

3. MULTIPLES AND FACTORS

①

Class: VI, MATHEMATICS

FOUNDATION[†] SOLUTIONS

TEACHING TASK JEE MAINS

01. The factors of $90 = \{1, 2, 3, 5, 6, 9, 10, 15, 18, 30, 45, 90\}$

Even factors = $\{2, 6, 10, 18, 30, 90\} \rightarrow 6$

Ans: B

02. A) $108 = 2^3 \cdot 3^3$

No. of factors = $(2+1)(3+1) = 3 \times 4 = 12$

B) $120 = 2^3 \cdot 3 \cdot 5$

No. of factors = $(3+1)(1+1)(1+1)$
 $= 4 \times 2 \times 2 = 16$

C) $144 = 2^4 \cdot 3^2$

No. of factors = $(4+1)(2+1) = 5 \times 3 = 15$

D) $180 = 2^2 \cdot 3^2 \cdot 5$

No. of factors = $(2+1)(2+1)(1+1) = 3 \times 3 \times 2 = 18$

$\therefore 108$ has exactly 12 factors

Ans: A

03

$$\begin{array}{r} 2 \overline{) 150} \\ 3 \overline{) 75} \\ 5 \overline{) 25} \\ 5 \end{array} \quad \therefore 150 = 2 \times 3 \times 5^2$$

(1)

Ans: A

04

$$\text{L.C.M. of } \{1, 2, 3, 4, 5, 6\} = 60$$

Ans: B

05

$$30 = 2 \times 3 \times 5$$

Ans: D

06

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

Ans: C

$$\text{No. of factors} = (2+1)(3+1) = 3 \times 4 = 12$$

07

$$100 = 2^2 \times 5^2$$

$$\begin{array}{r} 2 \overline{) 100} \\ 2 \overline{) 50} \\ 5 \overline{) 25} \end{array}$$

$$\begin{aligned} \text{No. of factors} &= (2+1)(2+1) \\ &= 3 \times 3 = 9 \end{aligned}$$

$$\begin{array}{r} 2 \overline{) 96} \\ 2 \overline{) 48} \\ 2 \overline{) 24} \\ 2 \overline{) 12} \\ 2 \overline{) 6} \end{array}$$

$$\begin{aligned} \text{B) } 96 &= 2^5 \times 3^1 \\ \text{No. of factors} &= (5+1) \cdot (1+1) \\ &= 6 \times 2 \\ &= 12 \end{aligned}$$

$$\text{A) } 72 = 2^3 \times 3^2$$

$$\begin{array}{r} 2 \overline{) 72} \\ 2 \overline{) 36} \\ 2 \overline{) 18} \\ 3 \overline{) 9} \end{array}$$

$$\begin{aligned} \text{No. of factors} &= (3+1)(2+1) \\ &= 4 \times 3 = 12 \end{aligned}$$

$$\text{D) } 48 = 2^4 \times 3^1$$

$$\begin{array}{r} 2 \overline{) 48} \\ 2 \overline{) 24} \\ 2 \overline{) 12} \\ 2 \overline{) 6} \end{array}$$

$$\begin{aligned} \text{No. of factors} &= (4+1)(1+1) \\ &= 5 \times 2 \\ &= 10 \end{aligned}$$

Ans: D

08	$9 \times 14 = 126$	Ans. B (3)
09	$21 + 23 = 44$	Ans: B
10	A) $1+6=7$, prime No. B) $3+4=7$, prime no C) $1+9=10$, Not a prime no. d) Both A and B	Ans. D
11	Let $a=2, b=4, c=8$ $2 \times 4 = 8$ $\downarrow \quad \downarrow \quad \downarrow$ $a \quad b \quad c$ A) 8 is not a factor of 2 and 4	Ans. A
12	1995	Ans: B
13	1002	Ans: A
14	Let $a=2, b=4$. 2 is a factor of B. Common factors of a, b = $\{1, 2\}$ = factors of 2	Ans: B
15	Factors of 192 = $\{1, 2, 3, 4, 6, 8, 12, 16, 24, 32, 48, 64, 96, 192\}$	Ans. D
JEE ADVANCED LEVEL		
01.	A) (12, 18) D) (24, 30)	Ans. A, D

