



SCEGGS Darlinghurst

Year 9  
Common Test

Tuesday 8<sup>th</sup> September, 2009

# Mathematics Pathway 5.3+

### General Instructions

- Time allowed – 1 hour
- Carefully read the instructions
- This paper has **three** questions
- Write your name on every page
- Attempt all questions
- Show **all** your working in the spaces provided for each question
- Marks may be deducted for careless or badly arranged work
- Calculators may be used

Question	Possible Marks	Marks Awarded
1 – Equations and Inequalities	14	
2 – Coordinate Geometry	26	
3 – Geometry	10	
<b>TOTAL</b>	<b>50</b>	

Average: ..... Standard Deviation: .....

Parent's Signature: .....

Name: ..

Teacher: ...

## SCEGGS DARLINGHURST

Year 9 Common Test 2009

Question 1

Marks

a) Solve the following equations:

i.  $\frac{3x-1}{4} = \frac{x}{2}$

3

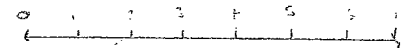
ii.  $7m - (6m - 9) = 5$

3

b) Solve and graph on a number line:

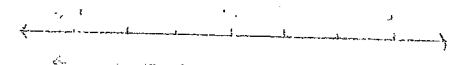
i.  $5a - 3 > 2a + 12$

2



ii.  $4 - 2(x - 4) \geq 8$

3



Question 1 (cont.)

Marks

- iii. If five is subtracted from twice a number, the result is the same as when four is added to the number. Form an equation and solve it to find the number. 3

Question 2

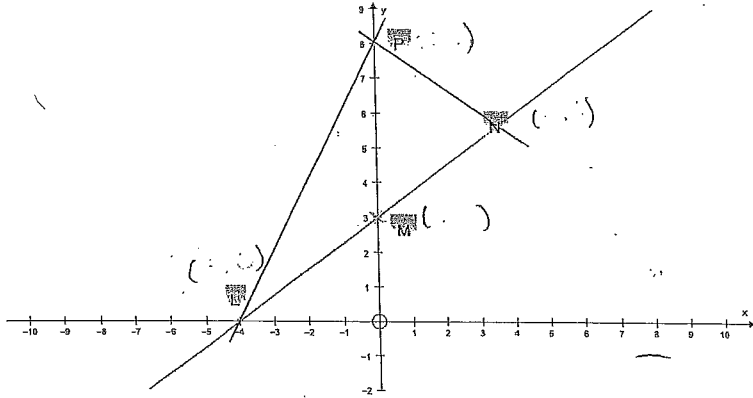
Marks

- a) What is the equation of a line with gradient 3 and y intercept -1? 1
- b) Graph the lines  $x=2$  and  $y=-1$ . What is their point of intersection? 3
- c) Are the lines  $2x-y+6=0$  and  $2y=x+3$  parallel? Give reasons for your answer. 3
- d) Find the x and y intercepts of the line  $3x-4y+12=0$ . 2
- e) Find the equation of a line passing through (2, 1) with gradient 3. Express your answer in general form. 3

Question 2 (Cont.)

Marks

- f) In the diagram below, the line shown cuts the x axis at L (-4, 0) and the y axis at M (0, 3). N is a point on the line and P is the point (0, 8).



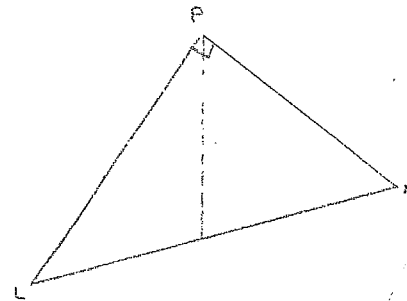
- i. Find the equation of the line LM. 1
- ii. Show that the point (16, 15) lies on the line LM. 1
- iii. Find the length of ML and MP. What sort of triangle is  $\triangle LMP$ ? 3
- iv. If M is the mid point of the interval LN, use the mid point formula to show that the coordinates of N are (4, 6). - 2

Question 2 (Cont.)

