Name: _____

St Catherine's School
Waverley

2017 Assessment Task I

Year 10 Mathematics 5.2/5.3

General Instructions

- Reading Time – 3 minutes
- Working Time – 55 minutes
- Write using black or blue pen. Black pen is preferred
- Board-approved calculators may be used
- All questions are to be attempted
- In Part B and Part C, show all relevant mathematical reasoning and/or calculations
- Marks may be deducted for careless or badly arranged work
- Answer all questions in the space provided.
- **Task Weighting – 20%**

Part A – Multiple Choice	/4
Part B – Indices and Surds	31
Part C – Linear Relationships	/23
TOTAL	/58

Part A – Multiple Choice.   4 marks

Circle the correct answer

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(1) What is the equation of a horizontal line passing through $(1, -3)$?

    (A) $x = 1$ **(B)** $y = -3$

    (C) $y = x - 3$ **(D)** $y = 0$

(2) $3.2^{12} \div 0.025$ in scientific notation correct to 3 significant figures is
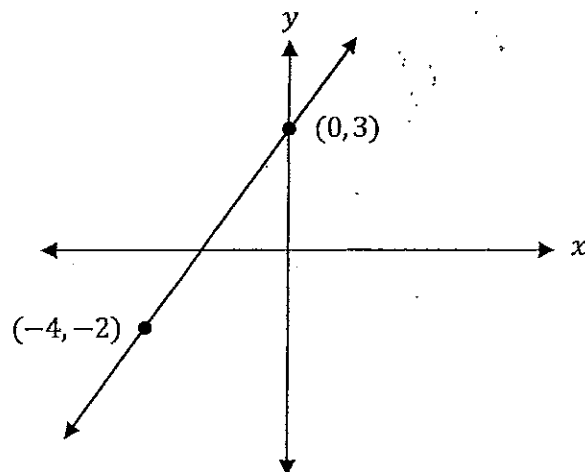
    (A) 4.612×10^7 **(B)** 461×10^5

    (C) 4.61×10^7 **(D)** 4.61×10^9

(3) What is the equation of the line?

    (A) $y = \frac{5}{4}x + 3$ **(B)** $y = \frac{4}{5}x + 3$

    (C) $y = -\frac{5}{4}x + 3$ **(D)** $y = 3x - 2$

3

(4) $\dfrac{5m^2}{\sqrt[4]{n^3}} =$

'(A) $5m^2n^{-\frac{3}{4}}$

(B) $5m^2n^{\frac{3}{4}}$

(C) $5m^2n^{-\frac{4}{3}}$

(D) $5(m^2n)^{-\frac{3}{4}}$

End of Part A

Part B – Common Section   **31 marks**

Answer in the space provided.
Show all necessary working clearly.

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(1) Simplify fully the following:

    (a) $\sqrt{80}$

    (b) $\dfrac{4\sqrt{32}}{2\sqrt{2}}$

    (c) $\sqrt{50} + 2\sqrt{98}$

    (d) $6\sqrt{5} \times \sqrt{10} \times \left(3\sqrt{2}\right)^2$

    (e) $\dfrac{\left(2x^7\right)^3 y^2}{x^{10} y}$

    (f) $(2x - 1)^0 + 2^{-2} - 3(2x)^0$

    (g) $\left(625 m^{12} n^8\right)^{\frac{1}{4}}$

    (h) $\sqrt{a^3}$

(2) Rewrite in simplest form with a rational denominator.

(a) $\dfrac{2}{3\sqrt{3}}$

(b) $\dfrac{2}{2\sqrt{2}-1}$

(3) Express the following without fractional or negative indices:

(a) $\dfrac{2m^{-3}}{5n^{-1}}$

(b) $\left(\dfrac{7x}{5y^3}\right)^{-2}$

(c) $7a^{-\frac{3}{5}}$

(4) Simplify fully expressing with positive indices $\dfrac{2(a^{-5})^2 b^4}{4a^{-9}(b^2)^{-1}}$.

