



Student's Name:

Teacher's Initials:

LZM* AYG
GPF RJW
HYB JWH
AXD WMD
JAI BHC

YEAR 10

MONDAY 15TH JUNE
PERIOD 4/5

5.3 MATHEMATICS

TERM 2A, 2020

TOTAL TIME: 50 MINUTES

Assessment Task 2

245 COPIES

INSTRUCTIONS TO STUDENTS:

Write your name and teacher's initials on the TOP of Page 1 and 3.

Attempt ALL questions.

Show ALL necessary working.

Calculators can be used throughout the examination.

Marks may not be awarded for careless or badly arranged work.

Diagrams are NOT drawn to scale.

Write your answers in the spaces provided on the paper.

A formula sheet is provided on page 2 for use throughout the examination. You may detach this page

This assessment consists of FIVE parts.

PART A: SURDS & INDICES (14 marks)

PART B: INTEREST & DEPRECIATION (9 marks)

PART C: GRAPHS (12 marks)

PART D: QUADRATIC EQUATIONS & PARABOLAS (20 marks)

PART E: MIXED QUESTIONS (8 marks)

TOTAL 63 Marks

FORMULA SHEET

Pythagoras' Theorem

$$c^2 = a^2 + b^2$$

Simple interest

$$I = Prn$$

Compound interest

$$A = P(1+r)^n$$

Depreciation

$$A = P(1-r)^n$$

Solution of a quadratic equation

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

Student's Name:

Teacher's Initials:

PART A: SURDS & INDICES (14 Marks)

Marks

Question 1

Fully simplify, showing all working and leaving your answers as surds.

(a) $\sqrt{96}$ 1

(b) $\sqrt{45} - \sqrt{20}$ 2

(c) $\frac{\sqrt{72} - \sqrt{27}}{3}$ 2

(d) $\frac{2\sqrt{3}}{\sqrt{6}}$ 2

Question 2

Fully simplify:

(a) $2x^{-3} \times 4xy$ 1

(b) $(27y^0)^{\frac{2}{3}}$ 2

Question 3

Rationalise the denominator and then simplify.

3

$$\frac{1 - \sqrt{7}}{\sqrt{6} + \sqrt{7}}$$

Question 4

Find the value of n so that expression 2^n is half the value of 2^{100} .

1

PART B: INTEREST & DEPRECIATION (9 marks)**Marks****Question 5**

Nicola used a spreadsheet to calculate the value of her investment over a 5 year period. She invested \$10 000 at an interest rate of 4% p.a and her investment compounded yearly.

- (i) Fill in the spreadsheet with the missing values.

2

Year	Value at start of the year (\$):	Interest earned (\$):	Value at end of the year (\$):
1	10,000.00	400.00	
2	10,400.00		10,816.00
3		432.64	11,248.64
4	11,248.64	449.95	11,698.59
5	11,698.59		

- (ii) How much interest did she earn over the 5 years?

1

- (iii) What would the simple interest rate need to be to earn the same amount of interest over 5 years? Express your answer as a percentage rounded to 1 decimal place.

2

- (iv) Use the compound interest formula to find the interest earned over the 5 year period if compounded biannually, instead of yearly.

2**Question 6**

Michael purchased an iPhone 11 for \$1 749. The phone depreciates at a rate of 2.5% per month. How much will the iPhone be worth after 2 years?

2**End of PART B**

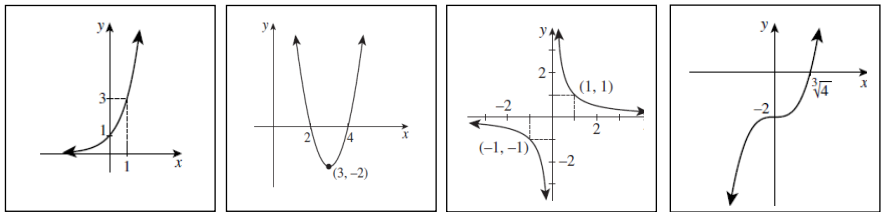
PART C: GRAPHS (12 marks)

Marks

Question 7

Identify the following graphs by labelling them as either parabola, cubic, exponential or hyperbola.

