Topic Check In - 3.01 Powers and roots

Write the following in index form, as simply as possible.

1. $3 \times 3 \times 3 \times 3 \times 3$
2. $5^2 \times 5^7$
3. $8^6 \div 8^2$

Calculate the following.

4. $\sqrt{36}$
5. $\sqrt[3]{64}$

6. Explain why 8^3 is greater than 8×3.
7. Explain why $5^2 + 6^2$ is not equal to 11^2.
8. Given that the volume of a cube is found using the formula $V = s^3$, show how to find the length of the sides, s, for a cube with volume of $27\,\text{cm}^3$.
9. $x^2 + y = 37$, $x + y^2 = 149$. Calculate the values of x and y.
10. Find the value of a and the value of b given that $2^a + 3^b = 82$.

Extension

a) $2^1 = 2$, $2^2 = 4$, $2^3 = 8$ Find the least value of n where $2^n > 5000$.

b) $3^1 = 3$, $3^2 = 9$, $3^3 = 27$ Find the least value of n where $3^n > 5000$.

c) Find different pairs of values for m and n when $m > n$ and $m^n > 5000$.

Answers

1. 3^5
2. 5^9
3. 8^4
4. ± 6
5. 4
6. 8^3 means $8 \times 8 \times 8 = 512$ which is greater than $8 \times 3 = 24$
7. Must do the indices before the addition $25 + 36 = 61$, $11^2 = 121$ so $5^2 + 6^2 \neq (5 + 6)^2$
8. $\sqrt[3]{27} = 3$ cm
9. $x = 5$, $y = 12$
10. $a = 0$, $b = 4$

Extension

a) $2^{13} = 8192$

b) $3^8 = 6561$

c) Possible solutions:

m	n	m^n
6	5	7776
7	5	16807
8	5	32768
9	4	6561
10	4	10000
18	3	5832
71	2	5041
5001	1	5001

GCSE (9–1) MATHEMATICS

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AO1	2	Multiply expressions written in index form.			
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AO2	6	Understand the meaning of index notation.			
AO2	7	Justify the correct order of operations with indices (BIDMAS).			
AO2	8	Clearly apply rules of powers and roots in the context of volume.			
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