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

~~$y = 15$~~ $x = 15$

B(15, 0)

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

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

$= 45$

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

$= 2\sqrt{5}$

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

$= 3\sqrt{5}$

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

Gold:

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

Gradient of L_2 : $-1/2$

L_2: $y = -1/2\,x + c$ (using A coordinate (2, 9))

$9 = -1/2\,(2) + c$

$9 = -1 + c$

$c = 10$

L_2 equation : $y = -1/2\,x + 10$

Point C : when $y = 0$

$0 = -1/2\,x + 10$ → Point C : (10, 0)

$1/2\,x = 10$

$x = 20$

→ distance formula

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

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

Area of triangle ABC : $1/2 \times 9\sqrt{5} \times 2\sqrt{5}$

$= \underline{45}$