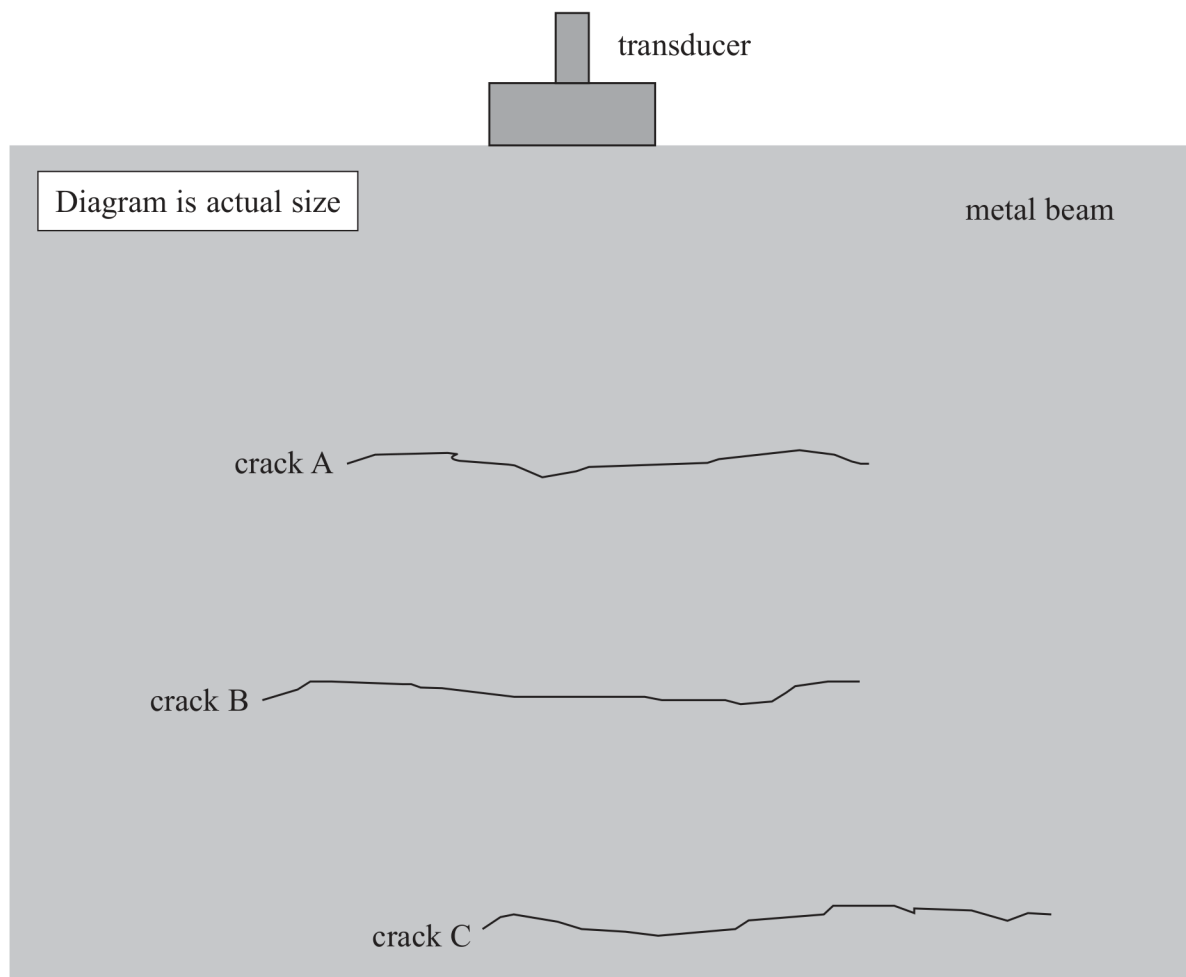


**15** Ultrasound can be used to check for cracks in metal beams.

A transducer emits a pulse of ultrasound into a metal beam. The same transducer detects the returning pulses.

Part of a metal beam is shown. The beam contains three cracks, A, B and C.



The transducer detects a returning pulse from each crack.

(a) Explain why there is a returning pulse from crack B.

(3)

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- (b) One pulse returns  $1.4 \times 10^{-5}$  s after being emitted by the transducer.

Deduce whether the pulse has returned from crack A, crack B or crack C.

You should take measurements from the diagram.

speed of ultrasound in metal =  $5900 \text{ m s}^{-1}$

(3)

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- (c) Explain why ultrasound used to detect cracks in metal beams usually has frequencies of MHz, rather than kHz.

(2)

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(Total for Question 15 = 8 marks)