Name:	School:	Target Grade:

PARADIGM

SECONDARY 2 WA1
MOCK EXAM PAPER

READ THESE INSTRUCTIONS FIRST

INSTRUCTIONS TO CANDIDATES

1. Find a nice comfortable spot without distraction.

2. Be fully focused for the whole duration of the test.

3. Speed is KING. Finish the paper as soon as possible then return-back to Check Your Answers.

4. As you are checking your answers, always find ways to VALIDATE your answer.

5. Avoid looking through line by line as usually you will not be able to see your Blind Spot.

6. If there is no alternative method, cover your answer and REDO the question.

7. Give non-exact answers to 3 significant figures, or 1 decimal place for angles in degree, or 2 decimal place for $$$, unless a different level of accuracy is specified in the question.

Wish you guys all the best in this test.

You can do it.

I believe in you.

Team Paradigm

If you are struggling in this paper, it's an indication to work harder!
If you need support and personalised guidance, you can find us here
www.mathtutor.com.sg

PARADIGM [Turn Over]

Name: _____ Class: _____ Date: _____

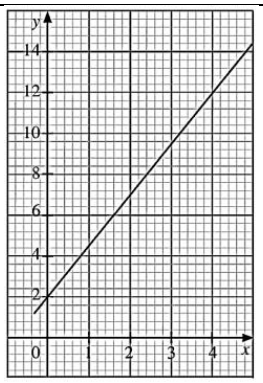
Secondary 2 E Mathematics
WA1 Mock Paper

Topic: Linear Graph, Simultaneous & Linear Inequalities

Duration: 1 hour and 15 minutes

50

Linear Graph & Simultaneous Linear Equations

1	(a) Find the gradient of the line. (b) Write down the y-intercept of the line. (c) Write down the equation of the vertical line that passes through $(2, 0)$. 	[1] [1] [1]
2	The equation of a line is $ax + 2y = 3$. (a) This line passes through $(-1,2.5)$. Find the value of a. (b) On a piece of graph paper, draw the graph $ax + 2y = 3$ for $-3 \leq x \leq 3$. (c) Find the value of y when $x = 2.5$ (d) On the same graph, draw the line $y = 2.8$ (e) Find the coordinates of the point where both lines intersect.	[1] [2] [1] [1] [1]
3	Given that the equation $\frac{3}{2}x - 2y = \frac{1}{5}$, copy and complete the following table. (ii) Draw the graph of $\frac{3}{2}x - 2y = \frac{1}{5}$, for $-2 \leq x \leq 4$. (iii) Given that $(\frac{p}{2}, 2.3)$ is a solution of the equation, find the value of p. (b) The equation of another line is $y = \frac{2}{5}x + \frac{3}{5}$. Draw the graph of this line on the same axes. (c) Using the graph, solve the following Simultaneous Equation. $\frac{3}{2}x - 2y = \frac{1}{5}$ $5y - 2x = 3$	[2] [2] [2] [1] [1]

X	-2	0	2	4
Y				

Simultaneous Equation

1	Solve the following simultaneous equations. $\frac{x}{3}+\frac{y}{4}=\frac{1}{2}$ $-4y-5x=6$	[4]
2	Solve the simultaneous equations $21x+28y-36=0,$ $15x+52=14y$	[3]
3	(a) (i) Solve the simultaneous equations $x+3y=5$ and $7x-6y=-19$. (ii) Name the method you use to solve **(a)(i)**. (b) Explain why the simultaneous equations $2a+b=4$ and $4a+2b=8$ have infinitely many solutions. (c) A pair of simultaneous equation is given by $3a-b=12$ and $\frac{a}{3}-\frac{b}{4}=2$ Amy claims that the solution to the simultaneous equations is $a=4.8$, $b=2.4$. Explain how she can check if her answer is correct. Hence, explain whether her answer is correct. .	[2] [1] [2] [2]
4	(a) if $x=1$ and $y=2$ is the solution of the simultaneous equations $ax-by=1$ $ay+bx=17$ Find the value of *a* and *b*. (b) Jason and Benson are walking at different speeds. If they walk in the same direction, Jason would be 3 km in front of Benson after 3 hours. If they walk in opposite directions, Jason would be 10 km away from Benson after 2 hours. Let Jason's speed be *x* km/h and Benson's speed be *y* km/h. Assuming that their speeds are constant, find the speed of Jason and Benson.	[3] [3]

