



Year 10 MATHEMATICS 5.2/5.3 2022

TASK 2 – Half Yearly Examination

General Instructions

- Reading time – 5 minutes
- Working time – 90 minutes
- Show all necessary working / units
- Board approved calculators are allowed
- Exam guidelines
 - ✓ Use black pen for your working
 - ✓ Use a pencil and ruler for diagrams
 - ✓ Marks may be lost for poorly organised written work.

Total Marks – 80

Section 1 5.2 – 40 marks

Suggested time: 40 mins

Section 2 5.3 – 40 marks

Suggested time: 50 mins

Examiner's use only			B.Su, D.Luo, E.Shing , B.Vincent		
Question	Indices and Surds	Equations inequalities and formulas	Quadratic expressions non-linear Relationships	Right-angled triangles	Total
Section 1 (5.2)					/40
2-4,10,11	/10				
1,9,12		/7			
5-7,13-15,17			/20		
8,16				/3	
Section 2 (5.3)					/40
2,6	/8				
7,		/12			
1,3,4,5,8,9			/20		
					/40
Total	/18	/19	/40	/3	/80

Section 1 – 5.2 (40 marks)

Attempt Questions 1 to 17.

Allow approximately 50 minutes for this section

Multiple Choice Questions. Circle the correct answer on the question paper.

1. A number is decreased by 8 and then doubled. The result is equal to 24. This can be written as:

A. $2x - 8 = 24$

B. $2(x - 8) = 24$

C. $x - 8 = 2 \times 24$

D. $x - 8 \times 2 = 24$

2. $2 \times 4a^3$ is equal to:

A. $24a^3$

B. $8a^3$

C. $64a^3$

D. $128a^3$

3. $(a^2b^3)^3$ is equivalent to:

A. a^6b^9

B. a^5b^6

C. a^3b^9

D. a^2b^6

4. $4x^0 + 3$ is equal to:

