Student Name: Solutions

Mathematics Teacher:

St Mary's Cathedral College

2023

Assessment Task 2

Year 9 Mathematics 5.3

Content:

Expressions, Equations and Inequalities
Quadratic Expressions and Algebraic Fractions

General Instructions:

- Write using blue or black pen
- Use pencil for diagrams and graphs
- All necessary working should be shown for every question
- Calculators are able to be used in this test.
- All algebraic expressions are to be in simplest form.

Date: Tuesday 06 June, Period 3

Time allowed: 50 minutes

Weighting: 25%

Total Mark: 50 marks

- Attempt all questions
- Mark value of questions is as shown
- Answer each question in the space provided.

Outcomes:	**Total**
NUMBER AND ALGEBRA	
MA5.2-6NA simplifies algebraic fractions, and expands and factorises quadratic expressions. **MA5.2 8NA** Solves linear and simple quadratic equations, linear inequalities and linear simultaneous equations, using analytical and graphical techniques. **MA5.3–5NA** A student selects and applies appropriate algebraic techniques to operate with algebraic expressions.	**/50**
TOTAL	/50

SECTION I: EXPRESSIONS, EQUATIONS AND INEQUALITIES

Marks

1. Expand the following expressions and simplify where possible.

(a) $7(2 + w)$ **1**

$= 14 + 7w$

(b) $3y(5y - 3)$ **1**

$= 15y^2 - 9y$

(c) $8x + 7 + 3(2x + 4)$ **2**

$= 8x + 7 + 6x + 12$ ✓

$= 14x + 19$ ✓

(d) $4(6p - 5) + 3(4p - 6)$ **2**

$= 24p - 20 + 12p - 18$ ✓

$= 36p - 38$ ✓

2. Solve the following equations.

(a) $5x + 21 = 6$ **1**

$5x = -15$

$x = -3$

(b) $\frac{(3m-1)}{5} = 4$ **1**

$3m - 1 = 20$

$3m = 21$

$m = 7$

(c) $2(3x + 4) = 5 + 2x$ **2**

$6x + 8 = 5 + 2x$ ✓

$4x + 8 = 5$

$4x = -3$

$x = \frac{-3}{4}$ ✓

3. Circle the line in which an error has been made in solving $3(y + 4) - 2(y + 1) = -5$? **1**

$3(y + 4) - 2(y + 1) = -5$ *Line* 1

$3y + 12 - 2y + 2 = -5$ *Line* 2

$y + 14 = -5$ *Line* 3

$y = -19$ *Line* 4

4. Blake and Tim play a cricket match. Blake made 48 less runs than triple Tim's score. The sum of their scores is 252 runs. Form an equation from the given information **2**

Tim $= x$

Blake $= 3x - 48$

$3x - 48 + x = 252$ ✓

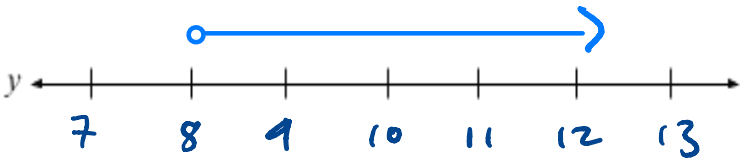
$4x - 48 = 252$ ✓

5. Solve each of the following inequalities and sketch the solutions on a number line..

(a) $y - 6 > 2$ **2**

$+6 \quad +6$

$y > 8$

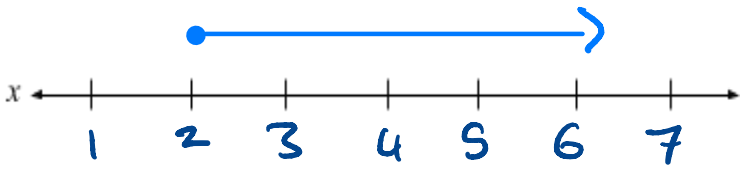


(b) $3 - 5x \leq -7$ **2**

$-3 \quad -3$

$\frac{-5x}{-5} \leq \frac{-10}{-5}$

$x \geq 2$



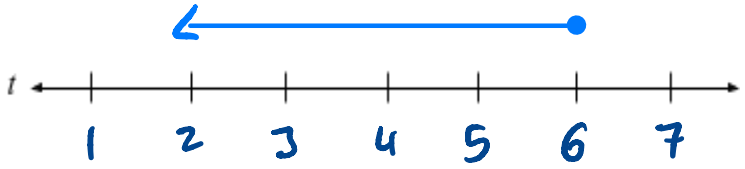
(c) $1 - 3t \leq 7 - 4t$ **2**

$-1 \quad -1$

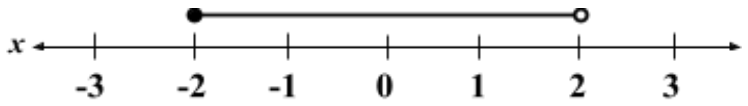
$-3t \leq 6 - 4t$

$+4t \quad +4t$

$t \leq 6$



6. Write a statement for the the following graph **2**



$-2 \leq x < 2$ ✓ values correct

✓ signs correct

7. The formula for finding the Volume, V, of a cone with radius, r, and perpendicular height, h, is **3**

$V = \frac{1}{3}\pi r^2 h$. Find the radius of a cone, to the nearest centimeter, with volume 63 cm^3 and perpendicular height 15 cm.

