10. ARTHMETIC - RATIOS

Class: VII, MATHEMATICS

INTEGRATED + SOLUTIONS

2025|26

TEACHING TASK

JEE MAINS LEVEL

01. Apples : Oranges = 3 : 5

Given 3 : 5 = x : 24

Given No. of oranges = 24

5 Units = 24

1 unit = $\frac{24}{5} = 4.8$

∴ No. of Apples = $3 \times 4.8 = 14.4 \approx 14$

Ans: —

02.

$a : b = 2 : 5$

$b : c = 3 : 4$

$a : b = 6 : 15$

$b : c = 15 : 20$

$a : b : c = 6 : 15 : 20$

$a : c = 6 : 20$

$= 3 : 10$

Ans: B

03

Tom : Jerry = 5 : 3

Tom = 15 years

$5x = 15$

$x = 3$

Jerry $= 3x$

$= 3 \times 3$

$= 9$ years

Ans: A

04. Income : Expenditure = 3 : 2

Given $3x = 600 \Rightarrow x = 200$

$\therefore$ Expenditure $= 2x = 2 \times 200 = Rs\,400$

Ans: C

---

05 $A : B = 3 : 7$

Sum = 100

$\Rightarrow 3x + 7x = 100$

$\Rightarrow x = 10$

B → $7x = 7 \times 10 = 70$

Ans: D

---

06 $A : B = 5 : 8$

$|A - B| = 8x - 5x = 12$

$\Rightarrow 3x = 12$

$\Rightarrow x = 4$

$A = 5x = 5 \times 4 = 20$

$B = 8x = 8 \times 4 = 32$

Ans: C

---

07. $A : B = 5 : 3$

A → 5x lit

B → 3x lit

12 lit added to B

$\therefore$ A → 5x lit

B → (3x + 12) lit

Given $5x : 3x + 12 = 5 : 4$

$\Rightarrow 4(5x) = 5(3x + 12)$

$\Rightarrow x = 12$

$\therefore$ A → 5x lit $= 5 \times 12 = 60$ lit

Ans: D

---

08 $63 : x = 9 : 8$

$\Rightarrow 9x = 63 \times 8$

$\Rightarrow x = 56$ Kgs

Ans: D

09. $1:7 \Rightarrow \frac{1}{7} = 1 \times \frac{1}{7}$

$\frac{27}{63} \Rightarrow \frac{3}{7} = 3 \times \frac{1}{7}$

$\frac{16}{56} \Rightarrow \frac{2}{7} = 2 \times \frac{1}{7}$

Clearly $\frac{27}{63}$ is greater

Ans : A

10. $3:5 = x : 12,500$

$\Rightarrow 5x = 3 \times 12,500$

$\Rightarrow x = Rs\ 7500$

Ans : C

11 Let the ratio be $a:b:c$

Given $b:c = 5:7$

$a:b = \frac{2}{3} : 1 = 2:3$

~~$b:c = 10:14$~~
~~$a:b = 14:21$~~

$\therefore a:b = 2:3$
$b:c = 5:7$

~~$a:b:c$~~

$\Rightarrow a:b = 10:15$
$b:c = 15:21$

$\Rightarrow a:b:c = 10:15:21$

Third part $= \frac{21}{46} \times 414 = Rs\ 189$

Ans. B

12. $l:m = 2\frac{1}{2} : 1\frac{2}{3}$ | $m:n = 1\frac{1}{4} : 3\frac{1}{2}$ (4)

$= \frac{5}{2} : \frac{5}{3}$ | $= \frac{5}{4} : \frac{7}{2}$

$= 3 : 2$ | $= 5 : 14$

$l:m = 15:10$

$m:n = 10:28$

$\therefore l:m:n = 15:10:28$ Ans: C

13 $4^{3.5} : 2^5 = 4^{\frac{7}{2}} : 2^5$

$= 2^7 : 2^5$

$= 2^2 : 1 \Rightarrow 4:1$ Ans: B

14 $2A = 3B$ | $4B = 5C$

$\Rightarrow \frac{A}{B} = \frac{3}{2}$ | $\Rightarrow \frac{B}{C} = \frac{5}{4}$

$\Rightarrow A:B = 3:2$ | $\Rightarrow B:C = 5:4$

$A:B = 15:10$

$B:C = 10:8$

$A:B:C = 15:10:8$

$A:C = 15:8$ Ans: C

15 $a:b:c = 3:4:5$ | Now, $3x + 4x + 5x$

$(3x)^2 + (4x)^2 + (5x)^2 = 1250$ | $= 12x$

$\Rightarrow x = 5$ | $= 12 \times 5$

$= 60$

Ans: C

16. $l : b : h = 4 : 3 : 2$ (5)

