A Factors and Factorising

List the factor pairs of the following numbers.

28: 1×28, 2×14, 4×7

26:

35:

49:

81:

50:

75:

144:

Do you notice anything about the square numbers (49, 81 and 144) that is different from the others?

B Write the factors of the following numbers in { … }

28: {1, 2, 4, 7, 14, 28}

26:

35:

49:

81:

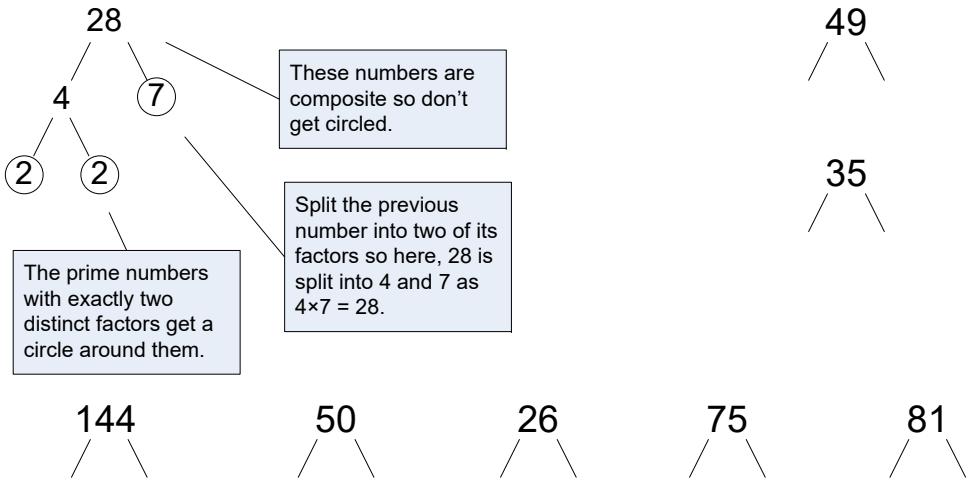
50:

75:

144:

{ … } are called braces and we use them in both maths and English to contain a set of items that have something in common with each other.

C Draw a factor tree for each of the numbers listed below.



D Write the numbers as a product of prime factors

28= $2^2 \times 7$ — Base numbers are in order of size

26=

35=

49=

81=

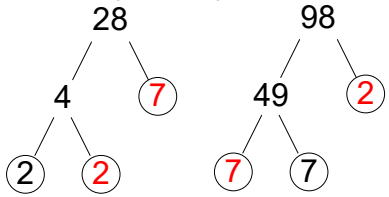
50=

75=

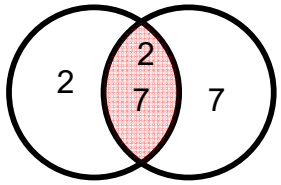
144=

E Find the Highest Common Factor of the numbers

HCF(28,98)



Draw a factor tree for each of the numbers to determine the prime factors.



The highlighted 2s in the factor trees are present in both trees. These go **once** in the intersect part of the Venn diagram. The same is true of the 7s. The remaining two and seven go in the other part of the Venn diagram.

HCF(50,75)

HCF(35,49)

HCF(216,300)

HCF(26,117)

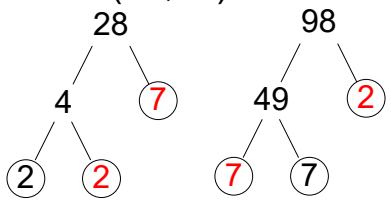
Multiply the numbers in the intersect of the Venn diagram. 28∩98

$HCF(28,98) = 2 \times 7 = 14$

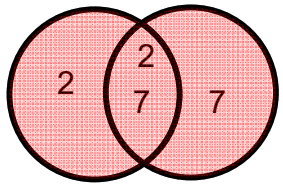
The highest common factor is the largest number that will go into both numbers.

F Find the Lowest Common Multiple of the numbers

LCM(28,98)



Draw a factor tree for each of the numbers to determine the prime factors.



The twos in each of the factor trees combine to make one seven in the intersect. The same is true of the 7s. The remaining two and seven go in the other part of the Venn diagram.