A. 3

B. 4

C. 6

D. 7

5. Which ONE of the following lines is parallel to $y = 2x + 4$?

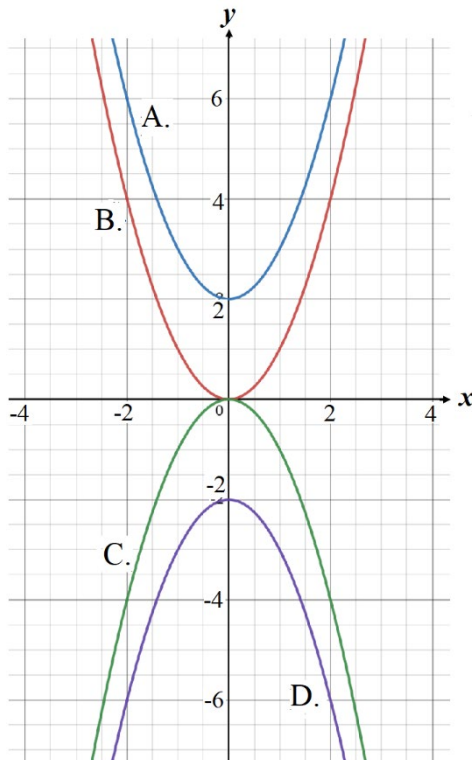
A. $y = -2x + 4$

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

C. $y = 4x + 2$

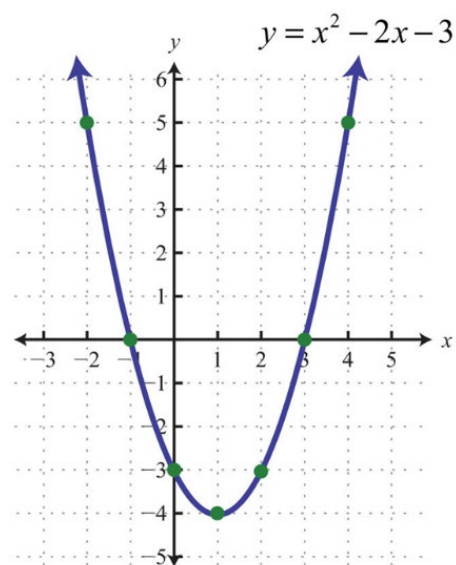
D. $y = 2x - 5$

6. The non-linear relationship, $y = x^2 + 2$ can be represented by



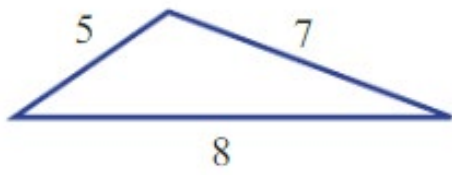
7. The turning point of the parabola below is:

- A. $(-1, 0)$
- B. $(0, -3)$
- C. $(1, -4)$
- D. $(3, 0)$

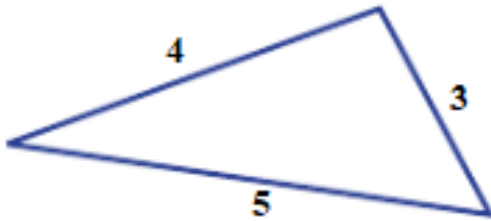


8. Which ONE of the following is a right-angled triangle? (All diagrams are not in scale.)

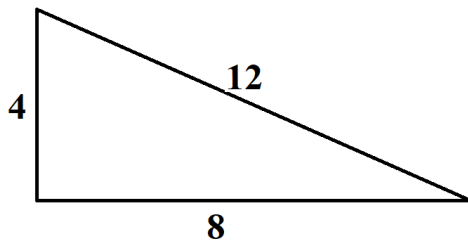
A.



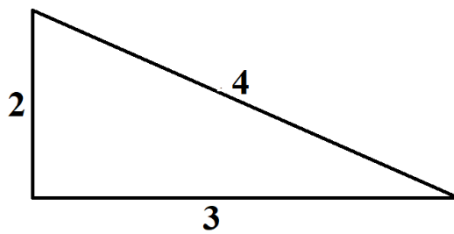
B.



C.



D.



Short Answer Questions

Answer the questions in the spaces provided. Your responses should include relevant mathematical reasoning and/or calculations.

Marks **CANNOT** be awarded for poorly organised written work.

9. Find x in the following equations.

a. $3(x + 1) = 9$ (2 marks)

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b. $\frac{x}{2} - 1 = 4$ (2 marks)

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10. Expand and simplify:

a. $5 + 4(x - 2)$ (1 mark)

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b. $3(2x + y) - 2x$ (2 marks)

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11. Using index laws to simplify the following:

a. $3x^2 \times (2x)^3$ (2 marks)

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b. $(x - 4x)^0 + 2 \times 7^0$ (2 marks)

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12. If $S = ut + \frac{1}{2}at^2$, if $u = 2$, $a = 10$ and $t = 3$, find the value of S . (2 mark)

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13. Solve the following simultaneous equations using suitable methods.

a. $x = y$ (2 marks)

$$3y = x + 4$$

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b. $x + y = 11$ (2 marks)