(5) Expand and simplify $(3\sqrt{2} - 4\sqrt{3})(\sqrt{3} - \sqrt{2})$.

(6) (a) Simplify $2\sqrt{8} + \sqrt{200}$.

(b) Hence, find the value of n such that $2\sqrt{8} + \sqrt{200} = \sqrt{n}$. 1

(7) Solve for x.

(a) $3^{2x} = 81$ 1

(b) $25^{2x-1} = \dfrac{1}{125\sqrt{5}}$ 3

End of Part B

Part C – Linear Relationships   **23 marks**

Answer in the space provided.
Show all necessary working clearly.

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(1) Solve the following equations for x

(a) $3 - \frac{3x+1}{2} = 7$ 2

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

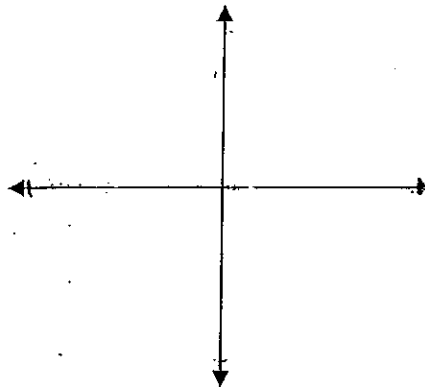**(2)** Simplify the following algebraic fractions

(a) $\frac{3}{2x-3} - \frac{2}{x+1}$

(b) $\frac{4x-6}{3x^2} \div \frac{6x-9}{9x}$

(3) Solve the following inequality and graph the solution on a number line.   3

$$7 - 2x > 5x - 1$$

(4) For the line with equation $3x + 5y = 15$,
    (a) Find the x and y intercepts.   2

    (b) Hence, sketch the graph of the line on the axes below.
       Label clearly the x and y intercepts.   1

(5) Find the equation of the line with gradient of 4 passing through $(-1, 2)$.   2

(6) The sum of three consecutive odd numbers is no more than 249.
Write an inequality and solve it to find the possible values for x, where
x represents the smallest of the three consecutive odd numbers.　　2

(7) A line ℓ passes through the points $(4, 3)$ and $(-2, -6)$.
(a) Find the equation of the line ℓ.　　3

(b) Does the line ℓ pass through the point $(-8, 10)$?　　1

END OF TASK

St Catherine's Waverley   (SAMPLE SOLUTIONS)

2017 Assessment task 1 YR10

TOPICS [INDICES / SURDS / LINEAR FUNCTIONS]

1. $y = -3$.

∴ = B.

2. $3.2^{12} \div 0.025$

$= 4.61 \times 10^{7}$ (3sf.)

