Chapter 11: Finding Common Ground

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Exercise 11.1 — List All Factors Using Prime Factorisation (Page 51)

Q1 List all the factors of 90.

SOLUTION

Prime factorise 90:
90 = 2 × 3 × 3 × 5

Every factor is a 'subpart' of this factorisation. List systematically:
Single prime factors: 2, 3, 5
Pairs: 2 × 3 = 6, 3 × 3 = 9, 2 × 5 = 10, 3 × 5 = 15
Triples: 2 × 3 × 3 = 18, 2 × 3 × 5 = 30, 3 × 3 × 5 = 45
All four: 2 × 3 × 3 × 5 = 90
Include 1.

Factors of 90: 1, 2, 3, 5, 6, 9, 10, 15, 18, 30, 45, 90

Answer: 1, 2, 3, 5, 6, 9, 10, 15, 18, 30, 45, 90

Q2 List all the factors of 105.

SOLUTION

Prime factorise 105:
105 = 3 × 5 × 7

Subparts:

Single: 3, 5, 7
Pairs: 3 × 5 = 15, 3 × 7 = 21, 5 × 7 = 35
All three: 3 × 5 × 7 = 105
Include 1.

Factors of 105: 1, 3, 5, 7, 15, 21, 35, 105

Answer: 1, 3, 5, 7, 15, 21, 35, 105

Q3 List all the factors of 132.

SOLUTION

Prime factorise 132:
132 = 2 × 2 × 3 × 11

Subparts:
Single: 2, 3, 11
Pairs: 2 × 2 = 4, 2 × 3 = 6, 2 × 11 = 22, 3 × 11 = 33
Triples: 2 × 2 × 3 = 12, 2 × 2 × 11 = 44, 2 × 3 × 11 = 66
All four: 2 × 2 × 3 × 11 = 132
Include 1.

Factors of 132: 1, 2, 3, 4, 6, 11, 12, 22, 33, 44, 66, 132

Answer: 1, 2, 3, 4, 6, 11, 12, 22, 33, 44, 66, 132

Q4 List all the factors of 360. (This number has 24 factors.)

SOLUTION

Prime factorise 360:
360 = 2 × 2 × 2 × 3 × 3 × 5

Using prime powers: 2^3, 3^2, 5^1.
Factors = (powers of 2: 1,2,4,8) × (powers of 3: 1,3,9) × (powers of 5: 1,5)
Number of factors = 4 × 3 × 2 = 24 ✓

Listing all 24 factors:
1, 2, 3, 4, 5, 6, 8, 9, 10, 12, 15, 18, 20, 24, 30, 36, 40, 45, 60, 72, 90, 120, 180, 360

Answer: 1, 2, 3, 4, 5, 6, 8, 9, 10, 12, 15, 18, 20, 24, 30, 36, 40, 45, 60, 72, 90, 120, 180, 360

Q5 List all the factors of 840. (This number has 32 factors.)

SOLUTION

Prime factorise 840:
840 = 2 × 2 × 2 × 3 × 5 × 7

Prime powers: 2^3, 3^1, 5^1, 7^1.
Number of factors = 4 × 2 × 2 × 2 = 32 ✓

Listing all 32 factors:
1, 2, 3, 4, 5, 6, 7, 8, 10, 12, 14, 15, 20, 21, 24, 28, 30, 35, 40, 42, 56, 60, 70, 84, 105, 120, 140, 168, 210, 280, 420, 840

Answer: 1, 2, 3, 4, 5, 6, 7, 8, 10, 12, 14, 15, 20, 21, 24, 28, 30, 35, 40, 42, 56, 60, 70, 84, 105, 120, 140, 168, 210, 280, 420, 840

Exercise 11.2 — Common Factors and HCF Using Prime Factorisation (Page 53)

Q1 Find the common factors and the HCF of 50 and 60.