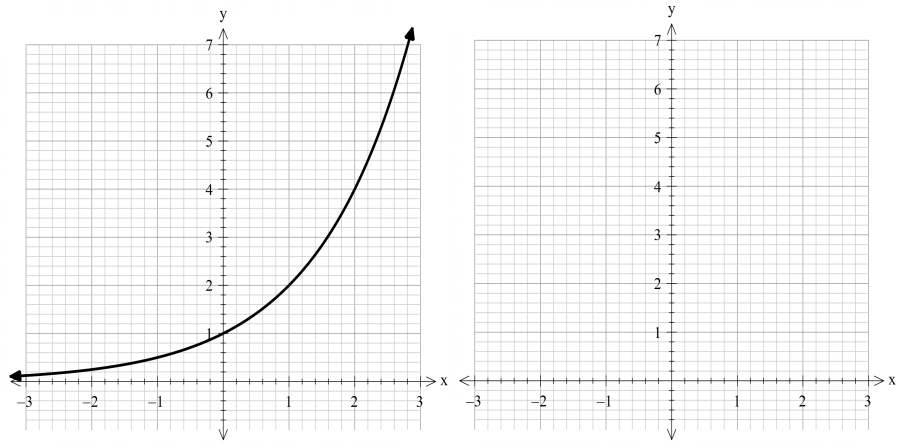
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Question 8

Below is the exponential $y = 2^x$.
On the second coordinate plane sketch the exponential $y = 2^{-x} + 1$.
Make sure to show all intercepts and asymptotes.

2



Question 9

A circle is described by the equation $(x - 2)^2 + (y + 3)^2 = 9$.

(i) What are the coordinates of the centre of the circle?

1

(ii) What is the radius of the circle?

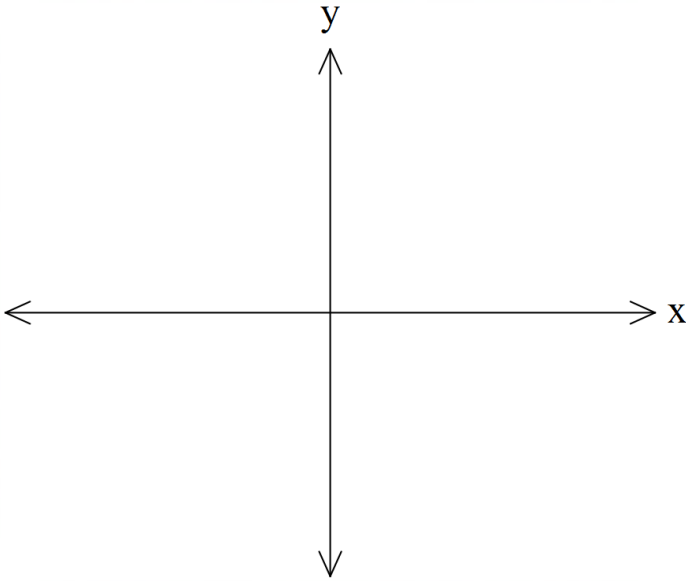
1

(iii) Find all x and y intercepts of the circle. Leave your answers in exact form.

3

(iv) Sketch the circle on the coordinate plane below, showing all of the above features.

2



End of PART C

PART D: QUADRATIC EQUATIONS & PARABOLAS (20 marks) **Marks**

Question 10

Solve:

(a) $2x^2 - 32 = 0$ **2**

(b) $x^2 - x - 72 = 0$ **by factorising.** **2**

(c) $x^2 - 6x + 7 = 0$ **by completing the square,**
leaving your answers in surd form. **3**

(d) $-3x^2 - 4x + 2 = 0$ **by using the quadratic formula,**
rounding your answers to 1 decimal place. **3**

Question 11

For the parabola $y = x^2 - 4x - 12$

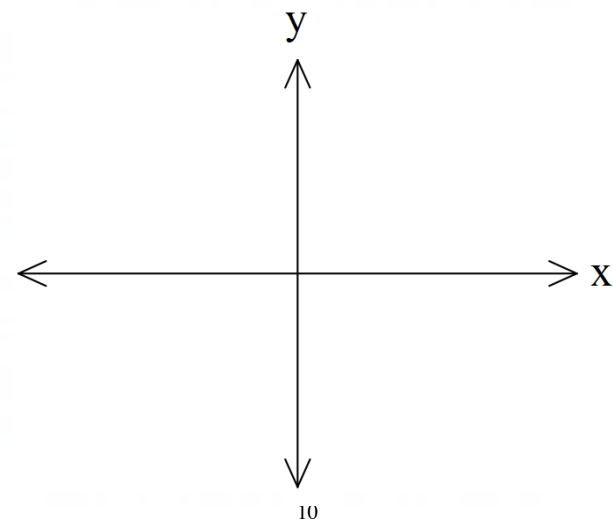
(i) Find the x – intercepts. **2**

(ii) State the y – intercept. **1**

(iii) Find the equation of the axis of symmetry. **1**

(iv) Find the coordinates of the vertex. **1**

(v) Sketch the parabola on this number plane, showing all of the above features. **2**

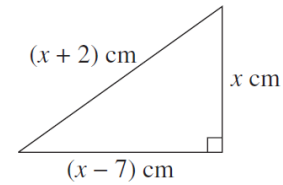


Question 12

Solve $2(\sqrt{x} - 1)^2 - 3(\sqrt{x} - 1) - 2 = 0$ using the substitution $u = \sqrt{x} - 1$.

