

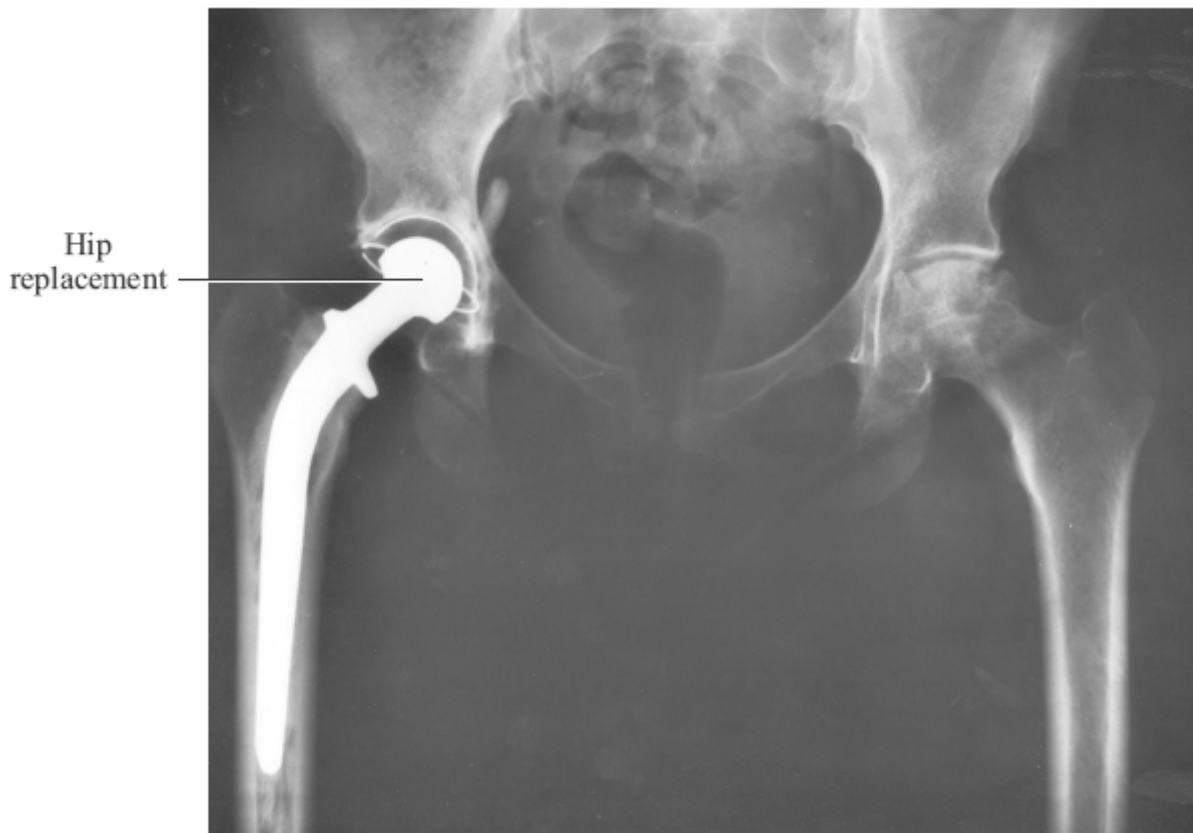
**Nanoscience**

1. Read this passage about metals.

Metals are crystalline materials. The metal crystals are normally about 20 000 nm (nanometres) in diameter. The atoms inside these crystals are arranged in layers.

A new nanoscience process produces nanocrystalline metals. Nanocrystalline metals are stronger and harder than normal metals.

It is hoped that nanocrystalline metals can be used in hip replacements.



The use of nanocrystalline metals should give people better hip replacements which last longer.

- (a) State why metals can be bent and hammered into different shapes.

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(1)

- (b) How is the size of the crystals in nanocrystalline metals different from the size of the crystals in normal metals?

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(1)

Unit C2, C2.2.6


(c) Hip joints are constantly moving when people walk.

Suggest and explain why the hip replacement made of nanocrystalline metal should last longer than one made of normal metals.

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(2)  
(Total 4 marks)

2. Read the article and then answer the questions.

<p style="text-align: center;"><b>Nanotennis!</b></p> <p>Tennis balls contain air under pressure, which gives them their bounce. Normal tennis balls are changed at regular intervals during tennis matches because they slowly lose some of the air.</p> <p>'Nanocoated' tennis balls have a 'nanosize' layer of butyl rubber. This layer slows down the escape of air so that the ball does not lose its pressure as quickly.</p>	
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(a) What is the meaning of *nanosize*?

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(1)

(b) Suggest why using 'nanocoated' tennis balls would be good for the environment.

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(2)  
(Total 3 marks)