



norWEST
CHRISTIAN COLLEGE
STRENGTH OF PURPOSE

Name: _____

Teacher's name: _____

Year 10 2024

MATHEMATICS ADVANCED

TASK 1

- No reading time given
- Working time – 55 minutes
- Show all necessary working / units
- Answer Multiple Choice questions on the Answer Sheet provided
- 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 – 50

Section 1 STANDARD – 25 marks

Allow 25 mins

Section 2 ADVANCED – 25 marks

Allow 30 mins

Questions	Indices and Surds	Equations, Formulas, Inequalities and Linear Relationships	Total
Section I STANDARD			/25
Qs 1,2,4,5, 8-12	/15		
Qs 3, 6-7, 13-15		/10	
Section II ADVANCED			/25
Qs 1-5, 8-12	/11		
Qs 6-7, 13-15		/14	
Total	/26	/24	/50

Section I - STANDARD (25 marks)

Attempt Questions 1 to 10. Allow approximately 25 minutes for this section.

Multiple Choice Questions – ANSWER ON THE MULTIPLE CHOICE ANSWER SHEET

1. The expression $\frac{6x^4 \times x^6}{2x^2}$ is equal to:

a) $3x^5$

☒ b) $3x^8$

c) $3x^{12}$

d) $3x^{22}$

2. $\frac{12c^2d}{24cd^2}$ simplifies to:

a) $2cd$

b) $\frac{2c}{d}$

c) $\frac{2d}{c}$

☒ d) $\frac{c}{2d}$

3. Given $y = mx + c$, find y when $m = 3$, $x = -2$ and $c = 5$

a) $y = 11$

b) $y = 1$

☒ c) $y = -1$

d) $y = -11$

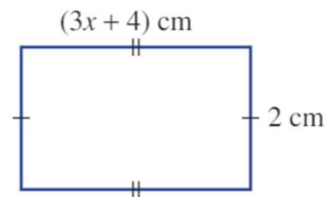
4. An expression for the **area** of this shape could be:

a) $6x + 12$

b) $(3x + 4) \div 2$

c) $2 + 3x + 4$

☒ d) $2(3x + 4)$



5. Expand $(k + 3)(k + 5)$.

a) $k^2 + 15$

b) $k^2 + 3k + 5$

☒ c) $k^2 + 8k + 15$

d) $k^2 + 15k + 8$

6. To solve the equation $3(x + 4) - 5(x + 2) = 6$ you would first:

a) divide both sides by 15

b) subtract 6 from both sides

☒ c) expand the brackets

d) multiply both sides by 6

7. The solution of $x + 5 < 4$ is:

a) $x < 1$

b) $x > 1$

☒ c) $x < -1$

d) $x > -1$

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.

8. Simplify:

a) $3x^0 - (2x)^0 + 5$

(1 mark)

$$3 - 1 + 5 = 7$$

b) $\left(\frac{3x}{y^3}\right)^2$

(2 marks)

$$\frac{9x^2}{y^6}$$

9. Simplify the following: $\frac{2x^2 \times 3x^4 y}{24xy}$

(2 marks)

$$\frac{x^5}{4}$$

10. Explain why 245×10^7 is not written correctly in scientific notation and then correctly write it in scientific notation. (2 marks)

The number multiplying by the power of 10 has to be a number ≥ 1 and < 10 . ① for Reason

2.45×10^9 ① for correct scientific notation

11. Expand and simplify: $5t(2t + 3) - 2(t - 2t)$

(2 marks)

$$5t(2t + 3) - 2(t - 2t)$$

$$= 10t^2 + 15t - 2t + 4t$$

$$= 10t^2 + 17t$$

12. Simplify: $\frac{3(b+3)}{4 \cancel{20b}} \times \frac{\cancel{5}}{b+3}$

(2 marks)

$$\frac{3}{4b}$$

13. Given the formula $V = \frac{1}{3}Ah$:

a) Find V when $A = 30$ and $h = 5$

(1 mark)

