

Foundation Check In - 3.01 Powers and roots

Do not use a calculator.

1. Write the reciprocal of 3^2 in index notation.
2. Using the laws of indices, simplify $4^{-3} \times 4^5$ and write your answer in index notation.
3. Using the laws of indices, simplify $8^3 \div 8^5$ and write your answer in index notation.
4. Calculate 5^{-2} , giving your answer as a fraction.
5. Calculate $2^{-3} \times \sqrt{64}$.
6. Explain which is greater, 2^{-2} or 4^{-2} .
7. Matthew is asked to simplify $(4^{-2} \times 4^3 \times 4^5)^2$, giving his answer in index notation. His answer is 4^{12} . Is he right? Give a reason for your answer.
8. Explain why $10^3 \times 3^0$ is not equal to 30^3 .
9. When you add the cube of Alfie's age to Hannah's age, the total is 79. When you add the ages of Alfie and Hannah together, the total is 19. How old are Alfie and Hannah?
10. Jenny wants to tile the wall above her bath which measures 2 m high by 2 m wide. The square tiles that she has chosen will each cover an area of 400 cm^2 . How many tiles will she need to complete one row of the wall?

Extension

You may use a calculator for the extension task.

Find different pairs of values for x and y which will satisfy the equation $x^y = 64$.



Answers

1. 3^{-2}
2. 4^2
3. 8^{-2}
4. $\frac{1}{25}$
5. 1 or -1
6. 2^{-2} as $\frac{1}{4}$ is bigger than $\frac{1}{16}$.
7. Yes he is correct using the laws of indices, $-2 + 3 + 5 = 6$ and then $6 \times 2 = 12$.
8. The answer is not calculated by multiplying the bases and adding the indices or different bases so cannot apply the laws of indices.
The answer is $1000 \times 1 = 1000 = 10^3$.
9. Alfie is 4 and Hannah is 15.
10. Dimension of one tile = $\sqrt{400} = 20$ cm
 $200 \text{ cm} \div 20 \text{ cm} = 10$ tiles per row

Extension

Possible answers include:

$$x = 2 \text{ and } y = 6$$

$$x = 8 \text{ and } y = 2$$

$$x = 16 \text{ and } y = \frac{3}{2}$$

$$x = 262\,144 \text{ and } y = \frac{1}{3}$$

$$x = 4 \text{ and } y = 3$$

$$x = 64 \text{ and } y = 1$$

$$x = 4096 \text{ and } y = \frac{1}{2}$$

$$x = 16\,777\,216 \text{ and } y = \frac{1}{4}$$

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Assessment Objective	Qu.	Topic	R	A	G
AO1	1	Use negative integer indices to represent reciprocals			
AO1	2	Using the laws of indices, know and apply $a^m \times a^n = a^{m+n}$			
AO1	3	Using the laws of indices, know and apply $a^m \div a^n = a^{m-n}$			
AO1	4	Calculate with negative integer powers			
AO1	5	Calculate with negative integer powers and roots			
AO2	6	Understand the values of negative integer indices			
AO2	7	Explain how the laws of indices can be applied to simplify expressions with negative integer indices and brackets			
AO2	8	Understand when the laws of indices cannot be applied to simplify expressions with integer indices			
AO3	9	Solve a worded problem using calculations of integer indices			
AO3	10	Solve a worded problem using calculations with roots			

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