Prime Factors HCF LCM

GCSE Maths · Written to the shared content for AQA, Edexcel and OCR

Name _____ Class _____ Date _____

1. Worked example

Write 360 product of its prime factors in index form.

Step 1 · Split into any factor pair and keep going

$360 = 36 \times 10 = (4 \times 9) \times (2 \times 5)$

Step 2 · Break every non-prime down

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

Step 3 · Collect the primes in order with powers

$2^3 \times 3^2 \times 5$

Answer: $360 = 2^3 \times 3^2 \times 5$

Check: $8 \times 9 \times 5 = 360$ ✓

2. Now try one with the steps

Find the HCF and LCM of 84 and 90.

Step 1 · Prime factorise both

Step 2 · HCF: shared primes, lower powers

Step 3 · LCM: all primes, higher powers

Answer:

3. Practice

Show your working. The marks tell you how much is expected.

1. Write 60 product of its prime factors in index form. [2]

2. Write 126 product of its prime factors in index form. [2]

3. Find the highest common factor (HCF) of 24 and 36. [2]

4. Find the lowest common multiple (LCM) of 8 and 12. [2]

5. Write 1000 product of its prime factors in index form. [2]

6. Find the HCF of 72 and 120. [2]

7. Find the LCM of 72 and 120. [2]

8. Two lighthouse lamps flash every 15 seconds and every 25 seconds. They flash together now. How many seconds until they next flash together? [2]

9. Ravi cuts a 84 cm ribbon and a 126 cm ribbon into pieces that are all the same length,, with nothing left over. How long is each piece, in cm? [3]

10. $A = 2^3 \times 3^2 \times 5$ and $B = 2^2 \times 3 \times 7$. Find the HCF of A and B ordinary number. [2]

11. Using the same A and B, find the LCM of A and B ordinary number. [2]

12. What is the smallest whole number you can multiply 72 by to get a square number? [2]

13. Find the smallest whole number n so that 300n is a cube number. [3]

14. The HCF of two numbers is 6 and their LCM is 72. One of the numbers is 18. Find the other number. [3]

15. Explain, using prime factors, why $2^5 \times 3^2$ is not a square number. [2]

4. Before you hand it in

Including 1 in the prime factorisation: $12 = 1 \times 2^2 \times 3$
1 is not prime (a prime has exactly two factors). Leave it out: $12 = 2^2 \times 3$.

Swapping the methods: HCF of $2^3 \times 3$ and 2×3^2 taken as $2^3 \times 3^2$
HCF uses the LOWER power of shared primes ($2 \times 3 = 6$). The higher powers of all primes give the LCM ($2^3 \times 3^2 = 72$).

Answering $2 \times 2 \times 2 \times 3 \times 3 \times 5$ when the question says 'index form'
Index form means grouping repeats: $2^3 \times 3^2 \times 5$.

Writing the LCM of 12 and 18 as $12 \times 18 = 216$
Shared factors are counted twice that way. Use prime factors: $2^2 \times 3^2 = 36$.