Solving Linear Inequalities

1	Solve the inequality $5(x-3)-2(x-6) \leq 4$.	[2]
2	Given that $2x + \frac{x}{3} \geq 28$. (a) Solve the inequality. (b) Hence state the smallest value of x if x is a prime number.	 [1] [1]
3	Given that p and q are integers such that $-6 \leq p \leq 2$ and $4 \leq q < 7$, (a) The greatest possible value of $(p-q)^2$. (b) The smallest possible value of pq. (c) The smallest possible value of $\frac{p}{q}$.	 [1] [1] [1]

Word Problems (Linear Inequalities)

1	Joseph has 13 coins which are made of 50-cent and 20-cent coins in his coin pouch. It the total value of all the coins is less than \$4.70, find the maximum number of 50-cent coins he has.	[2]
2	Isabelle wants to buy x pencils at 25 $cents$ each and 12 $pens$ at x $cents$. She cannot spend more than \$15. Write down an inequality in terms of x. Solve the inequality to find the maximum number of pencils that she can buy.	[2]
3	The masses of a sheet of writing paper and an envelope are 4g and 6g respectively. It costs 50 cents to send a letter with mass not exceeding 35g. Dylan bought \$0.50 worth of stamps. If x represents the number of sheets of writing paper, form an inequality in x and find the maximum number of pieces of writing papers that he can use.	[2]

Answer Key

Linear Graph

<table>
<tr><td>1</td><td>(a) $\frac{12-2}{4}$
$= 2.5$
Ans: (a) 2.5, (b) $y = 2$, (c) $x = 2$</td><td></td></tr>
<tr><td>2</td><td>Ans: $a = 2$ (ii) Graph (iii) $y = -1$ (iv) Graph (v) $(-1.3, 2.8)$</td><td></td></tr>
<tr><td>3</td><td>Ans:
<table><tr><td>X</td><td>-2</td><td>0</td><td>2</td><td>4</td></tr><tr><td>Y</td><td>-1.6</td><td>-0.1</td><td>1.4</td><td>2.9</td></tr></table>
(ii) Graph (iii) $p = 6.4$ (b) Graph (c) $x = 2, y = 1.4$</td><td></td></tr>
</table>

Simultaneous Equation

<table>
<tr><td>1</td><td>$\frac{x}{3} + \frac{y}{4} = \frac{1}{2}$ ---- (1)
$-4y - 5x = 6$ ---- (2)
From (1),
$4x + 3y = 6$
$x = \frac{6-3y}{4}$ ---- (3)
Sub (3) into (2),
$-4y - 5\left(\frac{6-3y}{4}\right) = 6$
$-16y - 30 + 15y = 24$
$\therefore y = -54$ ---- (4)
Sub into (4) into (1)
$\frac{x}{3} + \frac{(-54)}{4} = \frac{1}{2}$
$\frac{x}{3} = \frac{56}{4}$
$\therefore x = 42$

Ans: $y = -54, x = 42$</td><td></td></tr>
<tr><td>2</td><td>Ans: Solve using elimination or substitution
$x = -1\frac{1}{3}, y = 2\frac{2}{7}$</td><td></td></tr>
</table>

3

$x + 3y = 5$ ---- (1)
$7x - 6y = -19$ ---- (2)
By Elimination:
$(1) \times 7: 7x + 21y = 35$ ---- (3)
$(3) - (2)$:
$7x + 21y - (7x - 6y) = 35 - (-19)$
$7x + 21y - 7x + 6y = 35 + 19$
$27y = 54$
$y = 2$
Sub $y = 2$ into (1):
$x + 3(2) = 5$
$x + 6 = 5$
$x = -1$

