



**BAULKHAM HILLS HIGH SCHOOL 2025
YEAR 11 ASSESSMENT TASK 1
MATHEMATICS ADVANCED**

MARKING COVER SHEET

FINAL MARK

Student

Name: _____ **Teacher:** _____

	Outcomes		
Question	Functions	Number and Surds	Total
Multiple Choice	3 - 7, 9, 10 /7	1, 2, 8 /3	/10
11 - 13	12 - 13 /5	11 /2	/7
14 - 15	 /6		/6
16	 /3		/3
17 - 18	 /5		/5
19 - 20	 /4		/4
21	 /4		/4
22 - 23	 /7		/7
24 - 25	 /4		/4
26	 /4		/4
27 - 28	 /5		/5
29	 /3		/3
30	 /2		/2
31	 /3		/3
32	 /3		/3
TOTAL	 /65	 /5	/70



Baulkham Hills High School

2025

Year 11- Assessment Task 1

Mathematics

Section I – Multiple Choice

Select the alternative A, B, C or D that best answers the question. Fill in the response oval completely.

Sample: $2 + 4 =$ (A) 2 (B) 6 (C) 8 (D) 9
A ☐ B ☒ C ☐ D ☐

If you think you have made a mistake, put a cross through the incorrect answer and fill in the new answer.

A ☒ B ☒ C ☐ D ☐

If you change your mind and have crossed out what you consider to be the correct answer, then indicate the correct answer by writing the word *correct* and drawing an arrow as follows.

A ☒ B ☒ C ☐ D ☐
correct

Start
Here →

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|----------------------------|-------------------------|-------------------------|-------------------------|-----------------------------|-------------------------|-------------------------|-------------------------|
| 1. A ☐ | B ☐ | C ☐ | D ☐ | 6. A ☐ | B ☐ | C ☐ | D ☐ |
| 2. A ☐ | B ☐ | C ☐ | D ☐ | 7. A ☐ | B ☐ | C ☐ | D ☐ |
| 3. A ☐ | B ☐ | C ☐ | D ☐ | 8. A ☐ | B ☐ | C ☐ | D ☐ |
| 4. A ☐ | B ☐ | C ☐ | D ☐ | 9. A ☐ | B ☐ | C ☐ | D ☐ |
| 5. A ☐ | B ☐ | C ☐ | D ☐ | 10. A ☐ | B ☐ | C ☐ | D ☐ |
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BAULKHAM HILLS HIGH SCHOOL

YEAR 11 ASSESSMENT TASK 1 2025

MATHEMATICS ADVANCED

Student Name: _____

Teacher: _____

Mathematics Advanced

General Instructions

- Reading time - 10 minutes
- Working time - 90 minutes
- Write using black pen
- Calculators approved by NESA may be used
- A reference sheet is provided at the back of this paper
- In Questions 11 - 32, show relevant mathematical reasoning and/or calculations
- Marks may be deducted for careless or badly arranged work

Total marks: 70

Section I - 10 marks (pages 4-6)

- Attempt Questions 1 - 10
- Allow about 15 minutes for this section

Section II - 60 marks (pages 7 - 20)

- Attempt Questions 11 - 32
- Allow about 75 minutes for this section

Section I

10 marks

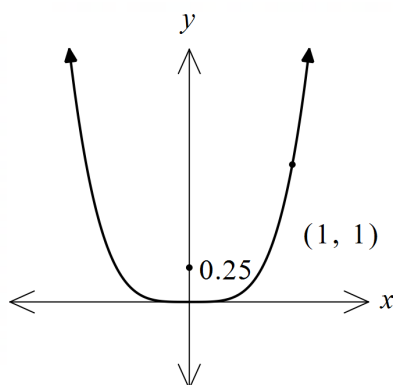
Attempt Questions 1 - 10

Allow about 15 minutes for this section

Use the multiple-choice answer sheet for Questions 1-10.

- 1 Which of the following correctly simplifies $\sqrt{128} + \sqrt{12} - \sqrt{50}$?
- (A) $\sqrt{90}$
 - (B) $3\sqrt{5}$
 - (C) $3\sqrt{2} + 2\sqrt{3}$
 - (D) $3\sqrt{2} - 2\sqrt{3}$
- 2 The distance between Earth and Neptune is approximately 4.3514×10^9 km and the distance between Earth and Mars is approximately 7.834×10^7 km . Correct to 3 significant figures, how much further to Earth is Neptune compared to Earth and Mars?
- (A) 4.27×10^9 km
 - (B) 4.273×10^9 km
 - (C) 5.55×10^1 km
 - (D) 5.554×10^1 km
- 3 A school keeps a record of the maths teacher (dependent variable) that students (independent variable) have in the current school year. Each student is assigned to one class which has one teacher. Which type of relation best describes the situation?
- (A) One-to-one
 - (B) One-to-many
 - (C) Many-to-one
 - (D) Many-to-many

- 4 Which of the following equations would best describe the following graph?



