St Aloysius' College
Year 9 5.3 Term 3 Mathematics Assessment
Thursday 14ᵗʰ September 2017

Time allowed: 40 minutes

Total Marks: 45

NAME: .... $SOLUTIONS$. ....

TEACHER: IMO   GON   MCR   PLU

Instructions:

- Approved calculators may be used.
- All necessary working is to be shown for Part C.
- Marks may be deducted for careless or poorly arranged work.

PART A: Multiple Choice Questions: 10 marks

For questions 1 – 10, circle the correct answer, A, B, C or D on the answer sheet provided.

1. Simplify the following giving your answer in exact form $\sqrt{54}$ $\sqrt{9} \times \sqrt{6}$

    (A) 7.35   (B) $3\sqrt{6}$ (C) $6\sqrt{3}$ (D) 10.39

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2. Write in gradient-intercept form $3y - 6x + 15 = 0$

    $3y = 6x - 15$ $y = 2x - 5$

    (A) $y = 2x + 5$ (B) $y = 2x - 5$ (C) $y = -2x + 5$ (D) $y = -2x - 5$

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3. Write the following using positive indices $\dfrac{x^{-2}}{5y^{-5}}$ $\dfrac{y^5}{5x^2}$

    (A) $\dfrac{x^2}{5y^5}$ (B) $\dfrac{-x^2}{5(-y^5)}$ (C) $\dfrac{y^5}{5x^2}$ (D) $\dfrac{y^2}{5x^5}$

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4. Calculate the IQR for the set of Quiz scores 2, 7, 11, 20, 8, 8, 10, 18, 19, 14 Q_3

    $2 \quad 7 \; (8) \; 8 \quad 10 \,|\, 11 \quad 14 \; (18) \; 19 \quad 20$

    (A) 8   (B) 10   (C) 18   (D) 10.5

    Q_1

    $IQR = 18 - 8$

    $= 10$

5. Factorise the following quadratic expression $4x^2 + 2x$

(A) $2x(2x+1)$ (B) $x(4x+2)$ (C) $2x(2x+2)$ (D) $2x(2+x)$
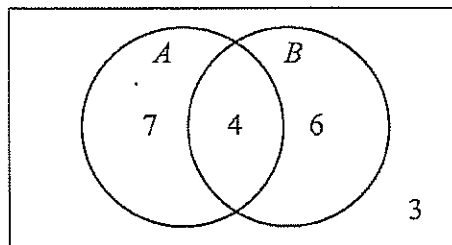
6. Expand $(x+8)(x-3)$

$x^2 - 3x + 8x - 24$

(A) $x^2 - 11x + 24$ (B) $x^2 + 5x - 24$ (C) $x^2 + 5x + 24$ (D) $x^2 - 5x - 24$

7. Simplify $(2a^3)^2 \times 3a^0$

$4a^6 \times 3(1)$

(A) $12a^5$ (B) $4a^6$ (C) $12a^6$ (D) $4a^5$

8. From the Venn Diagram, calculate $P(A \text{ and } B)$

(A) $\dfrac{1}{5}$ (B) $\dfrac{13}{20}$ (C) $\dfrac{17}{20}$ (D) $\dfrac{1}{4}$

9. Write 2 998 765 in scientific notation to 3 significant figures.

$2.99 | 8 765 \times 10^6$

(A) 3×10^6 (B) 2.99×10^6 (C) 3.00×10^{-6} (D) 3.00×10^6

10. A standard 6-sided dice is rolled. Calculate $P(\text{Prime Number})$.

$\{ 1, 2, 3, 4, 5, 6 \}$

(A) $\dfrac{1}{2}$ (B) $\dfrac{2}{3}$ (C) $\dfrac{1}{3}$ (D) $\dfrac{1}{6}$

End of Part A

Short Answer Questions: 10 questions. All questions are worth one mark. **10 marks**

1. Factorise $y(x-1)-(x-1)$

$$(y-1)(x-1)$$

2. Simplify $10\sqrt{7}+3\sqrt{2}-9\sqrt{2}-\sqrt{7}$

$$9\sqrt{7}-6\sqrt{2}$$

3. Calculate the midpoint of the interval joining points $(1, -1)$ and $(-3, 7)$.

$$M\left(\frac{1+(-3)}{2}, \frac{-1+7}{2}\right)$$

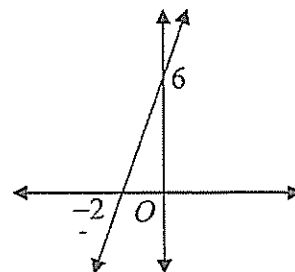$$M(-1, 3)$$

4. A coin is flipped 80 times and a head appeared 25 times. Based on these results, how many heads would you expect if the coin was flipped another 1200 times.

