

ANSWER KEY

1	(B) $3\sqrt{3}$
2	(B) 2
3	(A) 13
4	(C) 81
5	(D) 120
6	(B) 235
7	(C) 6
8	(C) 35
9	(D) A is false and R is True
10	(D) A is false and R is True
11	Required number = $\text{Lcm}(28, 32) - \text{Sum of remainders}$ $\text{Lcm}(28, 32) =$ $2 \times 2 \times 2 \times 2 \times 2 \times 7 = 224$ Sum of remainder $(\cancel{12} + 20)$ $\neq 8 + 12$ $= 20$ $N = 224 - 20 = 204$ OR $\text{LCM}(15, 24, 36) = 360$ $ \begin{array}{r} 2 \mid 15, 24, 36 \\ 2 \mid 15, 12, 18 \\ 2 \mid 15, 6, 9 \\ 3 \mid 15, 3, 9 \\ 3 \mid 5, 1, 3 \\ 5 \mid 5, 1, 1 \\ 1, 1, 1 \end{array} $ 27 $ \begin{array}{r} 360 \overline{) 9999} \\ \underline{7200} \\ 2799 \\ \underline{2520} \\ 279 \end{array} $ 9999 - 279 = 9720 is the number. Ans.
12	

$$\text{Given; } LCM = 14HCF \rightarrow I$$

$$LCM + HCF = 600 \rightarrow II$$

Put (I) in (II)

$$14HCF + HCF = 600$$

$$15HCF = 600$$

$$HCF = \frac{600}{15}$$

$$HCF = 40$$

$$LCM = 14HCF$$

$$= 14 \times 40$$

$$LCM = 560$$

$$\text{We know, } HCF \times LCM = a \times b$$

$$560 \times 40 = 280 \times b$$

$$2 \frac{560 \times 40}{280} = b$$

$$280$$

$$\Rightarrow b = 80$$

13

$$64 = 2^6$$

$$80 = 2^4 \times 5$$

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

$$LCM = 2^6 \times 3 \times 5 = 64 \times 3 \times 5 = 960 \text{ cm.}$$

The least length of cloth can be measured exactly using any of the rods is 960 cm.

OR

We will find LCM of 4, 7 and 14.

$$\begin{array}{r}
 2 \overline{) 4, 7, 14} \\
 2 \overline{) 2, 7, 7} \\
 7 \overline{) 1, 7, 7} \\
 1, 1, 1
 \end{array}$$

$$\text{LCM}(4, 7, 14) = 28$$

∴ At 6:28 am, the three bells will ring together next.

14

Given: The number is $\frac{1}{\sqrt{2}+5}$

$$\begin{aligned}
 \frac{1}{\sqrt{2}+5} &= \frac{1 \times \sqrt{2}-5}{(\sqrt{2}+5)(\sqrt{2}-5)} = \frac{\sqrt{2}-5}{4-25} = \frac{\sqrt{2}-5}{-21} \\
 &= -\frac{(\sqrt{2}-5)}{21} \\
 &= \frac{5-\sqrt{2}}{21}
 \end{aligned}$$

Let us assume $\frac{5-\sqrt{2}}{21}$ is rational

$$\Rightarrow \frac{5-\sqrt{2}}{21} = \frac{a}{b} \quad [a, b \text{ are co-prime, } b \neq 0]$$

$$5-\sqrt{2} = \frac{21a}{b}$$

$$-\sqrt{2} = \frac{21a}{b} - 5$$

$$-\sqrt{2} = \frac{21a-5b}{b}$$

$$\sqrt{2} = \frac{21a-5b}{-b} \quad \left[\begin{array}{l} p \text{ form, } q \neq 0 \\ p, q \text{ co-prime} \end{array} \right]$$

Here, Rational = Irrational which is not possible.

Hence, our assumption is wrong.

$\frac{1}{\sqrt{2}+5}$ is irrational.

