



FINAL MARK

**GIRRAWEEN HIGH SCHOOL
MATHEMATICS ADVANCED
YEAR 11 TASK 1
2023
ANSWERS COVER SHEET**

Name: _____

QUESTION	MARK	MA11-1	MA11-2	MA11-3	MA11-4	MA11-5	MA11-6	MA11-7	MA11-8	MA11-9
1-5	/5	✓	✓							
6	/17	✓								✓
7	/17	✓								✓
8	/18	✓	✓							✓
9	/12	✓	✓							✓
10	/16	✓								✓
11	/11		✓							✓
12	/15		✓							✓
TOTAL										
	/111	/85	/61							/106

Year 11 Mathematics Advanced outcomes

A student:

- MA11-1** uses algebraic and graphical techniques to solve, and where appropriate, compare alternative solutions to problems
- MA11-2** uses the concepts of functions and relations to model, analyse and solve practical problems
- MA11-3** uses the concepts and techniques of trigonometry in the solution of equations and problems involving geometric shapes
- MA11-4** uses the concepts and techniques of periodic functions in the solutions of trigonometric equations or proof of trigonometric identities
- MA11-5** interprets the meaning of the derivative, determines the derivative of functions and applies these to solve simple practical problems
- MA11-6** manipulates and solves expressions using the logarithmic and index laws, and uses logarithms and exponential functions to solve practical problems
- MA11-7** uses concepts and techniques from probability to present and interpret data and solve problems in a variety of contexts, including the use of probability distributions
- MA11-8** uses appropriate technology to investigate, organise, model and interpret information in a range of contexts
- MA11-9** provides reasoning to support conclusions which are appropriate to the context



GIRRAWEE HIGH SCHOOL

MATHEMATICS

Task 1

Year 11 Mathematics Advanced

2023

Time Allowed: 90 minutes

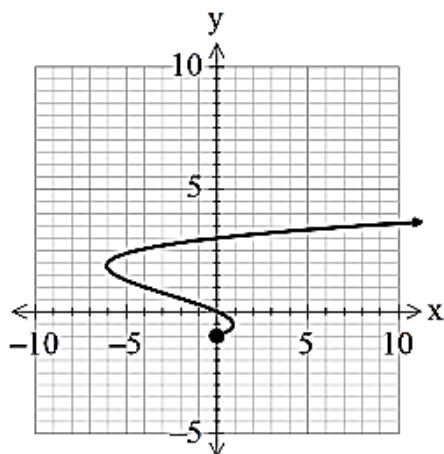
Instructions:

- There are 12 questions in this paper. All questions are compulsory.
- Use blue or black pen.
- For Questions 1 – 5, circle the letter corresponding to the correct answer in the answer sheet.
- For Questions 6 – 12, write your answers in the spaces provided.
Show all necessary working.
- Board-approved calculators may be used.
- Mathematics Reference sheets are provided.
- Marks may be deducted for careless or badly arranged work.

Questions 1 – 5 (5 marks)

Circle the letter corresponding to the correct answer on the answer sheet.

1. A relation is shown below.



What is the nature of the relation?

- A. One – to – one
B. One – to – many
C. Many – to – one
D. Many – to – many
2. How many real solutions does the equation $x^3 + 2x^2 + 3x = 0$ have?
- A. 3 B. 2 C. 1 d. 0

3. Simplify $\frac{x^2 - 5xy}{x^2 - 25y^2}$

- A. $\frac{x}{x - 5y}$
B. $\frac{x}{x + 5y}$
C. $\frac{1 - x}{x - 5y}$
D. $\frac{x - 5y}{x + 25y}$

4. What is the value of $f(-1)$ if $f(x) = x^3 - x^2$?

A. 2

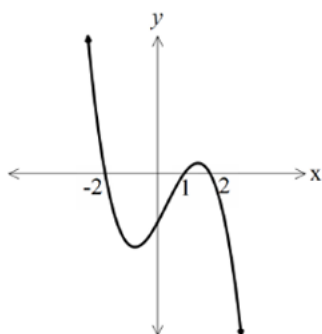
B. 0

C. -1

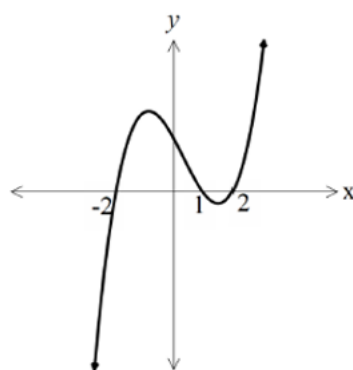
D. -2

5. Which of the following could be the graph of $y = (x + 2)(x - 2)(1 - x)$?

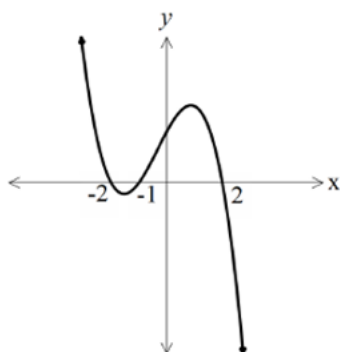
A.



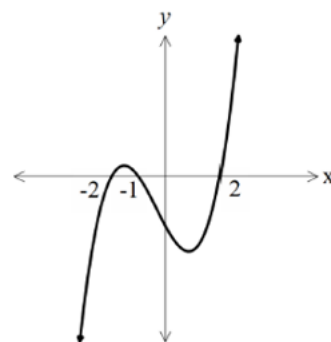
B.



C.



D.



Select the alternative A, B, C or D that best answers the question.

1. A ☐

B. ☐

C. ☐

D. ☐

2. A ☐

B. ☐

C. ☐

D. ☐

3. A ☐

B. ☐

C. ☐

D. ☐

4. A ☐

B. ☐

C. ☐

D. ☐

5. A ☐

B. ☐

C. ☐

D. ☐

Questions 6 – 12

- Answer in the spaces provided. Extra paper is provided at the end of the examination. Any questions answered on the extra paper must be clearly numbered.
- Show all necessary working.

Question 6 (17 marks)

a. Evaluate $\sqrt{\frac{275.4}{5.2 \times 3.9}}$ correct to two significant figures. [2]

b. Simplify:

(i) $\frac{2xy^2z^3}{4x^3y^2z}$ [2]

(ii) $(-3t^3)^4$ [2]

(iii) $a^5 - 7x^3 + a^5 - 2x^3 + 1$ [2]

c. Expand and simplify:

(i) $2ab(3 - a) - b(4a - 1)$

[2]

(ii) $(2x - y)(x^2 - xy + y^2)$

[3]

d. Factorise:

(i) $4x^2 - 49$

[1]

(ii) $x^2 + 14x - 32$

[1]

(iii) $a^2 - (a - b)^2$

[2]

Question 7 (17 marks)

a. Simplify:

(i) $\frac{x^3 + 3x^2 - 9x - 27}{x^2 + 6x + 9}$

[4]

This image shows a single sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

(ii) $\frac{3n}{n+2} - \frac{5n+19}{n^2+5n+6}$

[4]

This image shows a single sheet of white paper with horizontal ruling lines. The lines are evenly spaced and extend across the width of the page. There are no margins, text, or other markings on the paper.