Volume $= 4x \times 3x \times 2x = 216$

$\Rightarrow x^3 = 9.$

$\Rightarrow x = \sqrt[3]{9}.$

$\therefore$ length $= 4x = 4 \cdot \sqrt[3]{9}$ Ans: D

17 c) $a : b = 3 : 4$

$a + b = 3x + 4x = 7x$

$\therefore 7x = 72$

$x = \frac{72}{7} = 10.1$ (should be natural no) since for whole no

Ans: C

18 Let the no. be $3x, 5x$

$\Rightarrow 3x + 5x = 15$

$\Rightarrow x = \frac{15}{8}$

$\therefore$ The numbers are $3x = 3 \times \frac{15}{8} = \frac{45}{8}$

$5x = 5 \times \frac{15}{8} = \frac{75}{8}$

Ans: —

19. $a : b = 7 : 9$

Given $9x = 45$

$\Rightarrow x = 5$

Sum $= 7x + 9x$

$= 16x$

$= 16 \times 5$

$= 80$

Ans: C

20. $\frac{x}{y} \times \frac{y}{z} = \frac{3}{4} \times \frac{5}{6} = \frac{5}{8}$

$\therefore x : z = 5 : 8$ Ans: B

21. $\frac{a}{b} \times \frac{c}{d} = \frac{3}{5} \times \frac{7}{9}$

$ac : bd = \frac{7}{15}$

Ans: A

JEE ADVANCED LEVEL

01. Let the two term be x, ~~40~~ $x-40$

Given $\frac{x}{x-40} = \frac{2}{7} \Rightarrow x = -16$

$x - 40 = -56$

: Ratio = $-16 : -56$

$= 16 : 56$

$= 32 : 112$

Duplicate ratio: $\sqrt{16} : \sqrt{56}$

$= 4 : 2\sqrt{14}$

Ans: A, B, C

02. A) $2:1$
$2x + x = 12$
$\Rightarrow x = 4$ ✓

B) $3:1$
$3x + x = 12$
$x = 3$ ✓

C) $3:2$
$3x + 2x = 12$
$5x = 12x$

D) $7:5$
$7x + 5x = 12$
$12x = 12$
$x = 1$ ✓

Ans: A, B, D

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

Ans: A

04 Assertion: $6 : 9 = 2 : 3$ (True)
Reason: mathematically (True)

Ans: A

05 Assertion: mathematically (False)
Reason: mathematically (True)

Ans: D

06 Assertion: mathematically (True)
Reason: Mathematically (True)
Ans: A

07 Assertion: Mathematically (True)
Reason: Conceptual (True)
Ans. A

08 Statement: 3 : 7
Triplicate ratio = $3^3 : 7^3$
= 27 : 343 (True)
Statement II: Conceptual (True)
Ans. A

09 A : O : B = 4 : 3 : 2
Total = 90
$4x + 3x + 2x = 90$
$\Rightarrow x = 10$

No. of Bananas = $2x$
$= 2 \times 10$
$= 20$

Ans. A

~~08~~ Total = 90
3 friends, each = $\frac{90}{3}$ ~~X~~

10. Apples = 40, Oranges = 30, Bananas = 20
If Each friend received an equal number of apples, oranges and Bananas
Each one get = 20
Ans: C

11. Apples : Total = 40 : 90
= 4 : 9
Ans. B

12. Ratio never changes = 4 : 3 : 2 (8) Ans: C

13 Apples = 40, oranges = 2×30 = 60, Bananas = 20

Ratio = 40 : 60 : 20

= 2 : 3 : 1

Ans: D

14 $\frac{2}{3} \times \frac{6}{11} \times \frac{11}{12} = 1 : 3$

Ans: A

15 Duplicate ratio = $2^2 : 3^2$

= 4 : 9

Ans: C

16 F : S = 2 : 3

Given sugar = 600 gms

$\therefore 3x = 600$

$\Rightarrow x = 200$

$\therefore$ flour = $2x = 2 \times 200 = 400$

Ans: 400

17 A : B = 5 : 3

Car A = 150 miles

$\therefore 5x = 150$

$\Rightarrow x = 30$

Car B = 3x

= 3×30

= 90 miles

Ans: 90

18 Given P : Q = Q : R = R : S = 2 : 3

P : Q = 2 : 3

Q : R = 2 : 3

P : Q : R = 4 : 6 : 9

R : S = 2 : 3

P : Q : R : S = 8 : 12 : 18 : 27

Now, P's share = $\frac{8}{65} \times 1300$ = Rs 160

Ans: 160

19. 25p : 10p : 5p = 1 : 2 : 3 (9)

