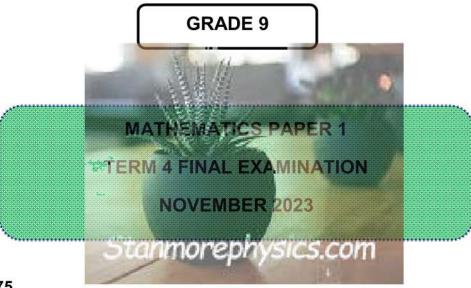


#### **SENIOR PHASE**



MARKS: 75 TIME: 2 HOURS

This question paper consists of 8 pages including the cover page.

#### **INSTRUCTIONS:**

- 1. Answer all the questions on a separate answer sheet
- 2. Answer question 6.2.2 on the grid paper provided. Remove the grid paper from the question paper and submit together with your answer sheet.
- 3. Number your answers the way the questions are numbered.
- 4. Show all your calculations.
- 5. You may start with any question, but keep its sub-questions together.
- 6. A non-programmable calculator may be used.
- 7. Write neatly and legibly.

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QUESTION 1 [10]

Four options are provided as possible answers to the following questions. Choose the correct option and write only the letter (A - D) next to the question number, for example 1.11. D

1.1 Which of the following numbers is a rational number?

A 
$$π$$
B  $\sqrt{-1}$ 
C  $1, 2\dot{3}$ 
D  $\sqrt{10}$ 

1.2 Calculate:  $6 + 6 \div 2 - 6 \times (-2) =$ 

A 12

B 18

C 21

D 0 [1]

[1]

1.3 Simplify:  $(2abc)^3 \times (2bc)^{-2} =$ 

A 
$$8a^3b^3c^3 \times 4\frac{1}{b^2c^2}$$

B 
$$6a^3b^3c^3 \times 4\frac{1}{b^2c^2}$$

C 
$$8a^3b^3c^3 \times \frac{1}{4b^2c^2}$$

$$5 tar_{\mathsf{D}} \mathsf{mor}_{6a} \mathfrak{s}_{b} \mathfrak{s}_{c} \mathfrak{s} \times \frac{\mathsf{c}_{1}}{4b^{2}c^{2}} \mathsf{com}$$
 [1]

1.4 The next term of the sequence: 18; 14; 11; 9; . . . is ?

A 5

B 6

C 8

D 7 [1]

1.5 How many terms are there in the expression  $\frac{-x^2-x+2}{x-1} \times \frac{3}{x-2}$ 

A 4

B 1

C 8

D 2 [1]

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1.6 Simplify: 
$$(x-3)^2 =$$

A 
$$x^2 - 9$$

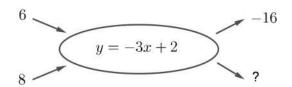
B 
$$x^2 - 6x + 9$$

C 
$$x^2 - 6x - 9$$

D 
$$x^2 - 6$$
 [1]

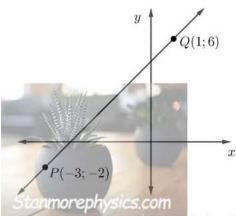
1.7 If 
$$x^2 = 25$$
, then  $x = ...$ ?

1.8 Complete the flow diagram by using the given rule.



$$D - 26$$
 [1]

1.9 Consider the graph of y = mx + c sketched below



The equation of the graph is given by. . .

$$A \qquad y = 2x - 4$$

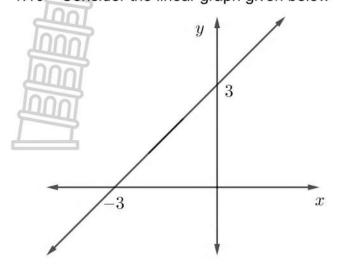
B 
$$y = -2x - 4$$

C 
$$y = -2x + 4$$

D 
$$y = 2x + 4$$
 [1]

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1.10 Consider the linear graph given below



x	- 3	- 2	- 1	0	b
у	0	1	2	а	4

A 
$$a=1$$
 and  $b=0$ 

B 
$$a=0$$
 and  $b=1$ 

C 
$$a = 1$$
 and  $b = 3$ 

D 
$$a=3$$
 and  $b=1$  [1]

QUESTION 2 [23]

2.