This image shows a single sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

[illegible]

b. Solve:

$$\frac{x-5}{3} - \frac{x+1}{4} = 5$$

[3]

Question 8 (18 marks)

- a. Solve by factorising:

$$5x^2 - 11x + 2 = 0$$

[3]

- b. Solve using the quadratic formula. Leave your answer in simplest exact form:

$$2x^2 - 6x + 1 = 0$$

[4]

c. (i) Solve by completing the square:

$$x^2 - 3x - 10 = 0$$

[4]

(ii) Hence, for $y = x^2 - 3x - 10$, find:

(α) the co-ordinates of the vertex.

[1]

(β) the equation of the axis of symmetry.

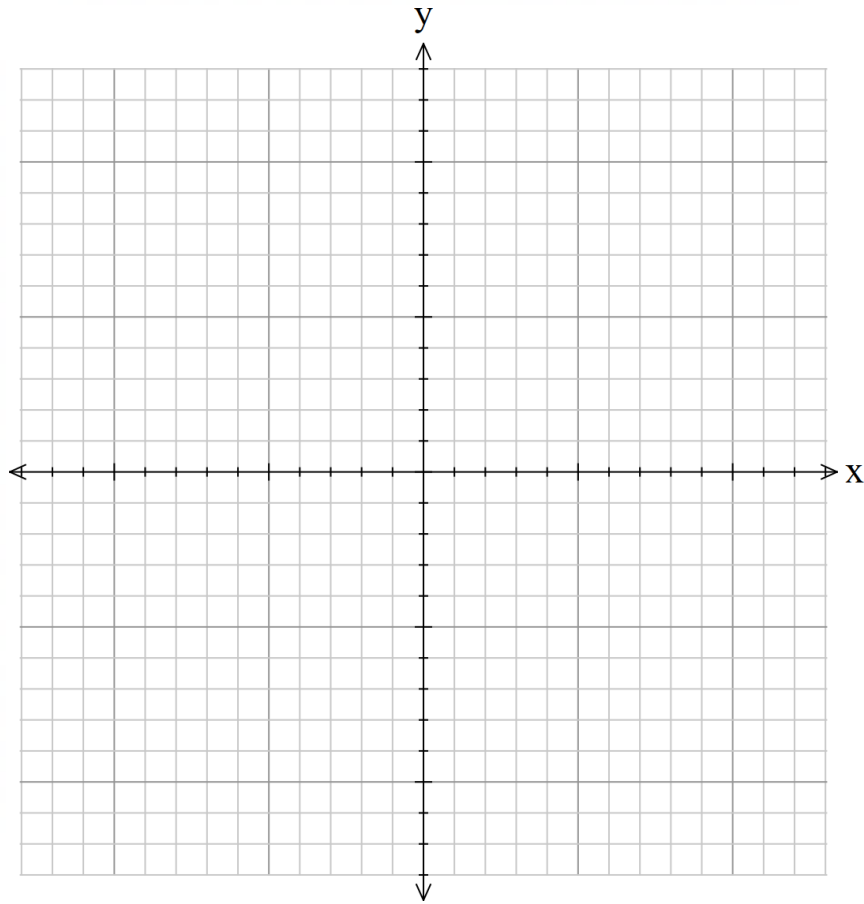
[1]

(γ) the intercepts with the axes.

[2]

(δ) Sketch the graph, clearly showing the main features.

[3]



Question 9 (12 marks)

a. Solve the simultaneous equations:

(i) $3x + 2y = 10$ and $4x + 3y = 13$

[3]

This image shows a single sheet of white paper with horizontal ruling lines. The lines are evenly spaced and extend across the width of the page. There are no margins, text, or other markings on the paper.

(ii) $y = -5 - 4x$ and $y = 3 - 2x - x^2$

[4]

This image shows a single sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

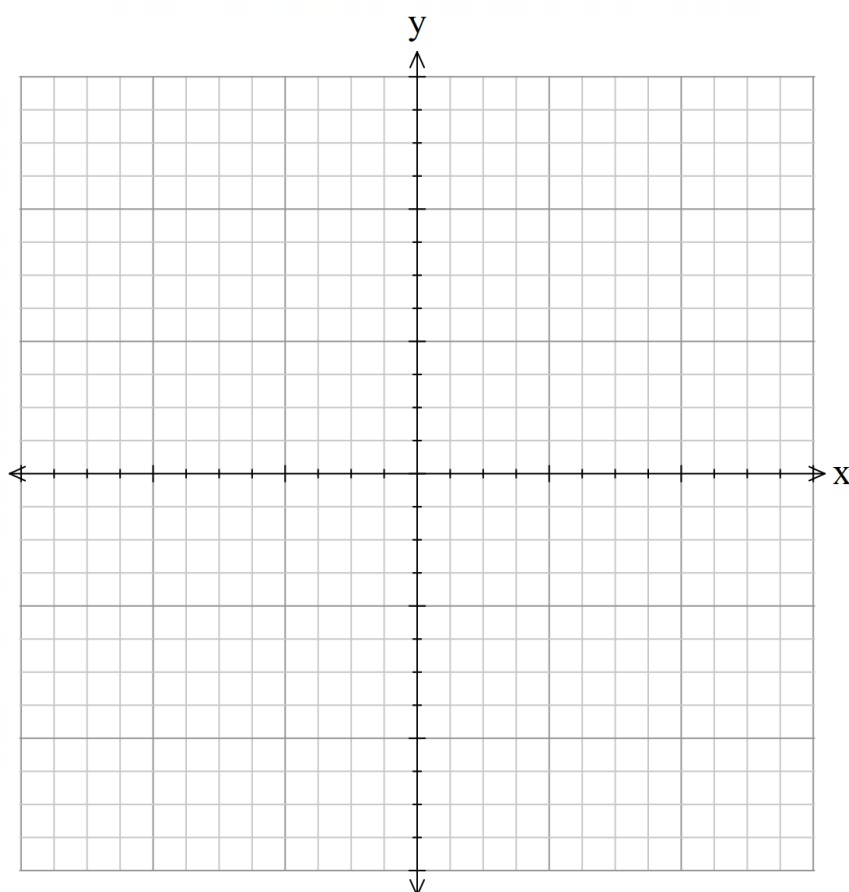
b. Given $y = x(x + 1)^2(x - 2)^3$

(i) Find the x and the y intercepts.

[2]

(ii) Sketch the graph of $y = x(x + 1)^2(x - 2)^3$, clearly showing the main features.