SOLUTION

Prime factorisations:
50 = 2 × 5 × 5
60 = 2 × 2 × 3 × 5

Common subparts (prime factors appearing in both):
2 appears at least once in both → 2 is a common factor.
5 appears at least once in both → 5 is a common factor.
2 × 5 = 10 is a common subpart → 10 is a common factor.

Common factors: 1, 2, 5, 10

HCF = the largest common subpart = 2 × 5 = 10

Answer: Common factors: 1, 2, 5, 10. HCF = 10

Q2 Find the common factors and the HCF of 140 and 275.

SOLUTION

Prime factorisations:
140 = 2 × 2 × 5 × 7
275 = 5 × 5 × 11

The only prime appearing in both is 5 (once each).
Common subparts: 5 only.

Common factors: 1, 5

HCF = 5

Answer: Common factors: 1, 5. HCF = 5

Q3 Find the common factors and the HCF of 77 and 725.

SOLUTION

Prime factorisations:
77 = 7 × 11
725 = 5 × 5 × 29

No prime appears in both factorisations.

There is no common subpart other than 1.

Common factors: 1 only

HCF = 1

Answer: Common factors: 1 only. HCF = 1

Q4 Find the common factors and the HCF of 370 and 592.

SOLUTION

Prime factorisations:
370 = 2 × 5 × 37
592 = 2 × 2 × 2 × 2 × 37

Common primes: 2 (once each, minimum) and 37 (once each).
Common subparts: 2, 37, 2 × 37 = 74.

Common factors: 1, 2, 37, 74

HCF = 2 × 37 = 74

Answer: Common factors: 1, 2, 37, 74. HCF = 74

Q5 Find the common factors and the HCF of 81 and 243.

SOLUTION

Prime factorisations:
81 = 3 × 3 × 3 × 3
243 = 3 × 3 × 3 × 3 × 3

Common prime: 3. It appears 4 times in 81 and 5 times in 243.
Minimum count = 4, so the largest common subpart is $3^4 = 81$.

Common subparts: 3, 9, 27, 81.
Common factors: 1, 3, 9, 27, 81

HCF = 81

Note: 81 is one of the two given numbers, and 243 = 3 × 81, so 81 is a factor of 243.

Answer: Common factors: 1, 3, 9, 27, 81. HCF = 81

Exercise 11.3 — Find HCF Using Prime Factorisation (Page 54)

Q1 Find the HCF of the following numbers: (a) 24 and 180 (b) 42, 75, and 24 (c) 240 and 378 (d) 400 and 2500 (e) 300 and 800

SOLUTION

(a) HCF of 24 and 180:
24 = 2 × 2 × 2 × 3
180 = 2 × 2 × 3 × 3 × 5
Common primes: 2 (min 2 times), 3 (min 1 time).
HCF = 2 × 2 × 3 = 12

(b) HCF of 42, 75, and 24:
42 = 2 × 3 × 7
75 = 3 × 5 × 5
24 = 2 × 2 × 2 × 3
Only prime common to all three: 3 (once each).
HCF = 3

(c) HCF of 240 and 378:
240 = 2 × 2 × 2 × 2 × 3 × 5
378 = 2 × 3 × 3 × 3 × 7
Common primes: 2 (min 1 time), 3 (min 1 time).
HCF = 2 × 3 = 6

(d) HCF of 400 and 2500:
400 = 2 × 2 × 2 × 2 × 5 × 5
2500 = 2 × 2 × 5 × 5 × 5 × 5
Common primes: 2 (min 2 times), 5 (min 2 times).
HCF = 2 × 2 × 5 × 5 = 100

(e) HCF of 300 and 800:
300 = 2 × 2 × 3 × 5 × 5
800 = 2 × 2 × 2 × 2 × 2 × 5 × 5
Common primes: 2 (min 2 times), 5 (min 2 times).
HCF = 2 × 2 × 5 × 5 = 100

Answer: (a) 12 (b) 3 (c) 6 (d) 100 (e) 100

Q2 Consider the numbers 72 and 144. Suppose they are factorised into composite numbers as: 72 = 6 × 12 and 144 = 8 × 18. Seeing this, can one say that these two numbers have no common factor other than 1? Why not?

