaped just like a healthy, working joint.

Diagram 1 shows what the replacement joint looks like in its correct location in the hip.

Here is some information about two metals that may be used to make an artificial hip joint.

Steel is stronger than titanium. 1 g of steel has a mass of 7.85g, and pure titanium has a mass per cm³ that is 56% that of steel.

The extraction of titanium from titanium ore involves many stages.

Titanium is a transition element.

1 (a) (i) Use the information given and your own knowledge to evaluate the use of titanium as a material for making replacement hip joints. [4 marks]

Titanium is lighter or less dense. [1]
Titanium not corrosive or less corrosive than steel or does not rust. [1]
Titanium is strong, but less strong than steel. [1]

Steel is stronger than titanium so less likely to get damaged or break. [1]
Titanium production or extraction is expensive. [1]
Steel is more abundant or more steel available or steel less expensive. [1]

1 (a) (ii) Copper is a transition metal that is often used to make electrical wiring and pipes for plumbing.

Explain why copper is a suitable metal for these uses. [3 marks]

Copper (it) is a good conductor of electricity (to be used in making wires). [1]
It can be bent into shape but/and is hard (to be used in making pipes). [1]
It does not react with water. [1]

Saying it can be bent into shape alone is not enough as all metals have this property (apart from mercury of course).

(Total 7 marks)