LCM(50,75)

LCM(35,49)

LCM(216,300)

LCM(26,117)

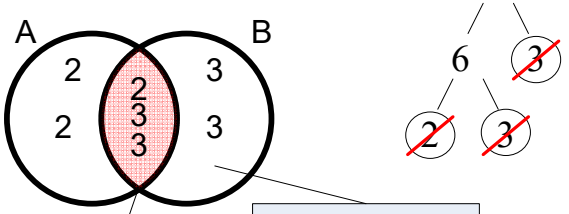
Multiply all the numbers in the Venn diagram. 28∪98

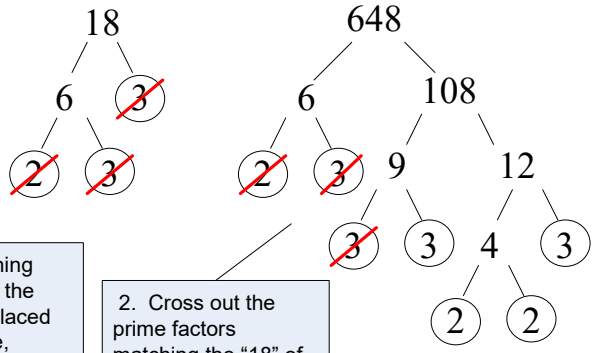
$LCM(28,98) = 2 \times 2 \times 7 \times 7 = 196$

G Find possible numbers given the HCF and LCM

There are various answers for these types of question.

A and B are two integers.
The HCF(A,B) = 18 and the LCM(A,B) = 648.
What could A and B be?





1. Draw a factor tree for the HCF and LCM

2. Cross out the prime factors matching the "18" of the HCF.

3. Put the factors from the HCF in the intercept section of the Venn diagram.

4. The remaining numbers from the LCM can be placed where you like, outside the intersect, in the Venn diagram.

5. Multiply the numbers in circle A and then multiply the numbers in circle B.

$A = 2 \times 2 \times 2 \times 3 \times 3 = 72$

$B = 2 \times 3 \times 3 \times 3 \times 3 = 162$

HCF(C,D) = 12
LCM(C,D) = 40
HCF(E,F) = 15
LCM(E,F) = 135

H Apply the HCF and LCM.

Two LEDs are flashing. LED A flashes every 8 seconds. LED B flashes every 34 seconds. At precisely 12 noon, both LEDs flash together. At what time do they next flash together?

Two friends work on the buses. Fred drives route A which takes 54 minutes. Leanne drives route B which takes 36 minutes. They both set off at precisely 9am on their respective routes. At what time do they next see each other at the bus station?

Billy wants to tile a wall that is 240 cm high and 345 cm long. He hates cutting tiles as they always seem to snap so wants to tile his wall with whole tiles. What is the largest size of tile he can use and how many tiles will he need?

I Using HCF and LCM in algebra

Factorise $8p^2q^3r^5 + 36p^3qr^2$

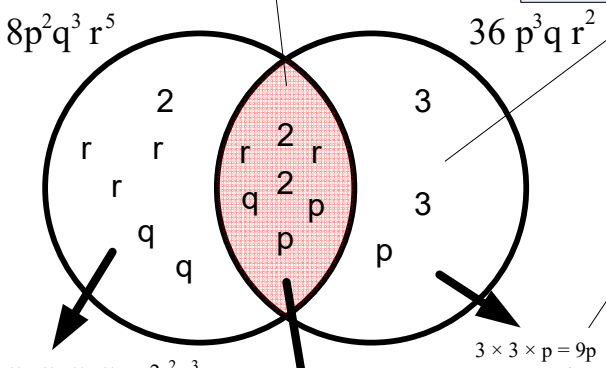
1. Split each expression into its prime factors.

$8p^2q^3r^5 = 2 \times 2 \times 2 \times p \times p \times q \times q \times q \times r \times r \times r \times r \times r$

$36p^3qr^2 = 2 \times 2 \times 3 \times 3 \times p \times p \times p \times q \times r \times r$

2. Cross out the common prime factors and write them into the intersect section of the Venn diagram.

3. Put the remaining factors into the outside part of the Venn diagram making sure you place them in the correct circle.



4. Reconstitute the expressions from the prime factors

$2 \times q \times q \times r \times r \times r = 2q^2r^3$

$3 \times 3 \times p = 9p$

$2 \times 2 \times p \times p \times q \times r \times r = 4p^2qr^2$

$4p^2qr^2(2q^2r^3 + 9p)$

5. Put the intersect outside the brackets.

6. Make sure you use the same operator ie + or – as was used in the original question.

Factorise $16x^2y^3z^5 + 40x^3yz^2$

Factorise $18t^5v^3w + 66t^2w - 12$

Factorise $35c^5d^2e + 75c^3d^2$

Factorise $48k^2r + 64k^5t - 6t^2$