COORDINATE GEOMETRY 9, 10, 11, 12 MIXED EXERCISE 5

9) ℓ $2x - y - 1 = 0$

a) m $x + 2y + c = 0$

thro $A(0, 4)$

$0 + 2(4) + c = 0$

$c = -8$

m $x + 2y - 8 = 0$

b) $2x - y - 1 = 0$ ①

$x + 2y - 8 = 0$ ②

①×2 $4x - 2y - 2 = 0$ ③

②+③ $5x - 10 = 0$

$5x = 10$

$x = 2$

Sub for x in ②

$2 + 2y - 8 = 0$

$2y - 6 = 0$

$2y = 6$

$y = 3$

ℓ and m intersect at

$(2, 3)$

c) n $x + 2y + c = 0$

thro $B(3, 0)$

$3 + 0 + c = 0$

$c = -3$

n $x + 2y - 3 = 0$

ℓ $2x - y - 1 = 0$ ①

n $x + 2y - 3 = 0$ ②

①×2 $4x - 2y - 2 = 0$ ③

②+③ $5x - 5 = 0$

$5x = 5$

$x = 1$

Sub for x in ②

$1 + 2y - 3 = 0$

$2y - 2 = 0$

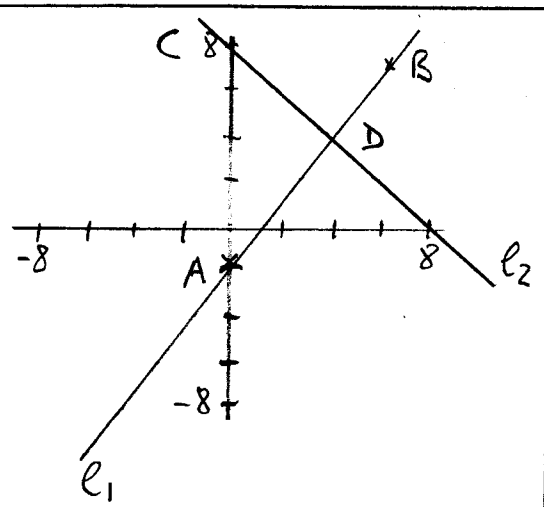
$2y = 2$

$y = 1$

ℓ and n intersect at

$(1, 1)$

10)



ℓ_1 through $(0,-2)$ and $(6,7)$

$$m = \frac{7--2}{6-0} = \frac{9}{6} = \frac{3}{2}$$

$$y - y_1 = m(x - x_1)$$

$$y--2 = \frac{3}{2}(x-0)$$

$$y+2 = \frac{3}{2}x$$

ℓ_1 $\quad y = \frac{3}{2}x - 2$

ℓ_2 $\quad x + y = 8$

cuts y-axis at $(0,8)$

Find point of intersection D

Sub for y in ℓ_2

$$x + \frac{3}{2}x - 2 = 8$$

$$2x + 3x - 4 = 16$$

$$5x = 20$$

$$x = 4$$

Sub for x in ℓ_2

$$4 + y = 8$$

$$y = 4$$

$$\therefore D(4,4)$$

Find area of $\triangle ACD$

Take AC as base

then height is x-coord of D

$$|AC| = 8--2 = 10$$

x-coord of D $= 4$

Area $= \frac{1}{2}$ base $\times$ height

$$= \frac{1}{2} \times 10 \times 4$$

$$= 20 \text{ units}^2$$

COORDINATE GEOMETRY 9, 10, 11, 12 MIXED EXERCISE 5

11) $A(2,16)$ $B(12,-4)$

a) $m = \frac{16 - -4}{2 - 12} = \frac{20}{-10}$

$m = -2$

$y - y_1 = m(x - x_1)$

$y - 16 = -2(x - 2)$

$y - 16 = -2x + 4$

$y = -2x + 20$

e_1 $2x + y = 20$

b) $C(-1,1)$ $m = \frac{1}{3}$

$y - y_1 = m(x - x_1)$

$y - 1 = \frac{1}{3}(x - -1)$

$y - 1 = \frac{1}{3}x + \frac{1}{3}$

e_2 $y = \frac{1}{3}x + \frac{4}{3}$

12) $A(-1,-2)$ $B(7,2)$ $C(k,4)$

a) gradient AB

$$= \frac{2--2}{7--1} = \frac{4}{8} = \frac{1}{2}$$

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b) $\angle ABC = 90°$

$\therefore$ AB is $\perp$ to BC

$\Rightarrow$ gradient BC $= -2$

$$\frac{4-2}{k-7} = -2$$

$$2 = -2(k-7)$$

$$2 = -2k + 14$$

$$2k = 14 - 2$$

$$2k = 12$$

$$k = 6$$

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c) $m = -2$ found above

$$y - y_1 = m(x - x_1)$$

$$y - 2 = -2(x - 7)$$

$$y - 2 = -2x + 14$$

$$y = -2x + 16$$

$$2x + y - 16 = 0$$

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d) Since $\angle ABC = 90°$

Use AB as base and BC as height of $\triangle$

$$|AB| = \sqrt{(7--1)^2 + (2--2)^2}$$

$$= \sqrt{64 + 16}$$

$$= \sqrt{80}$$

$$|BC| = \sqrt{(7-6)^2 + (2-4)^2}$$

$$= \sqrt{1 + 4}$$

$$= \sqrt{5}$$

Area $= \frac{1}{2}$ base $\times$ height

$$= \frac{1}{2} \times \sqrt{80} \times \sqrt{5}$$

$$= \frac{1}{2} \times \sqrt{80 \times 5}$$

$$= \frac{1}{2} \times \sqrt{400}$$

$$= \frac{1}{2} \times 20$$

$$= 10 \text{ units}^2$$