02.	A) 6 is the multiple of 6, but ^{also} not factors of 36 B) 30 is the multiple of 6, but not the factor of 36 d) 24 is the multiple of 6, but not the factor of 36 Ans: B, D
03	<u>Statement I:</u> Conceptual (True) Ans: A <u>Statement II:</u> Conceptual (True)
04	<u>Statement I:</u> Conceptual (False) Ans: D <u>Statement II:</u> Conceptual (True)
05	<u>Assertion:</u> Conceptual (False) Ans: D <u>Reason:</u> Conceptual (True)
06	<u>Assertion:</u> $45 \times 3 = 135$ (True) Ans: A <u>Reason:</u> Conceptual (True) Ans: D
07.	Conceptual Ans: A
08	Conceptual
09	$60 = 2 \times 30 = 2 \times 2 \times 15 = 2 \times 2 \times 3 \times 5 = 2^2 \times 3 \times 5$ Ans: B
10	$84 = 2 \times 42 = 2 \times 2 \times 21 = 2 \times 2 \times 3 \times 7 = 2^2 \times 3 \times 7$ Ans: A

11.	31 has only two factors 1 and 31 Ans: 31	Ans: 24
12	$143 = 11 \times 13$ $Sum = 11 + 13 = 24$	
13	a) 5, 10 (x) b) 12, 24 (p) c) 4, 8 (s) d) 2, 5 (q)	Ans: x, p, s, q
14	a) $90 = 2 \times 3 \times 3 \times 5$ (s) b) $84 = 2 \times 2 \times 3 \times 7$ (q) c) $72 = 2 \times 2 \times 2 \times 3 \times 3$ (p) d) $60 = 2 \times 2 \times 3 \times 5$ (x)	Ans: s, q, p, x
LEARNER'S TASK		
01.	Conceptual	Ans: B
02.	Conceptual	Ans: C
03.	Conceptual	Ans: C
04.	Conceptual	Ans: C
05.	multiples of 12 = 36, 48, 60	Ans: A
06.	No. of factors = $(2+1)(3+1)(1+1)$ $= 3 \times 4 \times 2 = 24$	Ans: B

Q7	Conceptual	Ans: B
Q8	Factor of 6 = {1, 2, 3, 4, 6} Sum = $1+2+3+4+6 = 12 = 2 \times 6$ Factors of 28 = {1, 2, 4, 7, 14, 28} Sum = $1+2+4+7+14+28 = 56 = 2 \times 28$	Ans: D
Q9	Conceptual	Ans: D
10	32 is not multiple of 6	Ans: C
11	Factors of 100 = {1, 2, 4, 5, 10, 20, 25, 50, 100} Sum = $1+2+4+5+10+20+25+50+100 = 207$	Ans: D
12	Conceptual	Ans: B
JEE MAINS LEVEL		
Q1	Conceptual (6)	Ans: A
Q2	$36 \overline{) 600}$ $24 \overline{) 360}$ $12 \overline{) 240}$ $24 \overline{) 240}$ G.C.D = 12	Ans: B
Q3	115	Ans: D
Q4	Conceptual	Ans: D

⑦

Factors of 28 = {1, 2, 4, 7, 14, 28}

Ans: B

$$\text{Sum} = 1 + 2 + 4 + 7 + 14 = 28$$

$$84 = 2^2 \times 3 \times 7 \text{ } \square$$

Ans: A

$$30 = 2 \times 3 \times 5$$

Ans: A

$$(a+b)(a-b) = c$$

Ans: C

$$\text{Let } a=4, \quad b=12 \quad 4 \nmid 12$$

~~$c=2$ is a common factor of 4 and 12~~

$$bc = 12 \times 2 = 24. \text{ (False)}$$

A) $ac = 4 \times 2 = 8$, $bc = 12 \times 2 = 24$. (True)

B) 8 is a factor of 24 (True)

C) 24 is a multiple of 8 (True)

Ans:

$$12 > 4$$

$$\text{Let } a=12, \quad b=4$$

is a common factor of 12 and 4

$$\text{Let } c=2$$

$$bc = 8$$

A) $ac = 24$, 24 is a multiple of 8

Ans: A

$$\text{Let } x=12, \quad y=6, \quad z=2$$

$$\text{i.e. } \frac{12}{6} = 2 \quad \left(\frac{x}{y} = z \right)$$

~~A) 12 is not a factor of 6~~

Ans: B

~~B) 12 is not a factor of 6~~



8

$$\frac{xyz}{abc} = \frac{(ab)(cd)(ca)}{abc} = abc$$

Ans: D

a, b and c are the factors

11. least factor of $x = 1$

greatest factor of $x = x$

Ans: B

$$\therefore \text{product} = 1 \times x = x$$

12. let the natural numbers be 1.

