

# Year 8 Knowledge Organiser

## Primes and Indices

### Key Concept

Square numbers



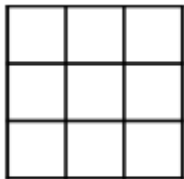
$$1^2$$

$$1 \times 1 = 1$$



$$2^2$$

$$2 \times 2 = 4$$



$$3^2$$

$$3 \times 3 = 9$$

Cube numbers



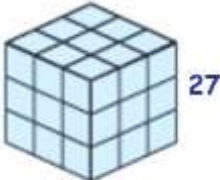
$$1^3$$

$$1 \times 1 \times 1$$



$$2^3$$

$$2 \times 2 \times 2$$



$$3^3$$

$$3 \times 3 \times 3$$

### Key Words

**Square:** A square number is the result of multiplying a number by itself.

**Cube:** A cube number is the result of multiplying a number by itself twice.

**Root:** A root is the reverse of a power.

**Prime number:** A prime is a number that has only two factors which are 1 and itself.

### Examples

What is  $2^4$  ?

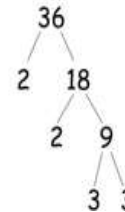
$$2 \times 2 \times 2 \times 2 = 16$$

What is  $\sqrt{64}$  ?

$$8^2 = 64, \text{ so } \sqrt{64} = \pm 8$$

List all the prime numbers less than 20

Write 36 as a product of prime factors



$$36 = 2 \times 2 \times 3 \times 3 = 2^2 \times 3^2$$

Product means 'multiply'



Clip Numbers  
27-30, 99-101

### Tip

There is only one even prime number which is the number 2. This can be used to help solve lots of problems.

### Questions

- a)  $2^5$    b)  $3^3$    c)  $1^{17}$    d)  $\sqrt{81}$    e)  $\sqrt{16}$    f)  $\sqrt[3]{64}$
- Find the reciprocal of:   a) 4   b)  $\frac{1}{3}$    c) 0.25
- Write 72 as a product of primes.

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#### Factors:

Find these in pairs

**12**

1, 12

2, 6

3, 4

#### Multiples:

Start with the number itself

**7** – 7, 14, 21,

28, ...

### Key Words

**Factor:** The numbers which fit into a number exactly.

**Multiple:** The numbers in the times table.

**Prime:** Numbers which have only two factors which are 1 and itself.

**Highest Common Factor:** The highest factor which is common for both numbers.

**Lowest Common Multiple:** The smallest multiple which is common to both numbers.

### Examples

#### Lowest Common Multiple (LCM)

Q - Find the LCM of 6 and 7:

6 – 6, 12, 18, 24, 30, 36, 42, 48, 54, 60,

...

7 – 7, 14, 21, 28, 35, 42, 49, 56, ...

LCM = 42

#### Highest Common Factor (HCF)

Q – Find the HCF of 18 and 24

18 – 1, 2, 3, 6, 9, 18

24 – 1, 2, 3, 4, 6, 8, 12, 24

HCF = 6

### TIP

There is only one even prime number which is the number 2. This can be used to help solve lots of problems.



Clip Numbers  
4,6,10, 26 – 34

### Questions

- 1) List the first 5 multiples of: a) 7 b) 12 c) 50
- 2) List the factors of: a) 12 b) 15 c) 16
- 3) a) Find the LCM of 5 and 7 b) Find the HCF of 20 and 16

# Year 8 Knowledge Organiser

## Primes and Indices

### Key Concept

#### Prime Factors:

Find the HCF of 12 and 18.

Step 1: List the prime factorization of each number. 12:  $2 \times 2 \times 3$  or  $2^2 \times 3$ . 18:  $2 \times 3 \times 3$  or  $2 \times 3^2$ . Step 2: Look for factors that are common, or the same, in both lists.

Then multiply those factors. The common factors of 12 and 18 are 2 and 3;  $2 \times 3 = 6$ . Solution: The HCF of 12 and 18 is 6.

### Key Words

**Factor:** The numbers which fit into a number exactly.

**Multiple:** The numbers in the times table.

**Prime:** Numbers which have only two factors which are 1 and itself.

**Highest Common Factor:** The highest factor which is common for both numbers.

**Lowest Common Multiple:** The smallest multiple which is common to both numbers.

**Venn Diagrams:** is an illustration of the relationships between **and** among sets, groups of objects

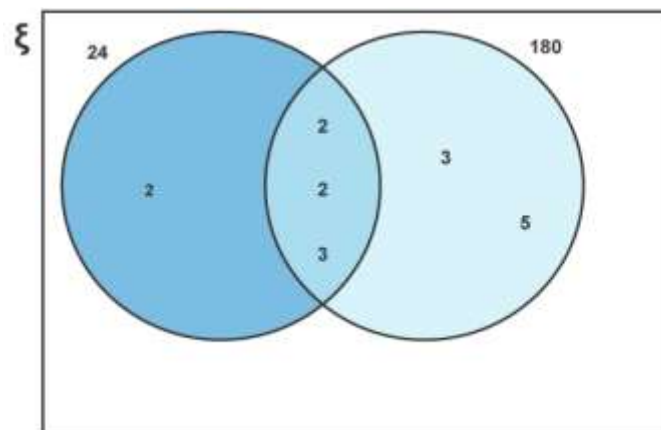
### Examples

Find the HCF and LCM of 12 and 180.

Break the numbers into the product of prime factors using prime factor trees, as before.

The product of prime factors for 24 are:  $2 \times 2 \times 2 \times 3$

The product of prime factors for 180 are:  $2 \times 2 \times 3 \times 3 \times 5$



Clip Numbers  
4,6,10, 26 – 34

### TIP

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### Questions

- List the first 5 multiples of: a) 7 b) 12 c) 50
- List the factors of: a) 12 b) 15 c) 16
- a) Find the LCM of 5 and 7 b) Find the HCF of 20 and 16