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FOUNDATION (V₂)

Class: VI, MATHEMATICS

3. ARITHMETIC PROPORTIONS

TEACHING TASK (JEE MAINS)

01. $\frac{1}{5} : \frac{1}{x} = \frac{1}{x} : \frac{1}{1.25} \quad \Rightarrow x = \frac{25}{10}$
 $\Rightarrow \frac{1}{x^2} = \frac{1}{5 \times 1.25} \quad \Rightarrow x = 2.5$
 $\Rightarrow x^2 = \frac{5 \times 1.25}{100}$

Ans: C

02. $\frac{x}{y} = \frac{5}{2}$
 $\frac{8x+9y}{8x+2y} = \frac{8(\frac{5}{2})+9}{8(\frac{5}{2})+2}$
 $= \frac{8(\frac{x}{y})+9}{8(\frac{x}{y})+2} = \frac{29}{22}$

Ans: C

03. Given $\frac{x}{y} = \frac{2}{1}$
 $\frac{x^2-y^2}{x^2+y^2} = \frac{(2)^2-1}{(2)^2+1}$
 $= \frac{3}{5}$
 $= \frac{(\frac{x}{y})^2-1}{(\frac{x}{y})^2+1}$

Ans: A

04. $57 : x = 51 : 85$
 $\Rightarrow x = \frac{57 \times 85}{51} = 115$

Ans: D



05 $x^2 + 4y^2 = 4xy$ $\Rightarrow (a-2)^2 = 0$ (2)
 $\Rightarrow \left(\frac{x}{y}\right)^2 + 4 = 4\left(\frac{x}{y}\right)$ $\Rightarrow a = 2$
 let $\frac{x}{y} = a$ $\Rightarrow \frac{x}{y} = \frac{2}{1}$
 $\Rightarrow a^2 + 4 = 4a$ $x:y = 2:1$
 $\Rightarrow a^2 - 4a + 4 = 0$ Ans: A

06 let the least no. be x
 $14-x, 17-x, 34-x, 42-x$ are in proportion
 $\Rightarrow (14-x)(42-x) = (17-x)(34-x)$
 $\Rightarrow x = 2$

07 $\frac{a+b+c}{c} = \frac{3x+4x+7x}{7x} = \frac{14x}{7x} = 2$ Ans: C
Ans: B

08 $x \propto 3y+1$ $\therefore x = \frac{9}{4}(3y+1)$
 $\Rightarrow x = k(3y+1)$ $= \frac{9}{4}(3 \cdot 5 + 1)$
 $\Rightarrow 9 = k(3 \cdot 1 + 1)$ $= \frac{9}{4} \times 16 = 36$
 $\Rightarrow k = \frac{9}{4}$ Ans: D

09 $\frac{p+q}{p-q} = \frac{\frac{p}{q} + 1}{\frac{p}{q} - 1} = \frac{\frac{4}{3} + 1}{\frac{4}{3} - 1} = \frac{7}{1} = 7$ Ans: B

10 $\frac{5a+3b}{2a-3b} = \frac{23}{5}$ let $\frac{a}{b} = x$
 $\Rightarrow \frac{5\left(\frac{a}{b}\right) + 3}{2\left(\frac{a}{b}\right) - 3} = \frac{23}{5}$ $\frac{5x+3}{2x-3} = \frac{23}{5}$
 $\Rightarrow x = 4$
 $\Rightarrow \frac{a}{b} = 4$ Ans: A

11. Conceptual

Ans: A,

12. Given 6 hours 60 km/hr (Inverse proportion)

$$\Rightarrow 1 \text{ hour} \rightarrow 10 \text{ km.}$$

$$A) 6 \times 60 = 90 \times 4 \text{ (True)}$$

$$B) 6 \times 60 = 120 \times 3 \text{ (True)}$$

$$C) 6 \times 60 = 30 \times 12 \text{ (True)}$$

$$D) 6 \times 60 = 150 \times 2 \text{ (False)}$$

Ans: A, B, C

13. Statement I: $15:1500 = 25:2500$

$$\Rightarrow 15 \times 2500 = 1500 \times 25 \text{ (True)}$$

Statement II: Conceptual (True)

Ans: A

14. Statement I: $12 \times 15 = 20 \times 9$ (True)

Statement II: Conceptual (True)

Ans: A

15. Assertion: $5 \times 12 = 10 \times 6$ (True)

Reason: Conceptual (False)

Ans: C

16. Assertion: Conceptual (True)

Reason: Conceptual (True)