[3]



Question 10 (16 marks)

a. Simplify:

(i) $2\sqrt{50} - 3\sqrt{18} + \sqrt{3}$

[3]

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

[3]

(iii) $(\sqrt{3} - 1)(2\sqrt{3} + 5)$

[3]

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

[3]

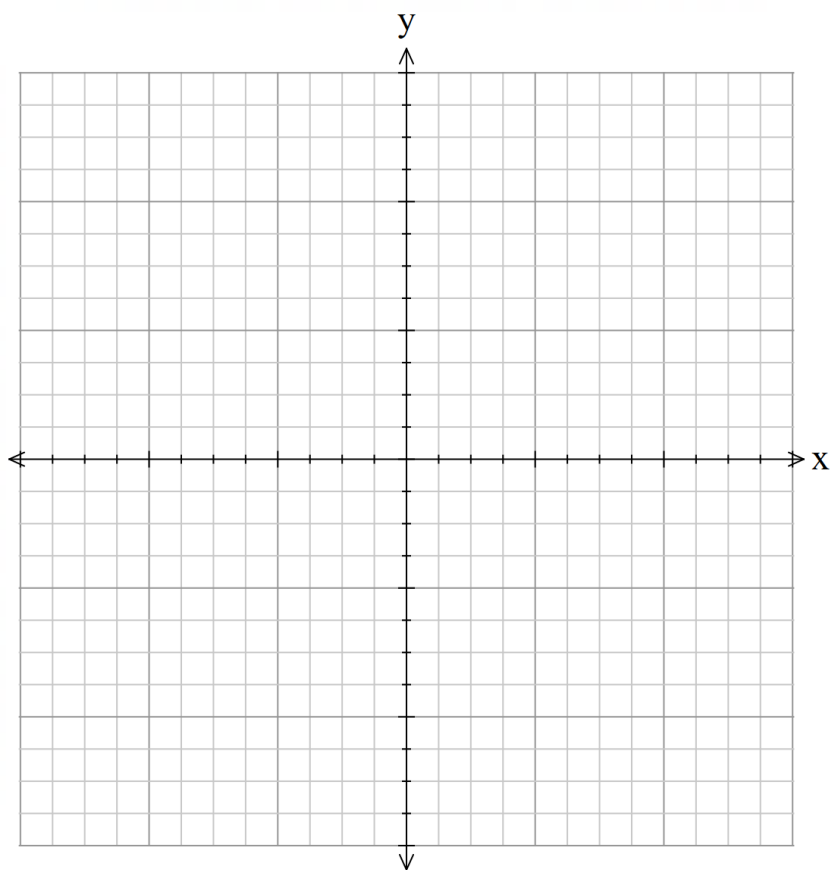
Question 11 (11 marks)

a. A function is defined as:

$$f(x) = \begin{cases} -1 & \text{for } x \leq -2 \\ 2x & \text{for } -2 < x < 0 \\ 3 - x & \text{for } x \geq 0 \end{cases}$$

- (i) Evaluate $f(-3) + f\left(\frac{1}{2}\right) + 2f(4)$ [4]

- (ii) Draw a sketch of the graph of $y = f(x)$ [3]



b. For $y = -\sqrt{16 - x^2}$

(i) State the domain.

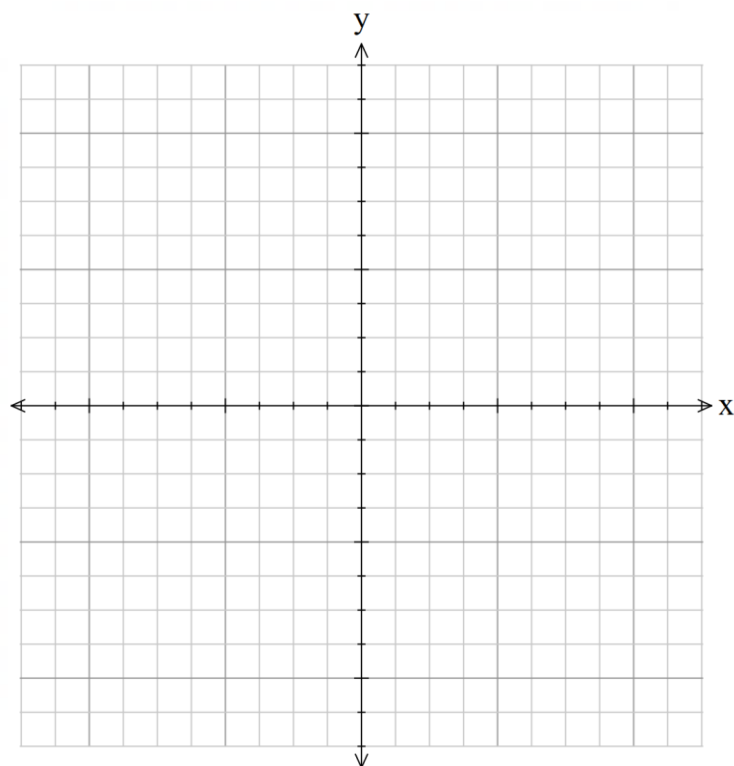
[1]

(ii) State the range.

[1]

(iii) Sketch the graph.

[2]



Question 12 (15 marks)

a. If $x + \frac{1}{x} = 9$, find the value of $x^2 + \frac{1}{x^2}$

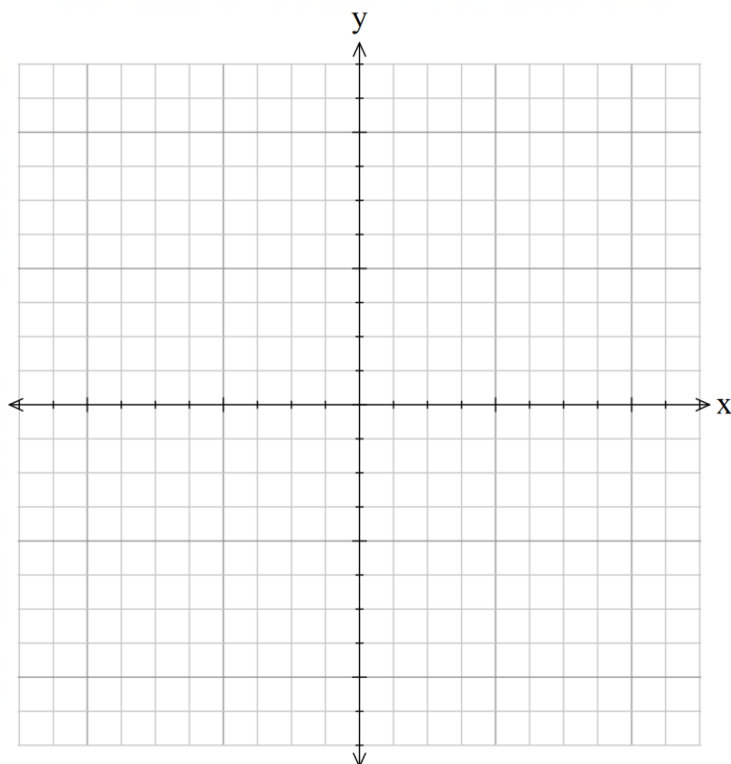
[3]

- b. Manuja has made an electrical circuit in which the current (C) varies inversely with the resistance (R). When the resistance is 10 units, the current is 8.6 units.
What is the current when the resistance is 12 units?

[3]

- c. Sketch the graph of $y = 3^x$, clearly showing any intercepts with the axes and any asymptotes.

[3]



- d. Given the function $y = \frac{-6}{x}$

(i) Find any asymptotes.