2.1 Four packets of biscuits cost R74, 00. What will six packets cost? [2]

2.2 Find the LCM and HCF of 60 and 80. [4]

2.3 Delea invested a certain amount into a savings account at 6,5% compound interest per annum. If the final amount is R15 000 after 5 years, how much did she originally invest?
[4]

2.4 Simplify without using a calculator:

2.4.1 
$$4 \times [20 + (-5)]$$
 [2]

2.4.2 
$$10 \times (-4) + 25 \div (-5)$$
 [2]

$$2.4.3 25 - (-2)3 [2]$$

2.4.4 
$$\frac{\sqrt[3]{-125} \times \sqrt{64}}{\sqrt{100} \times \sqrt[3]{-64}}$$
 [3]

2.5 Simplify using laws of exponents:

2.5.1 
$$3^2 \times 3^5$$
 [2]

2.5.2 
$$5^2 \times 2^0 - 3 \div 6 + (-2)^3$$
 [2]

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QUESTION 3 [12]

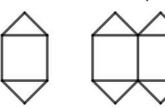
3.

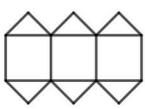
3.1 Given the following number pattern: 2; 5; 10; 17; . . .

3.1.1 Write down the next TWO terms. [2]

3.1.2 Provide a rule to describe the relationship between the number numbers in the number pattern. [2]

3.2. Mukhethwa creates pattern with sticks as illustrated below.





\_ \_ \_ \_

PATTERN 1

PATTERN 2

PATTERN 3

PATTERN 4

3.2.1 Draw PATTERN 4

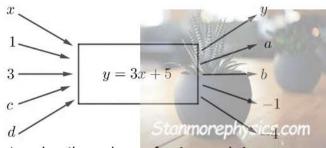
[2]

3.2.2 The following table describes the relationship between the pattern number and the number of sticks used to construct the pattern.

PATTERN NUMBER	1	2	3	4	10
NUMBER OF STICKS USED	8	15	22	а	b

Complete the table by writing the values of a and b [2]

3.3 Consider the figure below.



Determine the values of a, b, c and d.

[4]

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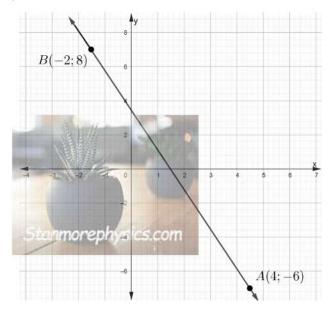
**QUESTION 4** [12] 4. Simplify the following expressions: 4.1.1 2(x+y)[1] 4.1.2 (x+2)(x+2)[2]  $(x - y)^2$ 4.1.3 [2]  $\frac{4x^3 - 6x^2 + 2}{2x} \ , \ x \neq 0$ 4.1.4 [2] 4.2 Factorise the following expressions: 4.2.1 3a + 3b + 3c[1]  $x^2 - y^2$ 4.2.2 [2]  $x^2 + 8x + 15$ 4.2.3 [2] **QUESTION 5** [9] 5. 5.1 Write an equation for the following problem: When I add 24 to the cube of a number, the answer is -3. [1] (**Hint**: Let the unknown number be *x*) 5.2 Write down the value of x which will make this statement TRUE. 2x - 4 = 12[1] 5.3 Solve for x 5.3.1 2x - 3 = 11[2]  $x^2 + 3x + 2 = 0$ 5.3.2 [3]  $\frac{x^2 + 4x + 4}{x + 2} = 0$ 5.3.3 [2]

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QUESTION 6 [9]

6

6.1 Consider the graph below:



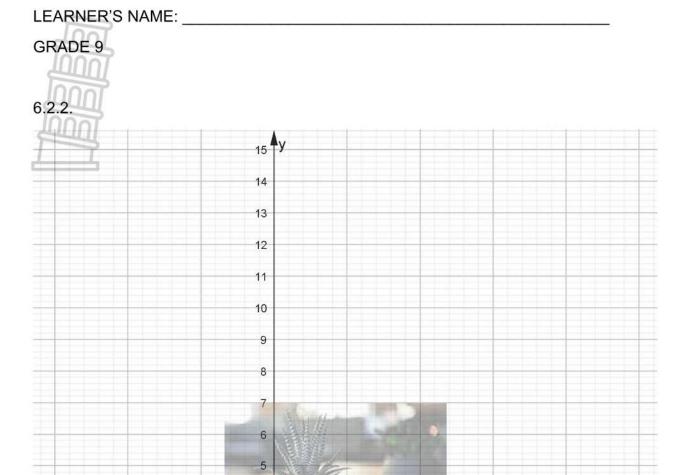
- 6.1.1 Determine the gradient of the line AB. [2]
- 6.1.2 Hence, determine the equation of AB in the form  $y = \cdots$  [2]