Ans: A

$$17. x \propto y \Rightarrow x = Ky$$

$$\Rightarrow K = \frac{x}{y}$$

$$\Rightarrow K = \frac{102}{170} = 0.6$$

Ans: A

$$18. x \propto \frac{1}{y} \Rightarrow x = \frac{K}{y} \Rightarrow xy = K \Rightarrow K = 185 \times 4$$

$$\text{Now, } x \times 10 = 185 \times 4$$

$$\Rightarrow x = 74$$

Ans: C

19.

$$20 \times 12 = 30 \times x$$

$$\Rightarrow x = \frac{20 \times 12}{30} = 8 \text{ days}$$

Ans: C

20

$$20 \times 12 = 15 \times x$$

$$\Rightarrow x = \frac{20 \times 12}{15} = 16 \text{ days}$$

Ans: C

21)

Food $\propto$ men (Directly proportional)

$$\text{Total man food} = 760 \times 22 = 16720$$

$$\text{man food left after 2 days} = 16720 - \frac{760}{2} \\ = 15200$$

$$\text{In 19 days, it will be good for } \frac{15200}{19} = 800$$

Hence 40 men should join after 2 days
to make the food last for 19 days

Ans: 40

$$22 \text{ Population} = 2000, \text{ No. of days} = 30$$

$$\text{Initial amount of food} = 2000 \times 30 = 60000$$

$$\text{After 10 days food left} = 60000 - 2000 \times 10 \\ = 40000$$

$$\text{When 500 men added, total population} = 2500$$

$$\text{No. of days, the food last} = \frac{40000}{2500} \\ = 16$$

Ans: 16

23 a) $\frac{2x+3y}{3y} = \frac{4}{3} \Rightarrow \frac{2}{3}\left(\frac{x}{y}\right) + 1 = \frac{4}{3}$ (5)

$$\Rightarrow \frac{2}{3}\left(\frac{x}{y}\right) = \frac{4}{3} - 1 = \frac{1}{3}$$

$$\Rightarrow \frac{x}{y} = \frac{1}{2} \Rightarrow \frac{y}{x} = \frac{2}{1} \text{ (r)}$$

b) $4:6=6:c \Rightarrow c = \frac{36}{4} = 9 \text{ (p)}$

c) $\sqrt{9 \times 25} = 3 \times 5 = 15 \text{ (s)}$

d) $5, 15, 25, x \Rightarrow x = \frac{15 \times 25}{5} = 75 \text{ (q)}$

Ans: r, p, s, q

24 a) $b^2 = ac \Rightarrow b^2 = 4 \times 36 \Rightarrow b = 2 \times 6 = 12 \text{ (p)}$

b) $4^2 = 2 \times 8 \text{ (Yes) (q)}$

c) $9^2 = 3 \times 27 \text{ (Yes) (q)}$

d) $b^2 = ac \Rightarrow \text{Continued proportion (s)}$

Ans: p, q, q, s

LEARNERS TASK (CUE'S)

01. $\frac{a}{b} = \frac{c}{d} \Rightarrow \text{componendo} \Rightarrow \frac{a+b}{b} = \frac{c+d}{d}$

Ans: A

02. $\frac{a+b}{a-b} = \frac{c+d}{c-d}$

Ans: B

03. $\frac{3}{4} = \frac{6}{8} = \frac{3}{4}$

Ans: C

04. $16:x:9 \Rightarrow \frac{16}{x} = \frac{x}{9} \Rightarrow x^2 = 16 \times 9 \Rightarrow x = 12 \text{ Ans: C}$

05. $a:b :: c:x$

$$\Rightarrow ax = bc$$

$$\Rightarrow x = \frac{bc}{a}$$

Ans: D



06	$a:b::b:c \Rightarrow \frac{a}{b} = \frac{b}{c} \Rightarrow b^2 = ac$	Ans. ⁽⁶⁾ B
07	$a^2 = 4 \times 36 \Rightarrow a = 12$	Ans: B
08	$bc = ad$	Ans: D
09	$b^2 = ac$	Ans: B
10	$a:b::b:c$	Ans: A

JEE MAINS LEVEL

01	$16, 28, 4, 7$ $\Rightarrow 16 \times 7 = 28 \times 4$ $\Rightarrow 112 = 112$	Ans: A
02	$18, x, 27, 36$ $\Rightarrow x = \frac{18 \times 36}{27} = 24$	Ans: C
03	$\frac{3}{7}, \frac{12}{7}, \frac{6}{7}, x$ $\Rightarrow x = \frac{24}{7}$ $\Rightarrow \frac{3x}{7} = \frac{12}{7} \times \frac{6}{7}$	Ans: B
04	$24, 18, 12, x$ $\Rightarrow x = \frac{18 \times 12}{24} = 9$	Ans: A
05	$5:30::12:x$ $\Rightarrow x = \frac{30 \times 12}{5} = 72$	Ans: C
06	$\text{men} \propto \frac{1}{\text{No. of days}} \Rightarrow 12 \propto \frac{1}{25} \Rightarrow 12 \times 25 = k$ $20 \times x = 12 \times 25 \Rightarrow x = 15 \text{ days}$	Ans: C