SOLUTION

No, we cannot say that. Factorising into composite numbers (like 6 × 12) does not give the prime factorisation.

The correct prime factorisations are:
72 = 2 × 2 × 2 × 3 × 3
144 = 2 × 2 × 2 × 2 × 3 × 3

Common primes: 2 (min 3 times), 3 (min 2 times).
HCF = 2 × 2 × 2 × 3 × 3 = 72

So 72 has many common factors with 144 (in fact, 72 itself divides 144).
Composite factorisation hides common prime factors inside the composite factors.

Answer: No. Prime factorisations show 72 = $2^3 \times 3^2$ and 144 = $2^4 \times 3^2$, so HCF = 72. The composite factorisation hides common factors inside 6, 12, 8, and 18.

Exercise 11.4 — Idli-Vada Game — First Common Multiple / LCM (Page 56)

Q1 In the Idli-Vada game, find the first number at which 'idli-vada' is called for each pair: (a) 4 and 6 (b) 7 and 11 (c) 14 and 30 (d) 15 and 55

SOLUTION

The first 'idli-vada' number is the first common multiple of the two numbers, which is their LCM.

(a) LCM of 4 and 6:
$4 = 2 \times 2, \quad 6 = 2 \times 3$
$LCM = 2 \times 2 \times 3 = 12$

(b) LCM of 7 and 11:
7 and 11 are both prime, so they share no common factors.
$LCM = 7 \times 11 = 77$

(c) LCM of 14 and 30:
$14 = 2 \times 7, \quad 30 = 2 \times 3 \times 5$
$LCM = 2 \times 3 \times 5 \times 7 = 210$

(d) LCM of 15 and 55:
$15 = 3 \times 5, \quad 55 = 5 \times 11$
$LCM = 3 \times 5 \times 11 = 165$

Yes, the answer is always the LCM of the two numbers, because the LCM is the smallest number that is a multiple of both, which is exactly when 'idli-vada' is first called.

Answer: (a) 12 (b) 77 (c) 210 (d) 165

Exercise 11.5 — Find LCM Using Prime Factorisation (Page 58)

Q1 Find the LCM of the following numbers: (a) 30 and 72 (b) 36 and 54 (c) 105, 195, and 65 (d) 222 and 370

SOLUTION

(a) LCM of 30 and 72:
30 = 2 × 3 × 5
72 = 2 × 2 × 2 × 3 × 3
Include each prime with its maximum count:
2 appears max 3 times, 3 max 2 times, 5 max 1 time.
LCM = 2 × 2 × 2 × 3 × 3 × 5 = 360

(b) LCM of 36 and 54:
36 = 2 × 2 × 3 × 3
54 = 2 × 3 × 3 × 3
2 appears max 2 times, 3 max 3 times.
LCM = 2 × 2 × 3 × 3 × 3 = 108

(c) LCM of 105, 195, and 65:
105 = 3 × 5 × 7
195 = 3 × 5 × 13
65 = 5 × 13
All primes: 3 (max 1), 5 (max 1), 7 (max 1), 13 (max 1).
LCM = 3 × 5 × 7 × 13 = 1365

(d) LCM of 222 and 370:
222 = 2 × 3 × 37
370 = 2 × 5 × 37
All primes: 2 (max 1), 3 (max 1), 5 (max 1), 37 (max 1).
LCM = 2 × 3 × 5 × 37 = 1110

Answer: (a) 360 (b) 108 (c) 1365 (d) 1110

Exercise 11.6 — Patterns and Properties of HCF and LCM (Page 59)

Q1 The LCM of 3 and 24 is 24 (one of the two given numbers). (a) Find more such number pairs where the LCM is one of the two numbers. (b) Make a general statement about such numbers. Describe them using algebra.

