



1

- Write down the first ten prime numbers.
- Explain why 2 is the only even prime number.
- Here is a list of numbers.

21 31 39 41 51

Write down the numbers from the list that are prime.

(3 marks)

a)

Prime = exactly two factors (1 is not prime)

2, 3, 5, 7, 11, 13, 17, 19, 23, 29

b)

Even numbers are all multiples of 2

e.g. 4 has factors 1, 2, 4

Any even number above 2 has 2 as an extra factor

c)

$$21 = 3 \times 7$$

$$39 = 3 \times 13$$

$$51 = 3 \times 17$$

31 and 41

2

Find two prime numbers that add together to make 32.

(2 marks)

Try prime pairs with sum 32

$$3 + 29 = 32 \text{ and both 3 and 29 are prime}$$

$$13 + 19 = 32 \text{ also works}$$

3 and 29 (or 13 and 19)

3

- a. Write down all the factor pairs of 60.
b. Write down all the common factors of 60 and 42.

(3 marks)

a)

$$1 \times 60$$

$$2 \times 30$$

$$3 \times 20$$

$$4 \times 15$$

$$5 \times 12$$

$$6 \times 10$$

7, 8, 9 do not divide 60; 10 x 6 repeats

b)

Factors of 60: 1, 2, 3, 4, 5, 6, 10, 12, 15, 20, 30, 60

Factors of 42: 1, 2, 3, 6, 7, 14, 21, 42

1, 2, 3, 6

4

Find the highest common factor (HCF) of 54 and 90

(2 marks)

$$54 = 2 \times 3^3 \text{ and } 90 = 2 \times 3^2 \times 5$$

Take the lowest power of each common prime: 2 and 3^2

$$\text{HCF} = 2 \times 9 = 18$$

A common factor must divide both numbers, so it cannot use more copies of a prime than either number contains. That is why we choose the lower of the two powers

18

5

- a. Find the two common multiples of 6 and 8 that are between 50 and 100.
b. Find the lowest common multiple (LCM) of 4, 6 and 10.

(3 marks)

a)

Multiples of 8: 8, 16, 24, ...

24 is the first multiple of 6 as well

Common multiples: 24, 48, 72, 96, 120, ...

72 and 96

b)

Multiples of 10: 10, 20, 30, 40, 50, 60

$60 \div 4 = 15$ and $60 \div 6 = 10$

LCM = 60

6

Write 264 as a product of its prime factors.

(2 marks)

$$264 = 2 \times 132, 132 = 2 \times 66, 66 = 2 \times 33$$

$$33 = 3 \times 11, \text{ and } 11 \text{ is prime}$$

$$\text{So } 264 = 2 \times 2 \times 2 \times 3 \times 11 = 2^3 \times 3 \times 11$$

$2^3 \times 3 \times 11$

7

- a. Write 600 as a product of its prime factors. Give your answer in index form.
b. Hence write 1200 as a product of its prime factors in index form.

(3 marks)

a)

$$600 = 2 \times 300$$

$$300 = 2 \times 150$$

$$150 = 2 \times 75$$

$$75 = 3 \times 25$$

$$25 = 5 \times 5$$

$$600 = 2 \times 2 \times 2 \times 3 \times 5 \times 5$$

$$600 = 2^3 \times 3 \times 5^2$$

b)

$$1200 = 2 \times 600$$

One more 2

$$1200 = 2^4 \times 3 \times 5^2$$

8

Priya has two ribbons. One is 84 cm long and the other is 126 cm long.

She cuts both ribbons into pieces that are all the same length, with no ribbon left over. She wants the pieces to be as long as possible.

- a. Work out the length of each piece.
b. How many pieces does she get altogether?

(3 marks)

Divides both exactly, as big as possible: HCF

$$84 = 2 \times 2 \times 3 \times 7$$

$$126 = 2 \times 3 \times 3 \times 7$$

$$\text{Common: } 2 \times 3 \times 7 = 42$$

$$\text{a) } 42 \text{ cm}$$

$$84 \div 42 = 2$$

$$126 \div 42 = 3$$

$$2 + 3 = 5$$

$$\text{b) } 5 \text{ pieces}$$

9

Nadia is making table decorations.

Each decoration needs one candle and one holder.

Candles are sold in packs of 9

Holders are sold in packs of 12

Nadia buys exactly the same number of candles as holders, with none left over.

Work out the smallest number of packs of candles and the smallest number of packs of holders she can buy.