Marks

- v. Find the gradients of lines PL and PN. What sort of an angle is  $\angle LPN$ ? 3

- vi. Find the area of  $\triangle LPN$ .

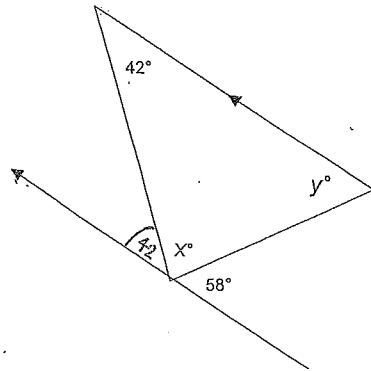


Question 3

Marks

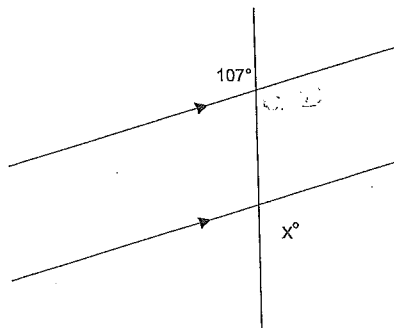
a) Find the values of  $x$  and  $y$  in the figure below.

2



b) Find the value of  $x$  in the figure below.

2





Name: .

Teacher:

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Question	Possible Marks	Marks Awarded
1 – Equations and Inequations	14	14
2 – Coordinate Geometry	26	24
3 – Geometry	10	10
<b>TOTAL</b>	50	48

Average: ..... Standard Deviation: .....

Parent's Signature: .....

## SCEGGS DARLINGHURST

Year 9 Common Test 2009

Question 1

Marks

a) Solve the following equations:

i.  $\frac{3x-1}{4} = \frac{x}{2}$

3

$2(3x-1) = 4x$

$6x - 2 = 4x$

$\frac{2x}{2} = \frac{2}{2}$   $x = 1$

ii.  $7m - (6m - 9) = 5$

3

$7m - 6m + 9 = 5$

$m = -4$

b) Solve and graph on a number line:

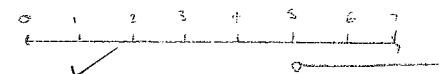
i.  $5a - 3 > 2a + 12$

2

$5a > 2a + 15$

$\frac{3a}{3} > \frac{15}{3}$

$a > 5$



ii.  $4 - 2(x - 4) \geq 8$

3

$4 - 2x + 8 \geq 8$

$-2x + 12 \geq 8$

$-2x \geq -4$

$x \leq 2$



Question 1 (cont.)

Marks

- iii. If five is subtracted from twice a number, the result is the same as when four is added to the number. Form an equation and solve it to find the number. 3

$$\begin{array}{r} 2x - 5 = x + 4 \\ -x + 5 \quad -x + 5 \end{array}$$

$$x = 9$$

well done!

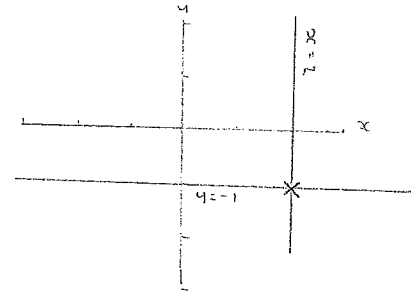
Question 2

Marks

- a) What is the equation of a line with gradient 3 and y intercept -1? 1

$$y = 3x - 1$$

- b) Graph the lines  $x=2$  and  $y=-1$ . What is their point of intersection? 3



point of intersection is  $(2, -1)$

- c) Are the lines  $2x-y+6=0$  and  $2y=x+3$  parallel? Give reasons for your answer. 3

$$2x - y + 6 = 0$$

$$\rightarrow y = 2x + 6$$

$$m = 2$$

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

$$\rightarrow y = x/2 + 3/2$$

$$m = 1/2$$

$$m_1 \neq m_2$$

$$2 \neq 1/2$$

$$2 \neq 1/2$$

$\therefore$  the lines  $2x-y+6=0$  &  $2y=x+3$  are not parallel because their gradients are different ( $m_1 \neq m_2$ )

