Date No.

Year 2 Term 2 class test 1 solutions

Q1a) $8x - y = 27$ — ①

$4x - 3y = 1$ — ②

From ①: $y = 8x - 27$ — ③

Sub ③ into ②:

$4x - 3(8x - 27) = 1$

$4x - 24x + 81 = 1$

$-20x = -80$

$x = 4$

$y = 8(4) - 27$

$= 5$

$\therefore x = 4, y = 5$ #

b) $\frac{x}{3} + \frac{y}{4} = 3x - 7y - 37 = 0$

Eqn ①: $\frac{x}{3} + \frac{y}{4} = 0$

$4x + 3y = 0$ — ①

Eqn ②: $3x - 7y - 37 = 0$

$3x - 7y = 37$ — ②

① × 3: $12x + 9y = 0$ — ③

② × 4: $12x - 28y = 148$ — ④

④ − ③: $-37y = 148$

$y = -4$

$4x = -3(-4)$

$x = 3$

$\therefore x = 3, y = -4$ #

Q2a) Grad of AB $= \frac{5-1}{4-(-4)}$

$= \frac{1}{2}$

Eqn of AB:

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

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

At $(-1, p)$,

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

$p = 2.5$ # shown

b) Grad of OC $= \frac{2.5}{-1}$

$= -2.5$

Eqn of OC: $y = -2.5x$ #

Q3) $x + y = 0$

$y = -x$

Eqn of line:

$y - (-4) = -1(x - 3)$

$y = -x - 1$ #

Q4a) $y = \frac{1}{2}(x - 1)$

when $x = 3$, $y = \frac{1}{2}(3 - 1)$

$y = 1$

∴ the point $(3, 1)$ lies on the line #

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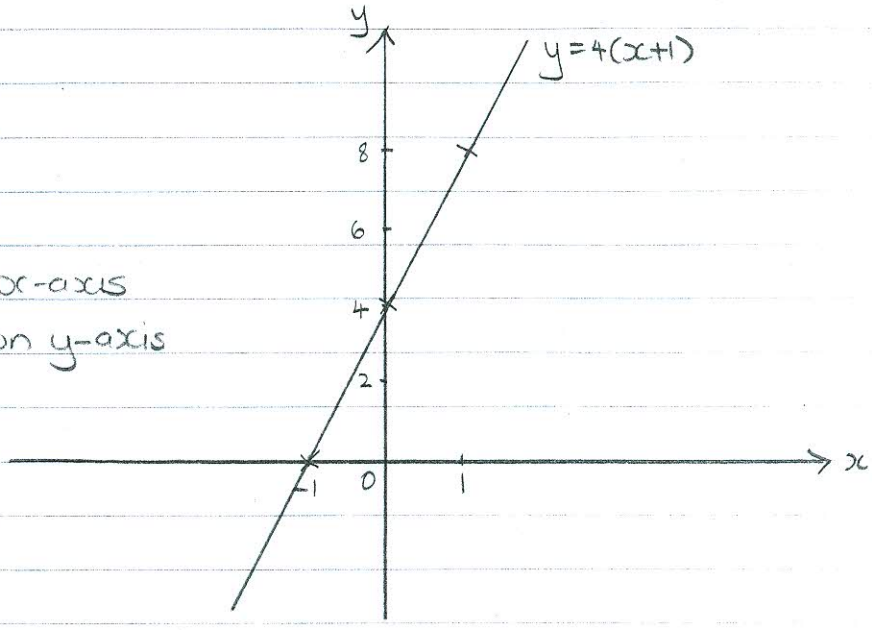
4b) $y = 4(x+1)$

x	-1	0	1
y	0	4	8

Scale: 1cm to 1unit on x-axis
1cm to 2 units on y-axis



4c) $m = \frac{-2}{4}$
$= -\frac{1}{2}$

Eq^n: $y = -\frac{1}{2}x + 6$ ✱

Q5a) Gradient $= -1$ for both
∴ they are parallel lines, hence no solution

b) change 2nd eq^n to: $2y = -2x + 12$ (same grad & y-intercept)
or change 1st eq^n to: $2y = -2x + 8$

c) change 2nd eq^n to: $y = x + 4$ (diff. grad)

