

2. Powers

The **square** of a number is the number multiplied by itself.

$$3^2 = 3 \times 3 = 9$$

The opposite of squaring is **square rooting**.

$$3^2 = 9 \text{ so } \sqrt{9} = 3$$

The **cube** of a number is the number multiplied by itself twice.

$$3^3 = 3 \times 3 \times 3 = 27$$

The opposite of cubing is **cube rooting**.

$$3^3 = 27 \text{ so } \sqrt[3]{27} = 3$$

$$5^2 = 5 \times 5 = 25$$

$$5^3 = 5 \times 5 \times 5 = 125$$

$$5^4 = 5 \times 5 \times 5 \times 5 = 625$$

$$5^5 = 5 \times 5 \times 5 \times 5 \times 5 = 3125$$

$$5^8 = 5 \times 5 \times 5 \times 5 \times 5 \times 5 \times 5 \times 5 = 390625$$

Maths, Y7 - Factors and Multiples

1. Keywords

Prime numbers: numbers with exactly two factors.

Multiples: are the numbers you find in a times table.

Eg the first five multiples of 2 are: 2, 4, 6, 8, 10

Factors: a factor of a number divides into it exactly.

3. Index Laws

simplify $2^5 \times 2^6$

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

$$= 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2$$

$$= 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2$$

$$= 2^{11}$$

$$2^5 \times 2^6 = 2^{5+6} = 2^{11}$$

To multiply numbers which have the same base, **add the powers**

simplify $5^7 \div 5^3$

$$\frac{5^7}{5^3}$$

$$= \frac{5 \times 5 \times 5 \times 5 \times 5 \times 5 \times 5}{5 \times 5 \times 5}$$

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

$$5^7 \div 5^3 = 5^{7-3} = 5^4$$

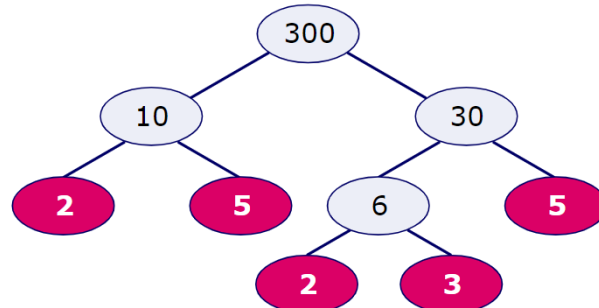
To divide numbers which have the same base, **subtract the powers**

4. Divisibility Tests

2	last digit 0, 2, 4, 6, 8?
3	sum of digits $\div 3$?
4	last 2 digits $\div 4$?
5	last digit 0 or 5?
6	$\checkmark 2$ rule and $\checkmark 3$ rule?
8	last 3 digits $\div 8$?
9	sum of digits $\div 9$?
10	last digit 0?

5. Prime Factorisation

Here is one possible factor tree for 300.



It shows that:

$$300 = 2 \times 2 \times 3 \times 5 \times 5$$

In index notation this is:

$$= 2^2 \times 3 \times 5^2$$

6. Highest Common Factor & Lowest Common Multiple

The **highest common factor** (HCF) of 18 and 30 is the highest number that both can be divided by without a remainder.

For small numbers like these we can just list all the factors.

18 has factors: 1, 2, 3, **6**, 9, 18

30 has factors: 1, 2, 3, 5, **6**, 10, 15, 30

The highest factor on both lists is 6.

The **lowest common multiple** (LCM) of 3 and 4 is the lowest number which is in both the 3 and 4 times tables.

First write down the 3 times table:

3, 6, 9, **12**, 15, ...

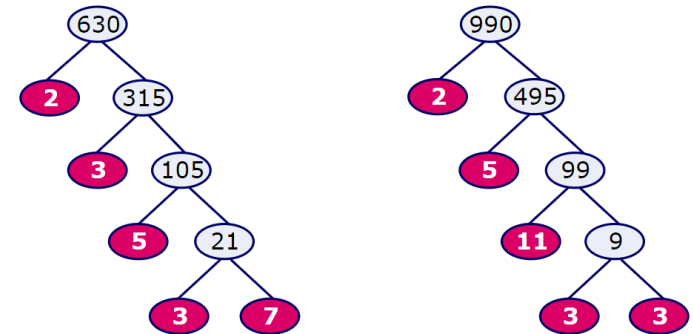
Then write down the 4 times table:

4, 8, **12**, 16, 20, 24, ...

The first number which comes up in both is 12.

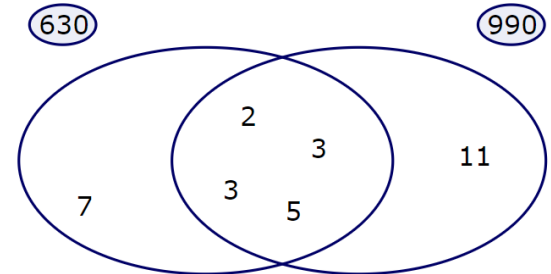
12 is the lowest common multiple of 3 and 4.

Find the LCM and HCF of 630 and 990.



$$630 = 2 \times 3 \times 3 \times 5 \times 7$$

$$990 = 2 \times 3 \times 3 \times 5 \times 11$$



The HCF is the product of the factors in the shared overlap.

$$\text{HCF} = 2 \times 3 \times 3 \times 5 = 90$$

The LCM is the product of the factors in all three areas.

$$\text{LCM} = 7 \times 2 \times 3 \times 3 \times 5 \times 11 = 6930$$