DRAWN TO SCALE

- (A) $y = x^2$
- (B) $y = x^4$
- (C) $y = 2^x$
- (D) $y = \sqrt{1 - x^2}$
- 5 Which of the following is the solution of $2x^2 - 8x - 7 = 0$?

(A) $x = \frac{-4 \pm \sqrt{30}}{2}$

(B) $x = \frac{4 \pm \sqrt{30}}{2}$

(C) $x = \frac{-2 \pm \sqrt{2}}{2}$

(D) $x = \frac{2 \pm \sqrt{2}}{2}$

- 6 Which of the following is the solution to $\frac{x}{x-1} - \frac{2}{x+3} = 1$?

(A) $x = -5$

(B) $x = -1$

(C) $x = 1$

(D) $x = 5$

- 7 Which of the following is the equation of a line that passes through the point $(-1, 2)$ and is parallel to the x -axis?

- (A) $x = -1$
- (B) $y = 2$
- (C) $y = x + 3$
- (D) $y = 2x + 4$

- 8 Which of the following correctly simplifies $\frac{8\sqrt{48} \times 36\sqrt{20}}{20\sqrt{12} \times 3\sqrt{15}}$?

- (A) $\frac{192\sqrt{5}}{5}$
- (B) $\frac{16\sqrt{3}}{15}$
- (C) $\frac{32}{5}$
- (D) $\frac{32\sqrt{3}}{5}$

- 9 Which of the following correctly factorises $12x^2 - 5x - 2$?

- (A) $(3x - 2)(4x + 1)$
- (B) $(3x + 2)(4x - 1)$
- (C) $(12x - 1)(x + 2)$
- (D) $(12x + 1)(x - 2)$

- 10 What is the maximum value of $5 + 3x - 2x^2$?

- (A) $\frac{-3}{10}$
- (B) $\frac{-3}{4}$
- (C) 5
- (D) $\frac{49}{8}$

Section II

60 marks

Attempt Questions 11 - 32

Allow about 75 minutes for this section

Answer the questions in the spaces provided. These spaces provide guidance for the expected length of response. Your responses should include relevant mathematical reasoning.

Question 11 (2 marks)

Rationalise the denominator of $\frac{6}{2\sqrt{3}-5\sqrt{7}}$. **2**

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Question 12 (3 marks)

State the domain and range of $y = \frac{3}{x+5}$. Write your answer using interval notation. **3**

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Question 13 (2 marks)

Simplify $\frac{9x^2y^3 \times 2x^4y}{(3x^3y^5)^2}$. **2**

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Question 14 (3 marks)

Fully factorise each of the following:

a) $15a^2 + 10ay + 6ax + 4xy$ **1**

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b) $36x^2 - 484y^2$ **2**

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Question 15 (3 marks)

For what values of k does the equation $2x^2 + (k - 6)x + k = 0$ have one real root? **3**

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Question 16 (3 marks)

Ishita is planning a holiday and wishes to spend some time in each of Cairns and Hamilton Island. If she spends 4 nights in Hamilton Island and 7 nights in Cairns, she will spend \$5205 on accommodation. If she spends 5 nights in Hamilton Island and 5 nights in Cairns, the cost of accommodation will be \$4950. What is the cost of accommodation in Cairns per night?

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Question 17 (3 marks)

A function is defined by $f(x) = (4x - 1)^2$.

- a) Calculate the value of $f(-2)$. **1**

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- b) Find the value(s) of x for which $f(x) = 25$. **2**

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Question 18 (2 marks)

Express each of the following without negative or fractional indices:

- a) $36x^{\frac{1}{2}}$. **1**

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- b) $9x^{-3}y^5$. **1**

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Question 19 (2 marks)

Simplify $\frac{5xy}{10\sqrt{xy^3}}$. Express your answer in index form.

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Question 20 (2 marks)

It is known that y varies inversely to the square root of x .

- a) When $x = 10, y = 2$. Write an equation for y in terms of x .

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- b) Hence or otherwise, find x when $y = 20$.

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Question 21 (4 marks)

a) Show that $(5-x)(x+2)^2 = -x^3 + x^2 + 16x + 20$.