5p coins = $\frac{3}{6} \times 30 = 15$ Ans: 15

20. a) a : b = 5 : 9

b : c = 3 : 5 = 9 : 15

a : b : c = 3 : 9 : 15 = x : 9 : 15

$\therefore x = 3$ (g)

b) $\frac{1}{7} : \frac{1}{x} = \frac{1}{2x} : \frac{1}{14}$

$\Rightarrow \frac{x}{7} = \frac{14}{2x}$

$\Rightarrow x^2 = 49 \Rightarrow x = 7$ (r)

c) $3x \times 4x \times 5x = 60000$

$\Rightarrow x^3 = 1000 \Rightarrow x = 10$

First number = $3x$

$= 3 \times 10$

$= 30 = 5y$

$\Rightarrow y = 6$ (t)

d) $a + b = 6x$

$b + c = 7x$

$c + a = 8x$

$\Rightarrow 2(a + b + c) = 21x$

$\Rightarrow 2 \times 14 = 21x$

$\Rightarrow x = \frac{4}{3}$

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

$= 14 - 6x$

$= 14 - 6 \times \frac{4}{3}$

$= 14 - 8$

$= 6$ (t)

(PTO)

e) ~~a : b = 1 : 7~~

~~a + 7 = b + 7~~

b) $a:b = 1:2 \Rightarrow b = 2a$

Given $a+7 : b+7 = 3:5$

$\Rightarrow 3(b+7) = 5(a+7)$

$\Rightarrow 3b+21 = 5a+35$

$\Rightarrow 3(2a)+21 = 5a+35$

$\Rightarrow a = 14 \rightarrow (5)$ Ans: A

LEARNERS TASK (CUQS)

01	$4:6 = 2:3$	Ans. A
02	$12:18 = 2:3$	Ans. A
03	$20:30 = 2:3$	Ans. B
04	Given word "UNIFIED COUNCIL" No. of consonents = 7 No. of vowels = 7 $\therefore$ Ratio = $7:7 = 1:1$	Ans. D
04	$9:15 = 3:5$	Ans. A
06	$11:20$ = Magazines : total publications	Ans. D
07	$\frac{a}{b} = a:b$	Ans: A
08	Doesn't change	Ans. D
09.	$30:36 = 5:6$	Ans. B
10	$5:4$	Ans. D

11. $2kg : 900gms$

$= 2000gms : 900gms$

$= 20 : 9$

Ans: C

12 $6 : 9 = 2 : 3$ Ans: C

13 $A : B : C = 1 : 2 : 3$

Largest Angle $= C = \frac{3}{6} \times 180^\circ = 90^\circ$ Ans: C

14 $384 : 480 = 4 : 5$ Ans: C

~~15~~ JEE MAINS LEVEL

01 $AB : BC : CA = 2 : 3 : 5$

Smallest side $= AB = \frac{2}{10} \times 100 = 20cm$

Ans: B

02 $l : w = 5 : 3$

width $\rightarrow 3x = 9$

$\Rightarrow x = 3$

Length $= 5x$

$= 5 \times 3$

$= 15$

Ans: A

03 We know, for two similar triangles

Area of $\triangle ABC$: Area of $\triangle PQR = AB^2 : PQ^2$

$\Rightarrow$ 27 : Area of $\triangle PQR = 3^2 : 4^2$

$\Rightarrow$ Ar of $\triangle PQR = 48$ sq. units Ans. B

04 $x : y = 2 : 3$

$y : z \quad 4 : 5$

$x : y = 8 : 12$

$y : z = 12 : 15$

$x : y : z = 8 : 12 : 15$

Ans: C

06 let C gets Rs x.

$\Rightarrow$ B gets Rs $2x$

$\Rightarrow$ A gets Rs $4x$.

$x + 2x + 4x = 31,500$

$\Rightarrow x = 4500$

share of C = Rs 4500

" " B = Rs 9000

" " A = Rs 18000

Ans: A

05 B : G = 3 : 4

Given $3x = 21$

$\Rightarrow x = 7$

Girls $= 4x$

$= 4 \times 7$

$= 28$

Ans. B

07 $7x + 9x = 112$

$\Rightarrow x = 7$

Larger No $= 9x$

$= 9 \times 7$

$= 63$

Ans: A

08 $l_1 : l_2 = 2 : 3$

$b_1 : b_2 = 5 : 4$

Area $= l_1 \times b_1 = 2x \cdot 5x = 10x^2 = 100$

$\Rightarrow x^2 = 10$

Area $= l_2 b_2 = 3x \cdot 4x = 12x^2 = 12 \cdot 10$

$= 120$

Ans: B

09 $x : y = 3 : 5$; $x + y = 80$ (13)

$y = \frac{5}{8} \times 80 = 50.$ Ans: C

10 Bus → speed $= \frac{D}{T} = \frac{126}{3} = 42$ km/hr

Train → speed $= \frac{315}{5} = 63$ km/hr.

