Factors, HCF, LCM

Vocabulary

Prime: a number which has only 2 factors (1 and itself). *E.g. 2, 3, 5, 7, 11*
Factor: a factor is any number you can divide by and still get an integer (whole number) answer. *E.g. 1,2 and 4 are factors of 4.*
Common: found in more than one list.
HCF (Highest Common Factor): the highest factor for the numbers
LCM (Lowest Common Multiple): the lowest multiple for the numbers

Factors

These are the numbers that you can divide 10 by, and get a whole number answer still

Factors of 10: 1, 2, 5, 10
Factors of 20: 1, 2, 4, 5, 10, 20

HCF: the highest common factor of 10 and 20 is **10**

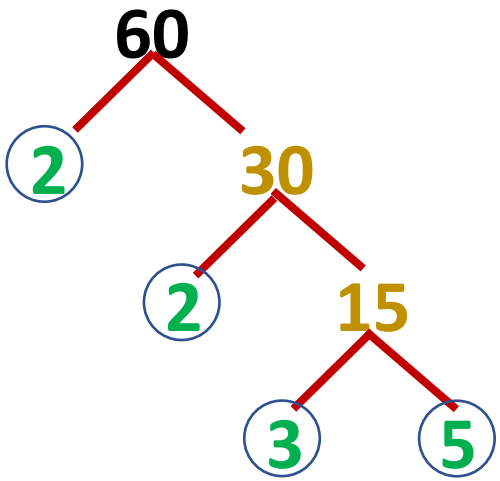
Multiples: Multiples are the numbers in each times table.

Multiples of 5: 5, 10, 15, **20**, 25 etc.
Multiples of 20: **20**, 40, 60, 80, 100 etc.

LCM: the lowest common multiple of 5 and 20 is **20**

Prime Factor Trees

Break down your number using a factor tree. Use pairs of factors, making sure each pair of factors can be multiplied together to find the number above it.



60 = 2 x 2 x 3 x 5

Step 1: Put your number at the top and then break it down into a **pair of factors**.
Check it is a pair, e.g. 2 x 30 = 60

Step 2: If you get a **prime**, circle it and leave it.

Step 3: If you get a **non-prime**, break it down again.

Step 4: Keep going until all of your numbers are **prime** (circled).

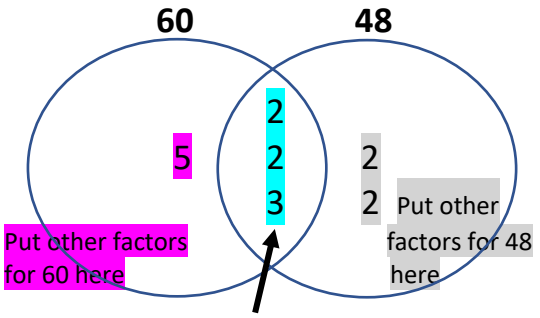
Step 5: Write the number as a product of its prime factors, e.g. 60 = 2x2x2x5

Venn Diagram HCF and LCM

E.g. find the LCM and HCF of **60** and **48**.

Step 1: Use a **prime factor tree** to write out the numbers as **products of their prime factors**. (Use trees like on the left-hand side of this sheet).

60 = 2 x 2 x 3 x 5
48 = 2 x 2 x 2 x 2 x 3



Step 2: Add the common factors to the middle

Step 3: Add the other factors to each side of the Venn diagram

HCF = prime factors in the middle multiplied together.
E.g. 2 x 2 x 3 = 12

LCM = all prime factors in the Venn diagram multiplied together. E.g. 5 x 2 x 2 x 3 x 2 x 2 = 240

LCM HCF FACTORS

Sequences

Vocabulary

Sequence: a pattern of numbers which fit a certain rule

Term: a number in a sequence, e.g. 4th term is the 4th number in the sequence

Term to term rule: the rule for how to get from one number to the next number in the sequence

nth term rule: the rule for how to work out any number in a sequence

Sequence

This is a **sequence** as there is a pattern to the numbers.

1, 4, 7, 10, 13

1st term — 3rd term — 5th term

Term to term rule

To work out the **term to term rule**, calculate the **difference** between each term. E.g.

1, 4, 7, 10, 13

+ 3 + 3 + 3 + 3

This sequence has a **term to term rule** of **+ 3**

20, 15, 10, 5, -5

- 5 - 5 - 5 - 5

This sequence has a **term to term rule** of **- 5**

You can use this to find the **next term** or **missing terms** too.

7 + 2 = 9 | 11 + 2 = 13

3, 5, 7, 9, 11, 13, 15

+ 2 + 2 + 2 + 2 + 2 + 2

nth term rule

The nth term rule is the general rule for the sequence. We can use this rule to work out any term in a sequence.

To calculate the **nth term rule:**

Step 1: Find the **term to term rule**. In this example, it is **+ 3**

1, 4, 7, 10, 13

+ 3 + 3 + 3 + 3 = 3n

Step 2: This means that the nth term rule starts with **3n** and we need to look at the 3 times table

3, 6, 9, 12, 15

Step 3: Now calculate how we get from the times table to the original sequence. Here it is **- 2**

- 2

1, 4, 7, 10, 13

This means that the nth term rule is 3n -2

Generating Sequence Method 1

nth term = **4n + 3**

Work out **4n** first (4 times table):

4n = 4, 8, 12, 16, 20

Then complete the last part; **+ 3**

4n = 4, 8, 12, 16, 20

4n +3 = 7, 11, 15, 19, 23

Sequence = **7, 11, 15, 19, 23, …**

Generating Sequence Method 2

nth term = **4n + 3**

*Substitute **n** for the term number. E.g 1 for the 1st term, 3 for the 3rd term etc.*

n	4n + 3
1	4 x 1 + 3 = 7
2	4 x 2 + 3 = 11
3	4 x 3 + 3 = 15

Sequence = **7, 11, 15, …**

20th term = 4 x 20 + 3 = **83**