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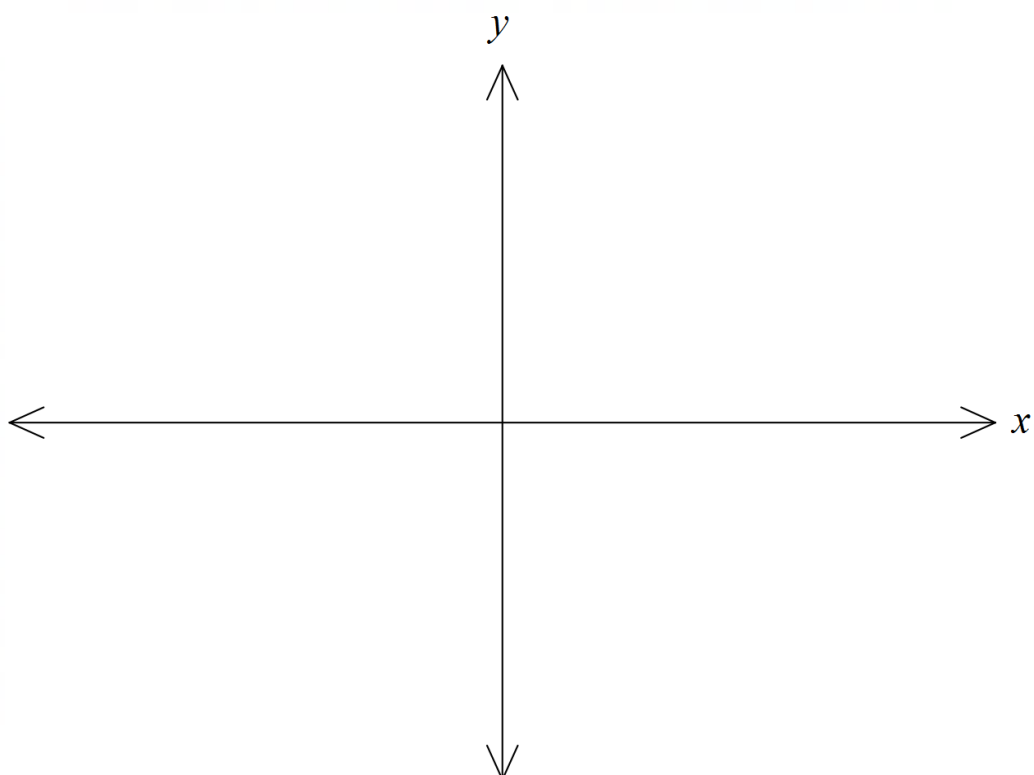
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b) Hence, or otherwise graph $P(x) = -x^3 + x^2 + 16x + 20$ on the number plane below.

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Show all intercepts with the axes.



Question 22 (2 marks)

Solve $x^4 + 8x^2 - 48 = 0$

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Question 23 (5 marks)

Simplify the following:

a) $\frac{4}{x^2 + 2x - 15} + \frac{7}{6x - 18}$.

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b) $\frac{6a^3b + 6a^2b^2}{a^2 - b^2} \times \frac{2b^2 - ab - a^2}{18b}$.

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Question 24 (2 marks)

The distance, d , (in metres) required for a car to stop varies directly with the square of the cars speed, v , (km/h). A car travelling at 80 km/h has a stopping distance of 35 metres. **2**

What will be the stopping distance of a car travelling 40 km/h?

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Question 25 (2 marks)

Simplify $\frac{9^x - 1}{9^x - 3^x}$. **2**

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Question 26 (4 marks)

