gradeup

gradeup

Sahi Prep Hai Toh Life Set Hai

Ratio & Proportion

Part-1

gradeup

Agenda Today's → 85 min

Basics of Ratio

- Meaning of Ratios
- How to solve Ratio

20 Simple Question

gradeup

MEANING OF RATIO

Def: Comparison between 2 quantities of same units.

gradeup

Eg. If, Boys : Girls = 2 : 3
then find:

let Boys → 2x, Girls → 3x

(i) Girls are what % more than boys? → $\frac{1}{2} \times 100 = 50\%$

(ii) Boys are what % less than girls? → $\frac{1}{3} \times 100 = 33\frac{1}{3}\%$

(iii) Boys are what % whole class? → $\frac{2}{5} \times 100 = 40\%$

(iv) Find the difference between number of girls & number of boys?

→ x

Can't be det [B/C we know Ratio of Boys & Girls but we don't absolute value]

gradeup

Eg1. If ratio of boys and girls is 5:8 and the total strength of the class is 156. Find the number of girls in the class.

I st

B : G = 5 : 8

Boys → 5x

Girls → 8x

13x = 156

x = 12

8 x 12 = 96

II nd

B : G → 5 : 8

$\frac{8}{13} \times 156^{12}$

→ 96

gradeup

Ans. .96

gradeup

Eg2. If a : b = 5 : 3.
Find the value of:

let $a = 5x$ $b = 3x$

$\frac{5^2+3^2}{5^2-3^2} = \frac{34}{16}$

(i) $\frac{a^2+b^2}{a^2-b^2} \rightarrow \frac{25x^2+9x^2}{25x^2-9x^2} = \frac{34x^2}{16x^2} = \frac{17}{8}$ ✓

(ii) $\frac{a^3-b^3}{a^3+b^3} \rightarrow \frac{5^3-3^3}{5^3+3^3} = \frac{98}{152} \frac{49}{76}$ ✓

(iii) $\frac{a^2-b^2+ab}{a^2+b^2-ab} \rightarrow \frac{25-9+15}{25+9-15} = \frac{31}{19}$

gradeup

Ans. (i) 17/8 **(ii) 49/76** **(iii) 31/19**

gradeup

Eg3. If a : b = 7 : 3.

Find the value of:

(i) $\frac{a^3+b^3}{a^2b+ab^2}$ → $\frac{7^3+3^3}{7^2.3+7.3^2} = \frac{379}{219}$ ✓✓

(ii) $\frac{a^2+b^2}{a+b}$ → $\frac{(7x)^2+(3x)^2}{7x+3x} \Rightarrow \frac{58x^2}{10x} \Rightarrow$ Can't be det

(iii) $\frac{a^3-b^3}{a^2+ab+b^2}$ → Can't be det

$\frac{343x^3-27x^3}{49x^2+21x^2+9x^2} = \frac{316x^3}{79x^2}$ Can't be det

gradeup

Ans. (i) 37/21

(ii) Can't be determined

(iii) Can't be determined

gradeup

Eg4. If P : Q : R = 1 : 2 : 4, then find $\sqrt{5P^2 + Q^2 + R^2}$

(a) 5 **(b) 2Q** **(c) 4R** **(d) 5P**

Let P → x

Q → 2x

R → 4x

$$= \sqrt{5P^2 + Q^2 + R^2}$$

$$= \sqrt{5x^2 + 4x^2 + 16x^2}$$

$$= 5x$$

gradeup

Ans. (d)

gradeup

Eg5. If P : Q : R = 1 : 2 : 4, then find $\sqrt{5P^2+Q^2+R^2}$ ⇒ 5x

multiple answer can be correct

P → x
Q → 2x
R → 4x

(a) 5 ✗

(b) 5P ✓

(c) 2Q+P ✓

(d) R+P ✓

(e) R+Q-P ✓

(f) $\frac{R^2-P^2}{P+Q}$ → $\frac{15x^2}{3x}$ = 5x

(g) 2R-Q-P

(h) 3Q-P

(i) $\frac{R^3+P^3}{3Q^2+P^2}$ → $\frac{65x^3}{13x^2}$ = 5x

(j) $\frac{3R-Q}{2}$

gradeup

Ans. All are correct except (a).

gradeup

Eg6. A sum of Rs. 2002 is divided among A, B and C in the ratio 3 : 4 : 6. Find the share of B in that?

II

A → 3x

B → 4x

C → 6x

13x = 2002

x = 154

4 × 154

= 616 Rs

I

A : B : C

3 : 4 : 6

$\frac{4}{13} \times 2002 = 616$ Rs

gradeup

Ans. Rs. 616

gradeup

Eg7. A sum of Rs.234 is to be divided among A, B and C in the ratio 2:3:4, but by mistake, it is divided in the ratio 1/2 : 1/3 : 1/4. In this process who gains the maximum and by what amount?

