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FOUNDATION (V₂)

Class: 8th. MATHEMATICS

2. DIRECT AND INVERSE PROPORTION

TEACHING TASK (JEE MAIN)

01. Given $\frac{1}{5} : \frac{1}{x} = \frac{1}{x} : \frac{1}{125}$

$$\Rightarrow \frac{1}{x^2} = \frac{1}{5 \times 125} = \frac{1}{625}$$

$$\Rightarrow \frac{1}{x} = \frac{1}{25}$$

$$\Rightarrow x = 25$$

Ans: C

02

$$\begin{aligned} 1 &: 30000000 \\ 4\text{cm} &= 4 \times 30000000 \\ &= 120000000 \\ &= 1200\text{Km} \end{aligned}$$

Ans: A

03 Clearly, it's Inverse proportion

$$x \times 7 = 9 \times 560$$

$$\Rightarrow x = 720$$

$$\therefore \text{Extra employee required} = 720 - 560$$

$$= 160 \quad \text{Ans: A}$$

04 $270 \times 15 = x \times 3$

$$\Rightarrow x = \frac{270 \times 3}{15} = 54$$

Ans: D

05 Inverse proportion ②
 $200 \times 40 = 250 \times x$
 $\Rightarrow x = 32 \text{ days}$

Ans: B

06 Inverse proportion
 $6 \times 8 = 8 \times x$
 $\Rightarrow x = 6 \text{ days}$

Ans: A

07 Inverse proportion
 $36 \times 25 = 15 \times x$
 $\Rightarrow x = 60 \text{ days}$

Ans: C

08 Direct proportion
 $14 : 441 = 22 : x$
 $\Rightarrow x = \frac{441 \times 22}{14} = 693 \text{ Rs.}$

Ans: D

09 Let the two number be x, y
 Given $0.6 \times x = 0.09 \times y$

$$\Rightarrow \frac{x}{y} = \frac{0.09}{0.6} = \frac{0.09}{0.60} = \frac{9}{60} = \frac{3}{20}$$

Ans: D

$$\therefore x : y = 3 : 20$$

10 $x \propto \frac{1}{y} \Rightarrow xy = K \Rightarrow 4 \times 6 = K \Rightarrow K = 24$

$$\therefore xy = 24$$

$$\therefore 3 \times y = 24$$

$$\Rightarrow y = 8$$

Ans: A

JEE ADVANCED LEVEL

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11. Two persons $\rightarrow$ 3 days
 $\Rightarrow$ 1 person $\rightarrow$ 6 days
 $\Rightarrow$ 1 day $\rightarrow$ 6 people
 $\therefore$ This inverse proportion problem
Ans: A, B, D

12. Conceptual
Ans: A, D

13. Statement I: $16:300 = 18:x$
 $\Rightarrow x = \frac{300 \times 18}{16} = 337.50$ (True)
Ans: A
Statement II: Conceptual (True)

14. Statement I: $24 \times 7 = 12 \times x$
 $\Rightarrow x = \frac{24 \times 7}{12} = 14$ men (False)
Ans: D
Statement II: Conceptual (True)

15. Assertion: $a:x = x:b \Rightarrow x^2 = ab$ (True)
Ans: A
Reason: Conceptual (True)

16. Assertion: Conceptual (False)
Ans: D
Reason: Conceptual (True)

17. $a \propto \frac{1}{b} \Rightarrow ab = K$
 $xy = K \Rightarrow 5 \times 15 = K \Rightarrow K = 75$
 $xy = K \Rightarrow xy = 75$
 $\Rightarrow x \times 12 = 75$
 $x = \frac{75}{12} = 6.25$
Ans: A

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$$ay = k \Rightarrow 128 \times 0.25 = k$$

$$\therefore k = 32$$

Ans: C

19.

$$\text{Speed} = 105 \text{ km/hr}$$

$$60 \text{ minutes} \rightarrow 105 \text{ km}$$

$$20 \text{ minutes} \rightarrow ? \quad (\text{Direct proportion})$$

$$60 : 105 = 20 : x$$

$$\Rightarrow x = \frac{105 \times 20}{60} = 35 \text{ km}$$

Ans: C

20.

$$105 \text{ km} \rightarrow 60 \text{ minutes}$$

$$210 \text{ km} \rightarrow 2 \times 60 = 120 \text{ minutes}$$

Ans: A

21.