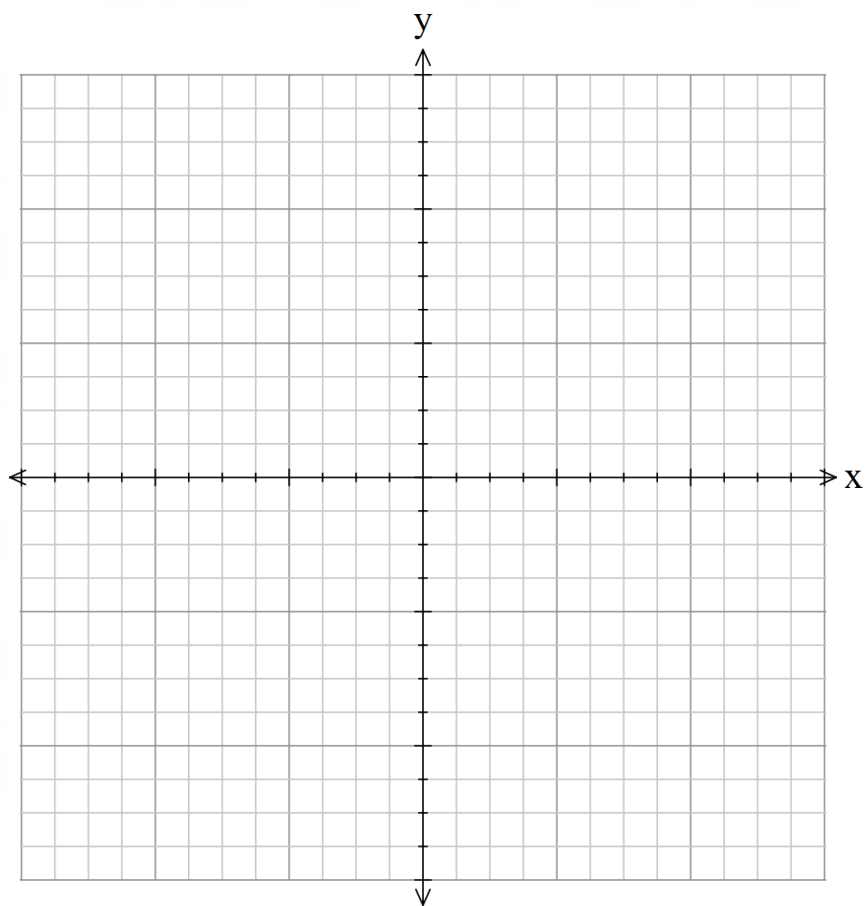
[2]

(ii) In which quadrants does the graph lie?

[1]

- (iii) Sketch the graph of the function, clearly showing the main features, including one point in each branch.

[3]



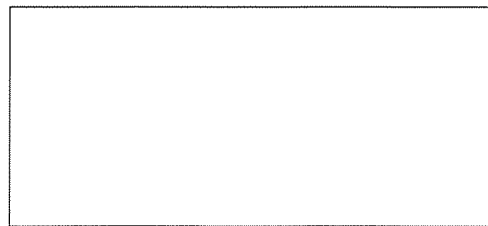
End of Task

Extra Paper

If you use this space, please clearly number the questions attempted.

[illegible]

Lined area for student response, consisting of multiple horizontal lines.



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GIRRAWEE HIGH SCHOOL MATHEMATICS

Task 1

Year 11 Mathematics Advanced

2023

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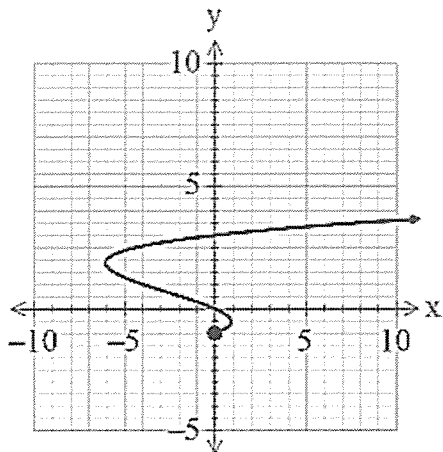
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What is the nature of the relation?

- A. One – to – one
- ☒ B. One – to – many
- C. Many – to – one
- D. Many – to – many

2. How many real solutions does the equation $x^3 + 2x^2 + 3x = 0$ have?

- A. 3
- B. 2
- ☒ C. 1
- D. 0

3. Simplify $\frac{x^2 - 5xy}{x^2 - 25y^2}$

- A. $\frac{x}{x - 5y}$
- ☒ B. $\frac{x}{x + 5y}$
- C. $\frac{1 - x}{x - 5y}$
- D. $\frac{x - 5y}{x + 25y}$

$$\begin{aligned}
 & x(x^2 - 2x + 3) = 0 \\
 & \quad \uparrow \\
 & \quad \Delta = (-2)^2 - 4(1)(3) \\
 & \quad = -8 \\
 & \quad < 0 \\
 & \quad \text{(no real roots)}
 \end{aligned}$$

$x=0$

4. What is the value of $f(-1)$ if $f(x) = x^3 - x^2$?

A. 2

B. 0

C. -1

☒ D. -2

$$\begin{aligned} f(-1) &= (-1)^3 - (-1)^2 \\ &= -1 - 1 \\ &= -2 \end{aligned}$$

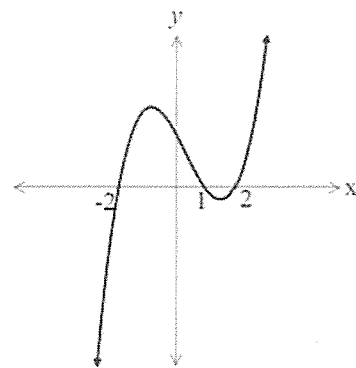
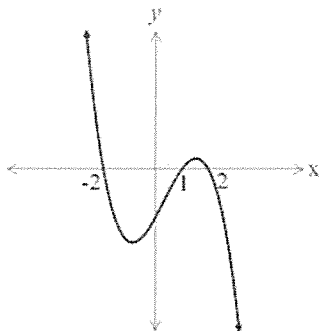
5. Which of the following could be the graph of $y = (x + 2)(x - 2)(1 - x)$?

☒ A.

B.

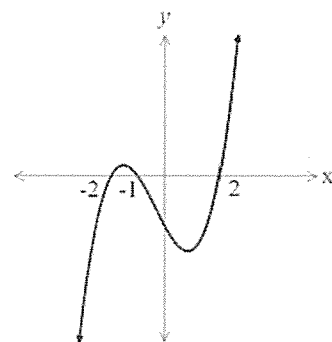
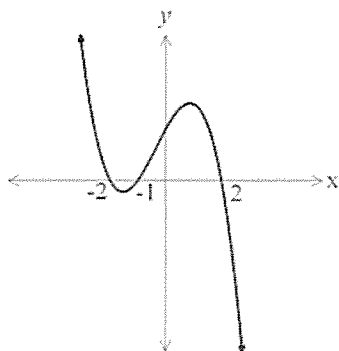
$$-x^3 \cup$$

zeros: $\pm 2, 1$



C.

D.



Select the alternative A, B, C or D that best answers the question.

1. A ☐

B. ☒

C. ☐

D. ☐

2. A ☐

B. ☐

C. ☒

D. ☐

3. A ☐

B. ☒

C. ☐

D. ☐

4. A ☐

B. ☐

C. ☐

D. ☒

5. A ☒

B. ☐

C. ☐

D. ☐

Questions 6 - 12

- Answer in the spaces provided. Extra paper is provided at the end of the examination. Any questions answered on the extra paper must be clearly numbered.
- Show all necessary working.

Question 6 (17 marks)

- a. Evaluate $\sqrt{\frac{275.4}{5.2 \times 3.9}}$ correct to two significant figures. [2]

$$= 3.685089 \dots$$

$$= 3.7 \text{ (to 2 significant places)}$$

Some students wrote 3.69 lost 1 mark.

- b. Simplify:

(i) $\frac{2xy^2z^3}{4x^3y^2z}$ [2]

$$= \frac{z^2}{2x^2}$$

Most got correct.

(ii) $(-3t^3)^4$ [2]

$$= 81t^{12}$$

Students wrote $-81t^{12}$ and lost 1 mark.