- d) Find the x and y intercepts of the line  $3x-4y+12=0$ . 2

~~$$3x - 4y + 12 = 0$$~~
~~$$\rightarrow 4y = 3x + 12$$~~
~~$$y = 3/4x + 3$$~~

$$y\text{-intercept} = 3$$

$$x\text{-intercept} = 3x - 4 \times 0 + 12 = 0$$

$$= 3x + 12 = 0$$

$$3x = -12$$

$$x = -4 \quad x\text{-intercept}$$

$$y\text{-intercept} = 3 \times 0 - 4y + 12 = 0$$

$$-4y + 12 = 0$$

$$-4y = -12$$

$$y = 3 \quad y\text{-intercept}$$

- e) Find the equation of a line passing through (2, 1) with gradient 3. Express your answer in general form. 3

$$y - 1 = 3(x - 2)$$

$$y - 1 = 3x - 6$$

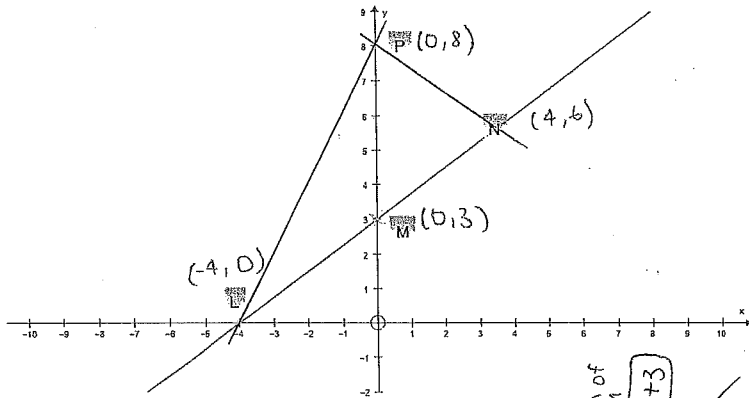
$$y = 3x - 5 \quad (\text{gradient intercept form})$$

$$\rightarrow 3x - y - 5 = 0 \quad (\text{general form})$$

Question 2 (Cont.)

Marks

- f) In the diagram below, the line shown cuts the x axis at L (-4, 0) and the y axis at M (0, 3). N is a point on the line and P is the point (0, 8).



- i. Find the equation of the line LM.

$$m = \frac{3-0}{0-(-4)} = \frac{3}{4} \text{ (gradient)}$$

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

equation of LM

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

- ii. Show that the point (16, 15) lies on the line LM. 1

$$y = \frac{3}{4}x + 3 \Rightarrow (16, 15)$$

$$15 = \frac{3}{4} \times 16 + 3$$

$$15 = 12 + 3$$

$$15 = 15$$

∴ point (16, 15) lies on the line  $y = \frac{3}{4}x + 3$

- iii. Find the length of ML and MP. What sort of triangle is  $\Delta LMP$ ? 3

$$(ML) \quad D = \sqrt{(3-0)^2 + (0-(-4))^2} = \sqrt{3^2 + 4^2} = \sqrt{9 + 16} = \sqrt{25} = 5$$

$$(MP) \quad D = \sqrt{(3-8)^2 + (0-0)^2} = \sqrt{5^2} = \sqrt{25} = 5$$

∴  $\Delta LMP$  is isosceles because two sides are equal (ML & MP)

- iv. If M is the mid point of the interval LN, use the mid point formula to show that the coordinates of N are (4, 6). 2

$$\left( \frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2} \right) \rightarrow L(-4, 0) \text{ \& } N(?)$$

$$(0, 3) = \left( \frac{-4 + x_2}{2}, \frac{0 + y_2}{2} \right)$$

∴ the coordinates of the point N are (4, 6) because  $(0, 3) = \left( \frac{-4 + 4}{2}, \frac{0 + 6}{2} \right)$

the midpoint is (0, 3)  $\rightarrow (0, 3) = (0, 3)$

Question 2 (Cont.)