$x, 20, 30, 60$ are in proportion

$$\Rightarrow x : 20 = 30 : 60$$

$$\Rightarrow x = \frac{20 \times 30}{60} = 10$$

Ans: 10

22

$$\frac{1}{6} : \frac{1}{x} = \frac{1}{x} : \frac{1}{216}$$

$$\Rightarrow \frac{1}{x^2} = \frac{1}{6 \times 216}$$

$$\Rightarrow \frac{1}{x} = \frac{1}{36} \Rightarrow x = 36$$

Ans: 36

23

$$\text{i) } \frac{x_1}{8.8} = \frac{7.2}{3.6} \Rightarrow x_1 = 17.6 \text{ (9)}$$

$$\text{ii) } 6 : 1800 = 9 : x \Rightarrow x = \frac{1800 \times 9}{6} = 2700 \text{ (8)}$$

$$\text{iii)} \quad 8 : 20.80 = 5 : x$$

$$\Rightarrow x = \frac{5 \times 20.80}{8} = \text{Rs. } 13$$

$$\text{iv)} \quad 45 \times 49 = 63 \times x$$

$$\Rightarrow x = \frac{45 \times 49}{63} = 35 \text{ days (s)}$$

Ans: 9, 1, 1, 5

24

i) Direct proportion

$$93 : 1395 = 105 : x$$

$$\Rightarrow x = \frac{1395 \times 105}{93} = 1575 \text{ (s)}$$

ii) Indirect proportion

$$55 \times 16 = 10 \times x$$

$$\Rightarrow x = \frac{55 \times 16}{10} = 88 \text{ (r)}$$

iii) Inverse proportion

$$18 \times 35 = 15 \times x$$

$$\Rightarrow x = \frac{18 \times 35}{15} = 42 \text{ (p)}$$

iv) 60 minutes $\rightarrow$ 1080 words

$$\therefore 1 \text{ minute} = \frac{1080}{60} = 18 \text{ (w)}$$

Ans: Sir, 9, P

LEARNER'S TASK (CQ's)

01 $\frac{a}{b}$ or $a : b$

Ans: D

02	$\frac{1}{n}$	Ans: ⁶ D
03	Also one day work = n $\therefore$ time taken by A to finish the work = $\frac{1}{n}$ days	Ans: B
04	$x \propto y \Rightarrow x = ky \Rightarrow \frac{x}{y} = k$	Ans: A
05	$x \propto \frac{1}{y} \Rightarrow xy = k$	Ans: A
06	Conceptual	Ans: A
07	Conceptual	Ans: A
08	Conceptual	Ans: D
09	Conceptual	Ans: A B
10	$a:b = 2:3 \Rightarrow 2b = 3a$	Ans: B
JEE MAINS LEVEL		
01	Inverse proportion $8 \times 10 = 10 \times x \Rightarrow x = 8 \text{ days}$	Ans: B

02 $63 \text{ soldiers} \times 27 \text{ days} = 1701 \text{ soldiers-days}$
 $63 \text{ soldiers} \times 7 \text{ days} = 441 \text{ soldiers-days}$
 Remaining food = $1701 - 441 = 1260 \text{ soldiers-days}$
 With 27 more soldiers, the new
 total is $63 + 27 = 90 \text{ soldiers}$
 $\therefore$ food will last for $\frac{1260}{90} = 14 \text{ days}$
 Ans: C