multiples of 1 are = 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100

$$x + y + w + z = 1 + 2 + 3 + 4 + 5 = 15 = 3 \times 5 = 15$$

Ans: C

13. let the number be x

multiples of x are = $x, 2x, 3x, 4x, 5x$

$$\text{Sum} = x + 2x + 3x + 4x + 5x = 15x = 45$$

$\Rightarrow$

$$x = 3$$

$$\Rightarrow \text{next multiple} = 6x = 6 \times 3 = 18$$

Ans: C

14. 1 is a factor of 2, 2 is a factor of 4,

4 is a factor of 8.

$$a = 1, b = 2, c = 4, d = 8$$

$$8 = 1 \times 2 \times 4 = abc$$

Ans: B

JEE ADVANCED LEVEL

9

01.

A) Factors of $\underline{4} = \{1, 2, \underline{4}\}$

B) Factors of $\underline{6} = \{1, 2, 3, \underline{6}\}$

C) Factors of $\underline{8} = \{1, 2, 4, \underline{8}\}$

D) All the multiples of 2 satisfies the given conditions.
Ans: A, B, C, D

02. C) Factors of $\underline{18} = \{1, 2, 3, 6, 9, 18\}$

$$\text{Sum} = 1 + 2 + 3 + 6 + 9 + 18 = 39 = 3 \times 13$$

D) Factors of $\underline{10} = \{1, 2, 5, 10\}$

$$\text{Sum} = 1 + 2 + 5 + 10 = 18 = 3 \times 6 \quad \text{Ans: C, D}$$

03. Statement I: $2x = 2x^2 = 4$

$$2y = 2 \times 3 = 6$$

$$2z = 2 \times u = 8$$

But 4, 6 are not factors of 8 (False) Ans: D

Statement II: Conceptual (True)

04. Statement I: Conceptual (True) Ans: A

Statement II: Conceptual (True)

05. Assertion: 2 is even, but not Composite (False)

Reason: Conceptual (True) Ans: D

06

Assertion: 1 is not prime (False)

10

Reason: Conceptual (True)

Ans: D

07

$$180 = 2 \times 90 = 2 \times 2 \times 45 = 2 \times 2 \times 3 \times 15 = 2 \times 2 \times 3 \times 3 \times 5$$

$$\therefore 180 = 2^2 \times 3^2 \times 5^1$$

$$\therefore \text{No. of factors} = (2+1)(2+1)(1+1)$$

$$= 3 \times 3 \times 2$$

$$= 18$$

Ans: A

08

$$\text{A) } 16 = 2^4. \text{ No. of factors} = (4+1) = 5 \text{ (True)}$$

$$\text{B) } 68 = 2^2 \times 17. \rightarrow N.F = (2+1)(1+1) = 3 \times 2 = 6 \text{ (True)}$$

$$\text{C) } 102 = 2 \times 3 \times 17 \rightarrow N.F = (1+1)(1+1)(1+1)$$

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

$$= 8 \text{ (False)}$$

Ans: C

09

Conceptual

Ans: C

10

15

Ans: A

11.

$$\text{No. of factors} = 3+1 = 4$$

Ans: 4

12.

$$7+14+21+28+35$$

$$= 7(1+2+3+4+5)$$

$$= 7 \times \frac{5 \times 6}{2} = 105$$

Ans: 105

13

a) Factors of 99 = $\{1, 3, 9, 11, 33, 99\}$

11

odd prime factors = 3, 11

b) Even prime factors of $100 = 2$

c) 6

d) 28

Ans: 1, 3, 9, 11, 33, 99

14 a) 6 $\rightarrow$ perfect number (P)

b) 12 $\rightarrow$ Even Composite number (C)

c) 1 $\rightarrow$ Neither prime nor Composite (N)

d) 3 $\rightarrow$ prime no. (P)

Ans: P, 9, 11, 33

$\Rightarrow$ THE END $\Leftarrow$