Marks

- v. Find the gradients of lines PL and PN. What sort of an angle is  $\angle LPN$ ? 3

$$P(0, 8) \quad L(-4, 0) \quad N(4, 6)$$

$$m \text{ of PL} = \frac{0-8}{-4-0} = \frac{-8}{-4} = 2$$

$$m \text{ of PN} = \frac{6-8}{4-0} = \frac{-2}{4} = -\frac{1}{2}$$

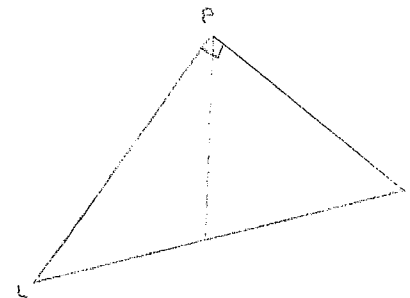
$$m_1 \times m_2 = -1$$

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

∴  $\angle LPN$  is right angled because PL & PN are perpendicular to each other (bisect at  $90^\circ$ )

- vi. Find the area of  $\Delta LPN$ .

$$A \text{ of } \Delta = \frac{1}{2}bh$$



base = D of LN (Not useful)

$$D \text{ of LN} = \sqrt{(6-0)^2 + (4-(-4))^2} = \sqrt{6^2 + 8^2} = \sqrt{36 + 64} = \sqrt{100} = 10$$

base = 10

$$A = \frac{1}{2}bh$$

height =  $8 - 3$  (length of interval on plane)

$$= 5$$

$$A = \frac{1}{2}bh$$

$$A = \frac{1}{2} \times 10 \times 5 = 5 \times 5 = 25 \text{ units}^2$$

∴ area of  $\Delta LPN = 25 \text{ units}^2$

4

Question 3

Marks

a) Find the values of  $x$  and  $y$  in the figure below.

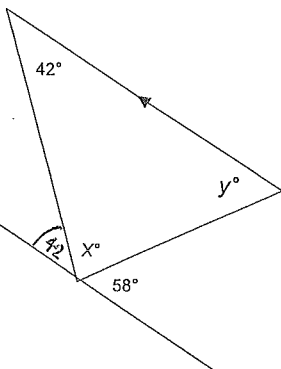
2

$$x = 180^\circ - 42^\circ - 58^\circ$$

$x = 80^\circ$  (alternate  $\angle$ 's equal in parallel lines and angle sum of straight angle is  $180^\circ$ )

$$y = 180^\circ - 42^\circ - 80^\circ$$

$y = 58^\circ$  (angle sum of a triangle is  $180^\circ$ )



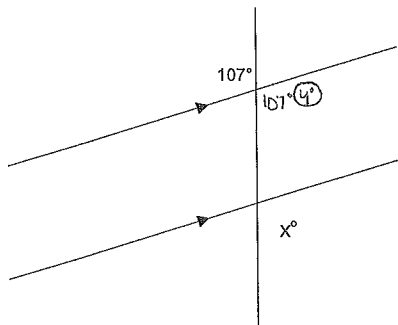
$x = 80^\circ$   
 $y = 58^\circ$

~~$y = 58^\circ - 42^\circ$~~

~~$x = 180^\circ - 42^\circ - 58^\circ$~~

b) Find the value of  $x$  in the figure below.

2



$x = 107^\circ$

$y = 107^\circ$  (vertically opposite angles equal)

$x = 107^\circ$  (corresponding angles equal in parallel lines)