SOLUTION

(a) Examples of pairs where LCM equals one of the numbers:
LCM(4, 12) = 12 ✓
LCM(5, 15) = 15 ✓
LCM(6, 18) = 18 ✓
LCM(7, 49) = 49 ✓

(b) This happens when one number is a factor of the other (equivalently, the larger is a multiple of the smaller).
In each case, the smaller number divides the larger exactly, so the larger number is already the smallest common multiple.

Algebraic description: If the two numbers are n and kn (where k is a positive integer), then LCM(n, kn) = kn.

Answer: LCM equals one of the two numbers when one is a multiple of the other (e.g., n and kn). LCM(n, kn) = kn.

Q2 Find the HCF of the following pairs of multiples of 14: (a) 18×10 and 18×15 (b) 10×38 and 10×21 (c) 5×13 and 5×20 (d) 12×16 and 12×20

SOLUTION

(a) HCF of 180 and 270:
180 = 2 × 2 × 3 × 3 × 5, 270 = 2 × 3 × 3 × 3 × 5
Common primes: 2 (min 1), 3 (min 2), 5 (min 1).
HCF = 2 × 3 × 3 × 5 = 90
(The common multiplier 18 is a factor, and the HCF of 10 and 15 is 5, so HCF = 18 × 5 = 90.)

(b) HCF of 380 and 210:
380 = 2 × 2 × 5 × 19, 210 = 2 × 3 × 5 × 7
Common primes: 2 (min 1), 5 (min 1).
HCF = 2 × 5 = 10
(The common multiplier 10 is the HCF because HCF(38, 21) = 1.)

(c) HCF of 65 and 100:
65 = 5 × 13, 100 = 2 × 2 × 5 × 5
Common prime: 5 (min 1).
HCF = 5
(The common multiplier 5 is the HCF because HCF(13, 20) = 1.)

(d) HCF of 192 and 240:
192 = 2 × 2 × 2 × 2 × 2 × 2 × 3, 240 = 2 × 2 × 2 × 2 × 3 × 5
Common primes: 2 (min 4), 3 (min 1).
HCF = 2 × 2 × 2 × 2 × 3 = 48
(The common multiplier 12 is not the full HCF because HCF(16, 20) = 4, so HCF = 12 × 4 = 48.)

Answer: (a) 90 (b) 10 (c) 5 (d) 48

Q3 In which of the cases above is the HCF the same as the common multiplier (like case (b) where HCF = 10)?

SOLUTION

The HCF equals the common multiplier only when the two multiplied numbers are coprime (HCF = 1).

Check each case:

(a) 18×10 and 18×15: HCF(10, 15) = 5 ≠ 1 → HCF of pair = 18 × 5 = 90 ≠ 18
(b) 10×38 and 10×21: HCF(38, 21) = 1 → HCF of pair = 10 × 1 = 10 ✓
(c) 5×13 and 5×20: HCF(13, 20) = 1 → HCF of pair = 5 × 1 = 5 ✓
(d) 12×16 and 12×20: HCF(16, 20) = 4 ≠ 1 → HCF of pair = 12 × 4 = 48 ≠ 12

Cases (b) and (c) have HCF equal to the common multiplier.

Answer: Cases (b) and (c). The HCF equals the common multiplier when the two remaining factors are coprime (have HCF = 1).

Exercise 11.7 — HCF × LCM Property and Applications (Pages 63–64)

Q1 In the two rows of coloured stars, colours repeat as shown. When will the blue stars meet next?
Row 1 has a repeating pattern of 6 colours; blue is at every 6th position.
Row 2 has a repeating pattern of 4 colours; blue is at every 4th position.

SOLUTION

Blue stars appear periodically in each row:
Row 1: blue star appears at every 6th position (period 6).
Row 2: blue star appears at every 4th position (period 4).