$$x - y = 5$$

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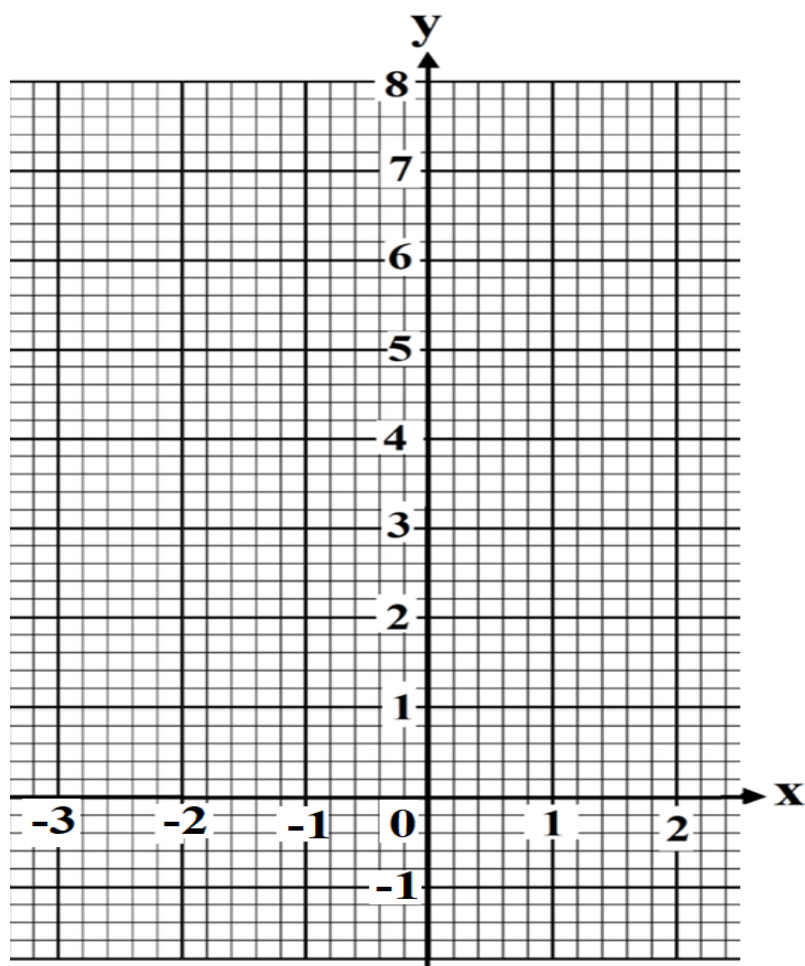
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14. a. Fill in the tables below for the given equation and then plot the graph of this equation on number plane below. (2 marks)

$$L_1 : y = 2x + 6$$

x	-2	-1	0	1
y				



- a. On the number plane above, draw a line L_2 which is parallel to L_1 and with y -intercept equals 3. (1 mark)
- b. Find the equation of L_2 . (1 mark)

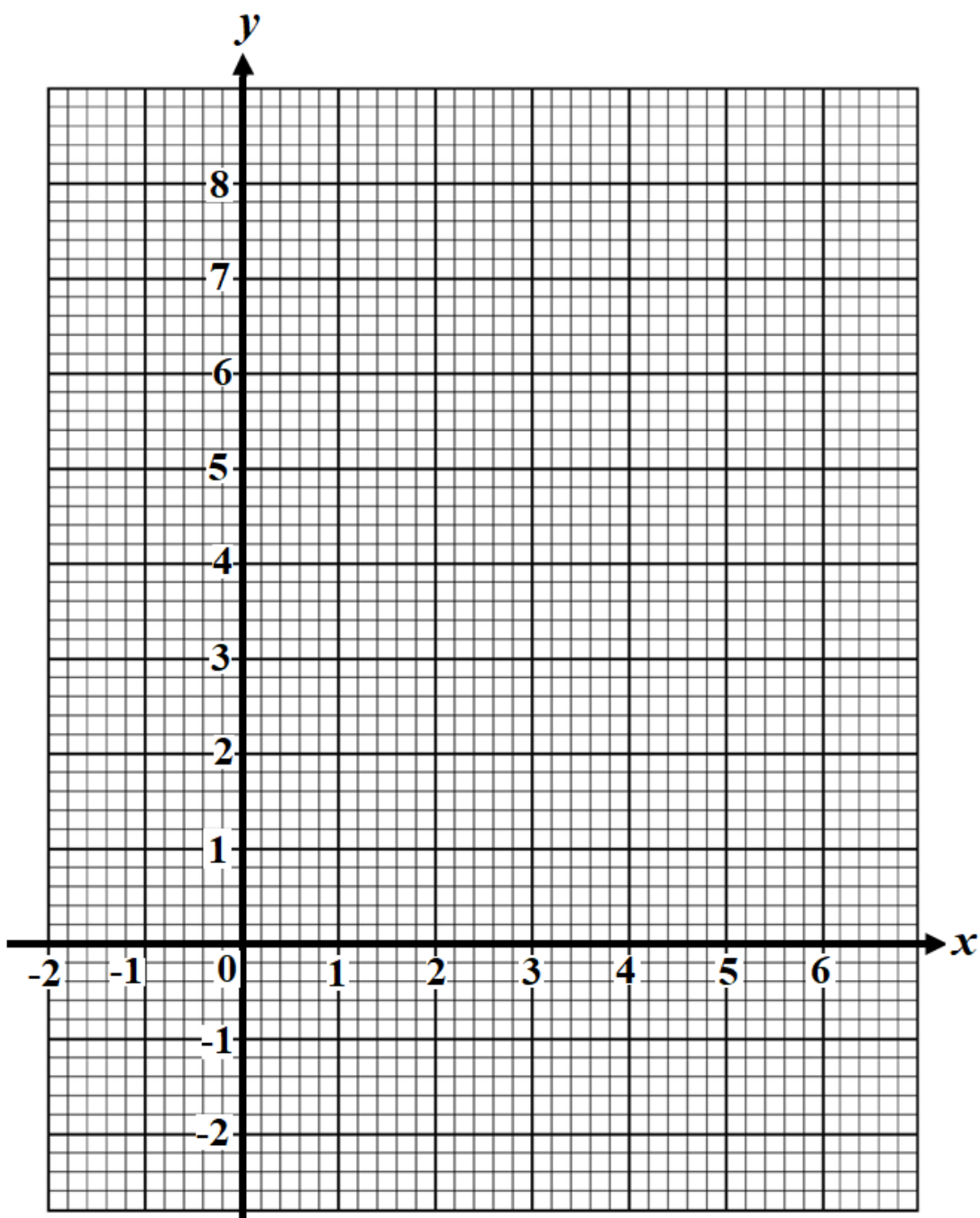
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15. a. Fill in the tables for the given equation below and then plot the graph of this equation on number plane below. (2 marks)