- a) Express $y = 2x^2 + 4x + 3$ in the form of $y = a(x - h)^2 + k$. **2**

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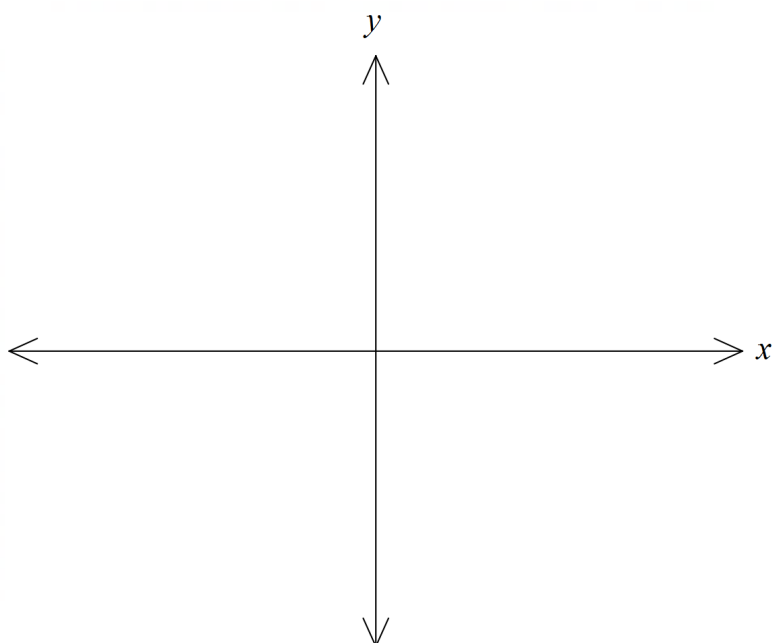
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- b) Hence, or otherwise, sketch the graph of $y = 2x^2 + 4x + 3$. Clearly label the **2**
intercepts with the axes and the vertex.



Question 27 (3 marks)

A piecemeal function is defined by the following:

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

- a) Evaluate $f(3) + f(0)$.

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- b) For what value(s) of x is $f(x) = 0$?

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Question 28 (2 marks)

If $x^2 + y^2 = 13$ and $xy = 6$, find the value of $x + y$.

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Question 29 (3 marks)

Simplify $(x^2 - 4)^{-1} - \left(\frac{x+2}{x-1}\right)^{-1}$.

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Question 30 (2 marks)

If $x^2 - 9x + 5 = 0$, evaluate $x^4 - 18x^3 + 81x^2 + 42$.

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Question 31 (3 marks)

Solve $(x^2 - 3x + 1)^{x+1} = 1$.

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Question 32 (3 marks)

Solve for x : $x = \sqrt{a^2 + x\sqrt{b^2 + x^2}} - a$.

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Multiple Choice

Question	1	2	3	4	5	6	7	8	9	10
Answer	C	A	C	B	B	D	B	D	A	D

Question 1

$$\begin{aligned}\sqrt{128} + \sqrt{12} - \sqrt{50} &= 8\sqrt{2} + 2\sqrt{3} - 5\sqrt{2} \\ &= 3\sqrt{2} + 2\sqrt{3}\end{aligned}$$

(C)

Question 2

$$\begin{aligned}4.3514 \times 10^9 - 7.834 \times 10^7 &= 4.27306 \times 10^9 \\ &= 4.27 \times 10^9\end{aligned}$$

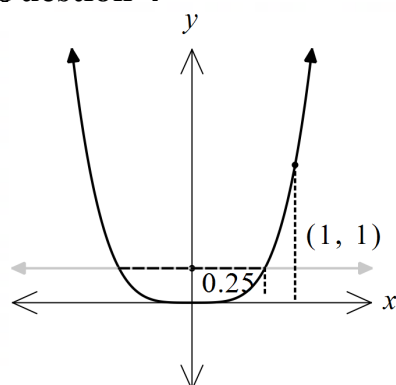
(A)

Question 3

Since a maths teacher can have many students but each student has one maths teacher, the relation is Many-to-one.

(C)

Question 4



DRAWN TO SCALE

The graph is not an exponential or semi circle. Since the graph does not pass through

$\left(\frac{1}{2}, \frac{1}{4}\right)$, the equation is $y = x^4$. Note diagram was drawn to scale.

(B)

Question 5

$$\begin{aligned}
 x &= \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} \\
 &= \frac{8 \pm \sqrt{(-8)^2 - 4(2)(-7)}}{2(2)} \\
 &= \frac{4 \pm \sqrt{30}}{2}
 \end{aligned}$$

(B)

Question 6

$$\begin{aligned}
 \frac{x}{x-1} - \frac{2}{x+3} &= 1 \\
 x(x+3) - 2(x-1) &= (x-1)(x+3) \\
 x^2 + 3x - 2x + 2 &= x^2 - x + 3x - 3 \\
 x^2 + x + 2 &= x^2 + 2x - 3 \\
 x &= 5
 \end{aligned}$$

(D)

Question 7

Since the line is parallel to the x axis, it has zero gradient.

$\therefore$ The equation of the line is $y = 2$.