#### 6.2 Consider the table below:

x	- 3	- 1	0	1	2	5
у	-1	а	5	7	9	b

- 6.2.1 Complete the table by writing values of a and b. [2]
- 6.2.2 Use the values of *x* and *y* from the table to draw the graph on the grid provided. [3]

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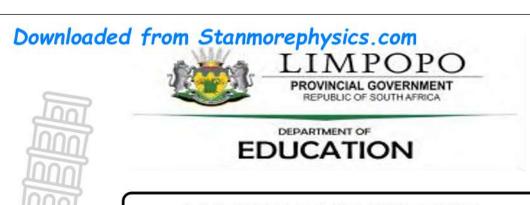
3

4

1

0

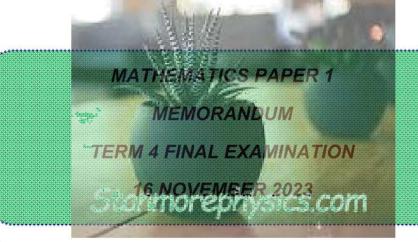
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#### **VHEMBE EAST DISTRICT**

**SENIOR PHASE** 

**GRADE 9** 



MARKS: 75

This memorandum consists of 5 pages including the cover page.

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No.	Mathematical Calculations	Clarification on mark allocations	Total marks
OUES	STION 1		[10]
1.1	C	<b>✓</b>	1
1.2	Č	· /	1
1.3	Č	· /	1
1.4	C	· /	1
1.5	В	· /	1
1.6	В	V	1
1.7	В	✓	1
1.8	D	V	1
1.9	D	· ·	1
1.10	D	· ·	1
QUES	STION 2		[24]
2.1.	$R74,00 \div 4 = R18,5$ each packet ✓ ∴ $R18,5 \times 6 = R111,00$ ✓	✓ Method ✓Answer only Note: Award full marks for answer only.	2
2.2	$60 = 2 \times 2 \times 3 \times 5 \checkmark$	✓ factors of 60	4
	$80 = 2 \times 2 \times 2 \times 2 \times 5 \checkmark$ $LCM = 2 \times 2 \times 2 \times 2 \times 3 \times 5 = 240 \checkmark$ $HCF = 2 \times 2 \times 5 = 20 \checkmark$	✓ Factors of 80 ✓ 240 ✓ 20  Note: Accept any correct method.	
2.3	$A = P \left( 1 + \frac{i}{100} \right)^{n} / S   CS. COM$ $15 \ 000 \checkmark = P \left( 1 + \frac{6.5}{100} \right)^{5} \checkmark$ $15000 \left( 1 + \frac{6.5}{100} \right)^{-5} = P$	✓ Correct formula ✓ Substitution ✓ Answer  Note: Accept any	4
	P = 10948,21	correct method.	
2.4.1	$4 \times [20 + (-5)] = 4 \times (20 - 5) = 4 \times 15 \checkmark = 60 \checkmark$	✓ Method ✓ Answer Accept any correct method.	2
2.4.2	$10 \times (-4) + 25 \div (-5)$ = -40 - 5 \( \neq \) = -45 \( \neq \)	✓ Method ✓ Answer Accept any correct method.	2
2.4.3	$2^5 - (-2)^3$	$√-2^3$ or 8	2