$$y = x^2 - 4x + 3$$

x	-1	0	1	2	3	4	5
y							



b. From the number plane above, find

i. The y-intercept.

(1 mark)

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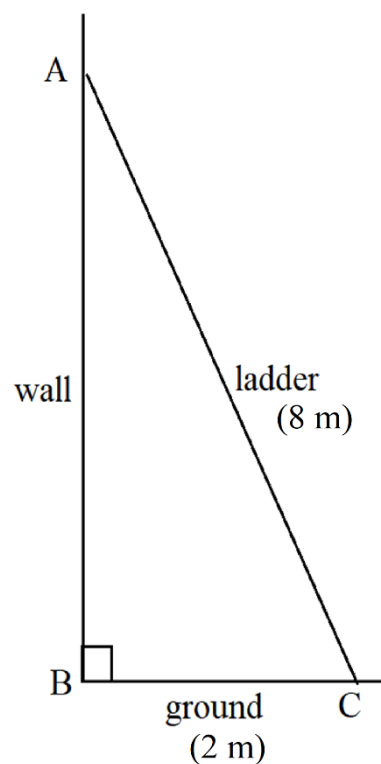
ii. The axis of symmetry.

(1 mark)

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16. A 8 m ladder leans against a vertical wall. If the base of the ladder is 2 m from the wall, determine how high the ladder is up the wall, correct to 2 decimal ponits. (2 marks)