(iii) $a^5 - 7x^3 + a^5 - 2x^3 + 1$ [2]

$$= 2a^5 - 9x^3 + 1$$

Most got correct

c. Expand and simplify:

(i) $2ab(3 - a) - b(4a - 1)$

[2]

$$= 6ab - 2a^2b - 4ab + b$$

$$= 2ab - 2a^2b + b$$

problems with signs

eg $2ab + 2a^2b - b$

(ii) $(2x - y)(x^2 - xy + y^2)$

[3]

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

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

Some got wrong.

d. Factorise:

(i) $4x^2 - 49$

[1]

$$= (2x - 7)(2x + 7)$$

well done

(ii) $x^2 + 14x - 32$

[1]

$$(x + 16)(x - 2)$$

well done

(iii) $a^2 - (a - b)^2$

[2]

$$= (a - (a - b))(a + (a - b))$$

$$= (a - a + b)(a + a - b)$$

$$= b(2a - b)$$

students tried to get the answer without writing all these steps and they got it wrong.

Question 7 (17 marks)

a. Simplify:

(i) $\frac{x^3 + 3x^2 - 9x - 27}{x^2 + 6x + 9}$

[4]

$$= \frac{x^2(x+3) - 9(x+3)}{(x+3)^2}$$

$$= \frac{(x^2 - 9)(x+3)}{(x+3)^2}$$

$$= \frac{(x+3)(x-3)(x+3)}{(x+3)^2}$$

$$= x - 3$$

well done.

(ii) $\frac{3n}{n+2} - \frac{5n+19}{n^2+5n+6}$

[4]

$$= \frac{3n}{n+2} - \frac{5n+19}{(n+2)(n+3)}$$

$$= \frac{3n(n+3) - (5n+19)}{(n+2)(n+3)}$$

$$= \frac{3n^2 + 9n - 5n - 19}{(n+2)(n+3)}$$

expanding incorrectly
common error $\frac{3n^2 + 9n - 5n + 19}{(n+2)(n+3)}$

$$= \frac{3n^2 + 4n - 19}{(n+2)(n+3)}$$

common errors:

* cancelling terms

eg. $\frac{3n(\cancel{n+3}) - 5n - 19}{(n+2)(\cancel{n+3})}$

* not factorising and not finding lowest common denominator

eg. $\frac{3n^3 + 10n^2 - 11n - 38}{(n+2)(n^2 + 5n + 6)}$

(iii) $\frac{4p - 12p^2}{3} \times \frac{6p}{3p^2 - p}$

[4]

$$= \frac{4p(1-3p)}{3} \times \frac{6p}{p(3p-1)}$$

$$= \frac{8p(1-3p)}{3p-1}$$

$$= \frac{-8p(3p-1)}{3p-1}$$

$$= -8p$$

Common error:
not noticing that the
negative can be factorised

(iv) $\frac{9x^2}{x+4} \div \frac{3x}{x^2-16}$

[2]

$$= \frac{9x^2}{x+4} \times \frac{x^2-16}{3x}$$

$$= \frac{9x^2}{x+4} \times \frac{(x+4)(x-4)}{3x}$$

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

well done

b. Solve:

$$\left(\frac{x-5}{3} - \frac{x+1}{4} = 5 \right) \quad \times 12$$

[3]

$$4(x-5) - 3(x+1) = 60$$

$$4x - 20 - 3x - 3 = 60$$

$$x - 23 = 60$$

$$x = 83$$

well done.

Question 8 (18 marks)

Overall well done!

- a. Solve by factorising.

$$5x^2 - 11x + 2 = 0$$

$$\begin{array}{l} \times 10 \\ + -11 \end{array}$$

[3]

$$-10, -1$$

$$5x^2 - 10x - x + 2 = 0$$

$$5x(x-2) - 1(x-2) = 0$$

$$(5x-1)(x-2) = 0$$

$$x = \frac{1}{5}, 2$$

Some students forgot to solve

- b. Solve using the quadratic formula. Leave your answer in simplest exact form:

$$2x^2 - 6x + 1 = 0$$

[4]

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

$$= \frac{-(-6) \pm \sqrt{(-6)^2 - 4(2)(1)}}{2(2)}$$

$$= \frac{6 \pm \sqrt{36 - 8}}{4}$$

$$= \frac{6 \pm \sqrt{28}}{4} = \frac{6 \pm 2\sqrt{7}}{4}$$

$$= \frac{2(3 \pm \sqrt{7})}{4}$$

$$= \frac{3 \pm \sqrt{7}}{2}$$

All students applied the Quadratic formula correctly, however, some of them made calculation errors

c. (i) Solve by completing the square:

$$x^2 - 3x - 10 = 0$$

[4]

$$x^2 - 3x + \left(\frac{3}{2}\right)^2 = 10 + \left(\frac{3}{2}\right)^2$$

$$x^2 - 3x + \frac{9}{4} = \frac{49}{4}$$

$$\left(x - \frac{3}{2}\right)^2 = \frac{49}{4}$$

$$x - \frac{3}{2} = \pm \frac{7}{2}$$

$$x = \frac{3}{2} \pm \frac{7}{2}$$

$$x = 5, -2$$

Some students forgot to solve

otherwise

most students have shown good understanding of completing the square method

(ii) Hence, for $y = x^2 - 3x - 10$, find:

(α) the co-ordinates of the vertex.

[1]

$$V = \left(\frac{3}{2}, -\frac{49}{4}\right)$$

Students lost marks if they did working

(β) the equation of the axis of symmetry.

out to find the vertex and did not realise it's a hence question [1]

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

↳ Most students have shown good understanding

(γ) the intercepts with the axes.

[2]

