Class 6 Maths

Prime Time – Prime Factorisation - NCERT Solutions

1. Find the prime factorisations of the following numbers: 64,10 105, 243, 320, 141, 1728, 729, 1024, 1331, 1000.

2. The prime factorisation of a number has one 2. two 3s, and one 11. What is the number?

3. Find three prime numbers, all less than 30, whose product is 1955

4. Find the prime factorisation of these numbers without multiplying first

    a. 56 * 25

    b. 108 * 75

    c. 1000 * 81

5. What is the smallest number whose prime factorisation has:
    a. three different prime numbers?
    b. four different prime numbers?

6. Are the following pairs of numbers co-prime? Guess first and then use prime factorisation to verify your answer.
    a. 30 and 45
    b. 57 and 85
    c. 121 and 1331
    d. 343 and 216

7. Is the first number divisible by the second? Use prime factorisation.

a. 225 and 27
b. 96 and 24
c. 343 and 17
d. 999 and 99

8. The first number has prime factorisation 2 x 3 x 7 and the second number has prime factorisation 3 x 7 x 11. Are they co-prime? Does one of them divide the other?

9. Guna says, "Any two prime numbers are co-prime". Is he right?

Answers

1. Prime Factorisations

- **64** = 2 × 2 × 2 × 2 × 2 × 2 = 2^6
- **105** = 3 × 5 × 7
- **243** = 3 × 3 × 3 × 3 × 3 = 3^5
- **320** = 2^6 × 5
- **141** = 3 × 47
- **1728** = 12^3 = $(2^2 \times 3)^3$ = $2^6 \times 3^3$
- **729** = 3^6
- **1024** = 2^{10}
- **1331** = 11^3
- **1000** = $(2 \times 5)^3$ = $2^3 \times 5^3$

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2. Find the number

Given: one 2, two 3s, one 11

Number = $2 \times 3^2 \times 11$
= 2 × 9 × 11 = **198**

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3. Three primes (<30) whose product is 1955

1955 ÷ 5 = 391
391 ÷ 17 = 23

Answer: 5 × 17 × 23

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4. Prime factorisation (without multiplying)

(a) 56 × 25

56 = $2^3 \times 7$
25 = 5^2

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

(b) 108 × 75

$108 = 2^2 \times 3^3$
$75 = 3 \times 5^2$

Answer: $2^2 \times 3^4 \times 5^2$

(c) 1000 × 81

$1000 = 2^3 \times 5^3$
$81 = 3^4$

Answer: $2^3 \times 3^4 \times 5^3$

5. Smallest number

(a) Three different primes

Smallest primes: 2, 3, 5

2 × 3 × 5 = 30

(b) Four different primes

2 × 3 × 5 × 7 = 210

6. Are they co-prime?

(a) 30 and 45

$30 = 2 \times 3 \times 5$
$45 = 3^2 \times 5$
Common factors = 3, 5

✗ **Not co-prime**

(b) 57 and 85

$57 = 3 \times 19$
$85 = 5 \times 17$

No common factor

✓ Co-prime

(c) 121 and 1331

$121 = 11^2$
$1331 = 11^3$

Common factor = 11

✗ Not co-prime

(d) 343 and 216

$343 = 7^3$
$216 = 2^3 \times 3^3$

No common factor

✓ Co-prime

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7. Divisibility using prime factorisation

(a) 225 and 27

$225 = 3^2 \times 5^2$
$27 = 3^3$

Missing one 3

✗ Not divisible

(b) 96 and 24

$96 = 2^5 \times 3$
$24 = 2^3 \times 3$

All factors present

✓ Divisible

(c) 343 and 17

$343 = 7^3$
17 not a factor

❌ Not divisible

(d) 999 and 99

$999 = 3^3 \times 37$
$99 = 3^2 \times 11$

Missing 11

❌ Not divisible

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8. Given numbers

First = $2 \times 3 \times 7$
Second = $3 \times 7 \times 11$

Common factors = 3, 7

❌ Not co-prime
❌ One does NOT divide the other

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9. Statement Check

"Any two prime numbers are co-prime."

✓ **Yes, correct**
Explanation: Prime numbers have only 1 and itself as factors, so any two primes share only 1 as common factor.