03 Direct proportion

$$12:156 = 7:x$$

$$\Rightarrow x = \frac{156 \times 7}{12} = 91$$

Ans: C

04 $x \propto \frac{1}{y} \Rightarrow xy = K \Rightarrow 4 \times 6 = K \Rightarrow K = 24$

$$\therefore xy = 24 \Rightarrow 3xy = 24 \Rightarrow y = 8 \quad \text{Ans: 8}$$

05 Inverse proportion

$$100 \times 20 = 125 \times x$$

$$\Rightarrow x = \frac{100 \times 20}{125} = 16 \text{ days}$$

Ans: B

$$\frac{a}{b-a} = \frac{7}{8}$$

$$\Rightarrow \frac{1}{\frac{a}{b}-1} = \frac{7}{8}$$

$$\Rightarrow \frac{b}{a} = \frac{b}{a} - 1$$

$$\frac{b}{a} = \frac{b}{a} + 1 = \frac{15}{8}$$

$$\therefore \frac{a}{b} = \frac{8}{15}$$

Ans: A

07 $2 \times \frac{x}{2} = 7 \times 5 \Rightarrow x = 35$ Ans: C (8)

08 30 minutes $\rightarrow$ 450
 $30: 450 = 9: x$
 $\Rightarrow x = \frac{450 \times 9}{30} = 135$ Ans: B

09 $6 \times 7 = 21 \times x$ Ans: A
 $\Rightarrow x = \frac{6 \times 7}{21} = 2$ days

10 $x \propto \frac{1}{y} \Rightarrow xy = k \Rightarrow 10 \times 6 = k \Rightarrow k = 60$
 $\therefore xy = 60$ Ans: C
 $\Rightarrow 15 \times y = 60 \Rightarrow y = 4$

JEE ADVANCED

11. A) $2: 9 \times 10^6 = 5: x$
 $\Rightarrow x = \frac{5 \times 9 \times 10^6}{2} = 22.5 \times 10^6 = 2.25 \times 10^7 \checkmark$
~~B) $x = \frac{5 \times 9 \times 10^6}{2} = 37.5 \times 10^6 = x$~~
 B) $x = \frac{1.2 \times 9 \times 10^6}{2} = 5.4 \times 10^6 \checkmark$
 C) $x = \frac{3 \times 9 \times 10^6}{2} = 13.5 \times 10^6 \times$
 D) $x = \frac{1.5 \times 9 \times 10^6}{2} = 6.75 \times 10^6 \times$ Ans: A, B

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Direct proportional

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$$5 \text{ mt } 60 \text{ cm} : 3 \text{ mt } 20 \text{ cm} = 10 \text{ mt } 50 \text{ cm} : x$$

$$\Rightarrow 560 : 320 = 1050 : x$$

$$\Rightarrow x = \frac{320 \times 1050}{560} = 600 \text{ cm} = 6 \text{ mt}$$

Again $560 : 320 = y : 500$

$$\Rightarrow y = \frac{560 \times 500}{320} = 875 \text{ cm}$$

$$= 8 \text{ mt } 75 \text{ cm}$$

Ans: B, C

13

Statement I: Conceptual (True)Statement II: Conceptual (True)

Ans: A

14

Statement I:

$$50 \times 1 = 2 \times x$$

$$\Rightarrow x = 25 \text{ men (True)}$$

Statement II: Conceptual (False)

Ans: C

15

Assertion: Conceptual (True)Reason: Conceptual (True)

Ans: A

16

Assertion: Conceptual (True)Reason: Conceptual (True)

Ans: A

17

Direct proportion

$$40 : 1940 = x : 727.5$$

$$\Rightarrow x = \frac{40 \times 727.5}{1940} = 15$$

Ans: D

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Total food in man-days

$$120 \text{ men} \times 200 \text{ days} = 24,000 \text{ man-days}$$

Food Consumed in first 5 days

$$120 \text{ men} \times 5 \text{ days} = 600 \text{ man-days}$$

$$\begin{aligned} \text{Remaining food} &= 24,000 - 600 \\ &= 23,400 \text{ man-days} \end{aligned}$$

