



Name: \_\_\_\_\_

Mark: \_\_\_\_\_

Teacher: \_\_\_\_\_

Parent Signature: \_\_\_\_\_

**INSTRUCTIONS**

Permitted equipment:

- No calculators are permitted
- No notes may be used
- Stationery and drawing equipment is allowed.

**Question 1. [8 marks]**

Work out the following. Where an answer is a fraction, give the answer fully simplified.

a.  $6^2 = 36$  ✓

b.  $2^6 = 2 \times 2 \times 2 \times 2 \times 2 \times 2 = 64$  ✓

c.  $10^4 = 10\,000$  ✓

d.  $\sqrt{49} = 7$  ✓

e.  $400^{\frac{1}{2}} = 20$  ✓

f.  $\sqrt[3]{1\,000\,000} = 100$  ✓

g.  $3^{-3} = \frac{1}{3^3} = \frac{1}{27}$  ✓

h.  $10^{-5} = \frac{1}{100\,000} \approx 0.00001$  ✓

**Question 2. [13 marks]**

Simplify each of the following and leave your answer in index form with positive indices:

a.  $7^5 \times 7^4 = 7^9$  ✓

b.  $8^9 \div 8^3 = 8^6$  ✓

c.  $11^5 \times 11 = 11^6$  ✓

d.  $(17 \times 13)^4 = 17^4 \times 13^4$  ✓

(8)

e.  $(7^4)^5$

$= 7^{20}$

f.  $(5^3 \times 9^{-3})^{-2}$

$= 5^{-6} \times 9^6$

$= \frac{9^6}{5^6}$

g.  $\frac{15^4 \times 5^{-2}}{10^{-3} \times 3^4}$

$= 3^4 \times 5^4 \times 5^{-2} \times 2^3 \times 5^3 \times 3^{-4}$

$= 3^0 \times 5^5 \times 2^3$

$= 5^5 \times 2^3$

h.  $60^2 \times \sqrt[3]{(5^6 \times 12^{-9})^2}$

$= 60^2 \times \sqrt[3]{5^{12} \times 12^{-18}}$

$= 60^2 \times 5^4 \times 12^{-6}$

$= 5^2 \times 12^2 \times 5^4 \times 12^{-6}$

$= 5^6 \times 12^{-4}$

$= \frac{5^6}{12^4}$

**Question 3. [3 marks]**

Write as ordinary numbers:

a.  $6 \times 10^4$

$60\,000$

b.  $8.92 \times 10^{-5}$

$0.000\,0892$

c.  $4.741 \times 10^2$

$474.1$

**Question 4. [2 marks]**

Write in scientific notation:

a. 0.002

$2 \times 10^{-3}$

b. 9\,070.5

$9.0705 \times 10^3$

(21)

(24)

(26)

**Question 5. [4 marks]**

Work out the following and write your answer in scientific notation:

$$\begin{aligned} \text{a. } 5 \times 10^9 \times 7 \times 10^{-2} &= 35 \times 10^7 \quad \checkmark \\ &= 3.5 \times 10^8 \quad \checkmark \end{aligned}$$

$$\begin{aligned} \text{b. } 2.5 \times 10^{-3} \div (5 \times 10^{-6}) &= 0.5 \times 10^3 \quad \checkmark \\ &= 5 \times 10^2 \quad \checkmark \end{aligned}$$

**Question 6. [2 marks]**

Refer to the following calculator screens and write the answer rounded to 3 significant figures.

$$\text{a. } \boxed{6.674\text{E-}11 \times 7.3477\text{E}22 \times 5.9} \quad 1.98 \times 10^{20} \quad \checkmark$$

$$\text{b. } \boxed{4^{-3} \times \sqrt{2}} \quad 0.0221 \approx 2.21 \times 10^{-2} \quad \checkmark$$

**Question 7. [3 marks]**

Use appropriate mental skills to work out the following:

$$\text{a. } -19 - -6 = -13 \quad \checkmark$$

$$\text{b. } -28 \div -4 = 7 \quad \checkmark$$

$$\text{c. } 52 + 12 \times -6 = -20 \quad \checkmark$$

**Question 8. [10 marks]**

Use appropriate written techniques to work out the following. You must show clear working to receive full marks. Fully simplify any fractions.

$$\begin{aligned} \text{a. } 21.75 - 33.409 &= 33.409 - 21.75 \\ &= 11.659 \quad \checkmark \\ 21.75 - 33.409 &= -11.659 \quad \checkmark \end{aligned}$$

$$\begin{aligned} \text{b. } -0.52 \times 11.6 &= 11.6 \times 52 \\ &= 232 \quad \checkmark \\ &= 5800 \quad \checkmark \\ &= 6032 \quad \checkmark \\ -0.52 \times 11.6 &= -6.032 \quad \checkmark \end{aligned}$$

c.  $3\frac{2}{3} + 5\frac{1}{6} - 1\frac{5}{9}$

$$\begin{aligned}
 3\frac{4}{6} + 5\frac{1}{6} &= 8\frac{5}{6} \quad \checkmark \\
 8\frac{5}{6} - 1\frac{5}{9} &= 8\frac{15}{18} - 1\frac{10}{18} \\
 &= \underline{7\frac{5}{18}} \quad \checkmark
 \end{aligned}$$