(B)

Question 8

$$\begin{aligned}
 \frac{8\sqrt{48} \times 36\sqrt{20}}{20\sqrt{12} \times 3\sqrt{15}} &= \frac{2\sqrt{4} \times 12\sqrt{4}}{5 \times \sqrt{3}} \\
 &= \frac{2 \times 2 \times 12 \times 2}{5\sqrt{3}} \\
 &= \frac{96}{5\sqrt{3}} \times \frac{\sqrt{3}}{\sqrt{3}} \\
 &= \frac{32\sqrt{3}}{5}
 \end{aligned}$$

(D)

Question 9

$$\begin{aligned}12x^2 - 5x - 2 &= 12x^2 - 8x + 3x - 2 \\&= 4x(3x - 2) + (3x - 2) \\&= (4x + 1)(3x - 2)\end{aligned}$$

(A)

Question 10

Maximum occurs at $y = \frac{-\Delta}{4a}$.

$$\begin{aligned}y &= \frac{-\Delta}{4a} \\&= \frac{-((3)^2 - 4 \times (-2) \times 5)}{4 \times (-2)} \\&= \frac{49}{8}\end{aligned}$$

(D)

Question 11

Criteria	Marks
• Correct solution	2
• Correctly multiplies either the numerator or denominator by $2\sqrt{3} + 5\sqrt{7}$	1

Sample answer:

$$\begin{aligned}\frac{6}{2\sqrt{3} - 5\sqrt{7}} &= \frac{6}{2\sqrt{3} - 5\sqrt{7}} \times \frac{2\sqrt{3} + 5\sqrt{7}}{2\sqrt{3} + 5\sqrt{7}} \\&= \frac{12\sqrt{3} + 30\sqrt{7}}{4 \times 3 - 25 \times 7} \\&= \frac{12\sqrt{3} + 30\sqrt{7}}{4 \times 3 - 25 \times 7} \\&= \frac{12\sqrt{3} + 30\sqrt{7}}{-163}\end{aligned}$$

Question 12

Criteria	Marks
• Correct solution	3
• Correctly states the domain and range with correct labelling and incorrect notation	2
• Correctly finds the domain or range with correct labelling OR Correctly finds the domain and range with no labelling OR States the domain as $x \neq -5$ and the range as $y \neq 0$	1

Sample answer:

Domain: $x \in (-\infty, -5) \cup (-5, \infty)$

Range: $y \in (-\infty, 0) \cup (0, \infty)$

Markers note: Many students lost a mark for not giving their final answer using interval notation.

Question 13

Criteria	Marks
• Correct solution	2
• Correctly applies the index laws to either the numerator or denominator	1

Sample answer:

$$\frac{9x^2y^3 \times 2x^4y}{(3x^3y^5)^2} = \frac{18x^6y^4}{9x^6y^{10}}$$
$$= \frac{2}{y^6}$$

Question 14(a)

Criteria	Marks
• Correct solution	1

Sample answer:

$$15a^2 + 10ay + 6ax + 4xy = 5a(3a + 2y) + 2x(3a + 2y)$$
$$= (5a + 2x)(3a + 2y)$$

Question 14(b)

Criteria	Marks
• Correct solution	2
• Correctly completes one factorisation	1

Sample answer:

$$\begin{aligned}36x^2 - 484y^2 &= 4(9x^2 - 121y^2) \\ &= 4(3x - 11y)(3x + 11y)\end{aligned}$$

Question 15

Criteria	Marks
• Correct solution	3
• Correctly finds the discriminant and equates it to 0	2
• Correctly finds an expression for the discriminant or recognises $\Delta = 0$	1

Sample answer:

$2x^2 + (k - 6)x + k = 0$ will have one real root when $\Delta = 0$

$$\Delta = (k - 6)^2 - 4 \times 2 \times k$$

$$k^2 - 12k + 36 - 8k = 0$$

$$k^2 - 20k + 36 = 0$$

$$(k - 18)(k - 2) = 0$$

$$k = 18 \text{ or } k = 2$$

Question 16

Criteria	Marks
• Correct solution	3
• Makes a correct substitution or makes the coefficient of one of the variables the same and attempts to add/subtract the equations.	2
• Correctly writes a pair of simultaneous equations	1

Sample answer:

Let x be the cost of one nights accommodation in Cairns and y be the cost of one nights accommodation in Hamilton Island

$$7x + 4y = 5205 \dots\dots\dots(1)$$

$$5x + 5y = 4950$$

$$x + y = 990$$

$$4x + 4y = 3960 \dots\dots\dots(2)$$

$$(1) - (2)$$

$$3x = 1245$$

$$x = 415$$

The cost of one nights accommodation in Cairns is \$415.