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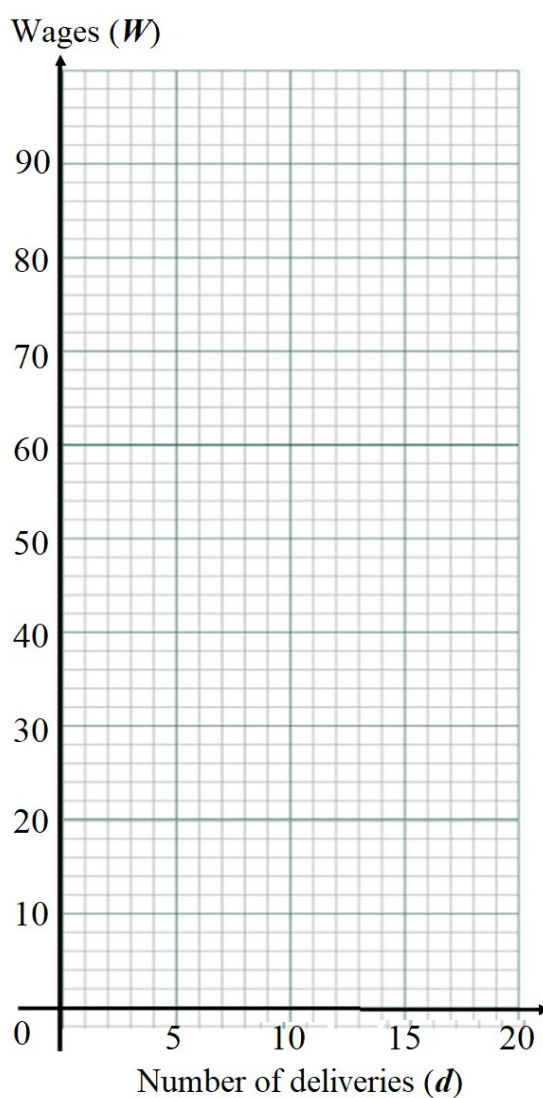


17. Peter delivers pizza for a fast-food restaurant. He is paid \$25 a shift plus \$3 per delivery.

a. Complete the table of values below. (1 mark)

No. of deliveries (d)	0	5	10	15	20
Wages (W)					

b. Plot a graph of Peter's wages (W) against number of deliveries (d). (1 mark)



c. Find the linear relationship between his wages (W) and the number of deliveries (d). (1 mark)

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d. Use the graph to determine: (2 marks)

i. Peter’s wages for 8 deliveries. (1 mark)

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ii. The minimum number of deliveries made if Peter wants to earn more than \$60. (1 mark)

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Section 2 – 5.3 (40 marks)

Attempt Questions 1 to 9.

Allow approximately 50 minutes for this section

Multiple Choice Questions

1 What are the solutions to the equation: $(3x - 2)(x + 4) = 0$?

(A) $x = -\frac{2}{3}$ and $x = 4$

(B) $x = \frac{2}{3}$ and $x = 4$

(C) $x = \frac{2}{3}$ and $x = -4$

(D) $x = \frac{3}{2}$ and $x = -4$

2 $\frac{12x^6 \times 3x^3}{9x^2 \times x^4}$ simplifies to:

(A) $6x^{10}$

(B) $6x^3$

(C) $4x^3$

(D) $4x^{10}$

3 What is the length of the interval joining $(2, -2)$ to $(-4, 6)$?

(A) $2\sqrt{5}$

(B) $\sqrt{6}$

(C) 10

(D) $2\sqrt{13}$

4 The transformation of the graph $y = x^2$ to $y = (x - 2)^2$ is described by:

(A) a translation of 2 units left

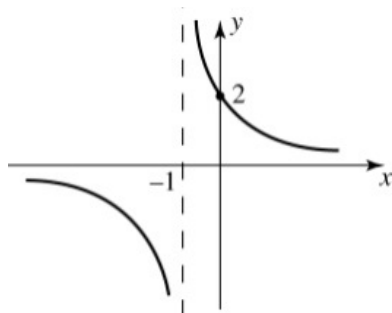
(B) a translation of 2 units up

(C) a translation of 2 units right

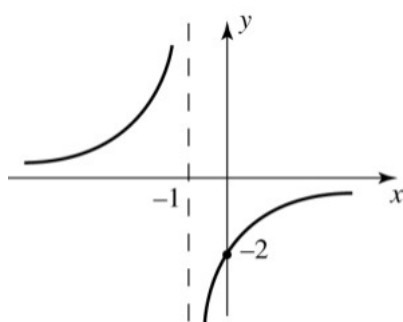
(D) a translation of 2 units down

5 The graph of $y = -\frac{2}{x-1}$ is best represented by:

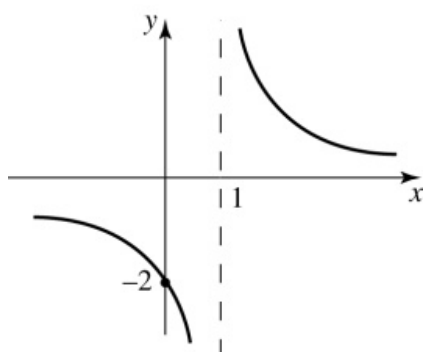
A



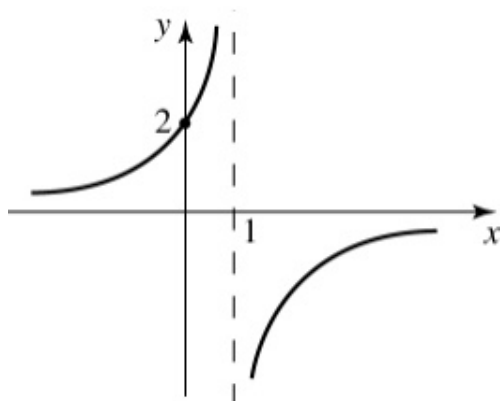
B



C



D



Short Answer Questions

Answer the questions in the spaces provided. Your responses should include relevant mathematical reasoning and/or calculations.

Marks CANNOT be awarded for poorly organised written work.

Question 6 (Indices and surds) (7 marks)

- (a) Expand and simplify: (2)

$$(2\sqrt{5} + \sqrt{10})(6 - 3\sqrt{2})$$

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- (b) Rationalise the denominator of the following expression

$$\frac{4\sqrt{2} - \sqrt{3}}{\sqrt{3}} \qquad \qquad \qquad (2)$$

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- (c) Solve for x: (3)

$$9^{3-2x} = 27^{x-2}$$

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Question 7 Equations, inequalities, and simultaneous equations

(12 marks)

(a) A line passes through the points $A(2, -5)$ and $B(-1, 1)$ on the Cartesian plane.

(i) Find the gradient of the line AB . (1)

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(ii) Find the equation of the line which passes through A and is perpendicular to AB . (2)

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(b) Simplify (2)

$$\frac{12x}{x^2 + 2x - 3} \times \frac{x^2 - 1}{6x + 6}$$

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(c) Solve for x

$$\frac{x+1}{3} + 2 = 9 \tag{2}$$

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(d) Solve for x (2)

$$\frac{2(x+1)}{3} > x + 5$$

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(e) Solve the following simultaneous equations (3)

$$\begin{aligned} 3x - 2y &= 15 \\ 5x - 4y &= 27 \end{aligned}$$

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Question 8 Quadratic equations**(7 marks)**

- (a) Solve for x (1)

$$x^2 - 10x + 25 = 0$$

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- (b) Find the maximum value of: $15 - 2x - x^2$ (2)

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- (c) Use the quadratic formula, to give the exact solution to the equation below. (2)

$$2x^2 - 4x - 5 = 0$$

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- (d) Find the discriminant, and hence determine the number of real solutions in: (2)

$$y = 2x^2 - 3x + 7$$

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Question 9 Quadratic graphs and nonlinear relationships

(9 marks)

- (a) Sketch $y = \frac{1}{x-1} + 2$ and label all intercepts, asymptotes and other important features. (3)