Ratio $= 42 : 63$

$= 2 : 3$ Ans: B

11 $m : F = 5 : 3$

male → $5x = 115$

→ $x = 23$

Female $= 3x$

$= 3 \times 23$

$= 69$ Ans: C

12 $l : b = 5 : 3$

→ $3x = 42$

⇒ $x = 14$

$l = 5 \times 14$

$= 70$ Ans: B

13 $A : B : C = 2 : 3 : 4$

$A = 2x$, $B = 3x$, $C = 4x$

$\frac{A}{B} : \frac{B}{C} : \frac{C}{A} = \frac{2x}{3x} : \frac{3x}{4x} : \frac{4x}{2x}$

$= \frac{2}{3} : \frac{3}{4} : \frac{4}{2}$

$= 8 : 9 : 24$ Ans. D

14. $A:B = 2:3 = 4:5$

$B:C$

$A:B:C = 8:12:15$

$C:D = 6:7$

$A:B:C:D = 48:72:90:105$

$= 16:24:30:35$ Ans. C

15

$R:S = 2:3$

Ravi salary = Rs $2x$

Sumit salary = Rs $3x$

New salaries Ravi = Rs $2x + 4000$

Sumit = Rs $3x + 4000$

$\therefore$ Ratio $\frac{2x+4000}{3x+4000} = \frac{40}{57}$

$\Rightarrow x = \frac{68000}{6}$

Sumit's salary = $3x$

$= 3 \times \frac{68000}{6}$

$= 34000$ Ans. D

16

16 Given $\frac{x}{y} = \frac{4}{5}$

A) $\frac{x+y}{y} = \frac{x}{y} + 1 = \frac{4}{5} + 1 = \frac{9}{5}$ ✓

B) $\frac{y+2x}{x} = \frac{y}{x} + 2 = \frac{5}{4} + 2 = \frac{13}{4}$ ✓

C) $\frac{x^2+y^2}{xy} = \frac{x}{y} + \frac{y}{x} = \frac{4}{5} + \frac{5}{4} = \frac{41}{20}$ ✓

D) $\frac{2x^2-y^2}{xy} = 2\left(\frac{x}{y}\right) - \frac{y}{x}$

$= 2\left(\frac{4}{5}\right) - \frac{5}{4} = \frac{7}{20}$ ✗

Ans.: D

JEE ADVANCED LEVEL

01 Triplicate ratio of $4:3 = 4^3 : 3^3$

$\frac{5x+3}{3x+1} = \frac{4^3}{3^3} \Rightarrow x = \frac{17}{57}$ ✓

Now, $1 - x = 1 - \frac{17}{57} = \frac{40}{57}$ ✓

Ans.. A, D

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

Ans.. A

03 Assertion: $15 : 20 = 3 : 4$ (True)
Reason: Conceptual (True)

Ans. A

04 Assertion: mathematically (False)
Reason: mathematically (True)

Ans. D

05 Assertion: Mathematically (True)
Reason: Mathematically (True)
Ans: A

06 Statement I: Conceptual (True)
Statement II: $\frac{1}{2} \times \frac{2}{3} \times \frac{3}{4} = \frac{1}{4}$ (True)
Ans: A

07 105
Ans: D

08 R : B = 2 : 5
Ans: C

09 Red balls = $\frac{2}{7} \times 105 = 30$
Ans: B

10 Blue balls = $\frac{5}{7} \times 105 = 75$
New Blue balls = $75 + 70 = 145$
R : B = 30 : 145
= 6 : 29
Ans: D

11 Blue Balls = $\frac{5}{7} \times 140 = 100$
Ans: C

12 I : E = 1274 : 1078 = 13 : 11
Ans: A

13 F : S = 2 : 5
$5x = 10$
$\Rightarrow x = 2$
Flour = $2x$
$= 2 \times 2$
$= 4$
Ans: 4

14 $3 : 4 = 120 : x \Rightarrow x = 160$
Ans: 160

15. $Z : C = 1 : 4$

$\text{Copper} = \frac{4}{5} \times 12\frac{1}{2}$

$= \frac{4}{\cancel{5}} \times \frac{25}{2} = 10 \text{ kgs}$

Ans 10

16 A) $150 ; 350 = 3 : 7$ (q)

B) Rs 1 : 15 paise

$100 : 15 = 20 : 3$ (r)

C) 2 Scores : 3 dozens

$\Rightarrow 2 \times \frac{5}{3} : 3$

$= 10 : 9$ (s)

1 Score $= \frac{5}{3}$ dozens

d) $240 \text{ mt} : 1\frac{1}{5} \text{ km}$

$\Rightarrow 240 \text{ mt} : \frac{6}{5} \times 1000$

$= 1 : 5$ (p, t)

Ans: q, r, s, p

(c)

$\Rightarrow$ THE END $\in$