Q6 Let fraction be $\frac{x}{y}$

$$\frac{x+8}{y} = 2 \quad \text{— ①}$$

$$\frac{x}{y+5} = \frac{1}{5} \quad \text{— ②}$$

Fr ①: $x + 8 = 2y$ — ③
Fr ②: $5x = y + 5$ — ④

① × 5: $5x + 40 = 10y$ — ⑤
⑤ − ④: $0 = 9y - 45$
$9y = 45$
$y = 5$ ∴ $x = 2$

Hence, fraction is $\frac{2}{5}$ ✱✱

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Q7a) Eqn of AC: $y = 2$ #

b i) $y = 8 + 2x$

Sub $y = 2 \Rightarrow 2 = 8 + 2x$

$2x = -6$

$x = -3$

∴ A is $(-3, 2)$ #

ii) Area of $\triangle ABC = \frac{1}{2} \times 3 \times 6$

$= 9$ units² #

Q8) $-2x + y = -7$

$y = 2x - 7$ — ① L_1

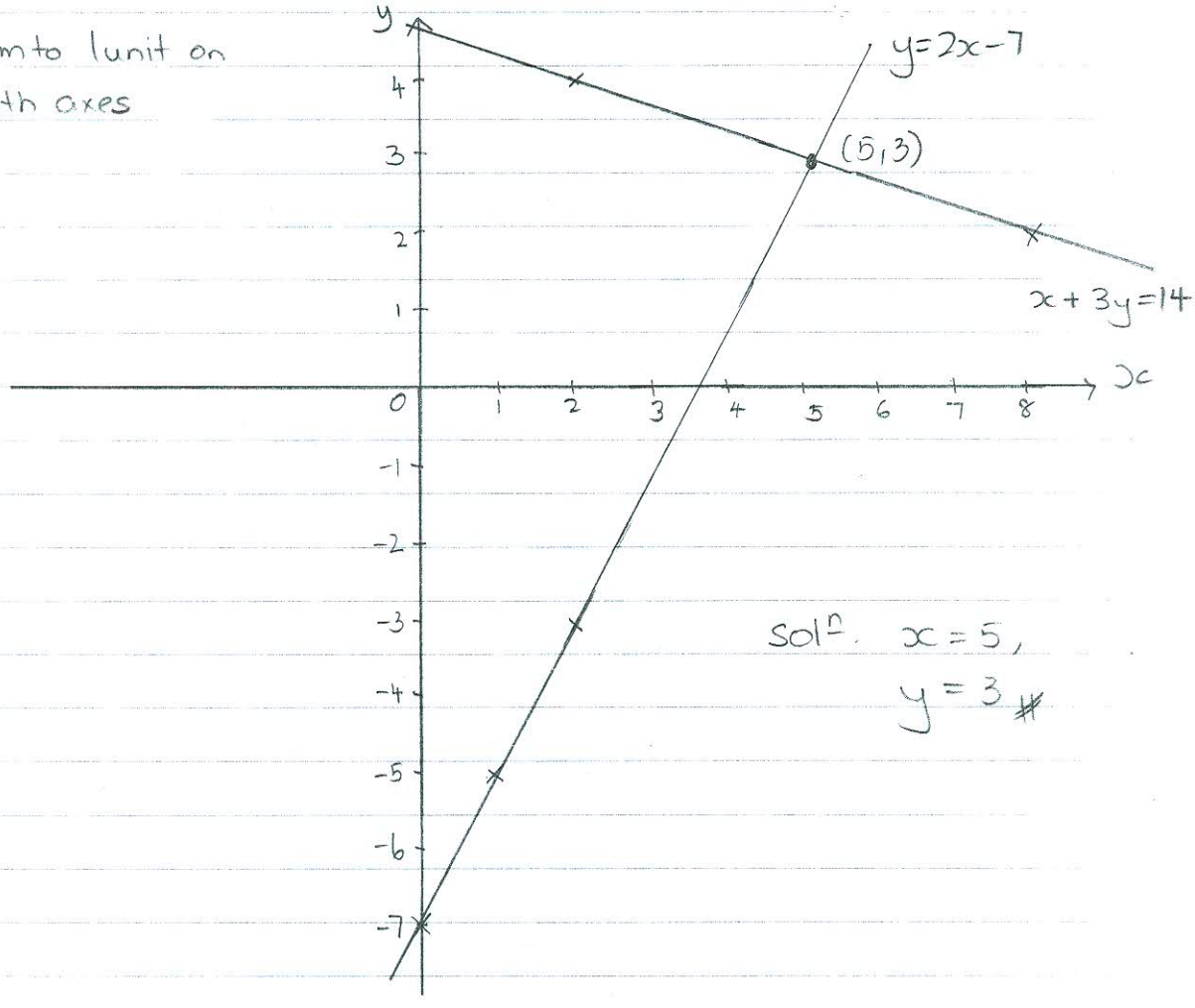
$x + 3y = 14$

$3y = 14 - x$

$y = -\frac{1}{3}x + \frac{14}{3}$ — ② L_2

L_1	x	0	1	2
	y	-7	-5	-3
L_2	x	2	5	8
	y	4	3	2

Scale. 1cm to 1unit on both axes



Soln. $x = 5$,

$y = 3$ #

Q9a) $y = 3x + \frac{1}{2}$

$0.50 for initial admin charge
$3 for hourly charge

b) $12a + b = 31.5$ —①
$25a + b = 64$ —②

②−①: $13a = 32.5$
$a = 2.5$ #

$\therefore b = 64 - 25(2.5)$
$b = 1.5$ # shown.

c) $ac + b = 74$
$2.5c + 1.5 = 74$
$c = 29$ hours #

Q10) $ax + (a-1)y = 10$ —①
$(a-2)x + 3ay = 20$ —②

Fr ①: $(a-1)y = 10 - ax$
$y = -\left(\frac{a}{a-1}\right)x + \frac{10}{a-1}$ —③

Fr ②: $3ay = 20 - (a-2)x$
$y = -\left(\frac{a-2}{3a}\right)x + \frac{20}{3a}$ —④

For no solution, lines are parallel ∴ same gradient.

$\Rightarrow -\left(\frac{a}{a-1}\right) = -\left(\frac{a-2}{3a}\right)$
$3a^2 = (a-1)(a-2)$
$3a^2 = a^2 - 3a + 2$
$2a^2 + 3a - 2 = 0$
$(2a-1)(a+2) = 0$
$a = -2$ or $\frac{1}{2}$