d.  $5\frac{5}{8} \div \frac{9}{10}$

$$\begin{aligned}
 \frac{45}{8} \div \frac{9}{10} &= \frac{45}{8} \times \frac{10}{9} \quad \checkmark \\
 &= \frac{25}{4} \\
 &= \underline{6\frac{1}{4}} \quad \checkmark
 \end{aligned}$$

e.  $9782 \div 8$

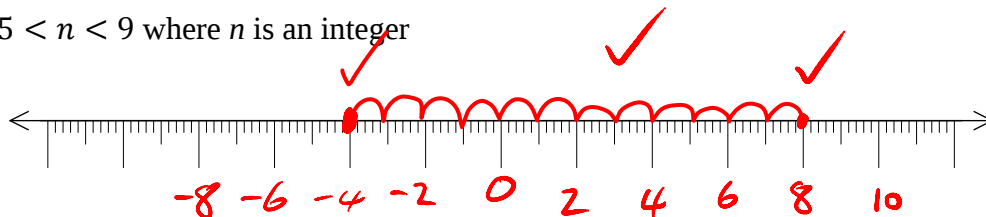
$$\begin{aligned}
 &\begin{array}{r} 1222 \text{ r } 6 \\ 8 \overline{) 9782} \end{array} \quad \checkmark \\
 9782 \div 8 &= 1222\frac{6}{8} \quad \checkmark \\
 &= 1222\frac{3}{4}
 \end{aligned}$$

51  
~~59~~

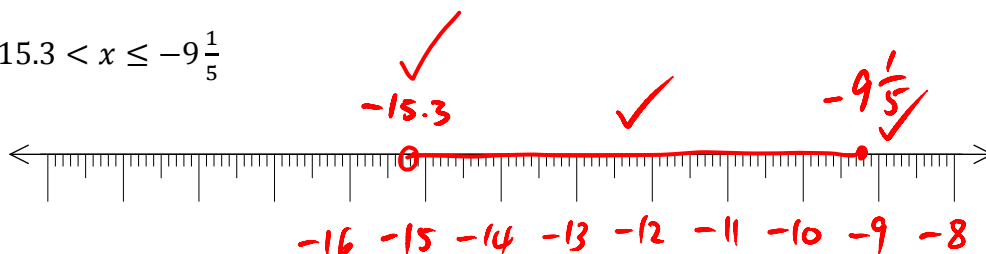
**Question 9. [6 marks]**

Show the following on separate number lines.

a.  $-5 < n < 9$  where  $n$  is an integer



b.  $-15.3 < x \leq -9\frac{1}{5}$



**Question 10. [3 marks]**

A rectangular house block is 38.10m long by 21.57m wide.

- a. Estimate the total area of the house block (Hint: use area = length  $\times$  width).

$$\begin{aligned} \text{area} &= 38.10 \times 21.57 \\ &\approx 40 \times 20 \\ &\approx 800 \text{ m}^2 \end{aligned} \quad \checkmark \checkmark$$

~~68~~  
54

The house occupies an area of 327.6m<sup>2</sup>.

- b. Estimate the area of the block available for the garden.

$$800 - 327.6 \approx 500 \text{ m}^2 \quad \checkmark$$

**Question 11. [4 marks]**

Simplify the following:

a.  $\sqrt{48} = \sqrt{16 \times 3} = 4\sqrt{3} \quad \checkmark$

~~68~~  
58

b.  $\sqrt{63} \times \sqrt{28} = \sqrt{9 \times 7} \times \sqrt{4 \times 7} = 3\sqrt{7} \times 2\sqrt{7}$   
 $= 6 \times 7 = 42 \quad \checkmark$

c.  $5\sqrt{5} + \sqrt{45} = 5\sqrt{5} + \sqrt{9 \times 5} = 5\sqrt{5} + 3\sqrt{5} = 8\sqrt{5} \quad /$

d.  $\frac{\sqrt{20}}{2\sqrt{5}} = \frac{\sqrt{4 \times 5}}{2\sqrt{5}} = \frac{2\sqrt{5}}{2\sqrt{5}} = 1 \quad \checkmark$

**Question 12. [2 marks]**

Write  $5\sqrt{8}$  as an entire surd.

$$\begin{aligned} &= \sqrt{25 \times 8} \\ &= \sqrt{200} \quad \checkmark \checkmark \end{aligned}$$

~~60~~  
72

**Question 13. [4 marks]**

- a. Write
- $0.\dot{5}\dot{7}$
- as a fully simplified fraction.

$$0.\dot{5}\dot{7} = \frac{57}{99} \quad \checkmark$$
$$= \frac{19}{33} \quad \checkmark$$

- b. Write
- $0.6\dot{7}\dot{9}$
- as a fully simplified fraction.

$$0.6\dot{7}\dot{9} \times 1000 = 679.7979 \dots$$
$$0.6\dot{7}\dot{9} \times 10 = 6.7979 \dots$$
$$0.6\dot{7}\dot{9} \times 990 = 673$$
$$0.6\dot{7}\dot{9} = \frac{673}{990} \quad \checkmark \checkmark$$