3**PART E: MIXED QUESTIONS (8 marks)****Marks****Question 13**

Find the value of x .

3**Question 14**

(i) Expand and simplify $\left(\sqrt{6 + \sqrt{11}} - \sqrt{6 - \sqrt{11}}\right)^2$.

2

(ii) Hence simplify $\sqrt{6 + \sqrt{11}} - \sqrt{6 - \sqrt{11}}$.

1**End of PART D**

Question 15

Solve for x .

$$(2^3 + 3^2)(2^6 + 3^4)(2^{12} + 3^8)(2^{24} + 3^{16})(2^{48} + 3^{32}) = 3^x - 2^{\frac{3x}{2}}$$

2

END OF PAPER

year 10 5-3
Student Solution

Part A:

1(a) $\sqrt{16 \times 6}$
 $= 4\sqrt{6}$

(b) $3\sqrt{5} - 2\sqrt{5}$
 $= \sqrt{5}$

(c) $\frac{2\sqrt{2} - 2\sqrt{3}}{3}$
 $\frac{2\sqrt{2} - \sqrt{3}}{3}$

(d) $\frac{2\sqrt{3}(\sqrt{6})}{\sqrt{6}(\sqrt{6})}$
 $= \frac{2\sqrt{18}}{6}$
 $= \frac{2(3\sqrt{2})}{6}$
 $= \sqrt{2}$

2(a) $= 8 \times 4$
(b) $= (2^4(1))^{4/3}$
 $= 9$

3) $\frac{1-\sqrt{7}}{\sqrt{6}+\sqrt{7}} \cdot \frac{(\sqrt{6}-\sqrt{7})}{(\sqrt{6}-\sqrt{7})}$
 $= \frac{\sqrt{6}-\sqrt{7}-\sqrt{42}+7}{6-7}$
 $= \frac{\sqrt{6}-\sqrt{7}-\sqrt{42}+7}{-1}$
 $= \sqrt{7}-\sqrt{6}+\sqrt{42}-7$

4) $\frac{2^{100}}{2} = 2^{100-1} = 2^{99}$

Part B:

5

(i)

1	10000	400	10400
2	10400	416	10816
3	10816	432.64	11248.64
4	11248.64	449.95	11698.59
5	11698.59	467.94	12166.53

(ii) $I = 12166.53 - 10000$
 $= \$2166.53$

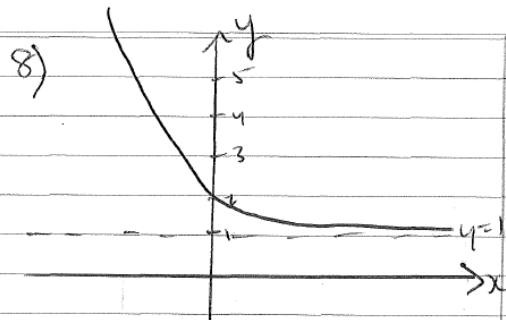
(iii) $I = PRN$
 $2166.53 = 10000 \times R \times 5$
 $\frac{2166.53}{50000} = R$
 $4.3\% = R$

(iv) $A = 10000(1 + \frac{0.04}{2})^{10}$
 $= 12189.94$
 $I = 12189.94 - 10000$
 $= \$2189.94$