15

$$1251 - 1 = 1250$$

$$9377 - 2 = 9375$$

$$15628 - 3 = 15625$$

$$(1250, 9375, 15625) = 625$$

largest no. = 625

OR

$$\text{LCM} + \text{HCF} = 1260 \rightarrow \text{I}$$

$$\text{LCM} = \text{HCF} + 900 \rightarrow \text{II}$$

Put II in I:

$$\text{HCF} + 900 + \text{HCF} = 1260$$

$$2\text{HCF} + 900 = 1260$$

$$2(\text{HCF} + 450) = 1260 \Rightarrow \text{HCF} + 450 = 630$$

$$\boxed{\text{HCF} = 180}$$

$$\text{LCM} = \text{HCF} + 900$$

$$\Rightarrow \text{LCM} = 180 + 900$$

$$\text{LCM} = 1080$$

$$\text{HCF} \times \text{LCM} = a \times b$$

$$\text{HCF} \times \text{LCM} = 1080 \times 180$$

$$= 194400 \text{ Ans.}$$

16

(6i) We will find HCF.

$$\text{Small} = 88 = 2 \times 2 \times 2 \times 11 = 2^3 \times 11 \text{ cm}^2$$

$$\text{Medium} = 12 \times 24 = 2 \times 2 \times 3 \times 2 \times 2 \times 2 \times 3$$

$$= 2^5 \times 3^2 \text{ cm}^2$$

$$\text{Large} = 24 \times 36 = 2^3 \times 3 \times 2^2 \times 3^2$$

$$= 2^5 \times 3^3 \text{ cm}^2$$

$$\text{Extra large} = 36 \times 48 = 2^2 \times 3^2 \times 2^4 \times 3$$

$$= 2^6 \times 3^3 \text{ cm}^2$$

$$\text{XXL} = 48 \times 96 = 2^4 \times 3 \times 2^4 \times 3 \times 2$$

$$= 2^4 \times 3 \times 2^4 \times 3 \times 2$$

$$= 2^9 \times 3^2 \text{ cm}^2$$

$$\text{HCF} = 2^4 \times 3 = 48$$

(We have found HCF of areas of all different types of cartons)

Maximum Size of box = 48 cm²
 maximum sheet

ii The Area of Semi-large carton is b/w 288 cm² and 864 cm²

17
(i)

Greatest no of students in each row = HCF(480, 640)

$$\begin{array}{r|l}
 2 & 480, 640 \\
 2 & 240, 320 \\
 2 & 120, 160 \\
 2 & 60, 80 \\
 2 & 30, 40 \\
 5 & 15, 20 \\
 & 3, 4
 \end{array}$$

$= 32 \times 5$
 $= 160$

(ii)

Rows required for girls = $\frac{480}{160} = 3$ rows

Rows required for boys = $\frac{640}{160} = 4$ rows

Total number of rows = $4+3=7$ rows

(iii)A

LCM (480, 640)

$$\Rightarrow \text{LCM} = 2^7 \times 5 \times 3$$

$$= 1920$$

$$\text{LCM} \times \text{HCF} = 480 \times 640$$

(iii)B

We need to find LCM of 45 and 60 = 180 (using prime factorisation)

18

Let us assume $\sqrt{5}$ is rational ($\sqrt{5} = \frac{p}{q}$, $q \neq 0$ p & q are co-prime)

$$\sqrt{5} = \frac{p}{q}$$

$$\sqrt{5}q = p$$

Squaring on both sides:

$$5q^2 = p^2 \rightarrow \text{I}$$

$$q^2 = \frac{p^2}{5} \rightarrow \text{II}$$

As 5 divides p^2 , 5 divides p also.

$$\Rightarrow \frac{p}{5} = k$$

$$p = 5k \rightarrow \text{Put in (I)}$$

$$5q^2 = (5k)^2$$

$$5q^2 = 25k^2$$

$$q^2 = 5k^2$$

$$\frac{q^2}{k^2} = 5$$

$$\Rightarrow \frac{q^2}{5} = k^2$$

As 5 divides q^2 , 5 divides q also.
 As 5 divides both p and q , this contradicts our assumption that p and q are co-prime.
 Hence, our assumption is wrong.
 $\sqrt{5}$ is irrational.

19

Let us assume $\sqrt{2} + \sqrt{3}$ is rational $(\Rightarrow \sqrt{2} + \sqrt{3} = \frac{p}{q})$, $q \neq 0$ and p, q are co-prime.
 Squaring both sides
 $(\sqrt{2} + \sqrt{3})^2 \Rightarrow 2 + 3 + 2\sqrt{6} \Rightarrow 5 + 2\sqrt{6}$

$$5 + 2\sqrt{6} = \frac{p^2}{q^2}$$

$$2\sqrt{6} = \frac{p^2}{q^2} - 5$$

$$2\sqrt{6} = \frac{p^2 - 5q^2}{q^2}$$

$$\sqrt{6} = \frac{p^2 - 5q^2}{2q^2}$$

Here, Irrational = Rational (which isn't possible)

Hence, our assumption is wrong.

$\sqrt{2} + \sqrt{3}$ is irrational.

End