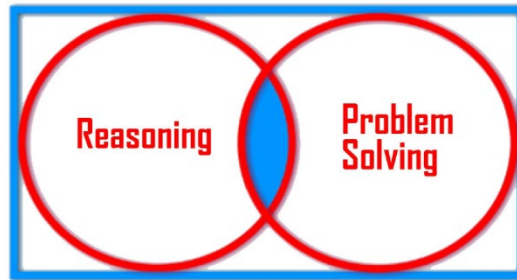


GCSE Foundation (5 – 1)



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Mathematical Reasoning Questions (Indices and Standard Form) – Set 1 Solutions

The questions are repeated here for your convenience

<p>1</p>	<p>Choose the numbers which are not in standard form and give a reason why</p> <p>a) 1.0×10^{-62}</p> <p>b) $1.0 \times 10^{\frac{1}{2}}$</p> <p>c) 1.0×10^0</p> <p>d) 0.1×10^3</p> <p style="text-align: center;"><u>Solution</u></p> <p>A number in standard form must be written in the form $a \times 10^n$ Where $1 \leq a < 10$ and n is an integer.</p> <p>B) is not in standard form because the power of 10 is a fraction [1mark]</p> <p>D) is not in standard form because 0.1 is less than 1 [1mark]</p>
<p>2</p>	<p>Given that, x and y are single digit numbers, which of the following represents the number $0.0x0y$ when it is written in standard form?</p> <p>a) $x.y \times 10^{-4}$</p> <p>b) $0.0x0y \times 10^0$</p> <p>c) $x.0y \times 10^{-2}$</p> <p>d) $x0.y \times 10^{-3}$</p> <p style="text-align: center;"><u>Solution</u></p> <p>Correct Answer: C [1mark]</p>
<p>3</p>	<p>Given that $a = 1 \times 10^5$ and $b = 2 \times 10^{10}$, without carrying out the actual calculations, which expression will have the least value?</p> <p>a) $a + b$</p> <p>b) $a - b$</p> <p>c) $\frac{b}{a}$</p> <p style="text-align: center;"><u>Solution</u></p> <p>Since b is larger than a, it means that $a - b$ will be negative and therefore will have the smallest value</p> <p>Correct Answer: B [1mark]</p>

4 Answer **True** or **False** to the following calculations

Solution

a) $2^{-5} \times 2^{-5} = 2^{25}$
 $2^{-10} \neq 2^{25}$ Therefore, **False** [1mark]

b) $2^{-5} \times 2^{-5} = 4^{-25}$
 $2^{-10} \neq 4^{-25}$ Therefore, **False** [1mark]

c) $2^{-5} \times 2^{-5} = 2^{10}$
 $2^{10} = 2^{10}$ Therefore, **True** [1mark]

5 Complete the calculations below by filling in the box each question

Solution

a) $6^{-2} \times \boxed{6^2} = 1$ [1mark]

b) $6^6 \div \boxed{-6^6} = -1$ [1mark]

c) $(p^{\boxed{3p}})^2 = \boxed{p}^{6p}$ [2marks]

d) $\left(\frac{\boxed{2}}{3}\right)^{\boxed{2}} \times \left(\frac{1}{3}\right)^2 = \frac{4}{\boxed{81}}$ [3marks]

6 Answer **True** or **False** to the following statements

Solution

a) $5^{-2} > 5^{-1}$

$$5^{-2} = \frac{1}{5^2} = \frac{1}{25}$$

$$5^{-1} = \frac{1}{5}$$

$\frac{1}{25}$ is less than $\frac{1}{5}$ Therefore, **False** [1mark]

b) $2x^0 = 2x$

$x^0 = 1$ Therefore, $2x^0 = 2$ Therefore, **False** [1mark]

c) $p^{-5} = \frac{1}{p^5}$

Therefore, **True** [1mark]

7 Workout $(5 \times 10^6) \times (4 \times 10^9)$

Given your answer in standard form

Olivia's Answer

$$5 \times 4 = 20$$

$$10^6 \times 10^9 = 10^{54}$$

$$\text{Therefore, } (5 \times 10^6) \times (4 \times 10^9) = 20 \times 10^{54}$$

Identify the two mistakes Olivia made and correct them

Solution




1. $10^6 \times 10^9 = 10^{15}$: Olivia multiplied the powers instead of adding

2. 20×10^{54} : is not in standard form since 20 is greater than 10 [2marks]

Correct Answer:

$$2.0 \times 10^{16}$$

[1mark]

<p>8</p> 	<p>Here is a list of 3 numbers arranged in ascending order</p> $p, 1.2 \times 10^5, 3.5 \times 10^5$ <p>The range of the numbers is 1.8×10^4 find the value of p. Give your answer in standard form</p> <p style="text-align: center;"><u>Solution</u></p> <p>Range = Largest – Smallest Therefore, $3.5 \times 10^5 - p = 1.8 \times 10^4$ So $p = (3.5 \times 10^5) - (1.8 \times 10^4) = 3.32 \times 10^5$ [2marks]</p>
<p>9</p> 	<p>Here is a calculation: $7^6 + 2^6 - 5^6$</p> <p><u>Oscar's Answer</u></p> $7 + 2 - 5 = 4$ $6 + 6 - 6 = 6$ <p>Since the powers are the same, then $7^6 + 2^6 - 5^6 = 4^6$ Oscar is wrong. State the mistake he made and complete the calculation correctly.</p> <p style="text-align: center;"><u>Solution</u></p> <p>Oscar is wrong because, the only operations used in the calculation are (+) and (-). Therefore, Oscar needs to work out the individual values of the powers before adding or subtracting them. [1mark]</p> <p>Correct Answer: $7^6 + 2^6 - 5^6$ $117649 + 64 - 15625 = 102088$ [1mark]</p>
<p>10</p> 	<p>Solve the equation $2^n + 3^n = 275$</p> <p style="text-align: center;"><u>Solution</u></p> <p>Use trial and improvement</p> $2^4 + 3^4 = 97$ $2^6 + 3^6 = 793$ $2^5 + 3^5 = 275$ [2marks]