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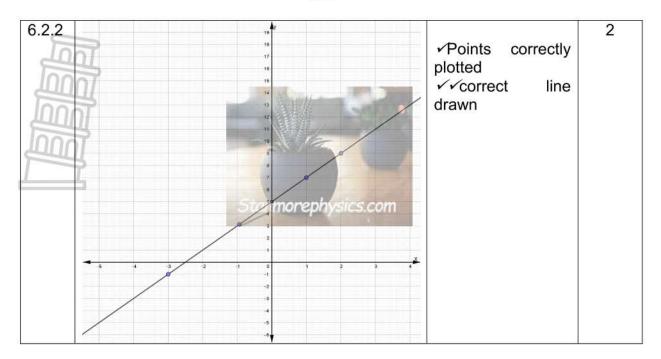
	$=2^5+2^3$	✓ answer	
Lo	= 32 + 8		
0.00	= 40 ×		
2.4.4	3/ 125 /64		
TIDI	$\frac{\sqrt[3]{-125} \times \sqrt{64}}{\sqrt[3]{-125}}$	✓ ✓ Simplification	3
nne	$\sqrt{100} \times \sqrt[3]{-64}$	✓Answer	Ü
1	$=\frac{-5\times8}{10\times-4}\checkmark$		
_	40		
	$=\frac{1}{40}$		
	= 1 🗸		
2.5.1.			
	$3^2 \times 3^5$	✓Adding	
	$=3^{2+5}$	exponents	2
	$=3^{7}$	✓Answer	
0.5.0	= 2187 ✓		
2.5.2.	$5^2 \times 2^0 - 3^1 \div 6 + (-2)^3$	<ul><li>✓ Method</li><li>✓ Answer</li></ul>	2
	$= 25 \times 1 - \frac{1}{2} - 8 \checkmark$ $= \frac{33}{2} \text{ or } 16\frac{1}{2} \checkmark$	, WIIPMEI	2
	33 1 1		
	$=\frac{1}{2} \text{ or } 16\frac{1}{2}$		
QUES	TION 3		[12]
3.1.1		✓26	2
		<b>√</b> 37	
3.1.2.			
3.1.2.	Add two more than was added to the previous term 🗸 🗸	✓ 37 ✓ ✓ Answer	2
		✓ ✓ Answer	
3.1.2.			2
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3.2.1	term $\checkmark$ PATTERN 4 $a = 29 \checkmark \text{ and } b = 71 \checkmark$	✓ Answer  ✓ Correct pattern  ✓ $a = 29$ ✓ $b = 71$ ✓ $a = 8$ ✓ $b = 14$	2
3.2.1	term $\checkmark$ PATTERN 4 $a = 29 \checkmark \text{ and } b = 71 \checkmark$	✓ Answer  ✓ Correct pattern  ✓ $a = 29$ ✓ $b = 71$ ✓ $a = 8$	2
3.2.1	term $\checkmark$ PATTERN 4 $a = 29 \checkmark \text{ and } b = 71 \checkmark$ $a = 8 \checkmark; b = 14 \checkmark; c = -2 \checkmark \text{ and } d = -3 \checkmark$	✓ Answer  ✓ Correct pattern  ✓ $a = 29$ ✓ $b = 71$ ✓ $a = 8$ ✓ $b = 14$ ✓ $c = -2$	2 4
3.2.1	term $\checkmark$ PATTERN 4 $a = 29 \checkmark \text{ and } b = 71 \checkmark$	✓ Answer  ✓ Correct pattern  ✓ $a = 29$ ✓ $b = 71$ ✓ $a = 8$ ✓ $b = 14$ ✓ $c = -2$	2
3.2.1 3.2.2 3.3	term $\checkmark$ PATTERN 4 $a = 29 \checkmark \text{ and } b = 71 \checkmark$ $a = 8 \checkmark; b = 14 \checkmark; c = -2 \checkmark \text{ and } d = -3 \checkmark$	✓ Answer  ✓ Correct pattern  ✓ $a = 29$ ✓ $b = 71$ ✓ $a = 8$ ✓ $b = 14$ ✓ $c = -2$ ✓ $d = -3$	2 4 [12]
3.2.1 3.2.2 3.3 QUES	term $\checkmark$ PATTERN 4 $a = 29 \checkmark \text{ and } b = 71 \checkmark$ $a = 8 \checkmark; b = 14 \checkmark; c = -2 \checkmark \text{ and } d = -3 \checkmark$	✓ Answer  ✓ Correct pattern  ✓ $a = 29$ ✓ $b = 71$ ✓ $a = 8$ ✓ $b = 14$ ✓ $c = -2$	2 4