$$x \text{ int} \Rightarrow 5, -2 \quad (\text{from (i)})$$

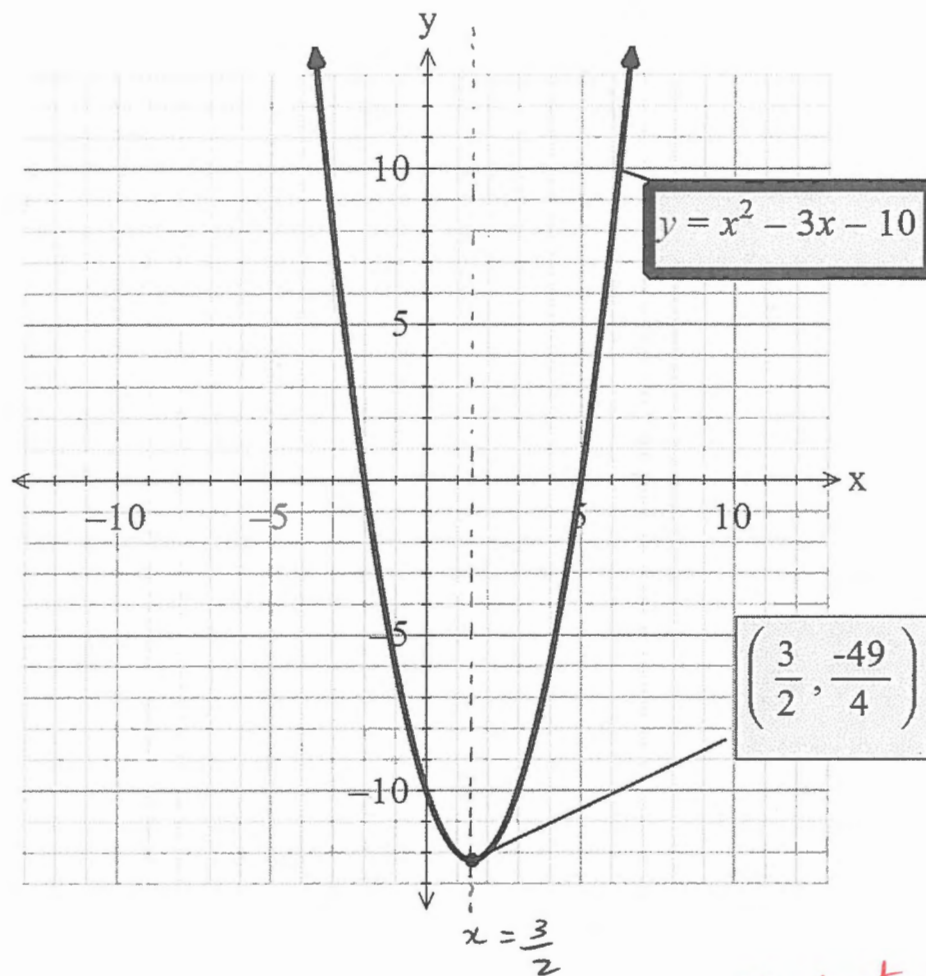
$$y \text{ int} \Rightarrow x = 0$$

$$\therefore y = -10$$

↳ Some students forgot to find y-intercept but marks were paid if shown on the sketch

(δ) Sketch the graph, clearly showing the main features.

[3]



Students to
practise drawing
neatly. Otherwise
well done!

Question 9 (1:2marks)

a. Solve the simultaneous equations:

(i) $3x + 2y = 10$ and $4x + 3y = 13$

[3]

$$\textcircled{1} \times 3 + \textcircled{2} \times 2$$

$$9x + 6y = 30 \quad \text{---} \textcircled{3}$$

$$8x + 6y = 26 \quad \text{---} \textcircled{4}$$

$$\textcircled{3} - \textcircled{4}$$

$$x = 4$$

Substituting $x = 4$ into $\textcircled{1}$

$$3(4) + 2y = 10$$

$$2y = -2$$

$$y = -1$$

$$\therefore x = 4, y = -1$$

(ii) $y = -5 - 4x$ and $y = 3 - 2x - x^2$

[4]

Substitute $\textcircled{1}$ into $\textcircled{2}$

$$-5 - 4x = 3 - 2x - x^2$$

$$x^2 - 2x - 8 = 0$$

$$(x-4)(x+2) = 0$$

$$x = 4, -2$$

Substitute $x = 4$ into $\textcircled{1}$

$$y = -5 - 4(4) \\ = -21$$

Substitute $x = -2$ into $\textcircled{1}$

$$y = -5 - 4(-2) \\ = 3$$

$$\therefore \text{When } x = -2, y = 3$$

$$\text{when } x = 4, y = -21$$

Poor setting out for (i) and (ii) by a significant number of students.

Please follow steps modelled in solution here:

- label equations

- show substitution

- show final solutions

need to be clear which x value goes with which y value.

b. Given $y = x(x+1)^2(x-2)^3$

(i) Find the x and the y intercepts.

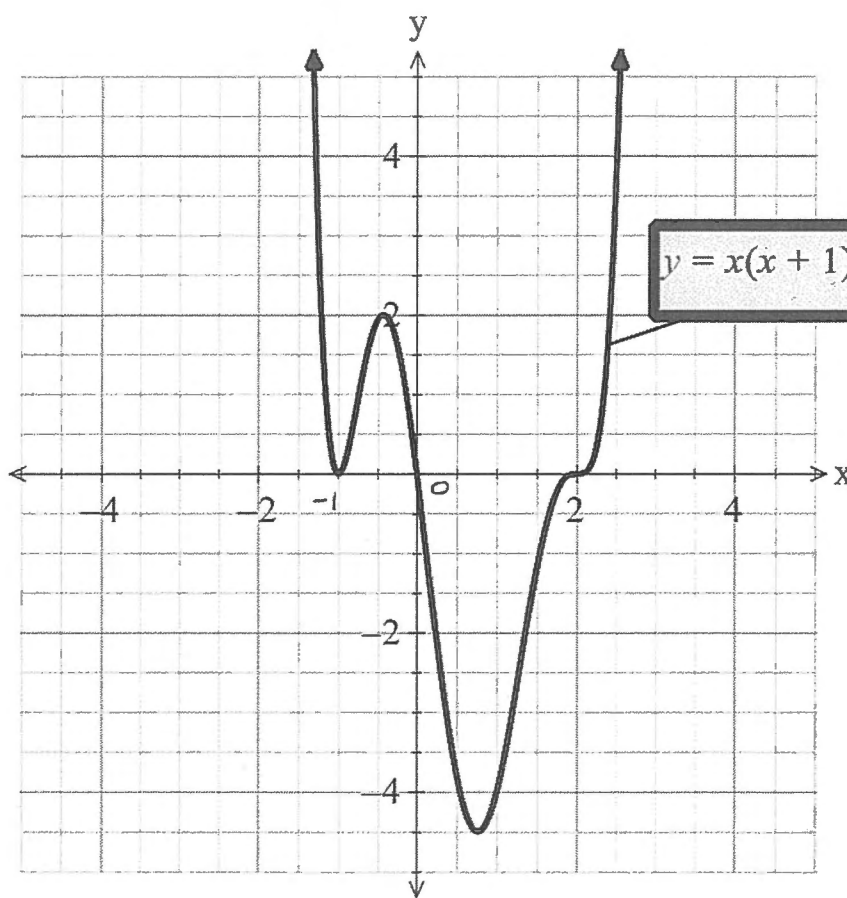
[2]

$$\begin{aligned} x \text{ int} &\Rightarrow y = 0 \\ &\Rightarrow x(x+1)^2(x-2)^3 = 0 \\ &\quad x = 0, -1, 2 \\ y \text{ int} &\Rightarrow x = 0 \\ &\Rightarrow y = 0. \end{aligned}$$

Well done.

(ii) Sketch the graph of $y = x(x+1)^2(x-2)^3$, clearly showing the main features.

[3]



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

Care must be taken to draw smooth curve (first with pencil, then when happy with curve, draw in pen).

Clearly indicate single, double, triple roots.

Question 10 (16 marks)

a. Simplify:

(i) $2\sqrt{50} - 3\sqrt{18} + \sqrt{3}$

[3]

$$\begin{aligned} &= 2\sqrt{25 \times 2} - 3\sqrt{9 \times 2} + \sqrt{3} \\ &= 10\sqrt{2} - 9\sqrt{2} + 3 \\ &= \sqrt{2} + 3 \end{aligned}$$

Mostly done well

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

[3]

$$\begin{aligned} &= 6\sqrt{12} - 3\sqrt{10} \\ &= 6\sqrt{4 \times 3} - 3\sqrt{10} \\ &= 12\sqrt{3} - 3\sqrt{10} \end{aligned}$$

Mostly done well

(iii) $(\sqrt{3} - 1)(2\sqrt{3} + 5)$

[3]

$$\begin{aligned} &= 2 \times 3 + 5\sqrt{3} - 2\sqrt{3} - 5 \\ &= 1 + 3\sqrt{3} \end{aligned}$$

Mostly done well

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

[3]

$$\begin{aligned} &= (3\sqrt{5})^2 - (2\sqrt{2})^2 \\ &= 9 \times 5 - 4 \times 2 \\ &= 45 - 8 \\ &= 37 \end{aligned}$$

Some students put 2 instead of 4

b. Find $\frac{\sqrt{3}}{\sqrt{2} + \sqrt{5}} - \frac{5}{\sqrt{3} - \sqrt{2}}$ by first rationalising each denominator.

