

## Topic Check In - 3.01 Powers and roots

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

- $3 \times 3 \times 3 \times 3 \times 3$
- $5^2 \times 5^7$
- $8^6 \div 8^2$

Calculate the following.

- $\sqrt{36}$
- $\sqrt[3]{64}$
- Explain why  $8^3$  is greater than  $8 \times 3$ .
- Explain why  $5^2 + 6^2$  is not equal to  $11^2$ .
- 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  $27 \text{ cm}^3$ .
- $x^2 + y = 37$ ,  $x + y^2 = 149$ . Calculate the values of  $x$  and  $y$ .
- Find the value of  $a$  and the value of  $b$  given that  $2^a + 3^b = 82$ .

### Extension

- $2^1 = 2$ ,  $2^2 = 4$ ,  $2^3 = 8$  Find the least value of  $n$  where  $2^n > 5000$ .
- $3^1 = 3$ ,  $3^2 = 9$ ,  $3^3 = 27$  Find the least value of  $n$  where  $3^n > 5000$ .
- Find different pairs of values for  $m$  and  $n$  when  $m > n$  and  $m^n > 5000$ .



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## Answers

1.  $3^5$
2.  $5^9$
3.  $8^4$
4.  $\pm 6$
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



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Assessment Objective	Qu.	Topic	R	A	G
AO1	1	Write expressions in index form.			
AO1	2	Multiply expressions written in index form.			
AO1	3	Divide expressions written in index form.			
AO1	4	Calculate simple square roots.			
AO1	5	Calculate simple cube roots.			
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.			
AO3	9	Solve problems involving indices.			
AO3	10	Apply index rules in solving problems.			

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