

Name _____
Date suggested
soln

Year 9 MATHEMATICS 5.2/5.3 2022

TASK 1

General Instructions

- No reading time given
- Working time – 55 minutes
- Show all necessary working / units
- Board approved calculators are allowed
- Exam guidelines
 - ✓ Use black pen for your working
 - ✓ Use a pencil and ruler for diagrams
 - ✓ Marks may be lost for poorly organised written work.

Total Marks – 40

Section I – 20 marks

Allow 25 mins

Section II – 20 marks

Allow 30 mins

Question	Indices and Surds	Algebraic Expressions, Equations and Inequalities	Total
Section 1 (5.2)			/20
1,2,6,7	/8		
3-5,8-10		/12	
Section 2 (5.3)			/20
1-2,6	/9		
3-5,8-9		/11	
	/17	/23	/40

Section 1 – 5.2 (20 marks)

Allow approximately 25 minutes for this section

Multiple Choice

Attempt Questions 1 to 10

1. This expression $-12hk^2 \div 3hk$ simplifies to:

A. $-36hk^3$

B. $-9hk^3$

C. $4h^2$

☒ D. $-4k$

2. 5×8^{-3} expressed with a positive index is:

A. 40^3

B. $\frac{1}{5 \times 8^3}$

☒ C. $\frac{5}{8^3}$

D. 5×8^3

3. The solution to the equation $\frac{x}{3} - 2 = 3$ is:

A. $x = 11$

☒ B. $x = 15$

C. $x = 7$

D. $x = 9$

4. $7(4y - 3)$ expands to:

A. $11y - 3$

☒ B. $28y - 21$

C. $28y - 3$

D. $11y - 10$

5. Calculate: $P = \frac{5}{3x-7}$ when $x = 4$

A. $P = -1$

☒ B. $P = 1$

C. $P = \frac{5}{19}$

D. $P = \frac{5}{4}$

Short Response

Answer the questions in the spaces provided. Your responses should include relevant mathematical reasoning and/or calculations

Question 6 (4 marks)

Marks **CANNOT** be awarded for poorly organised written work.

Simplify the following:

a) $(2v^2w^3)^3$ 2
 $= 8v^6w^9$

b) $\left(\frac{4pq^7}{2r}\right)^2$ 2
$$\frac{16p^2q^{14}}{4r^2} = \frac{4p^2q^{14}}{r^2}$$

Question 7 (2 marks)

Write the following value in scientific notation, using three significant figures:

(a) The time taken for light to travel 1 kilometre is 0.00000303356 seconds. 2
 $3.03 \times 10^{-6} \text{ s}$

Question 8 (2 marks)

Expand and simplify the following:

(a) $5a - 7(a + 1)$ 2
 $= 5a - 7a - 7$
 $= -2a - 7$

Question 9 (2 marks)

Solve the following equation:

$$3(7 - 2x) = 9x + 11$$

$21 - 6x = 9x + 11$

$$10 = 15x$$
$$x = \frac{10}{15}$$
$$= \frac{2}{3}$$

Question 10 (5 marks)

Aqua wanted to save water, so she installed a cylindrical rainwater tank in her backyard. Its volume is given by the formula $V = \pi r^2 h$, where V is the volume of tank in kilolitres (kL), r is its radius in metres, and h is its height in metres.

- (a) Rearrange the formula for volume ($V = \pi r^2 h$) to make the height (h) the subject. 1

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

- (b) The rainwater tank can hold 10 kL and has a radius of 1.4m. Using part (a), find the height of the tank (in metres). Round your answer to 3 significant figures. 2

$$h = \frac{10}{\pi (1.4)^2}$$

$$h = 1.62 \text{ m}$$

- (c) On a particular rainy day, Aqua measures the height of the collected water collected to be 1.2m. Calculate the volume of rain collected (in kilolitres - kL). Round your answer to 2 decimal places. 2

$$\begin{aligned} V &= \pi r^2 h \\ &= \pi (1.4)^2 \times 1.2 \end{aligned}$$

$$\begin{aligned} &= 7.39 \text{ kL (to 2 decimal point)} \\ &\quad \text{(to 2 sig fig)} \end{aligned}$$

Attempt Questions 1 to 9.

