

GCSE Maths: Prime factorisation (Higher): answers

GCSE Maths - Factors, Multiples and Primes - Higher - Lesson 2.3

Answers. Final answers to the worksheet questions. Full step-by-step solutions for every question are free at websink.site/gcse/maths/ch02-factors-multiples-primes-powers/higher/prime-factorisation/

Exercise 2C Prime factorisation Non-calculator

1 Use a factor tree or a division ladder to write each number as a product of prime factors. Give your answers in index form.

(a) 12

Answer: $2^2 \times 3$

(b) 20

Answer: $2^2 \times 5$

(c) 28

Answer: $2^2 \times 7$

(d) 45

Answer: $3^2 \times 5$

(e) 50

Answer: 2×5^2

(f) 63

Answer: $3^2 \times 7$

2 Write each number as a product of prime factors, in index form.

(a) 72

Answer: $2^3 \times 3^2$

(b) 90

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

(c) 120

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

(d) 150

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

(e) 180

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

(f) 200

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

3 Write each number as a product of prime factors, in index form.

(a) 360

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

(b) 504

Answer: $2^3 \times 3^2 \times 7$

(c) 630

Answer: $2 \times 3^2 \times 5 \times 7$

(d) 1000

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

(e) 1800

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

(f) 2310

Answer: $2 \times 3 \times 5 \times 7 \times 11$

4 Work out the value of each number.

(a) $2^3 \times 5$

Answer: 40

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

Answer: 36

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

Answer: 90

(d) $2^4 \times 3 \times 7$

Answer: 336

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

Answer: 675

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

Answer: 600

5 Use prime factors to decide whether each number is a square number. If it is, write down its square root.

(a) 36

Answer: Yes (6^2)

(b) 72

Answer: No

(c) 100

Answer: Yes (10^2)

(d) 180

Answer: No

(e) 225

Answer: Yes (15^2)

(f) 324

Answer: Yes (18^2)

6 A number $N = 2^3 \times 3^2 \times 5$. Without working out N , decide whether each number is a factor of N .

(a) 12

Answer: Yes

(b) 25

Answer: No

(c) 40

Answer: Yes

(d) 27

Answer: No

(e) 90

Answer: Yes

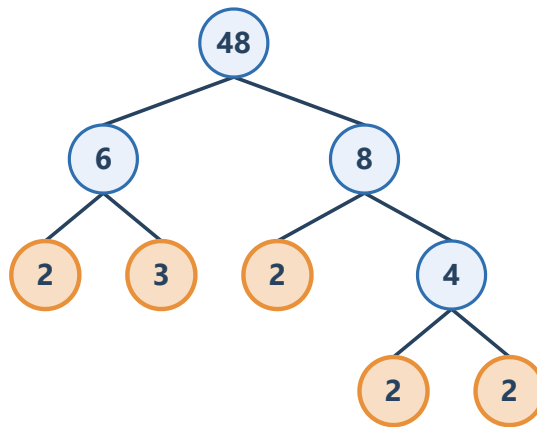
(f) 16

Answer: No

7 Jan writes $60 = 2 \times 3 \times 10$ and says that this is the prime factorisation of 60. Explain what is wrong and write down the correct prime factorisation.

Answer: 10 is not prime. $60 = 2 \times 2 \times 3 \times 5 = 2^2 \times 3 \times 5$

8 Amir draws a factor tree for 48 starting 6×8 . Bella starts hers 4×12 . Explain why they both end with the same prime factors.



Answer: Both get $2^4 \times 3$

- 9** A cube has a volume of 216 cm^3 . (a) Write 216 as a product of prime factors. (b) Use your answer to find the length of one edge of the cube.

(a) (a)

Answer: $216 = 2^3 \times 3^3$

(b) (b)

Answer: 6 cm

- 10** Which is bigger, $2^5 \times 3$ or $2^2 \times 3^3$? Show your working.

Answer: $2^2 \times 3^3 = 108$ is bigger (the other is 96)

- 11** Write down the number of factors of each number. Use its prime factorisation.

(a) 12

Answer: 6

(b) 36

Answer: 9

(c) 60

Answer: 12

(d) 100

Answer: 9

(e) 180

Answer: 18

(f) 360

Answer: 24

- 12** Find the smallest positive whole number k so that the product is a perfect square.

(a) $12k$

Answer: 3

(b) $18k$

Answer: 2

(c) $50k$

Answer: 2

(d) $360k$

Answer: 10

(e) $756k$

Answer: 21

13 p and q are two different prime numbers. Prove that pq has exactly four factors.

Answer: 1, p , q and pq

14 The number $2^a \times 3$ has exactly 8 factors. Find the value of a and work out the number.

Answer: $a = 3$ and the number is 24

15 What is the smallest number that has exactly six factors?

Answer: 12