

KENDRIYA VIDYALAYA SANGATHAN BHOPAL REGION

CLASS X — MATHEMATICS

Chapter 1: Real Numbers

(CBT) — Case Study Based Question

Maximum Marks: 10

Instructions: Each case study carries 5 marks (1 mark per sub-question).

Study the passage and diagram carefully, then choose the correct option for each sub-question.

CASE STUDY 1. MORNING WALK.

A morning walk may help improve your mental clarity and ability to focus throughout the day. A recent study found that amongst older adults, those who started their days with a morning walk improved their cognitive function, compared to those who remained sedentary. Walking may also help you think more creatively. In a morning walk three students step off together, their steps measure 80 cm, 85 cm and 90 cm respectively.



1. What is the HCF of 80 and 90?

- (a) 10
- (b) 720
- (c) 80
- (d) 90

2. What is the LCM of 80 and 90?

- (a) 10
- (b) 720
- (c) 80
- (d) 90

3. .What is the minimum distance each should walk so that he can cover the distance in complete steps?

- (a) 720
- (b) 12240
- (c) 12200
- (d) 1224

4.Find the sum of exponents of the prime factors of total distance?

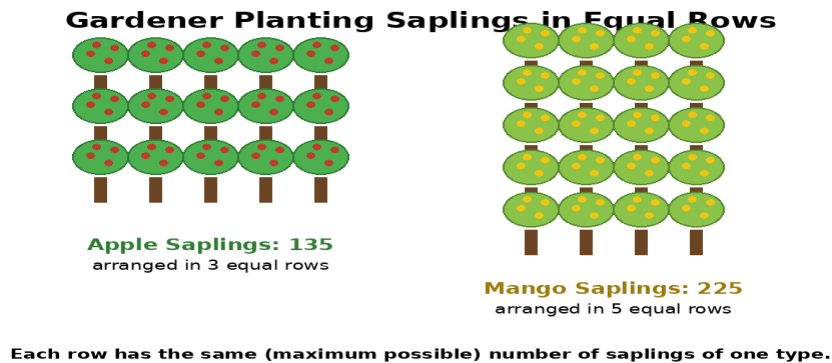
- (a) 10
- (b) 7
- (c) 8
- (d) 9

5. what is the product of the HCF and LCM of 80,85and 90?

- (a) 61,200
- (b) 7120
- (c) 8100
- (d) 7252

Q2. Case Study 2: Gardener Planting Saplings [5 Marks]

A gardener has 135 apple saplings and 225 mango saplings. He wants to plant them in rows such that every row has the same number of saplings, all of the same type, and the number of saplings in each row is as large as possible. The diagram below shows the arrangement he plans to follow. Based on the information given, answer the following questions.



(6) The prime factorisation of 135 and 225 is:

- (a) $135 = 3^3 \times 5$, $225 = 3^2 \times 5^2$
- (b) $135 = 3^2 \times 5$, $225 = 3 \times 5^2$
- (c) $135 = 3^3 \times 5^2$, $225 = 3^2 \times 5$
- (d) $135 = 3 \times 5^2$, $225 = 3^2 \times 5^2$

(7) The maximum number of saplings that can be planted in each row (HCF of 135 and 225) is:

- (a) 15
- (b) 25
- (c) 45
- (d) 9

(8) The number of rows of apple saplings will be:

- (a) 2
- (b) 3
- (c) 4
- (d) 5

(9) The number of rows of mango saplings will be:

- (a) 3**
- (b) 4**
- (c) 5**
- (d) 6**

(10) If the gardener also plants 90 cherry saplings using the same row size, the new maximum number of saplings per row (HCF of 135, 225 and 90) will be:

- (a) 30**
- (b) 45**
- (c) 15**
- (d) 90**

ANSWER KEY WITH EXPLANATION

Case Study 1: Morning walk.

Sub-Q	Correct Answer	Explanation
1.	(a) 10	$80 = 2^4 \times 5$, $90 = 2 \times 3^2 \times 5$ $HCF = 2 \times 5 = 10$
2.	(b) 720	$LCM = (80 \times 90) \div 10 = 720$
3.	(b) 12240	$80 = 2^4 \times 5$ $85 = 5 \times 17$ $90 = 2 \times 3^2 \times 5$ $LCM = 2^4 \times 3^2 \times 5 \times 17 = 12,240 \text{ cm}$
4.	(c) 8	$12,240 = 2^4 \times 3^2 \times 5^1 \times 17^1$ Sum of exponents = $4 + 2 + 1 + 1 = 8$
5.	(a) 61,200	$HCF(80, 85, 90) = 5$ $LCM(80, 85, 90) = 12,240$ Product = $5 \times 12,240 = 61,200$

Case Study 2: Gardener Planting Saplings

Sub-Q	Correct Answer	Explanation
6.	(a) $135 = 3^3 \times 5$, $225 = 3^2 \times 5^2$	$135 = 3 \times 3 \times 3 \times 5 = 3^3 \times 5$. $225 = 3 \times 3 \times 5 \times 5 = 3^2 \times 5^2$.
7.	(c) 45	HCF = product of the smallest power of common prime factors = $3^2 \times 5 = 45$.
8.	(b) 3	Number of rows = $135 \div 45 = 3$.
9.	(c) 5	Number of rows = $225 \div 45 = 5$.
10.	(b) 45	$90 = 2 \times 3^2 \times 5$. Common factors of 135 ($3^3 \times 5$), 225 ($3^2 \times 5^2$) and 90 ($2 \times 3^2 \times 5$) are $3^2 \times 5 = 45$, so the HCF remains 45.