By Substitution:
From (1):
$x = 5 - 3y$ ---- (3)
Sub (3) into (2):
$7(5 - 3y) - 6y = -19$
$35 - 21y - 6y = -19$
$35 - 27y = -19$
$-27y = -54$
$y = 2$
Sub $y = 2$ into (1):
$x + 3(2) = 5$
$x + 6 = 5$
$x = -1$

Ans: (a)(i) $y = 2, x = -1$
(ii) Elimination or substitution (based on answer in (a)(i))
(b) This is because when the equation $2a + b = 4$ is multiplied by 2,
$2(2a + b) = 2(4)$
$4a + 2b = 8$
The result is the second equation, i.e., they are equivalent.
(c) She can check if her answer is correct by
substituting the values of *x* and *y* into both equations.
Her answer is correct if the values satisfy both equations.
$3(4.8) - 2.4 = 14.4 - 24.4 = 12$
$\therefore a = 4.8, b = 2.4$ satisfies the equation $3a - b = 12$.
$\frac{4.8}{3} - \frac{2.4}{4} = 1.6 - 0.6 = 1$
$\therefore a = 4.8, b = 2.4$ does **not** satisfy the equation $\frac{a}{3} - \frac{b}{4} = 2$.
Her answer is not correct as $a = 4.8, b = 2.4$ does not satisfy $\frac{a}{3} - \frac{b}{4} = 2$.

4

(a) Substitute $x = 1$ and
$y = 2$ into each equation.
$a(1) = b(2) = 1$
$a - 2b = 1$ ---- (1)
$a(2) + b(1) = 17$
$2a + b = 17$---- (2)
From (1):
$a = 1 + 2b$----(3)
Sub (3) into (2):
$2(1 + 2b) + b = 17$
$2 + 4b + b = 17$
$5b = 15$
$b = 3$
Sub $b = 3$ into (3):
$a = 1 + 2(3) = 7$
$a = 7, b = 3$

(b) $3x - 3y = 3$ ---- (1)
$2x + 2y = 10$ ---- (2)
$(1) \times 2: 6x - 6y = 6$ ---- (3)
$(2) \times 3: 6x - 6y = 30$ ---- (4)
$(3) - (4): -6y - 6y = 6 - 30$
$-12y = -24$
$y = 2$
Sub $y = 2$ into (1):
$3x - 3(2) = 3$
$3x - 6 = 3$
$3x = 9$
$x = 3$

Jason's speed = 3 km/h
Benson's speed = 2 km/h

Ans: (a) $a = 7, b = 3$
(b) $y = 2, x = 3$ Jason's speed = 3 km/h; Benson's speed 2 km/h

Solving Linear Inequalities

1	$5(x-3)-2(x-6) \leq 4$ $5x-15-2x+12 \leq 4$ $3x-3 \leq 4$ $3x \leq 7$ $x \leq \frac{7}{3}$ $x \leq 2\frac{1}{3}$ Ans: $x \leq 2\frac{1}{3}$	
2	(a) $\frac{7}{3}x \geq 28$ $x \geq 12$ Ans: (a)$x \geq 12$ (b) 13	
3	Ans: (a) 144, (b) -36, (c) -1.5	

Word Problems (Linear Inequalities)

1	Let x be the number of 50cent coins. $(0.50)(x)+(0.20)(13-x)<4.70$ $0.50x+2.60-0.20x<4.70$ $0.30x<2.10$ $x<7$ Ans: $x<7$ $\therefore$ The maximum number of 50-cent coins he has is 6.	
2	$(x)(0.25)+12\left(\frac{x}{100}\right) \leq 15$ $0.25x+0.12x<15$ $0.37x<15$ $x<40\frac{20}{37}$ Ans: Maximum number of pencils = 40	
3	$4x+6 \leq 35$ $4x \leq 29$ $x \leq 7.25$ Ans: Maximum number of writing papers = 7	