They meet when a position is a multiple of both 6 and 4.
The smallest such position is LCM(6, 4).

$6 = 2 \times 3$
$4 = 2 \times 2$
$LCM = 2 \times 2 \times 3 = 12$

The blue stars will meet next at position 12.

Answer: The blue stars meet next at position 12 (LCM of 6 and 4).

Q2 (a) Is $5 \times 7 \times 11 \times 11$ a multiple of $5 \times 7 \times 7 \times 11 \times 2$? (b) Is $5 \times 7 \times 11 \times 11$ a factor of $5 \times 7 \times 7 \times 11 \times 2$?

SOLUTION

Let $A = 5 \times 7 \times 11 \times 11 = 4235$
Let $B = 5 \times 7 \times 7 \times 11 \times 2 = 5390$

(a) Is A a multiple of B? A multiple of B must contain B as a subpart.
$B = 5 \times 7 \times 7 \times 11 \times 2$. For A to be a multiple, it needs two 7s and one 2.
A has only one 7 and no 2. So A is NOT a multiple of B.

(b) Is A a factor of B? A factor of B must divide B exactly.
$A = 5 \times 7 \times 11 \times 11$ requires two 11s. B has only one 11.
So A is NOT a factor of B.

Check: 5390 ÷ 4235 is not a whole number; 4235 ÷ 5390 is not a whole number. Confirmed.

Answer: (a) No (b) No

Q3 Find the HCF and LCM of the following (state your answers in the form of prime factorisations): (a) 3 × 3 × 5 × 7 × 7 and 12 × 7 × 11 (b) 45 and 36

SOLUTION

(a) Let P = 3 × 3 × 5 × 7 × 7 = $3^2 \times 5 \times 7^2$

Let Q = 12 × 7 × 11 = $2^2 \times 3 \times 7 \times 11$

HCF: common primes with minimum powers.

3: min(2,1) = 1 → 3^1

7: min(2,1) = 1 → 7^1

HCF = 3 × 7 = 21

LCM: all primes with maximum powers.

2: max(0,2) = 2 → 2^2

3: max(2,1) = 2 → 3^2

5: max(1,0) = 1 → 5

7: max(2,1) = 2 → 7^2

11: max(0,1) = 1 → 11

LCM = $2^2 \times 3^2 \times 5 \times 7^2 \times 11$ = 4 × 9 × 5 × 49 × 11 = 97020

In prime factorisation form: LCM = $2^2 \times 3^2 \times 5 \times 7^2 \times 11$

(b) 45 = 3 × 3 × 5 = $3^2 \times 5$

36 = 2 × 2 × 3 × 3 = $2^2 \times 3^2$

HCF: common primes with minimum powers.

3: min(2,2) = 2 → 3^2

HCF = 3^2 = 9

LCM: all primes with maximum powers.

2: max(0,2) = 2 → 2^2

3: max(2,2) = 2 → 3^2

5: max(1,0) = 1 → 5

LCM = $2^2 \times 3^2 \times 5$ = 4 × 9 × 5 = 180

In prime factorisation form: LCM = $2^2 \times 3^2 \times 5$

Answer: (a) HCF = 3 × 7 = 21; LCM = $2^2 \times 3^2 \times 5 \times 7^2 \times 11$ = 97020 (b) HCF = 3^2 = 9; LCM = $2^2 \times 3^2 \times 5$ = 180

Q4 Find two numbers whose HCF is 1 and LCM is 66.

SOLUTION

Prime factorisation of 66: 66 = 2 × 3 × 11.

If HCF(a, b) = 1, the two numbers are coprime (no common prime factors).
We need to split the prime factors of 66 between a and b so that no prime appears in both.

Possible splits (each prime goes entirely to one number):

a = 1, b = 66 = 2 × 3 × 11
a = 2, b = 33 = 3 × 11
a = 3, b = 22 = 2 × 11
a = 6, b = 11

Any of these pairs works. The simplest are (2, 33) or (6, 11).