(3 marks)

The number of candles must equal the number of holders, so it must be a common multiple of 9 and 12

$$9 = 3^2 \text{ and } 12 = 2^2 \times 3, \text{ so } \text{LCM} = 2^2 \times 3^2 = 36$$

36 candles need $36 \div 9 = 4$ packs, and 36 holders need $36 \div 12 = 3$ packs

10

a. Find the highest common factor (HCF) of 72 and 120

b. Find the lowest common multiple (LCM) of 72 and 120

(4 marks)

$$72 = 2^3 \times 3^2 \text{ and } 120 = 2^3 \times 3 \times 5$$

a) HCF

Lowest powers of the common primes are 2^3 and 3, so $\text{HCF} = 8 \times 3 = 24$

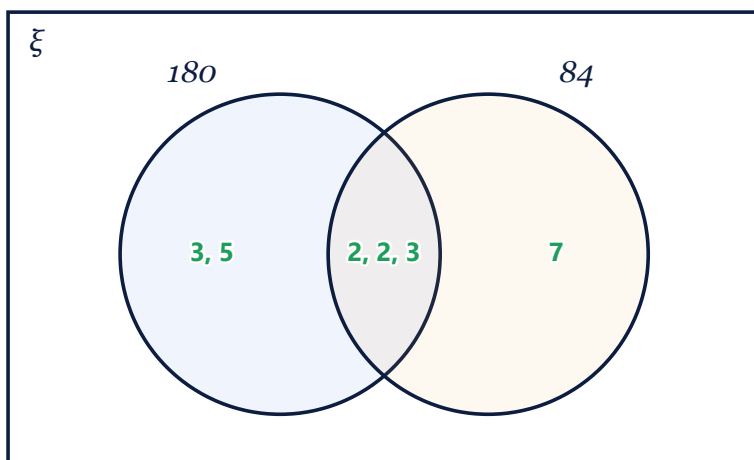
b) LCM

highest powers of all primes are 2^3 , 3^2 and 5, so $\text{LCM} = 8 \times 9 \times 5 = 360$

11

 $180 = 2 \times 2 \times 3 \times 3 \times 5$ and $84 = 2 \times 2 \times 3 \times 7$

- Complete the Venn diagram to show the prime factors of 180 and 84.
- Use your Venn diagram to find the highest common factor (HCF) of 180 and 84.
- Use your Venn diagram to find the lowest common multiple (LCM) of 180 and 84.



(4 marks)

a)

Shared: 2, 2, 3 in the middle

180 only: 3, 5

84 only: 7

b) HCF = multiply the middle

$$2 \times 2 \times 3 = 12$$

$$\boxed{\text{HCF} = 12}$$

c) LCM = multiply everything

$$3 \times 5 \times 2 \times 2 \times 3 \times 7$$

$$= 15 \times 12 \times 7$$

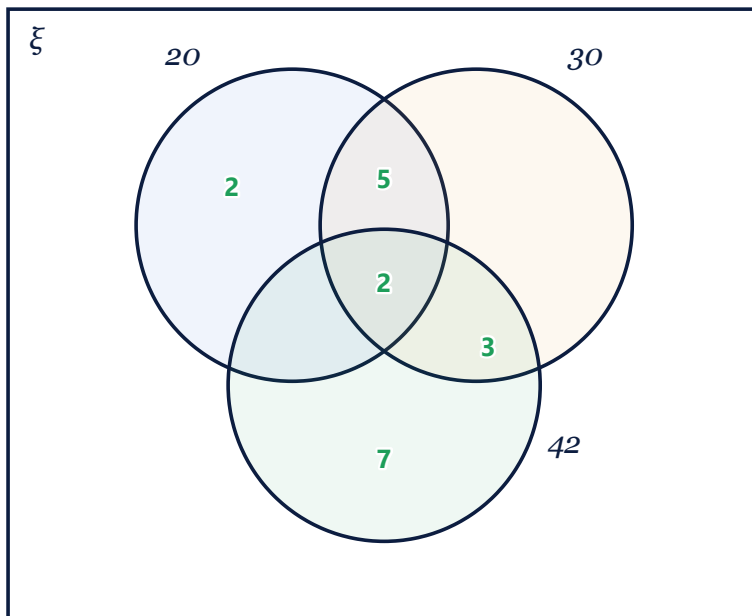
$$= 180 \times 7 = 1260$$

$$\boxed{\text{LCM} = 1260}$$

12

$$20 = 2 \times 2 \times 5 \quad 30 = 2 \times 3 \times 5 \quad 42 = 2 \times 3 \times 7$$

- Complete the Venn diagram to show the prime factors of 20, 30 and 42.
- Write down the highest common factor of 20, 30 and 42.
- Three lights on a stage flash every 20 seconds, every 30 seconds and every 42 seconds. They all flash together at the start of a show. How many minutes later do all three next flash together?



(4 marks)

a)

Centre (all three): 2

20 and 30 only: 5

30 and 42 only: 3

20 only: 2

42 only: 7

b)

$$\boxed{HCF = 2}$$

c) Next together = LCM, multiply everything

$$2 \times 5 \times 3 \times 2 \times 7 = 420 \text{ seconds}$$

$$420 \div 60 = 7$$

$$\boxed{7 \text{ minutes}}$$