[4]

Leave your answer as a fraction in exact form.

$$\frac{\sqrt{3}}{\sqrt{2} + \sqrt{5}} \times \frac{\sqrt{2} - \sqrt{5}}{\sqrt{2} - \sqrt{5}} - \frac{5}{\sqrt{3} - \sqrt{2}} \times \frac{\sqrt{3} + \sqrt{2}}{\sqrt{3} + \sqrt{2}}$$

$$= \frac{\sqrt{6} - \sqrt{15}}{2 - 5}$$

$$- \frac{5\sqrt{3} + 5\sqrt{2}}{3 - 1}$$

Some students put $\sqrt{15}$ and $\sqrt{10}$

$$= \frac{\sqrt{15} - \sqrt{6}}{3}$$

$$- \frac{5\sqrt{3} + 5\sqrt{2}}{1}$$

$$= \frac{\sqrt{15} - \sqrt{6} - 3(5\sqrt{3} + 5\sqrt{2})}{3}$$

$$= \frac{\sqrt{15} - \sqrt{6} - 15\sqrt{3} - 15\sqrt{2}}{3}$$

* Most of the students left the answer as

$$\frac{-\sqrt{15} + \sqrt{6} + 15\sqrt{3} + 15\sqrt{2}}{-3}$$

they are not penalised, but it would be nice to adjust the negative sign.

* Some wrote as

$$- \frac{\sqrt{15} + \sqrt{6} + 15\sqrt{3} + 15\sqrt{2}}{3}$$

and it was not clear if the negative sign is out of the whole thing or it is with the first term.

they should put brackets around the numerator.

Question 11 (11 marks)

a. A function is defined as:

$$f(x) = \begin{cases} -1 & \text{for } x \leq -2 \\ 2x & \text{for } -2 < x < 0 \\ 3-x & \text{for } x \geq 0 \end{cases}$$

(i) Evaluate $f(-3) + f\left(\frac{1}{2}\right) + 2f(4)$

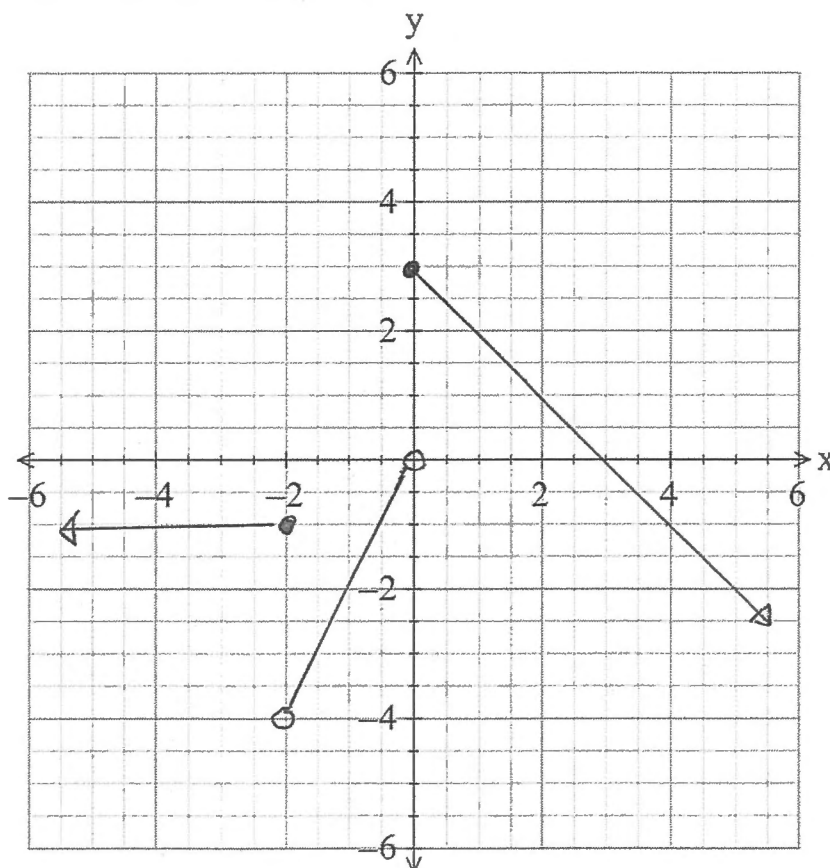
$$= -1 + \left(3 - \frac{1}{2}\right) + 2(3-4)$$

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

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

generally [4]
well done.
Some students
incorrectly
evaluated
 $f\left(\frac{1}{2}\right) = 2 \times \frac{1}{2} = 1$
and hence got
the wrong answer.
[3]

(ii) Draw a sketch of the graph of $y = f(x)$



Some students
had trouble
sketching the
graph.

b. For $y = -\sqrt{16 - x^2}$

(i) State the domain.

[1]

$-4 \leq x \leq 4$ Well done.

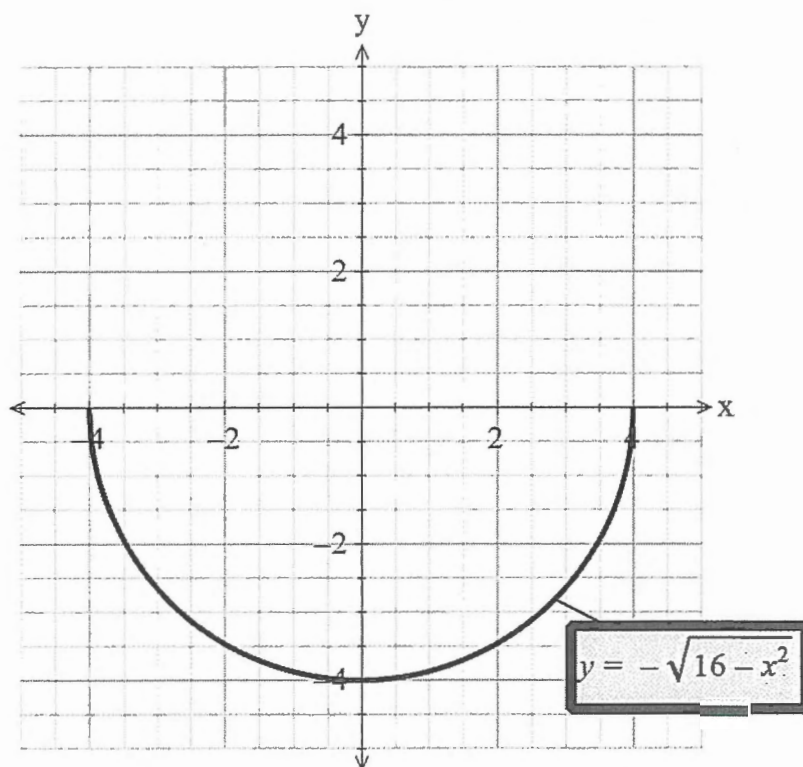
(ii) State the range.