Answer: Possible pairs: (1, 66), (2, 33), (3, 22), or (6, 11)

Q5 A cowherd took all his cows to graze. They came to a crossing with 3 gates, then one with 5 gates, then one with 7 gates. At each crossing, an equal number of cows passed through each gate. If the cowherd had fewer than 200 cows, how many cows did he have?

SOLUTION

At the crossing with 3 gates: total cows must be divisible by 3.
At the crossing with 5 gates: total cows must be divisible by 5.
At the crossing with 7 gates: total cows must be divisible by 7.

So the number of cows must be divisible by 3, 5, and 7.
The smallest such number is LCM(3, 5, 7).

3 = 3, 5 = 5, 7 = 7 (all prime, no common factors)
LCM = 3 × 5 × 7 = 105

The next multiple is 2 × 105 = 210, which exceeds 200.

Therefore, the cowherd had 105 cows.

Answer: 105 cows

Q6 The length, width, and height of a box are 12 cm, 18 cm, and 36 cm respectively. Which of the following sized cubes can be packed in this box without leaving gaps? (a) 9 cm (b) 6 cm (c) 4 cm (d) 3 cm (e) 2 cm

SOLUTION

A cube of side s fits without gaps in all three dimensions if s divides 12, 18, and 36 exactly.
That is, s must be a common factor of 12, 18, and 36.

Check each option:
(a) s = 9: 12 ÷ 9 = 1 remainder 3. Does NOT divide 12. ✗
(b) s = 6: 12 ÷ 6 = 2 ✓, 18 ÷ 6 = 3 ✓, 36 ÷ 6 = 6 ✓. Fits perfectly. ✓
(c) s = 4: 18 ÷ 4 = 4 remainder 2. Does NOT divide 18. ✗
(d) s = 3: 12 ÷ 3 = 4 ✓, 18 ÷ 3 = 6 ✓, 36 ÷ 3 = 12 ✓. Fits perfectly. ✓
(e) s = 2: 12 ÷ 2 = 6 ✓, 18 ÷ 2 = 9 ✓, 36 ÷ 2 = 18 ✓. Fits perfectly. ✓

Note: HCF(12, 18, 36) = 6, so valid cube sizes are all common factors of 12, 18, and 36 that are ≤ 6: i.e., 1, 2, 3, 6.

Answer: (b) 6 cm, (d) 3 cm, and (e) 2 cm

Q7 Among the numbers below, which is the largest number that perfectly divides both 306 and 36? (a) 36 (b) 612 (c) 18 (d) 3 (e) 2 (f) 360

SOLUTION

The largest number that divides both 306 and 36 is their HCF.

Prime factorisations:
306 = 2 × 3 × 3 × 17
36 = 2 × 2 × 3 × 3

Common primes with minimum powers:
2: min(1, 2) = 1 → 2
3: min(2, 2) = 2 → 3 × 3 = 9
HCF = 2 × 9 = 18

Check: 306 ÷ 18 = 17 ✓, 36 ÷ 18 = 2 ✓.
Also verify option (a) 36: 306 ÷ 36 = 8.5 — not a whole number. So 36 does not divide 306.

The answer is (c) 18.

Answer: (c) 18

Q8 Find the smallest number that is divisible by 3, 4, 5, and 7, but leaves a remainder of 10 when divided by 11.

SOLUTION

The smallest number divisible by 3, 4, 5, and 7 is LCM(3, 4, 5, 7).