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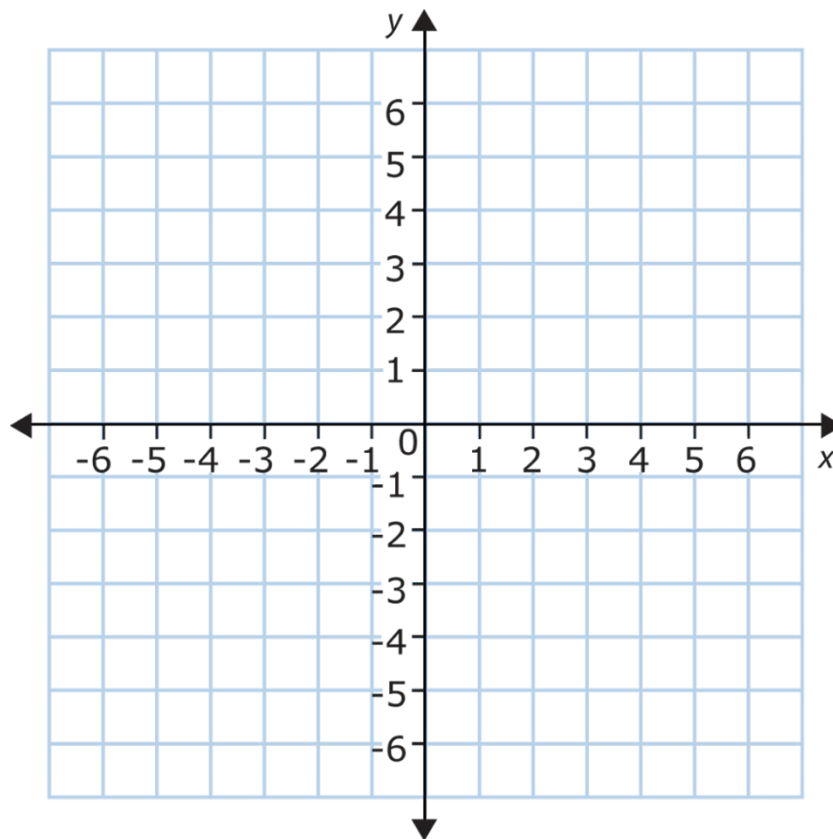
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- (c) By first completing the square, sketch $y = x^2 + 4x - 3$ labelling axes intercepts and the axis of symmetry. (3)

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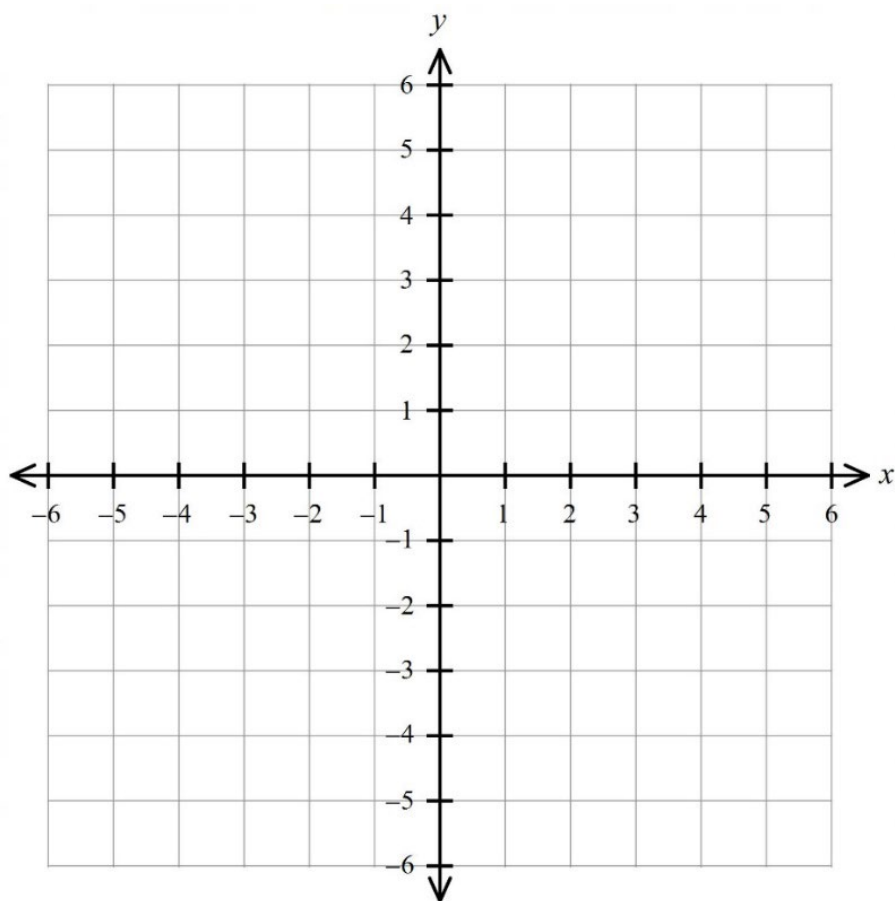
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(d) Sketch the graph $y = 2^{-x} - 2$, labelling x and y -intercepts, and the horizontal asymptote. (3)