Allow approximately 30 minutes for this section

Multiple Choice Questions

1. If $\left(\frac{x}{4}\right)^3 = \frac{125}{64}$, x is equal to:

A. 125

B. 25

☒ C. 5

D. 4

2. Find the exact value of $4 \times (5^{250} \div 5^{248})$.

A. 4

B. 25

☒ C. 100

D. 400

3. If $3(x - 6) - 5 = -2$, the value of x is

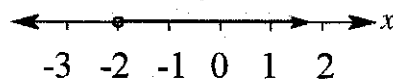
A. 2

B. 4

☒ C. 7

D. 13

4. Identify the inequality that can be represented by the given number line below:

☒ A. $x - 3 \geq -5$ B. $-3 - x \geq 2$ C. $2 - x \geq -5$ D. $x - 2 \geq -3$

5. Simplify fully: $(6xy + 12x) \div 2 - 5yx$

A. $9x - 5yx$

B. $6x - 2xy$

C. $3xy + 6x - 5yx$

D. $6xy + 6x - 5yx$

Short Answer Questions

Answer the questions in the spaces provided. Your responses should include relevant mathematical reasoning and/or calculations.

Marks **CANNOT** be awarded for poorly organised written work.

Question 6 (7 marks)

Simplify the following and leaving your answers in surd form if necessary.

(a) $12\sqrt{7} + 4\sqrt{5} - 4\sqrt{7} - 3\sqrt{5}$

1

$$= 8\sqrt{7} + \sqrt{5}$$

(a) $\frac{5\sqrt{3}}{4} + \frac{\sqrt{3}}{2}$

2

$$= \frac{5\sqrt{3}}{4} + \frac{2\sqrt{3}}{4}$$
$$= \frac{7\sqrt{3}}{4}$$

(b) $3\sqrt{2} - 2\sqrt{8}$

2

$$= 3\sqrt{2} - 2\sqrt{2 \times 4}$$
$$= 3\sqrt{2} - 2\sqrt{4}\sqrt{2}$$
$$= 3\sqrt{2} - 2 \times 2\sqrt{2} = 3\sqrt{2} - 4\sqrt{2}$$
$$= -\sqrt{2}$$

(d) $6\sqrt{125} \div 3\sqrt{5}$

2

$$= \frac{6\sqrt{125}}{3\sqrt{5}}$$
$$= \frac{6}{3} \sqrt{\frac{125}{5}} = 2\sqrt{25}$$
$$= 10$$

Question 7 (3 marks)

Find the answer for the given inequality and hence, draw the number line showing your answer.

3

$$3(x + 2) > x - 2$$

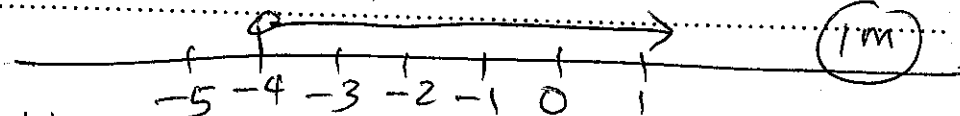
$$3x + 6 > x - 2$$

$$3x + 6 - x > x - 2 + x$$

$$2x + 6 - 6 > -2 - 6$$

$$2x > -8$$

$$x > -4$$



Question 8 (3 marks)

Two shapes below have the same perimeter. Determine the length of each side of the pentagon (fig B).

3

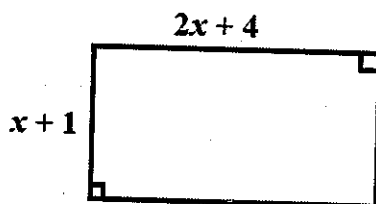


Figure A

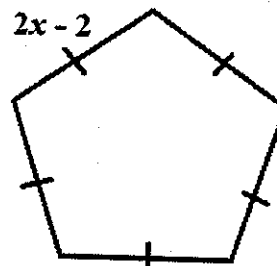


Figure B

NOT
TO
SCALE

$$(2x + 4 + x + 1) \times 2 = 5(2x - 2)$$

$$(3x + 5) \times 2 = 5(2x - 2)$$

$$6x + 10 = 10x - 10$$

$$6x + 10 - 6x = 10x - 10 - 6x$$

$$10 = 4x - 10$$

$$\therefore 4x = 20$$

$$x = 5$$

$$\therefore 2x - 2 = 10 - 2 = 8$$

$$\text{Length} = 8 \text{ units}$$

Question 9 (2 marks)

The formula of filling up the LP gas tank is given by $V = 4.5 + 0.14t$, where V is the volume of LP gas in litres and t is the time taken in second.

If the maximum volume of the gas tank is 90 litres, calculate the time taken needed to fill up a half-filled gas tank to the nearest minute.

2

Now $V = 45 \text{ L.}$

$$45 = 4.5 + 0.14t \quad \left. \vphantom{45 = 4.5 + 0.14t} \right\} \text{ 1m}$$

$$0.14t = 40.5$$

$$t = 289.285$$

$$= 5 \text{ min (to the nearest min.)}$$

1m

END OF EXAM