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4.1.4. $\frac{4x^3 - 6x^2 + 2}{2x}$ $\frac{2x}{2x} - \frac{6x^2}{2x} + \frac{2}{2x}$ 4.2.1 $3a + 3b + 3c = 3(a + b + c)$ 4.2.2 $x^2 - y^2 = (x - y) \cdot (x + y)$ 4.2.3 $x^2 + 8x + 15 = (x + 5) \cdot (x + 3)$ QUESTION 5 $x = 8 \cdot (x + 5)$ 5.1 $x^3 + 24 = -3 \cdot (x + 3)$ $x = 8 \cdot (x + 3)$ 7. Answer  1  2. Answer  1  2. Answer  1  2. Answer  1  2. Answer  2  4.2.3 $x^2 + 8x + 15 = (x + 5) \cdot (x + 3)$ QUESTION 5 $x = 8 \cdot (x + 3)$ $x = 8 \cdot (x + 3)$ $x = 14 \cdot (x + 3)$ $x = 14 \cdot (x + 3)$ $x = 14 \cdot (x + 1)$ $x = 14 \cdot (x$	4.1.3.	$(x-y)^2 = x^2 - xy + y^2 \checkmark \checkmark$	✓✓ Answer	2
	4.1.4.	$4x^3 - 6x^2 + 2$		
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4.2.1 $3a + 3b + 3c = 3(a + b + c)\checkmark$	Ш	$4x^3 6x^2 2$		
4.2.1 $3a + 3b + 3c = 3(a + b + c)\checkmark$	nn	$=\frac{1}{2x}-\frac{1}{2x}+\frac{1}{2x}$		
4.2.1 $3a + 3b + 3c = 3(a + b + c)\checkmark$		$\frac{1}{2}$		
4.2.2 $x^2 - y^2 = (x - y) \checkmark (x + y) \checkmark$ $\checkmark (x - y)$ $\checkmark (x + y)$ 4.2.3 $x^2 + 8x + 15 = (x + 5) \checkmark (x + 3) \checkmark$ $\checkmark (x + 3)$ 2  QUESTION 5 [8]  5.1 $x^3 + 24 = -3 \checkmark$ $\checkmark$ Answer 1  5.2 $x = 8 \checkmark$ $\checkmark$ Answer 1  5.3.1 $2x - 3 = 11$ $\checkmark$ Method 2 $x = \frac{14}{2}$ $x = 7 \checkmark$ $\checkmark$ Answer 1  5.3.2 $x = \frac{14}{2}$ $x = 7 \checkmark$ $\checkmark$ Answer 2  5.3.3 $x^2 + 3x + 2 = 0$ $x = -1 \checkmark$ or $x = -2 \checkmark$ $\checkmark$ Answer 2  5.3.4 $x = \frac{14}{2}$ $x = 10$	TUUL	$\int_{-\infty}^{\infty} \int_{-\infty}^{\infty} \int_{-\infty}^{\infty$		
4.2.3 $x^2 + 8x + 15 = (x + 5)\checkmark(x + 3)\checkmark$ $\checkmark(x + y)$ 4.2.3 $x^2 + 8x + 15 = (x + 5)\checkmark(x + 3)\checkmark$ $\checkmark(x + 5)$ $\checkmark(x + 5)$ $\checkmark(x + 5)$ QUESTION 5  5.1 $x^3 + 24 = -3\checkmark$ $\checkmark$ Answer  5.2 $x = 8\checkmark$ $\checkmark$ Answer  1  5.3.1 $2x - 3 = 11$ $\checkmark$ Method  2 $x = 14\checkmark$ $\checkmark$ Answer $x = \frac{14}{2}$ $x = 7\checkmark$ 5.3.2 $x^2 + 3x + 2 = 0$ $(x + 1)(x + 2) = 0$ $(x + 1)(x + 2) = 0$ $(x + 1)(x + 2) = 0$ $(x + 2)(x + 2)$ $(x + 2)(x$	4.2.1	3a + 3b + 3c = 3(a + b + c)	✓ Answer	1
4.2.3 $x^2 + 8x + 15 = (x + 5)\checkmark(x + 3)\checkmark$ $\checkmark(x + y)$ 4.2.3 $x^2 + 8x + 15 = (x + 5)\checkmark(x + 3)\checkmark$ $\checkmark(x + 5)$ $\checkmark(x + 5)$ $\checkmark(x + 5)$ QUESTION 5 $ \begin{array}{c ccccccccccccccccccccccccccccccccccc$		5		
4.2.3 $x^2 + 8x + 15 = (x + 5) \checkmark (x + 3) \checkmark$ $x + 5$	4.2.2	$x^2 - y^2 = (x - y) \checkmark (x + y) \checkmark$		2