$$P(H) = \frac{25}{80} \times 1200$$

$$= \frac{5}{16} \times 1200$$

$$= 375$$

5. What is the equation of the following line

$$y = 3x + 6.$$

6. Factorise $4yz+15+3z+20y$

$$= \ 4yz+3z+15+20y$$
$$= \ z(3+4y)+5(3+4y)$$
$$= (z+5)(3+4y)$$

7. Factorise $e^2-5e-14$

$$(e+2)(e-7)$$

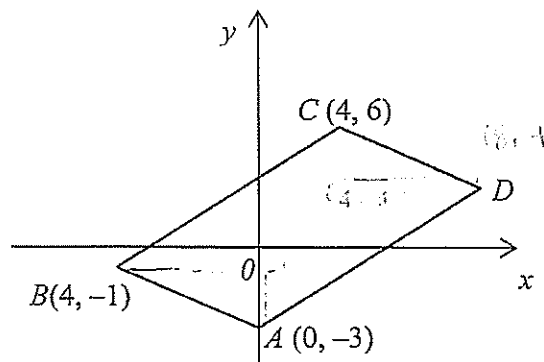8. Write without using fractional indices $(x^{\frac{3}{2}})^{\frac{1}{2}}$

$$= \ x^{\frac{3}{2}\times\frac{1}{2}}$$
$$= \ x^{3/4}$$
$$= \ ^4\sqrt{x^3}$$

9. Factorise $x^2-x+\dfrac{1}{4}$

$$\left(x-\tfrac{1}{2}\right)\left(x-\tfrac{1}{2}\right)$$

10. $ABCD$ is a parallelogram. Find the coordinates of D.

$$(8,4)$$

End of Part B

4

NAME: ....
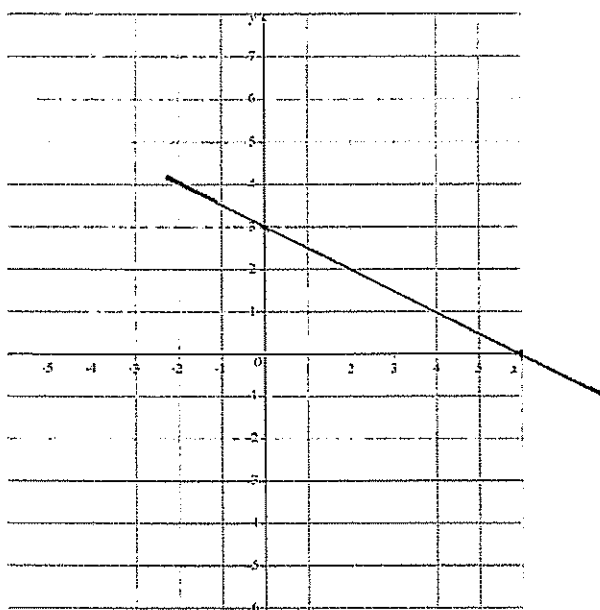TEACHER: IMO   GON   MCR   PLU

Extended Response Questions:

All necessary working is to be shown for Part C.
Marks indicated for each question.

24 marks

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1.   a)   Sketch the line $y = \dfrac{-x}{2} + 3$

2

   b)   Find the equation of the line parallel to $y = \dfrac{-x}{2} + 3$ and through the point (-2, -1)