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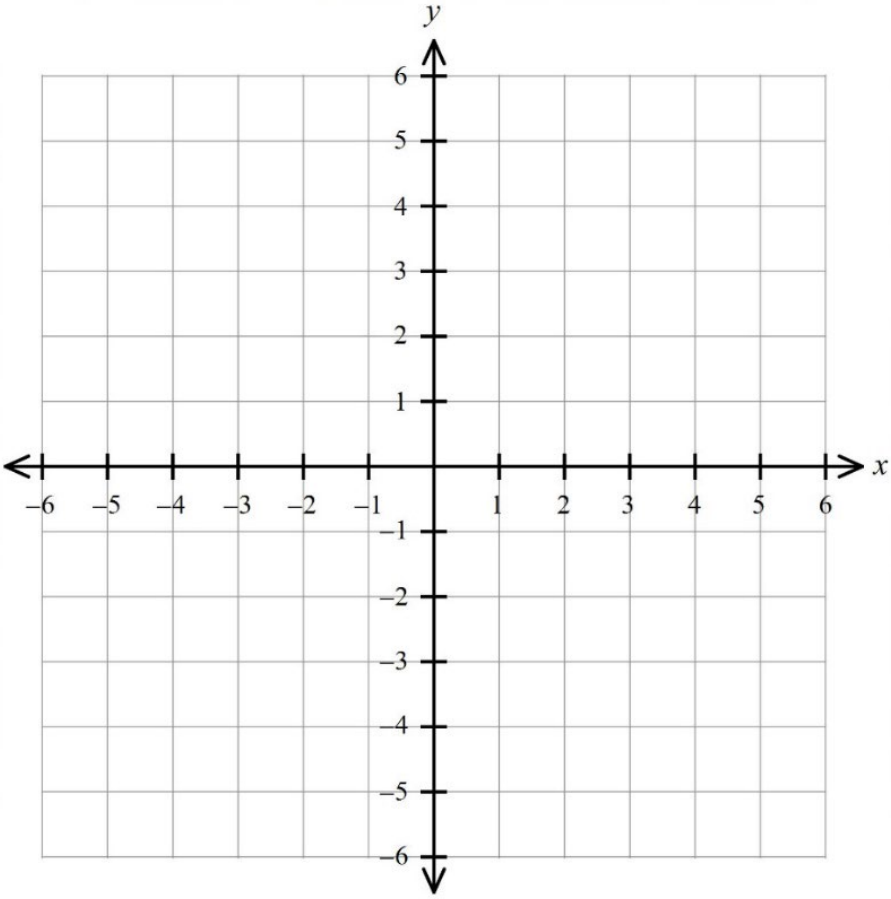
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END OF EXAM



Norwest Christian School
Mathematics Formulas (Stage 5)

Indices

$$a^m \times a^n = a^{m+n}$$

$$a^m \div a^n = a^{m-n}$$

$$(a^m)^n = a^{m \times n}$$

$$a^{-m} = \frac{1}{a^m}$$

$$a^0 = 1$$

$$a^{\frac{1}{m}} = \sqrt[m]{a}$$

Surds

$$\sqrt{a} \times \sqrt{b} = \sqrt{a \times b}$$

$$\sqrt{a} \div \sqrt{b} = \sqrt{\frac{a}{b}}$$

Equation of straight line

$$y = mx + c$$

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

Right angled triangle

$$a^2 + b^2 = c^2$$

Distance and Midpoint

$$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

$$M = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2} \right)$$

Quadratic Formula

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$