Markers note: Many students lost a mark for not defining the variables

Question 17(a)

Criteria	Marks
• Correct solution	1

Sample answer:

$$f(x) = (4x - 1)^2$$

$$\begin{aligned} f(-2) &= (4 \times (-2) - 1)^2 \\ &= 81 \end{aligned}$$

Question 17(b)

Criteria	Marks
• Correct solution	2
• Finds one correct solution	1

Sample answer:

$$f(x) = (4x - 1)^2$$

$$25 = (4x - 1)^2$$

$$4x - 1 = \pm 5$$

$$4x = 6 \text{ or } 4x = -4$$

$$x = \frac{3}{2} \text{ or } x = -1$$

Question 18(a)

Criteria	Marks
• Correct solution	1

Sample answer:

$$36x^{\frac{1}{2}} = 36\sqrt{x}$$

Question 18(b)

Criteria	Marks
• Correct solution	1

$$9x^{-3}y^5 = \frac{9y^5}{x^3}$$

Question 19

Criteria	Marks
• Correct solution	2
• Correctly applies two index laws	1

Sample answer:

$$\begin{aligned}
 \frac{5xy}{10\sqrt{xy^3}} &= \frac{xy}{2(x^{\frac{1}{2}})(y^3)^{\frac{1}{2}}} \\
 &= \frac{xy}{2x^{\frac{1}{2}}y^{\frac{3}{2}}} \\
 &= \frac{x^{\frac{1}{2}}y^{\frac{-1}{2}}}{2} \quad \left(= \frac{x^{\frac{1}{2}}}{2y^{\frac{1}{2}}} \right)
 \end{aligned}$$

Question 20(a)

Criteria	Marks
• Correct solution	1

Sample answer:

$$\begin{aligned}
 y &\propto \frac{1}{\sqrt{x}} \\
 y &= \frac{k}{\sqrt{x}} \\
 \text{when } x = 10, y = 2 \\
 2 &= \frac{k}{\sqrt{10}} \\
 k &= 2\sqrt{10} \\
 y &= \frac{2\sqrt{10}}{\sqrt{x}}
 \end{aligned}$$

Question 20(b)

Criteria	Marks
Correct solution	1

Sample answer:

$$y = \frac{2\sqrt{10}}{\sqrt{x}}$$

when $y = 20$,

$$20 = \frac{2\sqrt{10}}{\sqrt{x}}$$

$$20\sqrt{x} = 2\sqrt{10}$$

$$\sqrt{x} = \frac{2\sqrt{10}}{20}$$

$$x = \frac{1}{10}$$

Question 21(a)

Criteria	Marks
Correct solution	2
Correctly performs one expansion	1

Sample answer:

$$(5-x)(x+2)^2 = -x^3 + x^2 + 16x + 20$$

$$LHS = (5-x)(x+2)^2$$

$$= (5-x)(x^2 + 4x + 4)$$

$$= 5x^2 + 20x + 20 - x^3 - 4x^2 - 4x$$

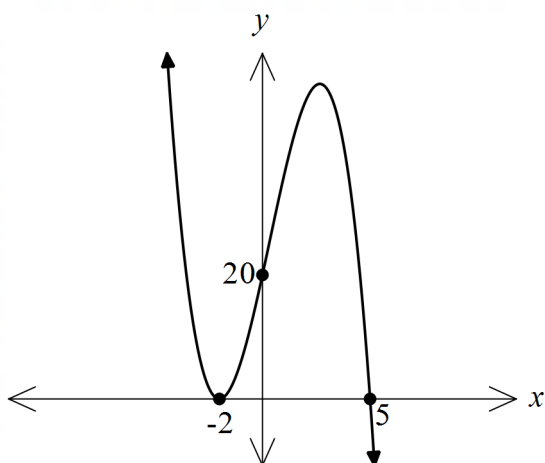
$$= -x^3 + x^2 + 16x + 20$$

$$= RHS$$

Question 21(b)

Criteria	Marks
Correct solution	2
- Correct shape without intercepts labelled OR - Graphs $-P(x)$ with intercepts labelled	1

Sample answer:



Question 22

Criteria	Marks
Correct solution	2
Obtains $(x^2 - 4)(x^2 + 12) = 0$	1

Sample answer:

$$\begin{aligned}
 x^4 + 8x^2 - 48 &= 0 \\
 (x^2 - 4)(x^2 + 12) &= 0 \\
 (x - 2)(x + 2)(x^2 + 12) &= 0 \\
 x &= \pm 2
 \end{aligned}$$

Question 23(a)

Criteria	Marks
• Correct solution	3
• Correctly factorises $x^2 + 2x - 15$ and forms equivalent fractions with a common denominator.	2
• Correctly factorises $x^2 + 2x - 15$ or forms equivalent fractions with a common denominator.	1

