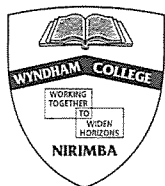


Student Name: _____

Marks: _____/68

Teacher's Name: _____ (Circle your teacher)

Satendra / Beata / Kirtana



Wyndham College Mathematics Department

ASSESSMENT TASK 1 Topic Review Year 11 2021 MATHEMATICS ADVANCED

Assessment Date: Term 1 Week 8

Thursday 18th March

Assessment Value: 30%

Instructions:

- Working time: 1 hour minutes plus 10 minutes reading
- Write using blue or black pen
- Show all necessary working
- Marks may be deducted for careless or badly arranged work
- Approved calculators may be used
- Multiple choice questions to be answered on the examination paper by circling the best alternative of your choice.
- Start each question on a new booklet.
- Clearly label each booklet with the question number, your name and your teacher's name (Even if you don't attempt the question)

Question	Marks
Question 1 Indices	/12
Question 2 Algebra	/19
Question 3 Surds	/8
Question 3 Equations	/26
Total	/68

Outcomes assessed:

- **MA11-1**
uses algebraic and graphical techniques to solve,
and where appropriate, compare
alternative solutions to problems

Question 1 Indices

Marks

a) Simplify

i. $\left(\frac{ab^4}{a^5b^5}\right)^0$

1 Mark

1

ii. $\frac{(2x^7)^3 y^2}{x^{10} y}$

1 Mark

$\frac{8x^{21}y^2}{x^{10}y} = 8x^{11}y$

b) Write in index form with no indices in the denominator.

i. $\sqrt[3]{x^4}$

1 Mark

$x^{\frac{4}{3}}$

ii. $\frac{3}{5^4 \sqrt{(x^2+2)^3}}$

1 Mark

$\frac{3(x^2+2)^{-\frac{3}{4}}}{5}$

c) Write without indices. $\frac{6(3x+8)^{-\frac{2}{9}}}{7}$

2 Marks

$\frac{6}{7 \sqrt[9]{(3x+8)^2}}$

d) Solve $3^{2n+1} = 27$

2 Marks

$$3^{2n+1} = 3^3$$

$$\therefore 2n+1 = 3$$

$$2n = 2$$

$$n = 1$$

e) Solve $x^{-\frac{3}{2}} = \frac{8}{125}$

2 Marks

$$x^{-\frac{3}{2}} = \frac{2^3}{5^3}$$

$$x^{-\frac{3}{2}} = \left(\frac{5}{2}\right)^{-3}$$

$$x^{-\frac{3}{2}} = \left(\frac{5^2}{2^2}\right)^{-\frac{3}{2}}$$

$$x^{-\frac{3}{2}} = \left(\frac{25}{4}\right)^{-\frac{3}{2}}$$

$$\therefore x = \frac{25}{4}$$

f) Solve $4^{3n} = 8^{n+3}$

2 Marks

$$(2^2)^{3n} = (2^3)^{n+3}$$

$$2^{6n} = 2^{3n+9}$$

$$\therefore 6n = 3n+9$$

$$3n = 9$$

$$n = 3$$

Question 2 (Take a new page and write your name, the question number and your teacher's name.)

Algebra

a) Expand and simplify

i. $(4x - 3)^2$

2 Marks

$$16x^2 - 24x + 9$$

ii. $(3x - 4)(3x + 4)$

2 Marks

$$9x^2 - 16$$

b) Factorise

i. $x^3 - 4x^2 - x + 4$

2 Marks

$$x^2(x-4) - (x-4)$$

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

$$(x-1)(x+1)(x-4)$$

ii. $4y^2 + 4y - 3$

2 Marks

$$4y^2 + 6y - 2y - 3 \rightarrow (2y-1)(2y+3)$$

$$2y(2y+3) - (2y+3)$$

iii. $9a^2 + 12a + 4$

2 Marks

$$9a^2 + 6a + 6a + 4 \rightarrow (3a+2)(3a+2)$$

$$3a(3a+2) + 2(3a+2) \rightarrow (3a+2)^2$$

iv. $4a^2 - 81b^2$

2 Marks

$$(2a - 9b)(2a + 9b)$$

v. $(x+2)^2 - (2y+1)^2$

2 Marks

$$[(x+2) - (2y+1)][(x+2) + (2y+1)]$$

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

c) Simplify

i. $\frac{2}{x^2-16} - \frac{7}{x^2-x-12}$

2 Marks

$$= \frac{2}{(x-4)(x+4)} - \frac{7}{(x-4)(x+3)}$$

$$= \frac{2(x+3) - 7(x+4)}{(x-4)(x+4)(x+3)}$$

$$= \frac{2x+6-7x-28}{(x-4)(x+4)(x+3)}$$

$$= \frac{-5x-22}{(x-4)(x+4)(x+3)}$$

ii. $\frac{x^2-8x+15}{5x^2+10x} \div \frac{x^2-9}{10x} \times \frac{x^2+5x+6}{2x-10}$

3 Marks

$$\frac{(x-3)(x-5)}{5x(x+2)} \times \frac{10x}{(x-3)(x+3)} \times \frac{(x+2)(x+3)}{2(x-5)}$$

$$= 1$$

Question 3(Take a new page and write your name, the question number and your teacher's name.)

