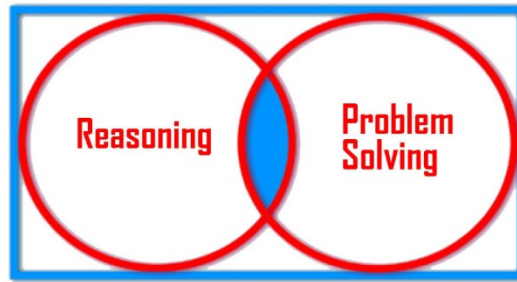


## GCSE Foundation (5 – 1)



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### Mathematical Reasoning Questions

#### (Powers and Roots) – Set 1

#### Solutions

**The questions are repeated here for your convenience**

1	<p>Choose all the calculations which will give an answer of 10</p> <p>a) <math>(2 + 3)^2</math>  b) <math>2^2 + 6</math>  c) <math>10^2 \div 2</math>  d) <math>(-6 + 4^2)</math></p> <p style="text-align: center;"><b><u>Solution</u></b></p> <p>a) <math>5^2 = 25</math>  b) <math>4 + 6 = 10</math>  c) <math>100 \div 2 = 50</math>  d) <math>-6 + 16 = 10</math></p> <p>Correct Answers: B and D <span style="float: right;"><b>[2Marks]</b></span></p>
2	<p>Circle the value of the calculation <math>(2 - 6)^2 + (5^2 - 7^2)</math></p> <p>a) <math>-40</math>  b) <math>-8</math>  c) <math>8</math>  d) <math>40</math></p> <p style="text-align: center;"><b><u>Solution</u></b></p> <p><math>(-4)^2 + (-24)</math> <span style="float: right;"><b>[1mark]</b></span>  <math>= 16 - 24</math>  <math>= -8</math> <span style="float: right;"><b>[1mark]</b></span></p>
3	<p>Here are two numbers <math>2^5</math> and <math>\sqrt{64}</math>  Tick the box(es) which are most appropriate about the two numbers</p> <p style="text-align: center;"><b><u>Solution</u></b></p> <p><input type="checkbox"/> <math>2^5 = \sqrt{64}</math> <b><math>32 \neq 8</math></b>  <input checked="" type="checkbox"/> <math>2^5 &gt; \sqrt{64}</math> <b><math>32 &gt; 8</math></b>  <input type="checkbox"/> <math>2^5 &lt; \sqrt{64}</math> <b><math>32 &lt; 8</math></b>  <input type="checkbox"/> None of the Above</p> <p style="text-align: right;"><b>[1mark]</b></p>

4



Here is a number pattern

$$1^3 = 1 = 1^2$$

$$1^3 + 2^3 = 9 = 3^2$$

$$1^3 + 2^3 + 3^3 = 36 = 6^2$$

$$1^3 + 2^3 + 3^3 + 4^3 = \square = \square$$

a) Fill in the missing numbers into the boxes

b) Use your answers above to complete the line

$$\dots\dots\dots = 784 = \dots\dots\dots$$

**Solution**

a)  $\square = \square$  [1mark]

b)  $\sqrt{784} = 28$  therefore  $784 = 28^2$  [1mark]

To obtain the beginning of the pattern we can follow the pattern by adding cube numbers in succession

$$1^3 + 2^3 + 3^3 + 4^3 + 5^3 + 6^3 + 7^3 = 784 = 28^2$$

[1mark]

5

Arrange the following numbers in ascending order

$$5, \quad 3^2, \quad (-4)^2, \quad \sqrt{64}, \quad -(4)^2$$

**Solution**

$$3^2 = 9$$

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

$$\sqrt{64} = 8$$

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

Correct order:  $-(4)^2, \sqrt{64}, 5, 3^2, (-4)^2$

[2marks]

6	<p>Without carrying out the actual calculation, how many zeros will the number <math>10^{15}</math> have when it is worked out?</p> <p style="text-align: center;"><b><u>Solution</u></b></p> <p>16 zeros</p> <p style="text-align: right;"><b>[1mark]</b></p>
7	<p>If <math>x</math> is an integer, which of the following statements is <b>true</b> about the expression <math>(-x)^3 + 10</math></p> <p style="text-align: center;"><b><u>Solution</u></b></p> <p><input type="checkbox"/> Always less than 1</p> <p><input type="checkbox"/> Always greater than 1</p> <p><input checked="" type="checkbox"/> Sometimes less than 1</p> <p><input type="checkbox"/> None of the Above</p> <p style="text-align: right;"><b>[1mark]</b></p>
8	<p>Given that <math>x</math> is a number, use an example to show that each of the statements could be true</p> <p style="text-align: center;"><b><u>Solution</u></b></p> <p>a) <math>x^2 + 1</math> will always be positive  <math>3^2 + 1 = 10</math> {accept any correct calculation where <math>x</math> is an integer} <b>[1mark]</b></p> <p>b) <math>x^2 - 1</math> can be positive or negative  <math>5^2 - 1 = 24</math> Positive <b>[1mark]</b>  <math>0^2 - 1 = -1</math> Negative. <b>[1mark]</b>  Or similar</p> <p>c) <math>10 - x^2</math> is negative  <math>10 - 4^2 = -6</math> <b>[1mark]</b>  Any calculation where <math>x</math> is greater or equal to 4  OR <math>x</math> is less or equal to <math>-4</math></p>

9 Oscar is solving the equation  $2x^2 + 3^2 = 8^2 + 3^2$   
Here is Oscars working out

$$2x^2 + 9 = 64 + 9$$

$$2x^2 + 9 = 73$$

$$2x^2 = 64$$

$$2x = 8$$

$$x = 4$$

a) Without carrying out the calculation, how could you check if Oscars answer is correct?

Substitute the number 4 in place of  $x$  to check whether the RHS is equal to the LHS **[1mark]**

b) Find any mistakes Oscar made

From  $2x^2 = 64$

Oscar took the square of 64 but he should have divided by 2 first **[1mark]**

10 State which of the following calculations is **TRUE** or **FALSE**

**Solution**

a)  $\sqrt{5} + \sqrt{6} = \sqrt{5 + 6}$

The LHS cannot be simplified further. RHS is  $\sqrt{11}$ .

Therefore, **False [1mark]**

b)  $2^2 + 3^2 = (2 + 3)^2$

$13 \neq 25$  Therefore, **False**

**[1mark]**

c)  $60 - 5^2 < 6^2 - 1^2$

$35 = 35$  Therefore, **False**

**[1mark]**

d)  $3 \times 2 = \sqrt{9} \times \sqrt{4}$

$6 = 3 \times 2$  Therefore, **True**

**[1mark]**