2

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

$$m_1 = m_2$$

$$y = mx + b$$

$$-1 = -\frac{1}{2}(-2) + b$$

$$-1 = 1 + b$$

$$b = -2$$

$$\therefore \quad y = -\frac{1}{2}x - 2$$

2. Simplify:

    a) $(4m-3)(4m+3)-(4m-3)^2$ 3

    $= 16m^2 - 9 - (16m^2 - 24m + 9)$

    $= 16m^2 - 9 - 16m^2 + 24m - 9$

    $= 24m - 18$

    b) $\dfrac{x^{-2}z}{2^{-2}y^5} \div \dfrac{14}{y^3z^{-2}}$ 3

    $= \dfrac{4z}{x^2y^5} \div \dfrac{14z^2}{y^3}$

    $= \dfrac{4z}{x^2y^5} \times \dfrac{y^3}{14z^2}$

    $= \dfrac{2}{7x^2y^2z}$

3. Factorise $10+33y+20y^2$ 2
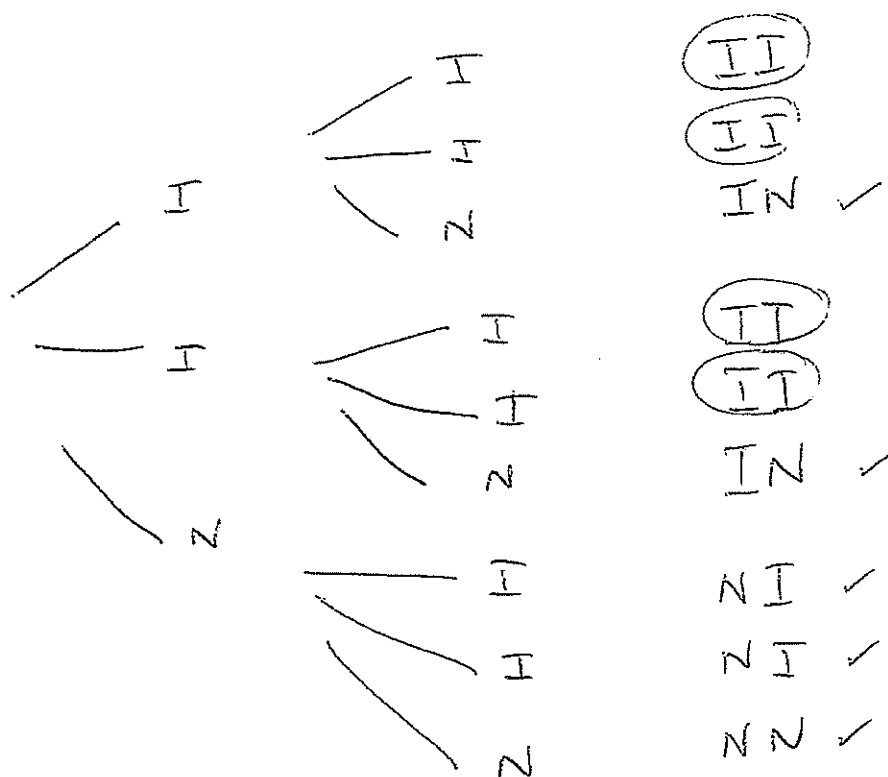
    $(5+4y)(2+5y)$

4.   A medical study shows that two out of every three teenagers are immune to the chickenpox.
     Two teenagers are chosen at random.

     a) Draw a tree diagram representing all outcomes.   2

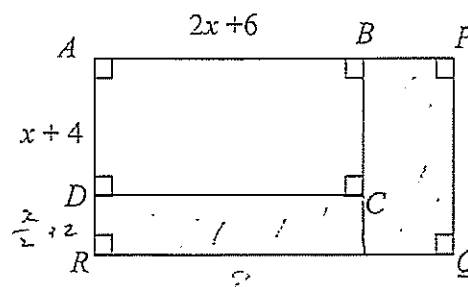   b) Find the probability that both teenagers chosen are immune.   1

$$P\ (II) \ = \ \frac{2}{3} \times \frac{2}{3}$$

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

     c) Find the probability of choosing at least one teenager that is not immune.   1

$$P\ (\text{One or two not immune}) \ = \ \frac{5}{9}$$

5. Mr O'Neill's backyard is being renovated. His current back deck $ABCD$ is $(x+4)$ cm wide and $(2x+6)$ cm long. He has decided to increase both the length and width by 50%, giving $APQR$.

a) Find the area of $APQR$ in terms of x.　　　　　3

$$(3x+9)(\frac{3x}{2}+6)$$

$$= \frac{9x^2}{2} + 18x + \frac{27x}{2} + 54$$

$$= \frac{9x^2}{2} + \frac{63x}{2} + 54.$$

b) Show that the difference between the areas of the two rectangles is $\frac{5}{2}x^2 + \frac{35}{2}x + 30$　　　3

$$\left(\frac{9x^2}{2} + \frac{63x}{2} + 54\right) - (x+4)(2x+6)$$

$$= \frac{9x^2}{2} + \frac{63x}{2} + 54 - (2x^2 + 6x + 8x + 24)$$

$$= \frac{9x^2}{2} + \frac{63x}{2} + 54 \; (-2x^2 - 14x - 24)$$

$$= \frac{5x^2}{2} + \frac{35x}{2} + 30.$$

c) If the original decks area was 40 m², by trial and error or otherwise, find how much extra area has been added from the renovation.　　　2

$$(2x+6)(x+4) = 40m^2$$

If $x=0$　　$A = 6 \times 4 = 24 m^2$

$x=1$　　$A = 8 \times 5 = 40 m^2$,　　$\therefore x = 1$

If $x=1$, $A = \frac{5}{2}(1^2) + \frac{35}{2}(1) + 30.$

$$= 50 m^2$$