$$V = \frac{1}{3} \times 30 \times 5$$

$$= 50$$

b) Find A when $V = 650$ and $h = 25$

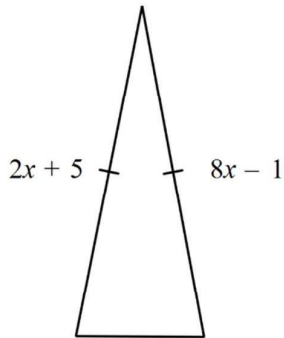
(1 marks)

$$650 = \frac{1}{3} \times A \times 25$$

$$A = 78$$

14. Given the isosceles triangle, find the value of x :

(2 marks)



$$2x + 5 = 8x - 1$$

$$6x = 6$$

$$x = 1$$

15. a) Solve the inequality: $2x - 5 < 3$

(2 marks)

$$2x - 5 < 3$$

$$2x < 8$$

$$x < 4$$

b) Graph the solution on the number line:

(1 mark)



SECTION II on the next page

Section II - ADVANCED (25 marks)

Attempt Questions 1 to 7. Allow approximately 25 minutes for this section

Multiple Choice Questions – ANSWER ON THE MULTIPLE CHOICE ANSWER SHEET

1. In index form $\sqrt[3]{m^5}$ is:

- a) $m^{-\frac{3}{5}}$ b) $m^{\frac{3}{5}}$ **c) $m^{\frac{5}{3}}$** d) $m^{-\frac{5}{3}}$

2. ~~$\frac{8c^{-2}d^{-3}}{12c^4d^{-6}}$~~ expressed with positive indices is:

- a) $\frac{2c^2}{3d^3}$ b) $\frac{3c^2}{4d^3}$ **c) $\frac{3d^3}{4c^6}$** d) $\frac{2d^3}{3c^6}$

3. Simplify $\sqrt{98}$

- a) $2\sqrt{7}$ **b) $7\sqrt{2}$** c) $49\sqrt{2}$ d) $2\sqrt{49}$

4. When you rationalise the denominator of $\frac{2\sqrt{3}-1}{\sqrt{5}}$ you get:

- a) $\frac{10\sqrt{3}-5}{5}$ **b) $\frac{2\sqrt{15}-\sqrt{5}}{5}$** c) $\frac{2\sqrt{15}-1}{5}$ d) $\frac{2\sqrt{5}-5}{5}$

5. $2x(4-3y) - 3(3x-4xy)$ is:

- ~~a) $6xy - x$~~ ~~b) $12xy - 7x$~~ ~~c) $2xy$~~ ~~d) $2x - 3y - 4xy$~~
- $8x - 6xy - 9x + 12xy$

6. The line that is perpendicular to the line with equation $y = -3x + 7$ is:

- ~~a) $y = -3x + 2$~~ ~~b) $3y = 4 - x$~~ ~~c) $3x + y = -1$~~ **d) $3y - x = 4$**

7. The point that is NOT on the line $y = 3x - 2$ is:

- a) $(-1, -5)$ b) $(4, 10)$ **c) $(-2, -4)$** d) $(0, -2)$

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.

8. Simplify the following:

a) $2\sqrt{3} + 4\sqrt{5} - \sqrt{48} + \sqrt{75}$

(1 mark)

$$\begin{aligned} & 2\sqrt{3} + 4\sqrt{5} - 4\sqrt{3} + 5\sqrt{3} \\ & = 3\sqrt{3} + 4\sqrt{5} \end{aligned}$$

b) $(2\sqrt{3} + 1)^2 - \sqrt{3}(2 - \sqrt{3})$

(2 marks)

$$\begin{aligned} & = 12 + 4\sqrt{3} + 1 - 2\sqrt{3} + 3 \\ & = 16 + 2\sqrt{3} \end{aligned}$$