Sample answer:

$$\begin{aligned}\frac{4}{x^2 + 2x - 15} + \frac{7}{6x - 18} &= \frac{4}{(x-3)(x+5)} + \frac{7}{6(x-3)} \\ &= \frac{24 + 7(x+5)}{6(x-3)(x+5)} \\ &= \frac{24 + 7x + 35}{6(x-3)(x+5)} \\ &= \frac{59 + 7x}{6(x-3)(x+5)}\end{aligned}$$

Question 23(b)

Criteria	Marks
• Correct solution	2
• Correctly factorises two terms	1

Sample answer:

$$\begin{aligned}\frac{6a^3b + 6a^2b^2}{a^2 - b^2} \times \frac{2b^2 - ab - a^2}{18b} &= \frac{6a^2b(a+b)}{(a-b)(a+b)} \times \frac{(2b+a)(b-a)}{18b} \\ &= \frac{-a^2(a+2b)}{3}\end{aligned}$$

Question 24

Criteria	Marks
• Correct solution	2
• Finds an equation linking d and v	1

$$d = kv^2$$

when $d = 35, v = 80$

$$35 = k(80)^2$$

$$k = \frac{35}{6400}$$

$$d = \frac{35}{6400}v^2$$

when $v = 40$,

$$\begin{aligned} d &= \frac{35}{6400} \times (40)^2 \\ &= 8.75 \text{ metres} \end{aligned}$$

Question 25

Criteria	Marks
• Correct solution	2
• Correctly expresses 9^x as a product of primes	1

Sample answer:

$$\begin{aligned} \frac{9^x - 1}{9^x - 3^x} &= \frac{3^{2x} - 1}{3^{2x} - 3^x} \\ &= \frac{(3^x - 1)(3^x + 1)}{3^x(3^x - 1)} \\ &= \frac{3^x + 1}{3^x} \\ &= (1 + 3^{-x}) \end{aligned}$$

Question 26(a)

Criteria	Marks
• Correct solution	2
• Factorises using a common factor and attempts to complete the square	1

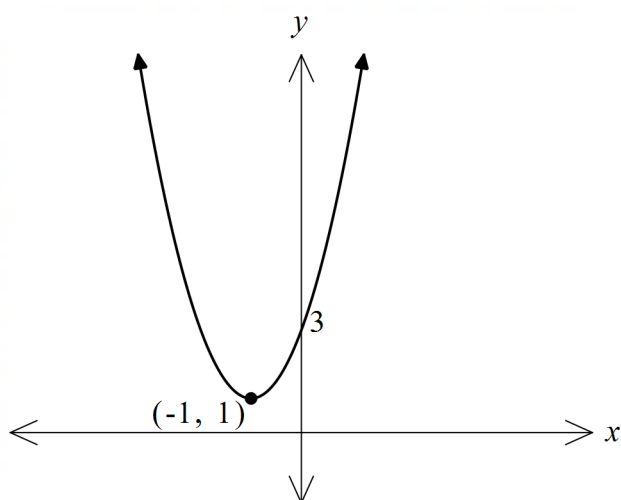
Sample answer:

$$\begin{aligned}y &= 2x^2 + 4x + 3 \\&= 2(x^2 + 2x) + 3 \\&= 2(x^2 + 2x + 1 - 1) + 3 \\&= 2(x + 1)^2 - 2 + 3 \\&= 2(x + 1)^2 + 1\end{aligned}$$

Question 26(b)

Criteria	Marks
• Correct solution	2
• Factorises using a common factor and attempts to complete the square	1

Sample answer:



Question 27(a)

Criteria	Marks
• Correct solution	1

Sample answer:

$$\begin{aligned}f(3) &= 2^{3-1} \\ &= 4\end{aligned}$$

$$\begin{aligned}f(0) &= 0^2 + 2(0) - 3 \\ &= -3\end{aligned}$$

$$\begin{aligned}f(3) + f(0) &= 4 - 3 \\ &= 1\end{aligned}$$

Question 27(b)