QUESTION 5  QUESTION 5 $x^3 + 24 = -3$ $x = 8$ Sa.1 $2x - 3 = 11$ $2x = 14$ $x = \frac{14}{2}$ $x = 7$ S.3.2 $x^2 + 3x + 2 = 0$ $(x + 1)(x + 2) = 0$ $x = -1$ $x + 2$ $x + 3$ $x + 3$ $x + 4$ $x + 2$ $x + 3$ $x + 4$ $x + 2$ $x + 3$ $x + 2$ $x + 3$ $x + 4$ $x + 2$ $x + 3$ $x + 4$ $x + 2$ $x + 3$ $x + 4$ $x + 2$ $x + 3$ $x + 4$ $x + 2$ $x + 3$ $x + 4$ $x + 2$ $x + 3$ $x + 4$ $x + 2$ $x + 3$ $x + 4$ $x + 2$ $x + 3$ $x + 4$ $x + 2$ $x + 3$ $x + 4$ $x + 2$ $x + 3$ $x + $			$\checkmark(x+y)$	-
QUESTION 5 [8]  5.1 $x^3 + 24 = -3$ $\checkmark$ Answer  5.2 $x = 8$ $\checkmark$ Answer  5.3.1 $2x - 3 = 11$ $\checkmark$ Method $2x = 14$ $\checkmark$ Answer $x = \frac{14}{2}$ $x = 7$ $\checkmark$ Method  5.3.2 $x = 3 + 2 = 0$ $x = -1$ $x = -2$	4.2.3	$x^2 + 8x + 15 = (x+5)\sqrt{(x+3)}$	1 127	2
5.1 $x^3 + 24 = -3 \checkmark$				
5.2 $x = 8\checkmark$			The second secon	e e e
5.3.1 $2x - 3 = 11$ $2x = 14 \checkmark$ $x = \frac{14}{2}$ $x = 7 \checkmark$ 5.3.2 $x^{2} + 3x + 2 = 0$ $(x + 1)(x + 2) = 0$ $x = -1 \checkmark \text{ or } x = -2 \checkmark$ 5.3.3 $\frac{x^{2} + 4x + 4}{x + 2} = 0$ $\frac{(x + 2)(x + 2)}{x + 2} = 0$ $x = -2 \checkmark$ QUESTION 6 $m = \frac{y_{2} - y_{1}}{x_{2} - x_{1}} = \frac{8 + 6}{-2 - 4} \checkmark = \frac{14}{-6} = -\frac{7}{3} \checkmark$ $y - 8 = -\frac{7}{3}(x + 2) \checkmark$ $y - \frac{7x}{3} + \frac{10}{3} \checkmark$ 6.2.1 $a = 3 \checkmark \text{ and } b = 15 \checkmark$ $\sqrt{\text{Method}} \checkmark \text{Answer}$ $\sqrt{\text{Method}} \checkmark \text{Answer}$ $\sqrt{\text{Substitution}} \checkmark \text{Answer}$ $\sqrt{\text{Method}} \checkmark \text{Answer}$ $\sqrt{\text{Answer}}$ $\sqrt{\text{Answer}}$ $\sqrt{\text{Answer}}$ $\sqrt{\text{Answer}}$				
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$x = \frac{14}{2}$ $x = 7\checkmark$ 5.3.2 $x^{2} + 3x + 2 = 0$ $(x + 1)(x + 2) = 0$ $x = -1\checkmark \text{ or } x = -2\checkmark$ 5.3.3 $\frac{x^{2} + 4x + 4}{x + 2} = 0$ $\frac{(x + 2)(x + 2)}{x + 2} = 0\checkmark$ $x + 2 = 0$ $x = -2\checkmark$ QUESTION 6 $m = \frac{y_{2} - y_{1}}{x_{2} - x_{1}} = \frac{8 + 6}{-2 - 4} \checkmark = \frac{14}{-6} = -\frac{7}{3}\checkmark$ $y - 8 = -\frac{7}{3}(x + 2)\checkmark$ $y = -\frac{7x}{3} + \frac{10}{3}\checkmark$ 6.2.1 $a = 3\checkmark$ and $b = 15\checkmark$ $\sqrt{Method}$ $\sqrt{Answer}$ $\sqrt{a} = 3$ 2	5.3.1		- U - Section Company Section	2
5.3.2 $x = 7$ 5.3.2 $x^2 + 3x + 2 = 0$ $(x + 1)(x + 2) = 0$ $x = -1$ or $x = -2$ 5.3.3 $\frac{x^2 + 4x + 4}{x + 2} = 0$ $\frac{(x + 2)(x + 2)}{x + 2} = 0$ $\frac{(x + 2)(x + 2)}{x + 2} = 0$ Answer   QUESTION 6 [9]  6.1.1 $m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{8 + 6}{-2 - 4} \checkmark = \frac{14}{-6} = -\frac{7}{3} \checkmark$ Substitution $\checkmark$ Answer  6.1.2 $y - 8 = -\frac{7}{3}(x + 2)\checkmark$ $y - 8 = -\frac{7}{3}(x + 2)\checkmark$ $y = -\frac{7x}{3} + \frac{10}{3}\checkmark$ 6.2.1 $a = 3$ and $b = 15$ $$ Answer			✓Answer	
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