6) $A = 1749(1 - 0.025)^{24}$
 $= \$952.58$

Part C

7) Exponential, Parabola, Hyperbola, Cubic



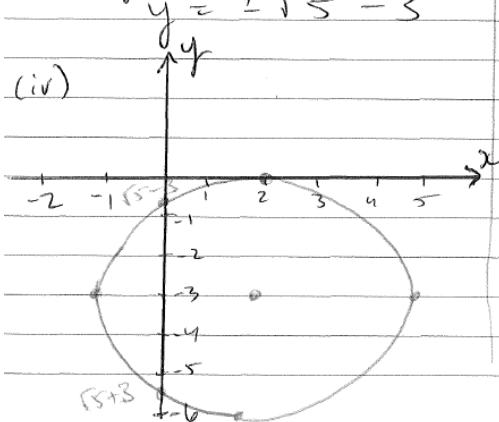
Part D

10)(a) $2x^2 = 32$
 $x^2 = 16$
 $x = \pm 4$

(b) $(x-9)(x+8) = 0$
 $x = 9$ $x = -8$

9) (i) Centre $(2, -3)$
 (ii) $R = 3$
 (iii) x -int: $y = 0$
 $(x-2)^2 + (0+3)^2 = 9$
 $(x-2)^2 + 9 = 9$
 $(x-2)^2 = 0$
 $x - 2 = 0$
 $x = 2$

y -int: $x = 0$
 $(0-2)^2 + (y+3)^2 = 9$
 $4 + (y+3)^2 = 9$
 $(y+3)^2 = 5$
 $y + 3 = \pm \sqrt{5}$
 $y = \pm \sqrt{5} - 3$



(c) $x^2 - 6x = -7$
 $x^2 - 6x + 9 = -7 + 9$
 $(x-3)^2 = 2$
 $x - 3 = \pm \sqrt{2}$
 $x = \pm \sqrt{2} + 3$

(d) $x = \frac{-(-4) \pm \sqrt{(-4)^2 - 4(-3)(2)}}{2(-3)}$
 $x = \frac{4 \pm \sqrt{16 + 24}}{-6}$

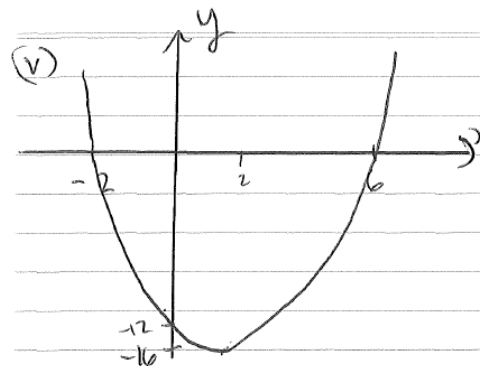
$x = \frac{4 + \sqrt{40}}{-6}$ $x = \frac{4 - \sqrt{40}}{-6}$
 $x = -1.7$ $x = 0.4$

11) (i) $x^2 - 4x - 12 = 0$
 $(x-6)(x+2) = 0$
 $x = 6, -2$

(ii) y -int: -12

(iii) $x = \frac{4}{2(1)}$

$x = 2$
 (iv) $y = 2^2 - 4(2) - 12$
 $y = -16$



14) (i)
 $(\sqrt{6+\sqrt{11}} - \sqrt{6-\sqrt{11}})(\sqrt{6+\sqrt{11}} + \sqrt{6-\sqrt{11}})$
 $= 6 + \sqrt{11} + 6 - \sqrt{11} + 2(\sqrt{6+\sqrt{11}})(\sqrt{6-\sqrt{11}})$
 $= 12 + 2(6-11)$
 $= 12 - 10$
 $= 2$

(ii) $(\sqrt{6+\sqrt{11}} - \sqrt{6-\sqrt{11}})^2 = 2$
 $\therefore \sqrt{6+\sqrt{11}} - \sqrt{6-\sqrt{11}} = \sqrt{2}$

12) $2u^2 - 3u - 2 = 0$
 $2u^2 - 4u + u - 2 = 0$
 $2u(u-2) + 1(u-2) = 0$
 $(2u+1)(u-2) = 0$
 $u = -\frac{1}{2}$ $u = 2$
 $\sqrt{x} + 1 = -\frac{1}{2}$ $\sqrt{x} - 1 = 2$
 $\sqrt{x} = -\frac{1}{2}$ $\sqrt{x} = 3$

$x = \frac{1}{4}$ $x = 9$

15) Difference of 2 squares
 $(3^2 - 2^3)(3^2 + 2^3)(3^4 + 2^4) = (3^2 - 2^3)(3^8 - 2^6)$
 $= (3^4 - 2^6)(3^4 + 2^6)(3^8 + 2^8) = 1(3^8 - 2^8)$
 $= 3^8 - 2^8 = 3^8 - 2^8$
 $x = 64$

Part E

13) $x^2 + (x-7)^2 = (x+2)^2$
 $x^2 + x^2 - 14x + 49 = x^2 + 4x + 4$
 $x^2 - 18x + 45 = 0$
 $(x-15)(x-3) = 0$
 $x = 15$ $x = 3$
 Not Soln