After 5 days, 30 men died

$$\text{Remaining men} = 120 - 30 = 90 \text{ men}$$

$$\therefore \text{Required time} = \frac{23400}{90} = 260 \text{ days} \quad \text{Ans: D}$$

19

Mr. Subba Rao $\rightarrow$ Speed = 60 km/hr

$$\text{Time} = 6 \text{ hr.}$$

$$\begin{aligned} \therefore \text{Distance} &= \text{Speed} \times \text{Time} \\ &= 60 \times 6 \\ &= 360 \text{ km.} \end{aligned}$$

Mr. Rama Rao $\rightarrow$ Distance = 360 km,
speed = 45 km/hr

$$\begin{aligned} \text{Time} &= \frac{\text{Distance}}{\text{Speed}} = \frac{360}{45} \\ &= 8 \text{ hr} \\ \text{Ans: C} \end{aligned}$$

$$\begin{aligned} \text{Work done by A in 1 day} &= \frac{1}{24} \\ \text{Work done by B in 1 day} &= \frac{1}{30} \\ \therefore \text{Work done by A+B in 1 day} &= \frac{1}{24} + \frac{1}{30} \end{aligned}$$

20. Work done by A in 1 day = $\frac{1}{24}$

" " B " = $\frac{1}{30}$

" " (A+B) " = $\frac{1}{24} + \frac{1}{30} = \frac{3}{40}$

$\therefore$ No. of days for (A+B) = $\frac{40}{3} = 13\frac{1}{3}$ days
Ans: B

21. $11.25 : 42.75 = 6 : x$

$$\Rightarrow x = \frac{42.75 \times 6}{11.25} = 22.8 = \frac{114}{5}$$

$$\therefore n = 5$$

Ans: 5

22. $17.5 : 40.25 = x : 28.75$

$$\Rightarrow x = \frac{17.5 \times 28.75}{40.25} = 12.5$$

$$\therefore 12.5 = 11.5 + n \Rightarrow n = 24$$

Ans: 24

23. 1) $x \propto \frac{1}{y} \Rightarrow xy = K \Rightarrow 6 \times 6 = K \Rightarrow K = 36$

$$\therefore xy = 36$$

$$\Rightarrow x \times 9 = 36 \Rightarrow x = 4 (x)$$

$$2) 250 : 60 = 200 : x \Rightarrow x = 48 (y) \text{ Unit digit} = 8 (S)$$

$$3) 500 : 50 = 3200 : x \Rightarrow x = 320$$

Unit digit = 0 (t)

$$4) 0.128 : 1 = 25 : x \Rightarrow x = 195.3125$$

$$\therefore 190 + n = 195.3125 \Rightarrow n = 5 (\text{Approx}) (v)$$

Ans: x, s, t, v

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24) 1) please discard this question

$$2) 5 \times 60 = 12 \times x$$

$$\Rightarrow x = \frac{60 \times 5}{12} = 25 \text{ min (9)}$$

$$3) \text{Total work} = \text{people} \times \text{Days}$$

$$= 550 \times 100$$

$$= 55000 \text{ person-days}$$

$$\text{In the first 10 days} = 550 \times 10 = 5500$$

$$\text{Remaining work} = 55000 - 5500$$

$$= 49500 \text{ person-days}$$

$$\text{New people} = 550 + 50 = 600 \text{ people}$$

$$\text{Days Remaining} = \frac{49500}{600} = 82 \frac{1}{2} \text{ days (5)}$$

$$4) 14 : 10 = x : 15$$

$$\Rightarrow x = \frac{14 \times 15}{10} = 21 \text{ mt (8)}$$

Ans: —, 9, 5, 8

 $\Rightarrow$ THE END $\Leftarrow$