$= C$

3. $m = \dfrac{3 - (-2)}{0 - (-4)} = \dfrac{5}{4}$

$y - 3 = \dfrac{5}{4}(x)$

$y = \dfrac{5}{4}x + 3 = A$

4. $\dfrac{5m^2}{4\sqrt{n^3}} = \dfrac{5m^2}{n^{3/4}}$

$= 5m^2 n^{-3/4}$

$= A$

1. $\sqrt{80} = \sqrt{16}\sqrt{5}$

$= 4\sqrt{5}$

b) $\dfrac{4\sqrt{32}}{2\sqrt{2}} = \dfrac{4\sqrt{4}\sqrt{8}}{2\sqrt{2}}$

$= \dfrac{8\sqrt{4}\sqrt{2}}{2\sqrt{2}}$

$= 4(2) = 8$

c) $\sqrt{50} + 2\sqrt{98}$

$\sqrt{50} + 2\sqrt{49}\sqrt{2}$

$= \sqrt{50} + 2(7)\sqrt{2}$

$\sqrt{2}\sqrt{25} + 14\sqrt{2}$

$= \sqrt{2}(\sqrt{25} + 14)$

$= \sqrt{2}(5 + 14)$

$= \sqrt{2}(19)$

d) $6\sqrt{5} \times \sqrt{10} \times (3\sqrt{2})^2$

$= 6\sqrt{5} \times \sqrt{2}\sqrt{5} \times 9(2)$

$= 18 \times 6\sqrt{2}(5)$

$= 18 \times 30\sqrt{2}$

$= 540\sqrt{2}$

e. $\dfrac{(2x^7)^3 y^2}{x^{10} y}$

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

$= 8x^{11} y$

f. $(2x-1)^0 + 2^{-2} - 3(2x)^0$

$= 1 + \dfrac{1}{2^2} - 3$

$= -1.75$

g. $(625 m^{12} n^8)^{1/4}$

$= 5 m^3 n^2$

h. $\sqrt{a^3} = \sqrt{a^3}$ (cannot be simplified further)

2. a) $\dfrac{2}{3\sqrt{3}} = \dfrac{2\sqrt{3}}{3(3)} = \dfrac{2\sqrt{3}}{9}$

b) $\dfrac{2}{2\sqrt{2} - 1} \times \dfrac{2\sqrt{2}+1}{2\sqrt{2}+1}$

$= \dfrac{4\sqrt{2} + 2}{4(2) - 1}$

$= \dfrac{2(2\sqrt{2} + 1)}{7}$

3. a) $\dfrac{2m^{-3}}{5n^{-1}} = \dfrac{\frac{2}{m^3}}{\frac{5}{n}}$

$= \dfrac{2}{m^3} \times \dfrac{n}{5}$

$= \dfrac{2n}{5m^3}$

b) $\left(\dfrac{7x}{5y^3}\right)^{-2}$

$= \left(\dfrac{5y^3}{7x}\right)^2 = \dfrac{25y^6}{49x^2}$

c. $7a^{-3/5}$

$= \dfrac{7}{\sqrt[5]{a^3}}$

6. $2\sqrt{8} + \sqrt{200}$

$= 2\sqrt{4}\sqrt{2} + \sqrt{100}\sqrt{2}$

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

$= 14\sqrt{2}$

4. $\dfrac{2(a^{-5})^2 b^4}{4a^{-9}(b^2)^{-1}}$

$= \dfrac{2a^{-10}b^4}{4a^{-9}b^{-2}}$

$= \dfrac{2b^2 b^4 a^9}{4a^{10}}$

$= \dfrac{2b^6}{4a}$

$= \dfrac{b^6}{2a}$

b. $2\sqrt{8} + \sqrt{200} = \sqrt{n}.$

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

$n = (14\sqrt{2})^2 = 196(2) = 392$

7. a) $3^{2x} = 81$

$2x = 4$

$x = 2.$

b) $25^{2x-1} = \dfrac{1}{125\sqrt{5}}$

$(5^2)^{2x-1} = \dfrac{1}{5^3\sqrt{5}}$

$5^{(4x-2)} = 5^{-7/2}$

$4x - 2 = -\dfrac{7}{2}$

$4x = -\dfrac{7}{2} + 2$

$4x = -\dfrac{3}{2}$

$x = -\dfrac{3}{8}$

5. $(3\sqrt{2} - 4\sqrt{3})(\sqrt{3} - \sqrt{2})$

$= 3\sqrt{6} - 3(2) - 4(3) + 4\sqrt{6}.$

$= 7\sqrt{6} - 6 - 12$

$= 7\sqrt{6} - 18$

LINEAR RELATIONSHIPS

1)