[1]

$-4 \leq y \leq 0$ Well done.

(iii) Sketch the graph.

[2]



Well done.

Question 12 (15 marks)

- a. If $x + \frac{1}{x} = 9$, find the value of $x^2 + \frac{1}{x^2}$

[3]

$$\left(x + \frac{1}{x}\right)^2 = x^2 + 2 + \frac{1}{x^2}$$

$$(9)^2 = 2 + x^2 + \frac{1}{x^2}$$

$$81 = 2 + \left(x^2 + \frac{1}{x^2}\right)$$

$$x^2 + \frac{1}{x^2} = 79$$

*NOT well done.

Some students solved

$$x + \frac{1}{x} = 9$$

& got $x = \frac{9 \pm \sqrt{77}}{2}$ & substituted.

→ This worked but was very messy.

Common BAD mistake with weaker students was thinking $\left(x + \frac{1}{x}\right)^2 = x^2 + \frac{1}{x^2}$ REALLY BAD!

- b. Manuja has made an electrical circuit in which the current (C) varies inversely with the resistance (R). When the resistance is 10 units, the current is 8.6 units.

What is the current when the resistance is 12 units?

[3]

$$C \propto \frac{1}{R}$$

$$C = \frac{k}{R}$$

$$\text{when } C = 8.6, R = 10$$

$$8.6 = \frac{k}{10}$$

$$k = 86$$

$$\text{when } R = 12,$$

$$C = \frac{86}{12} = \frac{43}{6}$$

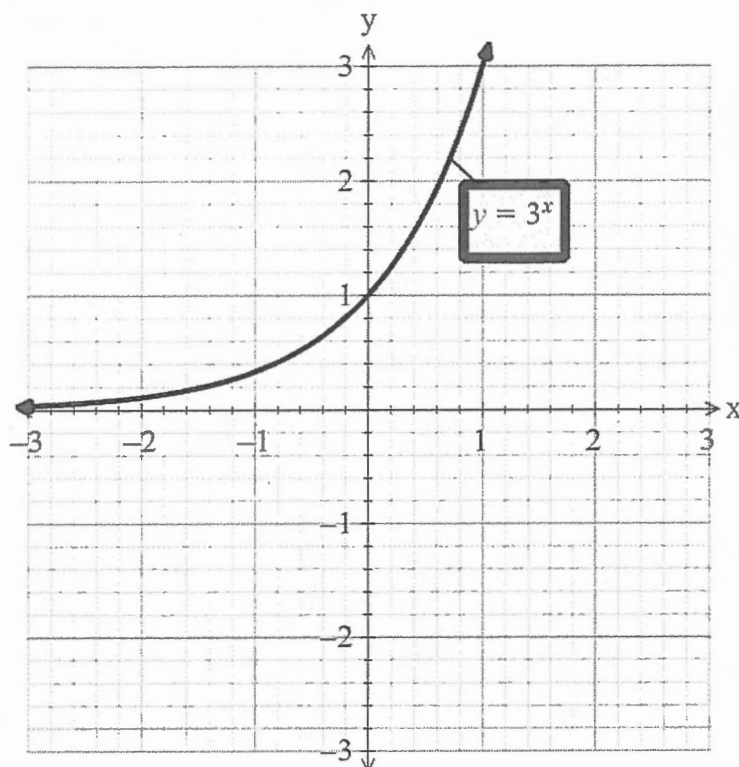
$$= 7\frac{1}{6}$$

when resistance is 12 Units, the current is $7\frac{1}{6}$ units

Generally well done.

Some students got mixed up with direct variation.

- c. Sketch the graph of $y = 3^x$, clearly showing any intercepts with the axes and any asymptotes. [3]



Generally well done.

- d. Given the function $y = \frac{-6}{x}$

- (i) Find any asymptotes. [2]

$x \neq 0 \Rightarrow x = 0$ is the vertical asymptote

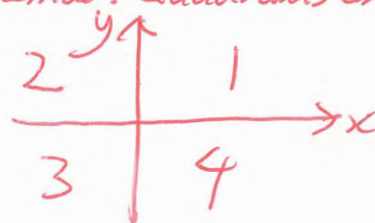
Horizontal asymptote $\Rightarrow y = 0$

Common mistake was writing $x \neq 0$ & $y \neq 0$. The asymptotes are the lines $x = 0$ & $y = 0$. $x \neq 0$ & $y \neq 0$ are the DOMAIN & RANGE. [1]

- (ii) Which quadrants do the graphs lie in? [1]

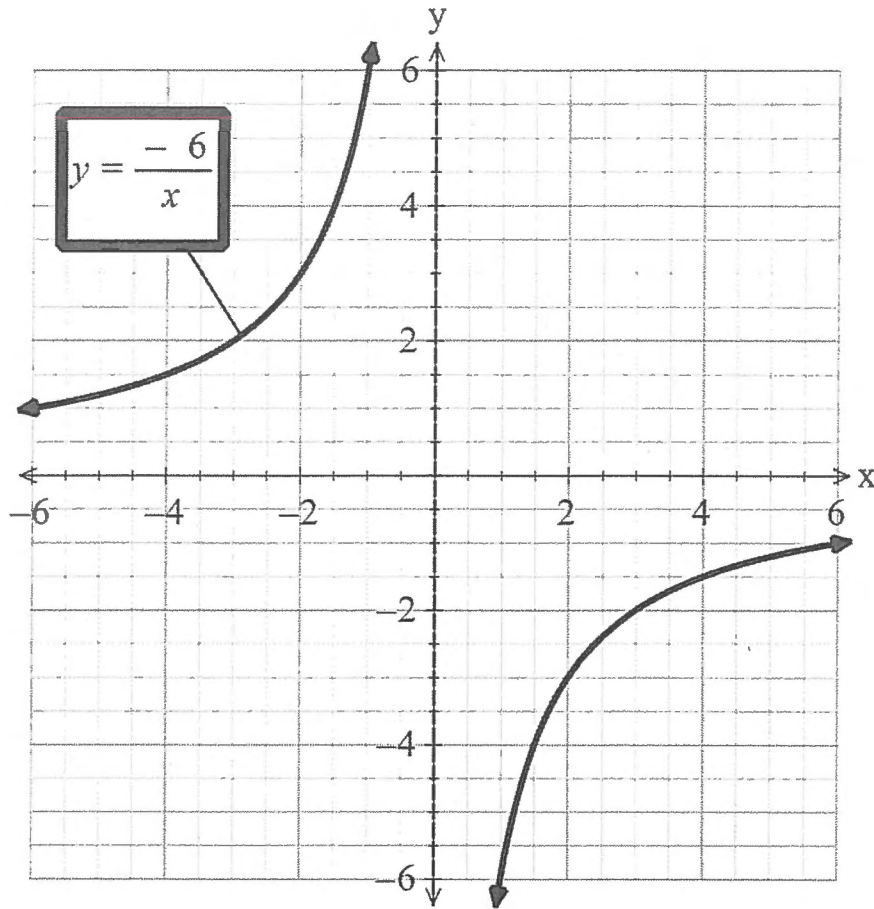
Quadrants 2 and 4

Some students [EVEN THOUGH THEY DID THE GRAPH CORRECTLY!] got this wrong! Remember: Quadrants are:



- (iii) Sketch the graph of the function, clearly showing the main features, including one point in each branch.

[3]



Generally
well
done.

End of Task