



Prime factors

Year 7 About 60 minutes No calculator 49 marks

Date _____

A Do Now

Quick questions to start.

- A1** Needed today [1 mark]

Write down all the prime numbers between 20 and 40.

A2 Needed today [1 mark]

Work out $2^3 \times 5$.

Answer

Answer

- A3** Last lesson [1 mark]

Work out $(-4)^3$.

A4 From chapter 1 [1 mark]

Find the HCF of 36 and 60.

Answer

Answer

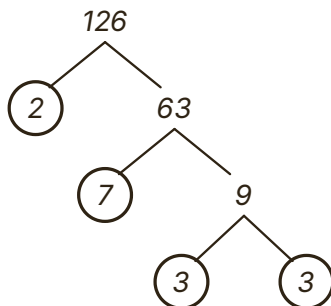
B Example, then your turn

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Your teacher works through each example with you. Then try the one beside it.

EXAMPLE 1

Use a factor tree to write 126 as a product of its prime factors. Give your answer in index form.



Hint Split the number into two factors. Keep splitting until every branch ends in a prime. Ring the primes.

- B1** Use a factor tree to write 132 as a product of its prime factors. Give your answer in index form. [2 marks]

Answer

EXAMPLE 2

Use the division method to write 392 as a product of its prime factors in index form.

Hint Divide by 2 as many times as you can, then try 3, then 5, then 7, until you reach 1.

B2 Use the division method to write 270 as a product of its prime factors in index form. [2 marks]

Answer

EXAMPLE 3

What number is $2^3 \times 3^2 \times 7$?

Hint Work out each power first, then multiply.

B3 What number is each of these? [2 marks]

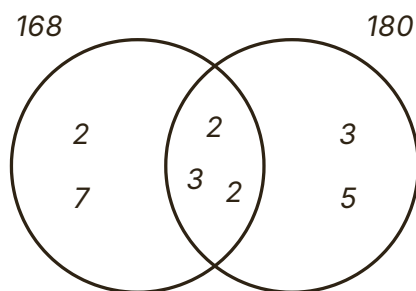
(a) $2^4 \times 7$

(b) $2^2 \times 3 \times 5^2$

Answer (a) ... (b) ...

EXAMPLE 4

$168 = 2^3 \times 3 \times 7$ and $180 = 2^2 \times 3^2 \times 5$. Use a Venn diagram to find the HCF and the LCM of 168 and 180.



Hint Put the primes the two numbers share in the middle. The HCF is the product of the middle. The LCM is the product of every number in the diagram.

B4 $154 = 2 \times 7 \times 11$ and $220 = 2^2 \times 5 \times 11$. Find the HCF and the LCM of 154 and 220. [3 marks]

Answer HCF ... LCM ...

EXAMPLE 5

Find the smallest whole number you can multiply 98 by to get a square number.

Hint In a square number, every prime appears an even number of times.

B5 Find the smallest whole number you can multiply 108 by to get a square number. [2 marks]

Answer

C Practice

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C1 Write 2000 as a product of its prime factors. Give your answer in index form. [2 marks]

Answer

C2 $2^a \times 5^b = 400$. Find the values of a and b . [2 marks]

Answer $a = \dots$ $b = \dots$

C3 $540 = 2^2 \times 3^3 \times 5$. Write 1080 as a product of its prime factors in index form. [2 marks]

Answer

C4 Use prime factors to find the HCF of 270 and 252. [2 marks]

Answer

C5 221 is the product of two prime numbers. Find the two prime numbers. [2 marks]

Answer

D Exam-style questions

GCSE Foundation

D1 This question is about the numbers 616 and 440.

(a) Write 616 as a product of its prime factors. Give your answer in index form. [2 marks]

Answer

(b) $440 = 2^3 \times 5 \times 11$. Find the HCF of 616 and 440. [2 marks]

Answer

(c) Find the LCM of 616 and 440. [2 marks]

Answer

Total for D1: 6 marks

- D2** Jo says, "135 written as a product of its prime factors is $3 \times 3 \times 15$." [2 marks]
Jo is wrong. Explain why, and write 135 correctly as a product of its prime factors.

- D3** Ali and Bea run laps of a track. They start together at the start line. Ali takes 75 seconds to run one lap. Bea takes 105 seconds to run one lap. How long is it until they are next at the start line together? Give your answer in minutes and seconds. [4 marks]

Answer ... minutes ... seconds

- D4** $x = 2^3 \times 3 \times 5^2$ and $y = 2^2 \times 3^2 \times 5$.

- (a) Find the HCF of x and y . Give your answer in index form. [2 marks]

Answer

- (b) Find the LCM of x and y . Give your answer in index form. [2 marks]

Answer

Total for D4: 4 marks

- D5** This question is about the number 1764.

- (a) Write 1764 as a product of its prime factors. Give your answer in index form. [2 marks]

Answer

- (b) Use your answer to part (a) to work out $\sqrt{1764}$. [2 marks]

Answer

Total for D5: 4 marks

No route is given. The hints are at the end of the sheet. Use one at a time.

- E1** Three whole numbers next to each other, such as 4, 5 and 6, are multiplied together. The answer is 2730. Find the three numbers. [4 marks]

Answer ... , ... , ...

Extension hints

Cover these with paper. Uncover one at a time.

- E1** **Hint 1** Write 2730 as a product of its prime factors.
Hint 2 $2730 = 2 \times 3 \times 5 \times 7 \times 13$. Group these primes into three numbers that are close together.
Hint 3 One of the numbers must be 13. $2 \times 7 = 14$ and $3 \times 5 = 15$, so the numbers are 13, 14 and 15.

How did it go?

Colour one circle on each line: not yet, nearly, yes.

- I can write a number as a product of its prime factors in index form. ☐ ☐ ☐
- I can use prime factors to find the HCF and the LCM of two numbers. ☐ ☐ ☐
- I can use prime factors to find a square root or make a square number. ☐ ☐ ☐