$3 = 3,\ 4 = 2^2,\ 5 = 5,\ 7 = 7$
$LCM = 2^2 \times 3 \times 5 \times 7 = 4 \times 3 \times 5 \times 7 = 420$

We need a multiple of 420 that leaves remainder 10 when divided by 11.
Check multiples of 420:
420 × 1 = 420: 420 ÷ 11 = 38 remainder 2 ✗
420 × 2 = 840: 840 ÷ 11 = 76 remainder 4 ✗
420 × 3 = 1260: 1260 ÷ 11 = 114 remainder 6 ✗
420 × 4 = 1680: 1680 ÷ 11 = 152 remainder 8 ✗
420 × 5 = 2100: 2100 ÷ 11 = 190 remainder 10 ✓

Verify: 2100 ÷ 3 = 700 ✓, 2100 ÷ 4 = 525 ✓, 2100 ÷ 5 = 420 ✓, 2100 ÷ 7 = 300 ✓, 2100 ÷ 11 = 190 r 10 ✓

Answer: 2100

Q9 Children are playing 'Fire in the Mountain'. When 6 was called out, no one got out. When 9 was called out, no one got out. But when 10 was called out, some people got out. How many children could have been playing initially? (a) 72 (b) 90 (c) 45 (d) 3 (e) 36 (f) None of these

SOLUTION

In this game, when number N is called, children form groups of N.
No one gets out means the total is exactly divisible by N.
Some get out means the total is NOT divisible by N.

Conditions:
No one out for 6 → total divisible by 6
No one out for 9 → total divisible by 9
Some out for 10 → total NOT divisible by 10

Total must be divisible by both 6 and 9, so divisible by LCM(6, 9).
$6 = 2 \times 3,\ 9 = 3 \times 3$

LCM(6, 9) = 2 × 3 × 3 = 18

Check each option:

(a) 72: 72 ÷ 6 = 12 ✓, 72 ÷ 9 = 8 ✓, 72 ÷ 10 = 7.2 (not divisible) ✓

(b) 90: 90 ÷ 10 = 9 exactly — someone would NOT get out. ✗

(c) 45: 45 ÷ 6 = 7.5 — some would get out for 6. ✗

(d) 3: Not divisible by 6. ✗

(e) 36: 36 ÷ 6 = 6 ✓, 36 ÷ 9 = 4 ✓, 36 ÷ 10 = 3.6 (not divisible) ✓

Both (a) 72 and (e) 36 satisfy all conditions.

Answer: (a) 72 and (e) 36

Q10 Tick the correct statement(s). The LCM of two different prime numbers (m, n) can be: (a) Less than both numbers (b) In between the two numbers (c) Greater than both numbers (d) Less than m × n (e) Greater than m × n

SOLUTION

Since m and n are different prime numbers, their only common factor is 1 (they are coprime).

Therefore, HCF(m, n) = 1.

Using the property: HCF × LCM = m × n

1 × LCM = m × n

LCM = m × n

Now evaluate each statement:

(a) Less than both numbers: LCM = m × n ≥ m and ≥ n (since m,n ≥ 2). NOT less than both. ✗

(b) In between the two numbers: LCM = m × n > max(m, n). NOT in between. ✗

(c) Greater than both numbers: LCM = m × n > m and > n. YES ✓

(d) Less than m × n: LCM = m × n exactly, so NOT less than m × n. ✗

(e) Greater than m × n: LCM = m × n exactly, so NOT greater. ✗

Only statement (c) is correct.

Answer: (c) Greater than both numbers

Q11 What is the smallest number that is a multiple of 1, 2, 3, 4, 5, 6, 8, 9, and 10?

SOLUTION

We need LCM(1, 2, 3, 4, 5, 6, 8, 9, 10).

Prime factorisations of each:

1 = 1

2 = 2

3 = 3

4 = 2 × 2

5 = 5

6 = 2 × 3

8 = 2 × 2 × 2

9 = 3 × 3

10 = 2 × 5

Take each prime with its maximum power across all numbers:

2: max power = 3 (from 8 = 2^3)

3: max power = 2 (from 9 = 3^2)

5: max power = 1 (from 5 or 10)

LCM = $2^3 \times 3^2 \times 5 = 8 \times 9 \times 5 = 360$

Answer: 360