AECS - 6, Mumbai

Class: X Maths Ch 1: Worksheet

Section A

1. (b)

2. $96 \overline{)404}$ quotient 4
-384
$20 \overline{)96}$ quotient 4
-80
$16 \overline{)20}$ quotient 1
-16
$4 \overline{)16}$ quotient 4
-16
0

HCF - 4

(b)

3.
2	96, 404
2	48, 202
2	24, 101
2	12, 101
2	6, 101
3	3, 101
101	1, 101
	1, 1

LCM = $2\times2\times2\times2\times2\times3\times101$

= 9696

(e)

~~4. 2 | 6, 72, 120~~
~~3 | 3, 36, 60~~
~~2 | 1, 12, 20~~
~~2 | 1, 6, 10~~
~~1, 3, 5~~
~~HCF = 2×3×2×2~~
~~= 2~~

4. $6 = 2\times3$
$72 = 2\times2\times2\times3\times3$
$120 = 2\times2\times3\times2\times5$
HCF = $2\times3 = 6$
(c) 6

5. LCM
$= 6\times 2\times2\times3\times2\times2\times5$
$= 360$

4. $6 = 2\times3$
$72 = 2\times2\times2\times3\times3$
$120 = 2\times2\times3\times2\times5$
HCF = $2\times3 = 6$
(c) 6

5. $6 = 2\times3$
$72 = 2\times2\times2\times3\times3$
$120 = 2\times2\times3\times2\times5$
LCM = $2\times3\times2\times2\times3\times5$
= 360 (c)

6. (b)

7. (b)

8. $A = x\cdot y\cdot y\cdot y$
$B = x\cdot x\cdot x\cdot x\cdot y\cdot y\cdot z$
HCF = xy^2 (a)

9. HCF of 408, 1032 = 24
$(1032)\times2 + 408p = 24$
$p = 5$ (a)

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Sundaram

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10. (a) 11. (a) 12. (a)

Section B

1. $32 = 2\times2\times2\times2\times2$
$48 = 2\times2\times2\times2\times3$
HCF $= 2\times2\times2\times2 = 16$
LCM $= 16\times2\times3 = 96$.
HCF $\times$ LCM $= 16\times96 = 1536$
$32\times48 = 1536$
Hence verified

2. $17\times5\times11\times3\times2 + 2\times11$
$= 2\times11\,(17\times5\times3+1)$
$= 2\times11\times256$
$= 2\times11\times2\times2\times2\times2\times2\times2\times2\times2$
$\therefore$ It is a composite number as it can be expressed as a product of primes. Also, acc. to FTA prime factorisation is unique.

3. $4^n = (2\times2)^n$
For any number to end with zero, it has to have 2 and 5 as its prime factors. But 4^n doesn't have 5 in its prime factorisation.
So 4^n cannot end with zero

4. Let $3+\sqrt{2}$ be rational
$\therefore 3+\sqrt{2} = \frac{p}{q}$, p, q = Coprime integers, $q \neq 0$
$\sqrt{2} = \frac{p}{q} - 3 = \frac{p-3q}{3}$
But $\sqrt{2}$ is irrational & $\frac{p-3q}{3}$ is rational
This is a contradiction formed due to our incorrect assumption
$\therefore 3+\sqrt{2}$ is irrational.

5.
$$\begin{array}{r|l} 2 & 56, 28 \\ \hline 2 & 28, 14 \\ \hline 7 & 14, 7 \\ \hline & 2, 1 \end{array}$$
HCF $= 2\times2\times7 = 28$
LCM $= 28\times2 = 56$

6.
$$\begin{array}{r|l} 5 & 210, 55 \\ \hline & 42, 11 \end{array}$$
HCF $= 5$.
$210\times5 + 55y = 5$ (Div. by 5)
$210 + 11y = 1$ $\therefore y = \frac{-209}{11} = -19$

7.

$$\begin{array}{r|l} 5 & 2520 \\ 2 & 504 \\ 2 & 252 \\ 2 & 126 \\ 3 & 63 \\ 3 & 21 \\ 7 & 7 \\ & 1 \end{array}$$

$2520 = 5 \times 2 \times 2 \times 2 \times 3 \times 3 \times 7 = 5 \times 2^3 \times 3^2 \times 7$

$p = 5$

$q = 7$

8. $a^5 b^2 c^2 d^5 = a \cdot a \cdot a \cdot a \cdot a \cdot b \cdot b \cdot c \cdot c \cdot d \cdot d \cdot d \cdot d \cdot d$

$a^7 b^3 e f^3 = a \cdot a \cdot a \cdot a \cdot a \cdot a \cdot a \cdot b \cdot b \cdot b \cdot e \cdot f \cdot f \cdot f$

HCF $= a^5 b^2$

LCM $= a^5 b^2 c^2 d^5 e f^3$

9. LCM of $5, 7 = 35$

Hence, they will go fishing together on 35^{th} day

10. $\therefore$ LCM $= 14$ (HCF) $\rightarrow$ ①

LCM $+$ HCF $= 600 \rightarrow$ ②

$\therefore$ Also,

LCM (HCF) $= n_1 \times n_2$

LCM (HCF) $= 280 n_2$

$\therefore n_2 = \frac{\text{LCM (HCF)}}{280} \rightarrow$ ③

From ①, ②

$14\,\text{HCF} + \text{HCF} = 600$

$15\,\text{HCF} = 600$

$\therefore$ HCF $= 40$.