9. Rationalise the denominator: $\frac{3\sqrt{5}-\sqrt{2}}{2\sqrt{5}}$

(2 marks)

$$\frac{15 - \sqrt{10}}{10}$$

10. Express in index form with positive indices: $\left(\frac{2a^2}{5b^3}\right)^{-4}$ (2 marks)

$$\left(\frac{5b^3}{2a^2}\right)^4 = \frac{625b^{12}}{16a^8}$$

11. Solve: $\frac{3(x-2)}{5} = \frac{2(x-1)}{3} - \frac{2}{5}$ (2 marks)

$$\frac{3}{15} \times \frac{3(x-2)}{5} = \frac{5}{15} \times \frac{2(x-1)}{3} - \frac{2}{5} \times \frac{3}{15}$$

$$9x - 18 = 10x - 10 - 6$$

$$x = -$$

12. Solve the following inequality : (2 marks)

$$15 \times -2 \leq \frac{5}{15} \times \frac{(x-4)}{3} - \frac{(x+2)}{5} < 1 \times 15$$

and graph the solution on a number line.

$$-30 \leq 5x - 20 - 3x - 6 < 15$$

$$-30 \leq 2x - 26 < 15$$

$$-4 \leq 2x < 41$$

$$-2 \leq x < 20.5$$



13. Find the value of a and b when the midpoint of $(a, -6)$ and $(7, b)$ is $(2, -3)$.

(2 marks)

$$\begin{array}{ccc} \xleftarrow{-5} & & \xrightarrow{+5} \\ (a, -6) & (2, -3) & (7, b) \\ \xleftarrow{-3} & & \xrightarrow{+3} \\ a = -3 & b = 0 & \end{array}$$

$$a = -3$$

$$b = 0$$

OR

$$\frac{a+7}{2} = -2$$

$$a = -3$$

$$\frac{b+(-6)}{2} = -3$$

$$b = 0$$

14. Find the equation of the straight line passing through the point $(3, -2)$ and parallel to the line

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

(2 marks)

$$\begin{array}{l} 3y = x + 2 \\ y = \frac{1}{3}x + \frac{2}{3} \end{array} \quad m = \frac{1}{3}$$

$$y = \frac{1}{3}x - 3$$

$$y - (-2) = \frac{1}{3}(x - 3)$$

$$y = \frac{1}{3}x - 3$$

13. At a fundraising event, two hot dogs and three cans of soft drink cost \$13, and four hot dogs and two cans of soft drink cost \$18. What will it cost (in total) for a group of 7 friends to buy a hotdog and a drink for each person?

(3 marks)

Let h be cost of hot dogs

s be cost of soft drink

$$2h + 3s = 13 \Rightarrow 4h + 6s = 26$$

$$4h + 2s = 18 \quad - \quad 4h + 6s = 18$$

$$4s = 8$$

$$s = \$2$$

Total cost

$$= \$38.50$$

$$\text{Sub } s=2 \text{ in } 2h + 3s = 13 \rightarrow h = \$3.50$$

$$7s + 7h = 7 \times 2 + 7 \times 3.50 = \$38.50$$

END OF EXAM

NAME: _____

Multiple Choice Answer Sheet

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.

correct
↓
A. ☒ B. ☒ C. ☐ D. ☐

SECTION I

- | | | | | | | | | |
|----|----|-----------------------|----|-----------------------|----|-----------------------|----|-----------------------|
| 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. | ☐ |
| 6. | A. | ☐ | B. | ☐ | C. | ☐ | D. | ☐ |
| 7. | A. | ☐ | B. | ☐ | C. | ☐ | D. | ☐ |

SECTION II

- | | | | | | | | | |
|----|----|-----------------------|----|-----------------------|----|-----------------------|----|-----------------------|
| 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. | ☐ |
| 6. | A. | ☐ | B. | ☐ | C. | ☐ | D. | ☐ |
| 7. | A. | ☐ | B. | ☐ | C. | ☐ | D. | ☐ |



MATHEMATICS – Stage 5 (Advanced) REFERENCE SHEET

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

$$1) \sqrt{a} \times \sqrt{b} = \sqrt{ab}$$

$$2) \frac{\sqrt{a}}{\sqrt{b}} = \sqrt{\frac{a}{b}}$$

$$3) (\sqrt{a})^2 = a$$

Linear Relationships

Gradient

$$m = \frac{\text{rise}}{\text{run}} = \frac{y_2 - y_1}{x_2 - x_1}$$

Distance

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

Midpoint

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

Gradient–intercept form

$$y = mx + c$$

Point-slope form

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

Perpendicular gradients

$$m_1 \times m_2 = -1$$