5 (a) On the grid opposite draw the line with equation

(i) $y = 2x + 5$ (ii) $4y = x - 8$ (iii) $5y + 3x = 30$

(3)

(b) Show, by shading, the region R defined by the inequalities

$$y \leqslant 2x + 5 \qquad 4y \geqslant x - 8 \qquad 5y + 3x \leqslant 30$$

(1)

For all points in R with coordinates (x, y)

$$P = 2x - 5y$$

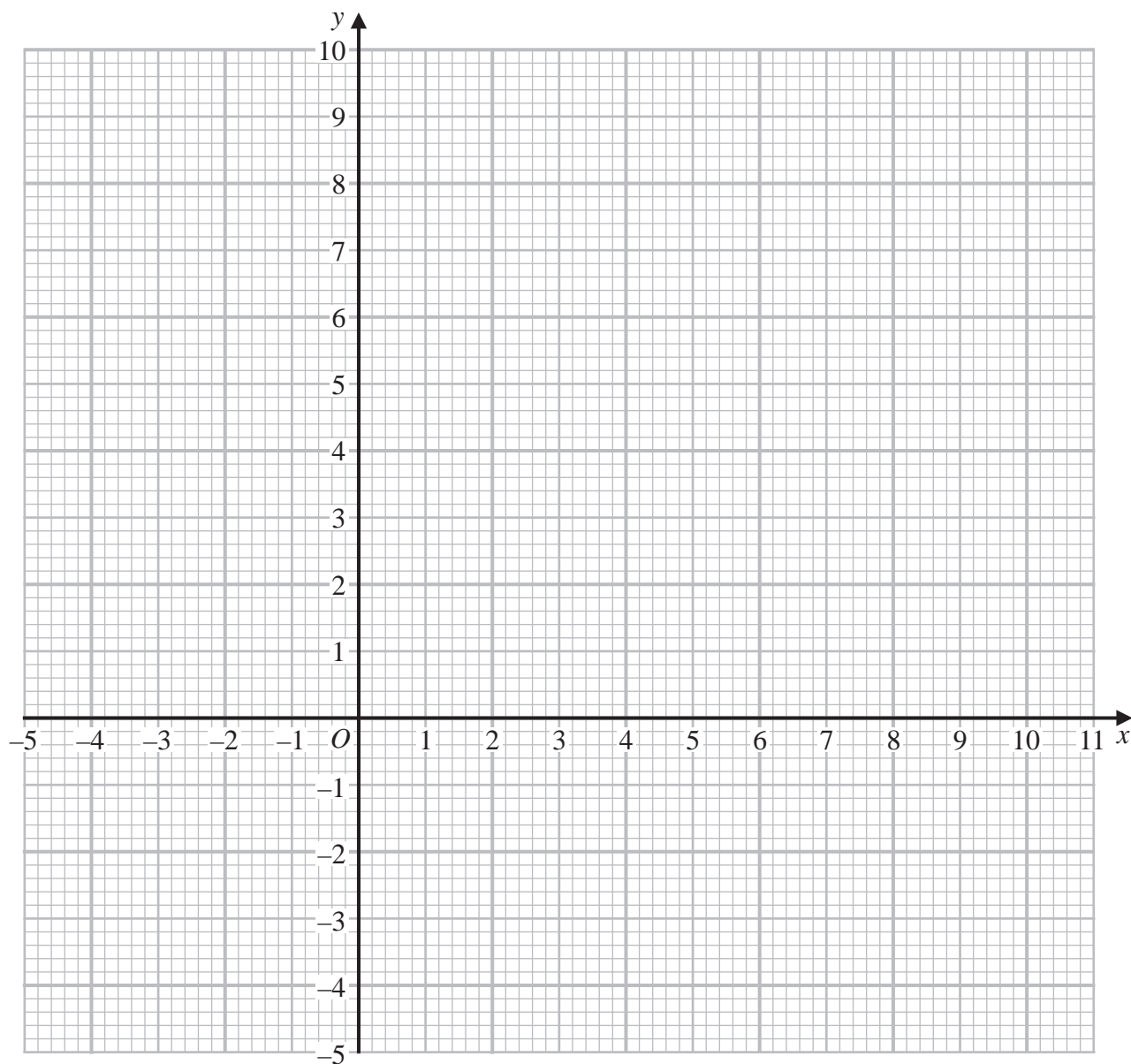(c) Using your graph, find the least value of P

(3)

P 7 2 8 6 6 A 0 1 2 3 6

Question 5 continued

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Turn over for a spare grid if you need to redraw your graph.

Question 5 continued

P 7 2 8 6 6 A 0 1 4 3 6

Question 5 continued

Only use this grid if you need to redraw your graph.

