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Problem Solving Set A

Bronze

a) $A(3,6)$ $O(0,0)$
Distance of $OA = \sqrt{(3-0)^2 + (6-0)^2}$
 $= 3\sqrt{5}$

$$a = 3$$

b) $m = \frac{6-0}{3-0} = 2$

perpendicular gradient $= -\frac{1}{2}$

c) $y = -\frac{1}{2}x + c$

$$6 = -\frac{1}{2}(3) + c$$

$$6 = -\frac{3}{2} + c$$

$$c = \frac{15}{2}$$

$$y = -\frac{1}{2}x + \frac{15}{2} \quad \times 2$$

$$2y = -x + 15$$

$$0 = -x - 2y + 15$$

d) $0 = -x - 2(0) + 15$

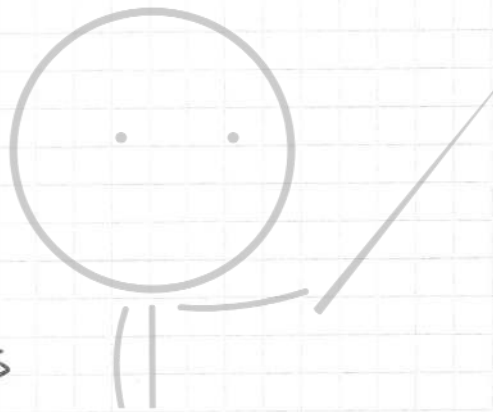
$$y = 15 \quad x = 15$$

$$B(15,0)$$

e) $AB = \sqrt{(15-3)^2 + (0-6)^2}$
 $= 6\sqrt{5}$

$$\text{Area of } \triangle ABC = \frac{1}{2} \times 6\sqrt{5} \times 3\sqrt{5}$$

$$= 45$$



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Silver

a) Gradient of L_1

$$\frac{0-3}{8-2} = -\frac{1}{2}$$

Gradient of $L_2 = 2$

$$y = 2x + c \quad (2, 3)$$

$$3 = 2(2) + c$$

$$3 = 4 + c$$

$$c = -1 \rightarrow y = 2x - 1$$

When $x = 0$

$$y = 2(0) - 1$$

$$y = -1$$

$$C(0, -1)$$

$$b) \text{ Length of AC} = \sqrt{(2-0)^2 + (3-(-1))^2}$$

$$= 2\sqrt{5}$$

$$\text{Length of AB} = \sqrt{(8-2)^2 + (0-3)^2}$$

$$= 3\sqrt{5}$$

$$\text{Area} = \frac{1}{2} \times 2\sqrt{5} \times 3\sqrt{5} = \underline{\underline{15}}$$

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Gold:

$$\text{Gradient of } L_1 : \frac{9-5}{2-0} = \underline{2}$$

$$\text{Gradient of } L_2 : -\frac{1}{2}$$

$$\begin{aligned} L_2 \rightarrow y &= -\frac{1}{2}x + c && \text{(using A coordinate (2, 9))} \\ 9 &= -\frac{1}{2}(2) + c \\ 9 &= -1 + c \\ c &= 10 \end{aligned}$$

$$L_2 \text{ equation: } y = -\frac{1}{2}x + 10$$

Point C: when $y = 0$

$$\begin{aligned} 0 &= -\frac{1}{2}x + 10 \\ \frac{1}{2}x &= 10 \\ x &= 20 \end{aligned}$$

Point C: (10, 0)

→ distance formula

$$\text{Length of AB: } \sqrt{(2-0)^2 + (9-5)^2} = 2\sqrt{5}$$

$$\text{Length of AC: } \sqrt{(20-2)^2 + (0-9)^2} = 9\sqrt{5}$$

$$\begin{aligned} \text{Area of triangle ABC: } & \frac{1}{2} \times 9\sqrt{5} \times 2\sqrt{5} \\ & = \underline{45} \end{aligned}$$



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