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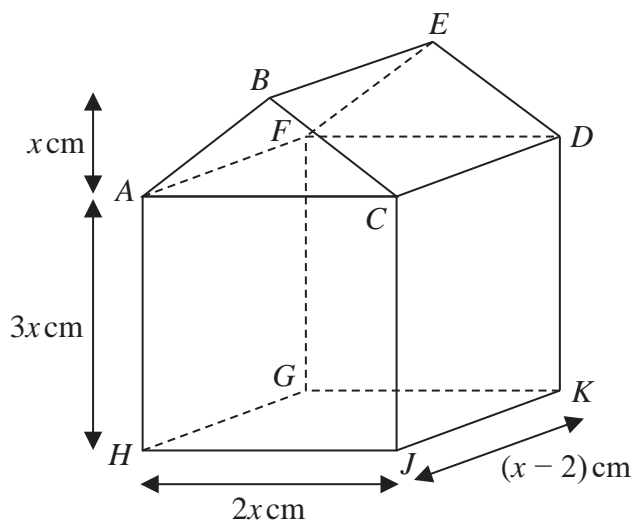


Figure 2

Figure 2 shows a solid right pentagonal prism  $ABCDEFGHJK$  which is made by fixing a solid right triangular prism  $ABCDEF$  onto a solid cuboid  $ACDFGHJK$ .

The triangle  $ABC$  is isosceles with  $BA = BC$  and the height of the triangle is  $x$  cm.

$$AH = FG = CJ = DK = 3x \text{ cm}$$

$$AC = HJ = FD = GK = 2x \text{ cm}$$

$$HG = JK = AF = CD = (x - 2) \text{ cm}$$

The volume of the pentagonal prism is  $1008 \text{ cm}^3$

(a) Show that  $x^3 - 2x^2 - 144 = 0$

(4)

Given that  $f(x) = x^3 - 2x^2 - 144$

(b) use the factor theorem to show that  $(x - 6)$  is a factor of  $f(x)$

(2)

(c) (i) Find the value of  $p$ , the value of  $q$  and the value of  $r$  so that

$$f(x) = (x - 6)(px^2 + qx + r)$$

(ii) Hence explain why the equation  $f(x) = 0$  has only one solution.

(4)

$$\left[ \text{Solutions of } ax^2 + bx + c = 0 \text{ are } x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} \right]$$



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**Question 8 continued**

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**Question 8 continued**

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**(Total for Question 8 is 10 marks)**