67. 25 packets of 12 pencils cost Rs. 750. (7)

$$\therefore 25 \times 12 = 300 \text{ pencils cost} \rightarrow \text{Rs. 750}$$

30 packets of 8 pencils

$$\therefore 30 \times 8 = 240.$$

Direct proportion: $300 : 750 = 240 : x$

$$\Rightarrow x = \frac{750 \times 240}{300} = \text{Rs } 600$$

Ans. A

08 16, 24, x, 54, 20

$$\Rightarrow x = \frac{16 \times 54}{24} = 36$$

Ans. D

09

$$x^2 - y^2, x - y, K$$

$$\Rightarrow \frac{x^2 - y^2}{x - y} = \frac{x - y}{K}$$

$$\Rightarrow x + y = \frac{x - y}{K}$$

$$\Rightarrow K = \frac{x - y}{x + y}$$

Ans. A

10.

6, 18, x, 75

$$\Rightarrow x = \frac{6 \times 75}{18} = 25$$

Ans. A

11.

$$G : B = 2 : 5$$

$$2 : 5 = x : 225$$

$$\Rightarrow x = \frac{2 \times 225}{5} = 90$$

$$\text{Total No. of students} = 225 + 90 = 315 \quad \text{Ans. A, B}$$

12

No. of people $\times \frac{1}{\text{No. of days}}$

$$\Rightarrow \text{No. of people} \times \text{No. of days} = \text{Constant}$$

$$\Rightarrow 60 \times 18 = 1080$$

$$\text{Now, } 72 \times x = 1080$$

$$x = 15 \text{ days or } 3 \times 5$$

Ans. B, C



13	<u>Statement I:</u> Conceptual (True) ⑧ <u>Statement II:</u> Conceptual (False) Ans: C
14	<u>Statement I:</u> $\frac{a}{b} = \frac{c}{d} \Rightarrow \frac{a+b}{b} = \frac{c+d}{d}$ (True) <u>Statement II:</u> Conceptual (False) Ans: C
15	<u>Assertion:</u> $6:9 = 14:21$ $\Rightarrow 6 \times 21 = 9 \times 14$ (True) <u>Reason:</u> Conceptual (True) Ans: A
16	<u>Assertion:</u> $b^2 = ac \Rightarrow 10^2 = 2 \times 50$ (True) <u>Reason:</u> Conceptual (True) Ans: A
17	$x \propto y \Rightarrow x = ky \Rightarrow 20 = k \cdot 15 \Rightarrow k = \frac{4}{3}$ Now $x = ky \Rightarrow 4 = \frac{4}{3} \cdot y \Rightarrow y = 3$ Ans: B
18	Inverse Direct proportion $484 : 11 = 264 : x$ $\Rightarrow x = \frac{11 \times 264}{484} = 6$ litres Ans: C
19	$500 : 5 = x : 12 \Rightarrow x = \frac{500 \times 12}{5} = 1200$ Ans: B
20	$500 : 5 = 2500 : x$ $\Rightarrow x = \frac{5 \times 2500}{500} = 25$ days Ans: B

21.

 $9, x, 8, 24 \rightarrow$ Proportion

(9)

$$\Rightarrow x = \frac{9 \times 24}{8} = 27$$

Ans: 27

22

$$6 : 1.260 = x : 3.150$$

$$\Rightarrow x = \frac{6 \times 3.15}{1.26} = 15$$

Ans: 15

23

$$a) x : 6 = 25 : 5$$

$$\Rightarrow 5x = 6 \times 25$$

$$\Rightarrow x = 30 (q)$$

$$b) 0.75 : x = 5 : 8$$

$$\Rightarrow x = \frac{0.75 \times 8}{5}$$

$$= 1.2 (r)$$

$$c) 5 : 40 = 30 : x$$

$$\Rightarrow x = \frac{40 \times 30}{5} = 240 (s)$$

$$d) x = \frac{57 \times 85}{51} = 95 (p)$$

Ans: q, r, s, p

24

$$a) 18 \times 20 = 12 \times 30 \text{ (True)} (p)$$

$$b) b = \sqrt{9 \times 25} = 3 \times 5 = 15 (q)$$

$$c) a : b = 2 : 3$$

$$b : c = 3 : 4 \Rightarrow a : c = 2 : 4 (s)$$

$$d) 8 \text{ and } 30 (r)$$

Ans: p, q, s, r

 $\Rightarrow$ THE END $\Leftarrow$