Surds

a) Rationalise the denominator

$$\frac{\sqrt{3}-4}{\sqrt{3}+4} \times \frac{\sqrt{3}-4}{\sqrt{3}-4}$$

2 Marks

$$\frac{3-8\sqrt{3}+16}{3-16}$$

$$\frac{19-8\sqrt{3}}{-13}$$

$$\frac{8\sqrt{3}-19}{13}$$

b) Find a and b if $\frac{2}{\sqrt{5}+1} = a + b\sqrt{5}$

2 Marks

$$LHS = \frac{2}{\sqrt{5}+1} \times \frac{\sqrt{5}-1}{\sqrt{5}-1}$$

$$= \frac{2\sqrt{5}-2}{5-1}$$

$$= \frac{2\sqrt{5}-2}{4}$$

$$= \frac{\sqrt{5}}{2} - \frac{1}{2}$$

$$= -\frac{1}{2} + \frac{\sqrt{5}}{2} = a + b\sqrt{5}$$

$$\therefore a = -\frac{1}{2} \quad b = \frac{1}{2}$$

c) Find n if $2\sqrt{8} + \sqrt{200} = \sqrt{n}$

2 Marks

$$2 \cdot 2\sqrt{2} + 10\sqrt{2} = \sqrt{n}$$

$$4\sqrt{2} + 10\sqrt{2} = \sqrt{n}$$

$$14\sqrt{2} = \sqrt{n}$$

$$\sqrt{196} \sqrt{2} = \sqrt{n}$$

$$\sqrt{392} = \sqrt{n}$$

$$\therefore n = 392$$

d) $(3\sqrt{7} - \sqrt{2})^2$

2 Marks

$$9 \times 7 - 6\sqrt{14} + 2$$

$$65 - 6\sqrt{14}$$

Equations

e) i The radius r of a sphere with volume V is given by the formula $r = \sqrt[3]{\frac{3V}{4\pi}}$.

What is the volume of a sphere of radius 4 cm? Answer correct to 2 decimal places.

2 Marks

$$r^3 = \frac{3V}{4\pi} \quad \rightarrow \quad V = \frac{4\pi r^3}{3} \quad \text{when } r = 4$$

$$4\pi r^3 = 3V \quad \rightarrow \quad V = \frac{4 \times \pi \times (4)^3}{3}$$

$$= 268.0825731$$

$$= 268.08$$

2 Marks

Solve: ii $\left(\frac{a}{4}\right)^{12} - \left(\frac{a+2}{3}\right)^{12} = 9$

$$3a - 4a - 8 = 108$$

$$-a - 8 = 108$$

$$-a = 116$$

$$a = -116$$

iii $4 - (x - 1) \leq 7$

2 Marks

$$4 - x + 1 \leq 7$$

$$-x + 5 \leq 7$$

$$-x \leq 2$$

$$x \geq -2$$

iv $|3b - 1| = 5$

2 Marks

$$3b - 1 = 5$$

$$3b - 1 = -5$$

$$3b = 6$$

$$3b = -4$$

$$b = 2$$

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

v $x^2 - 1 = 0$

2 Marks

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

$$x = \pm 1$$

vi $5x - x^2 = 0$

2 Marks

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

$$x = 0 \text{ or } 5$$

viii $(x+3)^2 = 11$

2 Marks

$$x+3 = \pm\sqrt{11}$$

$$x = -3 \pm\sqrt{11}$$

ix $x^2 - 5x - 6 = 0$

2 Marks

$$(x-6)(x+1) = 0$$

$$x = 6 \text{ or } -1$$

e) Solve by completing the square

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

2 Marks

$$x^2 - 10x + 25 = 3 + 25$$

$$(x-5)^2 = 28$$

$$x-5 = \pm\sqrt{28}$$

$$x-5 = \pm 2\sqrt{7}$$

$$x = 5 \pm 2\sqrt{7}$$

f) Solve by using the quadratic formula $3x^2 - 8x + 2 = 0$

2 Marks

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

$$= \frac{8 \pm \sqrt{64 - 4(3)(2)}}{2(3)}$$

$$= \frac{8 \pm \sqrt{40}}{6}$$

$$= \frac{8 \pm 2\sqrt{10}}{6}$$

$$= \frac{4 \pm \sqrt{10}}{3}$$

g) Solve the simultaneous equations (a) $3a - 2b = -6$ — ①
 $a - 3b = -2$ — ②

3 Marks

② $\times 3$ gives $3a - 9b = -6$ — ③

① - ③ gives $7b = 0$
 $b = 0$

sub in ② gives $a - 3(0) = -2$
 $a = -2$

(b) $y = x^2$ — ①
 $2x + y = 0$ — ②

3 Marks

sub ① into ② gives $2x + x^2 = 0$
 $x(2 + x) = 0$
 $x = 0$ or -2

when $x = 0$ sub in ① gives $y = 0$
 $x = -2$ " " ① " $y = (-2)^2$
 $= 4$

the two solutions are $(0, 0)$ and $(-2, 4)$

End of paper