

Index investigation
Use either Excel or a Calculator

Positive Powers

Copy and complete these tables:

2^0	1
2^1	
2^2	
2^3	8
2^4	
...	
2^{10}	

3^0	
3^1	
3^2	
3^3	27
3^4	
...	
3^8	

5^0	
5^1	
5^2	25
5^3	
5^4	
...	
5^7	

Multiplying

Using the table, Jack observes that $5^2 \times 5^3 = 25 \times 125 = \mathbf{3125}$

He then observes that this is the same as 5^5

So this means that $5^2 \times 5^3 = 5^5$

Copy and complete this one:

$$2^2 \times 2^3 = 4 \times 8 =$$

This is the same as

$$\text{So this means that } 2^2 \times 2^3 =$$

Do EXACTLY the same for the following:

$$3^1 \times 3^5 =$$

$$2^5 \times 2^4 =$$

$$5^3 \times 5^4 =$$

$$3^4 \times 3^3 =$$

$$2^3 \times 2 =$$

Write down any pattern you observe between the question and the answer

Now try and use the tables to just write down the answer for:

$$3^2 \times 3^6 =$$

$$2^4 \times 2^5 =$$

$$5^2 \times 5^6 =$$

Can you produce a general rule: eg: What would $2^a \times 2^b =$

Division:

Jack now observes that $5^3 \div 5^2 = 125 \div 25 = \mathbf{5}$

He then observes that this is the same as 5^1

So this means that $5^3 \div 5^2 = 5^1$

Copy and complete this one:

$$2^3 \div 2^2 = 8 \div 4 = 2$$

This is the same as

$$\text{So this means that } 2^3 \div 2^2 =$$

Do EXACTLY the same for the following:

$$3^5 \div 3^1 =$$

$$2^5 \div 2^4 =$$

$$5^8 \div 5^4 =$$

$$3^7 \div 3^3 =$$

$$2^3 \div 2 =$$

Write down any pattern you observe between the question and the answer

Now try and use the tables to just write down the answer for:

$$3^6 \div 3^2 =$$

$$2^{10} \div 2^2 =$$

$$5^5 \div 5^2 =$$

Can you produce a general rule: eg: What would $2^a \div 2^b =$

Extension:

Explore the following style of questions. Maybe make some of your own up and see what you can spot and further patterns.

A) $(3^2)^3 =$

B) $(2^2)^5 =$

C) $(5^3)^2 =$

D) $(2^5)^2 =$