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5.4

① a) (1, -2), (5, 6)
$x_1 y_1$ $x_2 y_2$

$d = \sqrt{(-5-1)^2 + (6--2)^2}$

$= 10$

b) (-8, 4), (16, -3)
$x_1 y_1$ $x_2 y_2$

$d = \sqrt{(16--8)^2 + (-3-4)^2}$

$= 25$

c) (6, -5), (-10, -1)
$x_1 y_1$ $x_2 y_2$

$d = \sqrt{(-10-6)^2 + (-1--5)^2}$

$= 4\sqrt{17}$

② A(-2, 5), B(3, 1)
$x_1 y_1$ $x_2 y_2$

$d = \sqrt{(3--2)^2 + (1+5)^2}$

$= \sqrt{41}$

B(3, 1), C(8, -3)
$x_1 y_1$ $x_2 y_2$

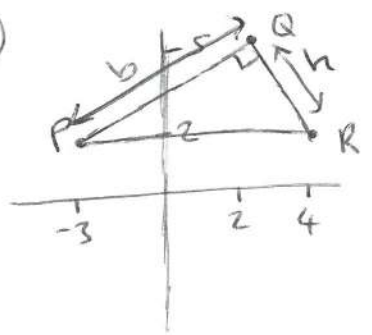
$d = \sqrt{(8-3)^2 + (-3-1)^2}$

$= \sqrt{41}$

$AB = BC = \sqrt{41}$

$\therefore$ AB and BC are congruent

③



QR
$d = \sqrt{(4-2)^2 + (2-5)^2}$

$= \sqrt{13}$

QP
$d = \sqrt{(2--3)^2 + (5-2)^2}$

$= \sqrt{34}$

$\sqrt{34} \times \sqrt{13} \times \frac{1}{2}$

$= \frac{\sqrt{442}}{2}$

$= 10.5$

(4) $\sqrt{58} = \sqrt{(-2-x)^2 + (11-8)^2}$

$58 = (-2-x)^2 + 9$ -9 -9

$49 = (-2-x)(-2-x)$

$49 = x^2 + 4x + 4$

$0 = x^2 + 4x - 45$

$0 = (x-5)(x+9)$

$x = 5$ or $x = -9$

(5) a) $(2, -6)$, $(-3, 14)$
A B

$\frac{14 - -6}{-3-2} = -4$

$y = -4x + c$

$-6 = -4(2) + c$

$c = 2$

$y = -4x + 2$

$y = 2 - 4x$

b) $d = \sqrt{(-3-2)^2 + (14 - -6)^2}$

$= 5\sqrt{17}$

(6) a) $m = \frac{1}{2}$ $A(4, 6)$

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

$6 = \frac{1}{2}(4) + c$

$c = 4$

$y = \frac{1}{2}x + 4$

b) substitute $B(-2, 3)$ into L_1
x y

$y = \frac{1}{2}x + 4$

$3 = \frac{1}{2}(-2) + 4$

$3 = -1 + 4$

$3 = 3$

(6) c) (4,6) (-2,3)
A B

$d = \sqrt{(-2-4)^2 + (3-6)^2}$

$AB = 3\sqrt{5}$

d) $y = \frac{1}{2}x + 4$

substituting P for x as C has x-coordinate of P

$y = \frac{1}{2}P + 4$

$C: (P, \frac{1}{2}P+4)$ and $A: (4,6)$

$6 = \sqrt{(4-P)^2 + (6-\frac{1}{2}P+4)^2}$

$36 = (4-P)^2 + (6-\frac{1}{2}P+4)^2$

$36 = P^2 - 8P + 16 + \frac{1}{4}P^2 - 2P + 4$

$(\times 4)\ 36 = \frac{5}{4}P^2 - 10P + 20 \quad (\times 4)$

$144 = 5P^2 - 40P + 80$

$0 = 5P^2 - 40P - 64$

(7) a) (-6,11), (9,-4)
A B

$\frac{-4-11}{9--6} = -\frac{1}{3}$

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

$11 = -\frac{1}{3}(-6) + c$

$c = -1$

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

$3y = -x - 3$

$x + 3y + 3 = 0$

b) $d = \sqrt{(9--6)^2 + (-4-11)^2}$

$d = 5\sqrt{10}$

(8) a) $(-3, 4), (5, -2)$

$$\frac{-2-4}{5-(-3)} = -\frac{3}{4}$$

$$y = -\frac{3}{4}x + c$$

$$-2 = -\frac{3}{4}(5) + c$$

$$c = \frac{7}{4}$$

$$(\times 4)\ y = -\frac{3}{4}x + \frac{7}{4}\ (\times 4)$$

$$4y = -3x + 7$$

$$3x + 4y - 7 = 0$$

b) A is the x-coordinate

$$0 = -\frac{3}{4}x + \frac{7}{4}$$

$$-\frac{7}{4} = -\frac{3}{4}x$$

$$x = \frac{7}{3}$$

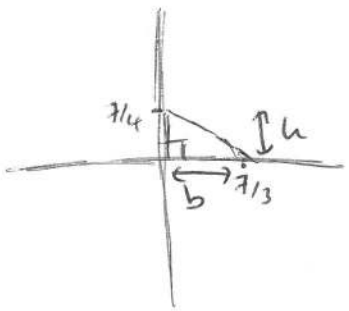
A is $(7/3, 0)$

B is the y-coordinate

$$y = -\frac{3}{4}(0) + \frac{7}{4}$$

$$y = \frac{7}{4}$$

B is $(0, 7/4)$



$$\frac{1}{2} \times \frac{7}{4} \times \frac{7}{3}$$

$$= \frac{49}{24}$$

(9) a) (-2, 4) (10, -2)
P Q

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

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

$-2 = -\frac{1}{2}(10) + c$

$c = 3$

$y = -\frac{1}{2}x + 3$

$y = 3 - 0.5x$

b) $L_2 : m = 2$

$y = 2x + c$

Substitute R(0, -7)

$-7 = 2(0) + c$

$c = -7$

$L_2 : y = 2x - 7$

$2x - 7 = -\frac{1}{2}x + 3$

$2x + \frac{1}{2}x = 3 + 7$

$\frac{5}{2}x = 10$

$x = 4$

Substitute x into either L_2 or L_1

$y = 2x - 7$

$y = 2(4) - 7$

$y = 1$

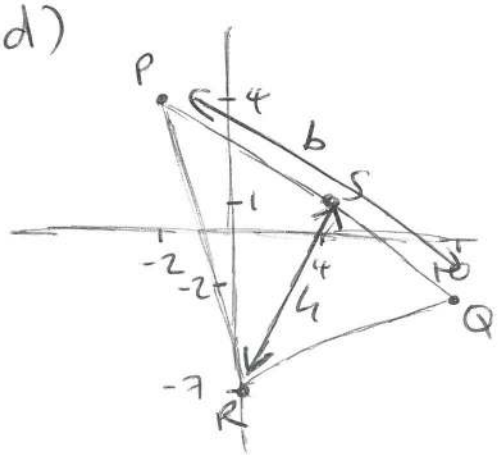
S : (4, 1)

c) (0, -7), (4, 1)
R S

$d = \sqrt{(4-0)^2 + (1--7)^2}$

$= 4\sqrt{5}$

d)



As worked out in part (c):

SR = $4\sqrt{5}$

(10, -2) (-2, 4)
Q P

$d = \sqrt{(-2-10)^2 + (4--2)^2}$

$= 6\sqrt{5}$

$\frac{1}{2} \times 6\sqrt{5} \times 4\sqrt{5} = 60$