$V = \frac{1}{3}\pi r^2 h$

$\times 3 \quad 63 = \frac{1}{3} \times \pi \times r^2 \times 15$ ✓

$\frac{189}{15\pi} = \frac{15\pi}{15\pi} \times r^2$

$\sqrt{4.0107\ldots} = \sqrt{r^2}$ ✓

$r = 2.002\ldots$

$\therefore$ Radius of the cone is 2 cm ✓

End of Section I

SECTION II: QUADRATIC EXPRESSIONS AND ALGEBRAIC FRACTIONS

1. Expand the following expressions and simplify where possible.

(a) $(4x + 1)(3x + 5)$ **1**

$= 12x^2 + 20x + 3x + 5$

$= 12x^2 + 23x + 5$

(b) $(2a - 3)^2$ **1**

$= (2a)^2 + 2(2a)(-3) + (-3)^2$

$= 4a^2 - 12a + 9$

(c) $(6 - x)(x + 6)$ **1**

$= 6^2 - x^2$

$= 36 - x^2$

2. Factorise the following

(a) $5x + 20y$ **1**

$= 5(x + 4y)$

(b) $-21pq^2 - 28p^2q$ **1**

$-7pq(3q + 4p)$

(c) $a(3 - 4b) - 5(3 - 4b)$ **1**

$= (3-4b)(a-5)$

(d) $3x - 8y - 6xy + 4$ **2**

$= 3x - 6xy - 8y + 4$

$= 3x(1-2y) + 4(-2y+1)$

$= (1-2y)(3x+4)$

(e) $x^2 + 3x - 10$ **1**

Mul = -10
Add = 3
+5 −2

$= x^2 - 2x + 5x - 10$

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

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

(f) $8x^2y^2 - 8$ **2**

$= 8(x^2y^2 - 1)$

$= 8((xy)^2 - 1^2)$

$= 8(xy+1)(xy-1)$

3. Simplify the following

(a) $\dfrac{10a^{7}x^{3}}{25a^{2}x^{7}}$ **1**

$= \dfrac{2a^{7}x^{3}}{5}$

(b) $\dfrac{x+3}{3} - \dfrac{x-4}{4}$ **2**

$= \dfrac{4(x+3)}{12} - \dfrac{3(x-4)}{12}$

$= \dfrac{4x+12-3x+12}{12}$

$= \dfrac{x+24}{12}$

(c) $\dfrac{5}{x+1} + \dfrac{2}{x-2}$ **2**

$= \dfrac{5(x-2)}{(x+1)(x-2)} + \dfrac{2(x+1)}{(x+1)(x-2)}$

$= \dfrac{5x-10+2x+2}{(x+1)(x-2)}$

$= \dfrac{7x-8}{(x+1)(x-2)}$

4. Factorise and simplify the following:

(a) $\frac{2x^2+9x+9}{2x+3}$ **2**

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

$= x+3$

Mul = 18
Add = 9
+3 +6

$= 2x^2 + 6x + 3x + 9$

$= 2x(x+3) + 3(x+3)$

$= (x+3)(2x+3)$

(b) $\frac{3x^2-21x+36}{2x^2-32} \div \frac{6x-18}{2x+10}$ **3**

$= \frac{3(x^2-7x+12)}{2(x^2-16)} \times \frac{2(x+5)}{6(x-3)}$

$x^2 - 7x + 12$
$= x^2 - 3x - 4x + 12$
$= x(x-3) - 4(x-3)$
$= (x-3)(x-4)$

Mul = 12
Add = -7
-3 -4

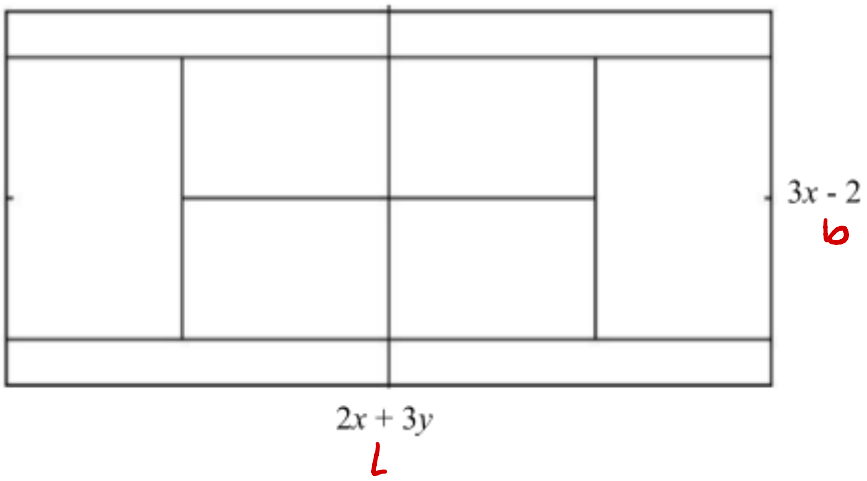
$x^2 - 16$
$= x^2 - 4^2$
$= (x+4)(x-4)$

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

$= \frac{x+5}{2(x+4)}$

5. Seamus draws a diagram of his family's new tennis court. He needs to determine the area. **2**

Write a fully simplified expression for the area, using the information given by the units shown.



$A = Lb$

$A = (2x + 3y)(3x - 2)$

$A = 6x^2 - 4x + 9xy - 6y$

6. Last year Mr Kyritsis was paid \$$x$ per week. **3**
This year due to extra responsibilities he is given a \$200 per week pay rise.

When creating his budget Mr Kyritsis noticed that half of his current pay is spent on rent and \$100 on petrol. This leaves Mr Kyritsis with \$450 for other expenses

Create an algebraic equation and find the amount Mr Kyritsis was paid per week last year

$\frac{x + 200}{2} - 100 = 450$

$\frac{x + 200}{2} = 550$

$x + 200 = 1100$

$x = 900$

∴ Mr Kyritsis was paid \$900 per week last year.

End of Assessment task

Additional Writing Space. (Please clearly indicate which questions you are answering)

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