Criteria	Marks
• Correct solution	2
• Correctly solves $x^2 + 2x - 3 = 0$	1

Sample answer:

$$2^{x-1} > 0 \text{ for all real } x.$$

$$x^2 + 2x - 3 = 0 \text{ when } x < 1$$

$$(x-1)(x+3) = 0$$

$$x = 1 \text{ or } x = -3$$

$$\text{but } x < 1 \rightarrow x = -3 \text{ only}$$

Question 28

Criteria	Marks
Correct solution	2
Obtains $(x + y)^2 - 2xy = 13$ or solves simultaneously to find x or y	1

$$x^2 + y^2 = 13$$

$$(x + y)^2 - 2xy = 13$$

$$(x + y)^2 - 2 \times 6 = 13 \quad (\text{since } xy = 6)$$

$$(x + y)^2 = 25$$

$$x + y = \pm 5$$

Question 29

Criteria	Marks
Correct solution	3
Correctly writes the expression with a common denominator	2
Correctly expresses each term with a positive index	1

Sample answer:

$$\begin{aligned}
 (x^2 - 4)^{-1} - \left(\frac{x+2}{x-1} \right)^{-1} &= \frac{1}{x^2 - 4} - \frac{x-1}{x+2} \\
 &= \frac{1}{(x-2)(x+2)} - \frac{x-1}{x+2} \\
 &= \frac{1 - (x-2)(x-1)}{(x-2)(x+2)} \\
 &= \frac{1 - (x^2 - 2x - x + 2)}{(x-2)(x+2)} \\
 &= \frac{-x^2 + 3x - 1}{(x-2)(x+2)}
 \end{aligned}$$

Question 30

Criteria	Marks
• Correct solution	2
• Correctly expands $(x^2 - 9x + 5)^2$	1

Sample answer:

$$\begin{aligned}(x^2 - 9x + 5)^2 &= (x^2 - 9x + 5)(x^2 - 9x + 5) \\&= x^4 - 9x^3 + 5x^2 - 9x^3 + 81x^2 - 45x + 5x^2 - 45x + 25 \\&= x^4 - 18x^3 + 91x^2 - 90x + 25 \\x^4 - 18x^3 + 81x^2 + 42 &= (x^2 - 9x + 5)^2 - 10x^2 + 90x + 17 \\&= -10(x^2 - 9x) + 17 \quad \text{since } x^2 - 9x + 5 = 0 \\&= -10(-5) + 17 \\&= 67\end{aligned}$$

Question 31

Criteria	Marks
• Correct solution	3
• Correctly solves 2 cases	2
• Correctly solves 1 case	1

$$(x^2 - 3x + 1)^{x+1} = 1$$

Case 1:

$$x + 1 = 0$$

$$x = -1$$

Case 2:

$$x^2 - 3x + 1 = 1$$

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

$$x(x - 3) = 0$$

$$x = 0 \text{ or } x = 3$$

Case 3:

$$x^2 - 3x + 1 = -1 \text{ and } x + 1 \text{ is even.}$$

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

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

$$x = 2 \text{ or } x = 1$$

$$x = 1 \text{ since } x + 1 \text{ must be even}$$

$$x = -1, 0, 1, 3$$

Markers feedback: Most students did not consider Case 3

Question 32

Criteria	Marks
• Correct solution	3
• Obtains $x^2(4ax + 4a^2 - b^2) = 0$ or $x = \frac{b^2 - 4a^2}{4a}$	2
• Obtains a correct expression without a radical sign	1

$$\begin{aligned}
 x &= \sqrt{a^2 + x\sqrt{b^2 + x^2}} - a \\
 x + a &= \sqrt{a^2 + x\sqrt{b^2 + x^2}} \\
 (x + a)^2 &= a^2 + x\sqrt{b^2 + x^2} \\
 x^2 + 2ax + a^2 &= a^2 + x\sqrt{b^2 + x^2} \\
 x(x + 2a) &= x\sqrt{b^2 + x^2} \\
 x^2(x + 2a)^2 &= x^2(b^2 + x^2) \\
 x^2(x + 2a)^2 - x^2(b^2 + x^2) &= 0 \\
 x^2((x + 2a)^2 - (b^2 + x^2)) &= 0 \\
 x^2(x^2 + 4ax + 4a^2 - b^2 - x^2) &= 0 \\
 x^2(4ax + 4a^2 - b^2) &= 0 \\
 x^2 = 0 \text{ or } 4ax + 4a^2 - b^2 &= 0 \\
 4ax &= b^2 - 4a^2 \\
 x &= \frac{b^2 - 4a^2}{4a} \\
 x = 0 \text{ or } x &= \frac{b^2 - 4a^2}{4a}
 \end{aligned}$$

Markers feedback:

- Many students obtained $x^2(x + 2a)^2 = x^2(b^2 + x^2)$ and then proceeded to divide both sides by x^2
- Students who did correctly make progression often ignored/forgot $x = 0$ as a solution