a) $3 - \dfrac{3x+1}{2} = 7$

$6 - (3x+1) = 14$

$6 - 3x - 1 = 14$

$-3x + 5 = 14$

$-3x = 9$

$x = -3$

b) $\dfrac{x-2}{3} + \dfrac{x+3}{2} = \dfrac{x}{3}$

$\dfrac{2(x-2)}{6} + \dfrac{3(x+3)}{6} = \dfrac{2x}{6}$

$2x - 4 + 3x + 9 = 2x$

$-x + 5 = 2x$

$3x = 5, \quad x = \dfrac{5}{3}$

2. $\dfrac{3}{2x-3} - \dfrac{2}{x+1}$

$= \dfrac{3(x+1)}{(2x-3)(x+1)} - \dfrac{2(2x-3)}{(x+1)(2x-3)}$

$= \dfrac{3x+3 - 4x + 6}{(2x-3)(x+1)}$

$= \dfrac{9-x}{}$

b. $\dfrac{4x-6}{3x^2} \div \dfrac{6x-9}{9x}$

$= \dfrac{4x-6}{3x^2} \times \dfrac{9x}{6x-9}$

$= \dfrac{9x(4x-6)}{(3x^2)(6x-9)}$

$= \dfrac{36x^2 - 54x}{18x^3 - 27x^2}$

$= \dfrac{9(4x^2 - 6x)}{9(2x^3 - 3x^2)}$
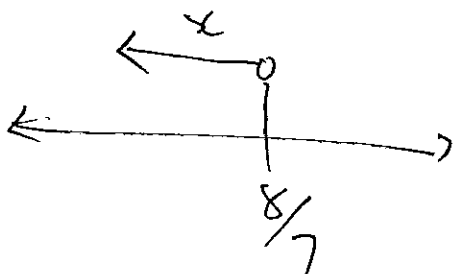
$= \dfrac{2(2x^2 - 3x)}{2x^3 - 3x^2}$

$= \dfrac{2(2x^2 - 3x)}{x(2x^2 - 3x)}$

$= \dfrac{2}{x}$

3. $7 - 2x > 5x - 1$
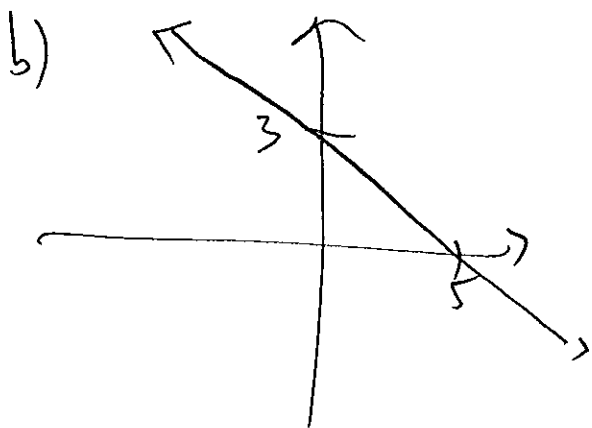
$7x < 8$

$x < \dfrac{8}{7}$

4. $3x + 5y = 15$

at $x = 0$, $5y = 15$

$y = 3$

at $y = 0$ $3x = 15$

$x = 5$

$(0,3)$ and $(5,0)$

b)

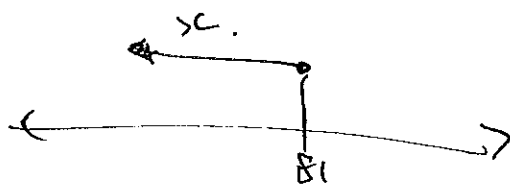5. $y - y_1 = m(x - x_1)$

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

$y - 2 = 4x + 4$

$y = 4x + 6$

6. $x + x + 2 + x + 4 \leq 249$

$3x + 6 \leq 249$

$3x \leq 243$

$x \leq 81$

7. $\dfrac{3 + 6}{4 + 2} = m = \dfrac{9}{6} = \dfrac{3}{2}$

$y - 3 = \dfrac{3}{2}(x - 4)$

$y - 3 = \dfrac{3}{2}x - 6$

$y = \dfrac{3}{2}x - 3$

b. sub in $10 = \dfrac{3}{2}(-8) - 3$ X

✗ not pass through