Substitute HCF $= 40$ in ③, ①

$n_2 = \frac{14(40)(40)}{280}$

$= 80$

Section C

1. Suppose $\sqrt{5}$ is irrational

$\therefore \sqrt{5} = \frac{p}{q}$; p, q are coprime integers, $q \neq 0$.

$p = \sqrt{5} q$

$\therefore p^2 = 5q^2 \rightarrow$ ①

$\therefore$ 5 divides p^2

Also 5 divides p

$\therefore p = 5c$, $c \in \mathbb{Z}$

$p^2 = 25c^2 \rightarrow$ ②

From ①, ②

$5q^2 = 25c^2$

$q^2 = 5c^2$

$\therefore$ 5 divides q^2 & hence q.

But p, q are coprime

This contradicts our assumption

$\therefore \sqrt{5}$ is irrational.

2. LCM of 15, 12, 18

$15 = 3 \times 5$

$12 = 3 \times 2 \times 2$

$18 = 3 \times 3 \times 2$

$LCM = 3 \times 2 \times 5 \times 2 \times 3$

$= 180$

180 min - 3 hrs.

So, 9 p.m.

3 HCF of 840, 615, 345 (cm)

$$\begin{array}{r|l} 5 & 840,\ 615,\ 345 \\ \hline 3 & 168,\ 123,\ 69 \\ \hline & 56,\ 41,\ 23 \end{array}$$

15 cm.

longest rod - 15 cm

4. LCM of 10, 16, 20

$10 = 2 \times 5$

$16 = 2 \times 2 \times 2 \times 2$

$20 = 2 \times 2 \times 5$

$LCM = 2 \times 5 \times 2 \times 2 \times 2$

$= 80.$

After 80 min

$= 1$ hr 20 min.

5. $x = p \cdot p \cdot q \cdot q \cdot q$

$y = p \cdot p \cdot p \cdot q$

$HCF = p^2 q$

$LCM = p^2 q \cdot q^2 \cdot p = p^3 q^3$.

Yes LCM is a multiple of HCF because p, q are primes.

Section D.

1. Same as Sec B. Q 4 and Sec C. Q 1

2. HCF of 720 and 405

$$\begin{array}{r|l} 5 & 720,\ 405 \\ \hline & 144,\ 81 \end{array}$$

Ans - 5 ml ~~glasses~~

Vessel 1 - $\frac{720}{5} = 144$.

Vessel 2 - $\frac{405}{5} = 81$

3 HCF of 104, 96

$$\begin{array}{r|l} 2 & 104,\ 96 \\ \hline 2 & 52,\ 48 \\ \hline 2 & 26,\ 24 \\ \hline & 13,\ 12 \end{array}$$

HCF = 8

8 rows

IX - $\frac{104}{8} = 13$ students

X - $\frac{96}{8}$ - 12 students

4. Let $(\sqrt{2}+\sqrt{3})^2$ be rational

$(\sqrt{2}+\sqrt{3})^2 = \frac{p}{q}$, p, q are coprime integers
$q \neq 0$

$2+3+2\sqrt{6} = \frac{p}{q}$

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

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

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

$\sqrt{6}$ is irrational
But $\frac{p-5q}{2q}$ is irrational
Now, this is a contradiction that arose due to our incorrect assumption
∴ Our assumption is wrong
$(\sqrt{2}+\sqrt{3})^2$ is irrational

5. Let $\frac{1}{3+2\sqrt{3}}$ be rational

$\frac{1}{3+2\sqrt{3}} = \frac{a}{b}$ a, b - coprime integers, $b \neq 0$

$3+2\sqrt{3} = \frac{b}{a}$

$2\sqrt{3} = \frac{b}{a} - 3$

$2\sqrt{3} = \frac{b-3a}{a}$

$\sqrt{3} = \frac{b-3a}{2a}$

Repeat the remaining steps of q 4.

Section E

1 (i) HCF of 850, 680.

$$
\begin{array}{r|l}
5 & 850,\ 680 \\
2 & 170,\ 136 \\
17 & 85,\ 68 \\
 & 5,\ 4
\end{array}
$$

HCF = 170

170 l.

(ii) $680 = 17 \times 2 \times 2 \times 2 \times 5$

(iii) $LCM = a^3 b^3$

2. (i) LCM of 80, 85, 90 = 12240

(ii) 5

(iii) $90 = 3 \times 3 \times 2 \times 5$