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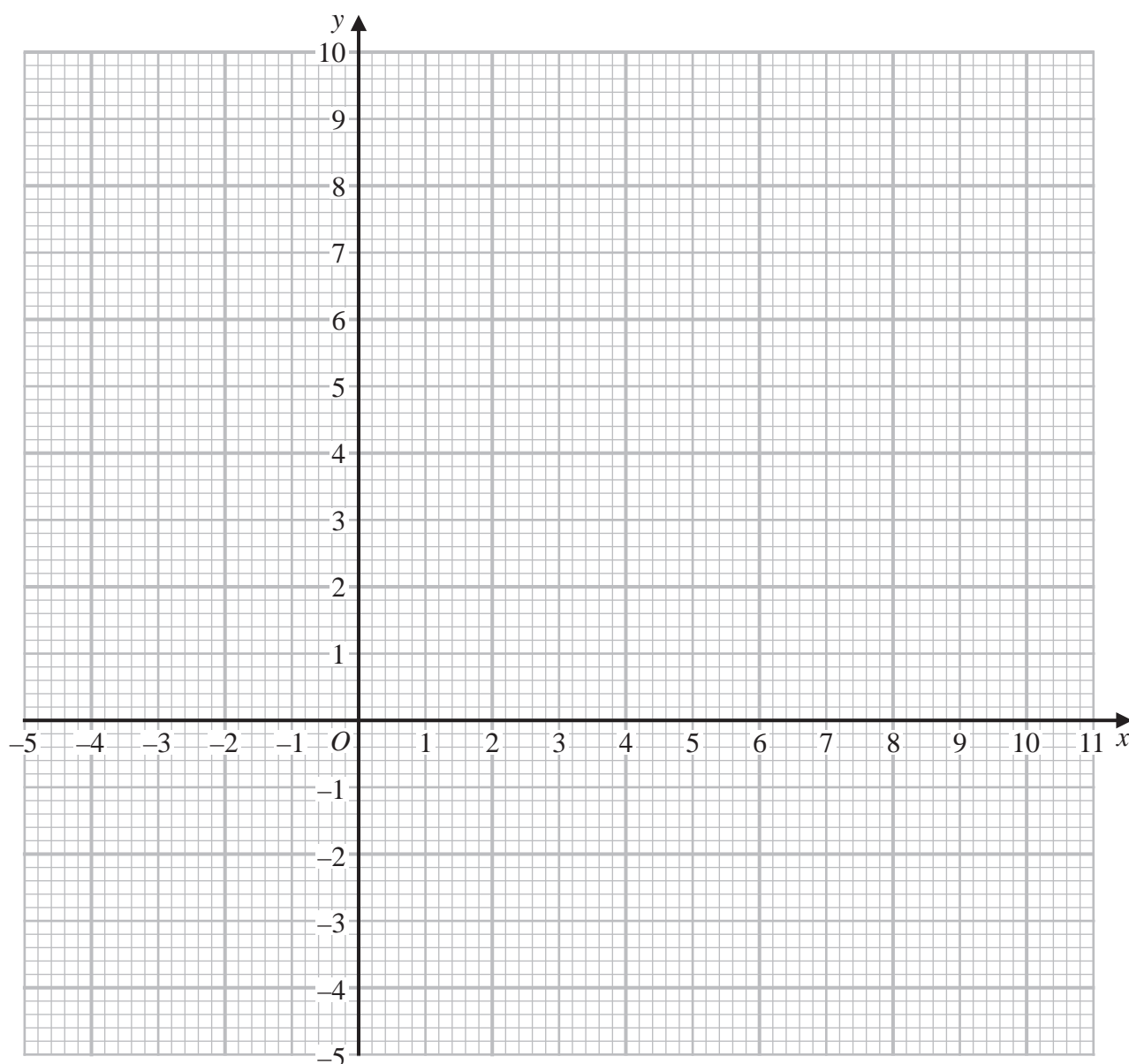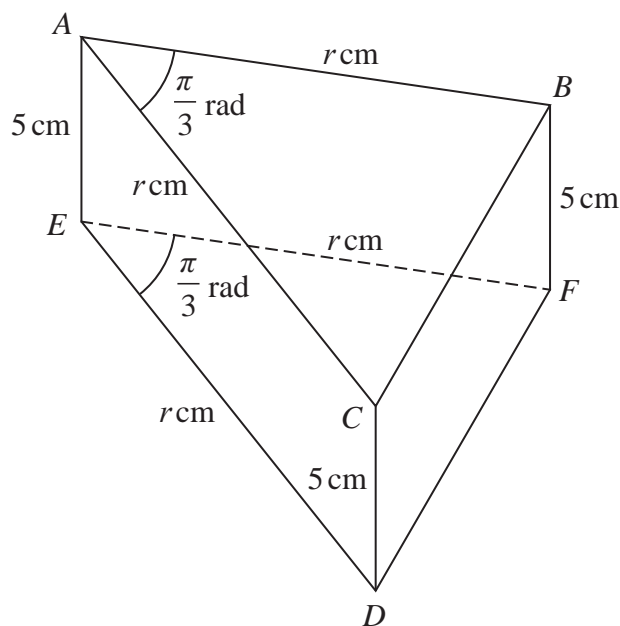
(Total for Question 5 is 7 marks)

Turn over ▶

6

Figure 3

Figure 3 shows a right triangular prism *ABCDEF*. A cross section *ABC* of the prism is a triangle in which $AB = AC = r$ cm and $\angle CAB = \dfrac{\pi}{3}$ radians.

In the prism

$$AE = BF = CD = 5 \text{ cm} \qquad ED = EF = r \text{ cm} \text{ and } \angle DEF = \dfrac{\pi}{3} \text{ radians}$$

(a) Show that the volume of the prism is $\dfrac{5\sqrt{3}}{4} \, r^2$ cm^3

(1)

The volume of the prism is increasing in such a way that the size of $\angle CAB$ and the size of $\angle DEF$ remain constant and the length of *AE*, the length of *BF* and the length of *CD* remain constant.
The lengths of *AB*, *AC*, *ED* and *EF* are each increasing at a constant rate of 0.2 cm/s

(b) Find the exact rate of increase, in cm^3/s, of the volume of the prism when the area of the rectangular face *BCDF* is 60 cm^2

(5)

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Question 6 continued

P7 2 8 6 6 A 0 1 7 3 6

Question 6 continued

P7 2 8 6 6 A 0 1 8 3 6

Question 6 continued

(Total for Question 6 is 6 marks)

P 7 2 8 6 6 A 0 1 9 3 6