A : B : C

Initial: 2 : 3 : 4

By Mistake: $\frac{1}{2} : \frac{1}{3} : \frac{1}{4}$

6 : 4 : 3

Initial $\frac{2}{9} \times 234 = 52$ Rs

Mistake $\frac{6}{13} \times 234 = 108$ Rs

A gains 56 Rs

gradeup

Ans. Max. profit A : Rs.56

gradeup

Eg8. If, a : b = 2 : 3

b : c = 4 : 5

Find a : b : c

I st

a : b : c

2 : 3 : 15/4

8 : 12 : 15

b	c
4	5
1	5/4
3	15/4

II nd Common Variable

a	b	c
8	12	15

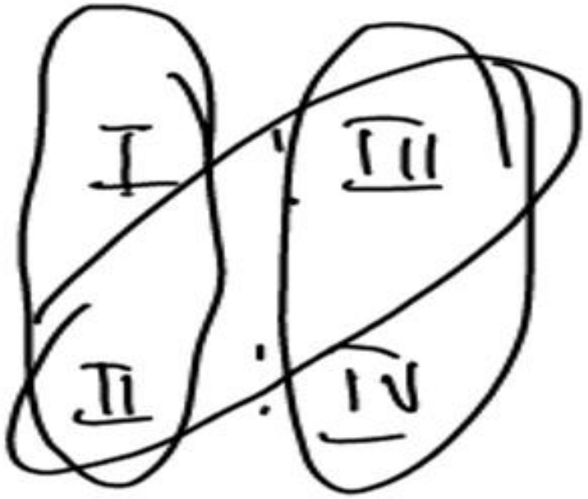
gradeup

Ans. 8 : 12 : 15

III rd

a : b

b : c



a : b : c

I II II III III IV

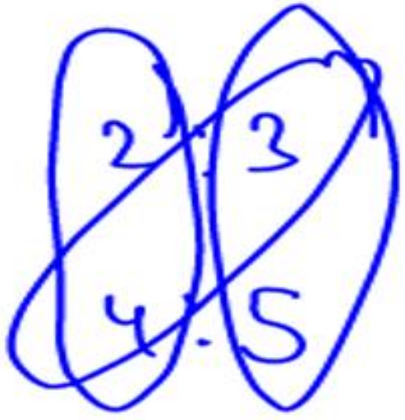
2·4 4·3 3·5

8 : 12 : 15

eg

a : b

b : c



gradeup

Eg9. If, a : b = 5 : 8

b : c = 12 : 13

Find a : b : c

a : b : c

$5 \cdot \cancel{12}^{3} : \cancel{12}^{3} \cdot 8 : \cancel{8}^{2} \cdot 13$

15 : 24 : 26

gradeup

Ans. 15 : 24 : 26

gradeup

Jeff Bezos Mukesh Ambani

Income 5 : 4

A : B

Income 11 : 10

Income Mukesh A

Eg10. If, a : b = 5 : 7

c : d = 8 : 11

Find b : c

Can't be determined

gradeup

Ans. Can't be determined

gradeup

Eg11. If, a : b = 2 : 3

b : c = 4 : 5

c : d = 6 : 7

Find a : b : c : d

a : b = 2 : 3

b : c = 4 : 5

c : d = 6 : 7

a : b : c : d

a b c d

2 · 4 · 6 · 7 | 4 · 6 · 7 | 6 · 5 · 7 | 5 · 7

16 : 24 : 30 : 35

gradeup

Ans. 16 : 24 : 30 : 35

gradeup

Eg12. If, a : b = 5 : 8

b : c = 12 : 13

c : d = 16 : 15

Find a : b : c : d

a : b : c : d

$5 \cdot 12 \cdot \overset{2}{\cancel{16}}$ $\quad 12 \cdot 16 \cdot \cancel{8}$ $\quad 16 \cdot \cancel{8} \cdot 13$ $\quad \cancel{8} \cdot 13 \cdot 15$

120 : 192 : 208 : 195

gradeup

Ans. 120 : 192 : 208 : 195

gradeup

Eg13. If, a : b = 2/9 : 1/3

b : c = 2/7 : 5/14

d : c = 7/10 : 3/5

Find a : b : c : d

a : b 2 : 3

b : c 4 : 5

c : d 6 : 7

a	b	c	d
$2 \cdot 4 \cdot \cancel{6}^{2}$	$4 \cdot 6 \cdot \cancel{3}$	$6 \cdot \cancel{3} \cdot 5$	$\cancel{3} \cdot 5 \cdot 7$
16 :	24 :	30 :	35

gradeup

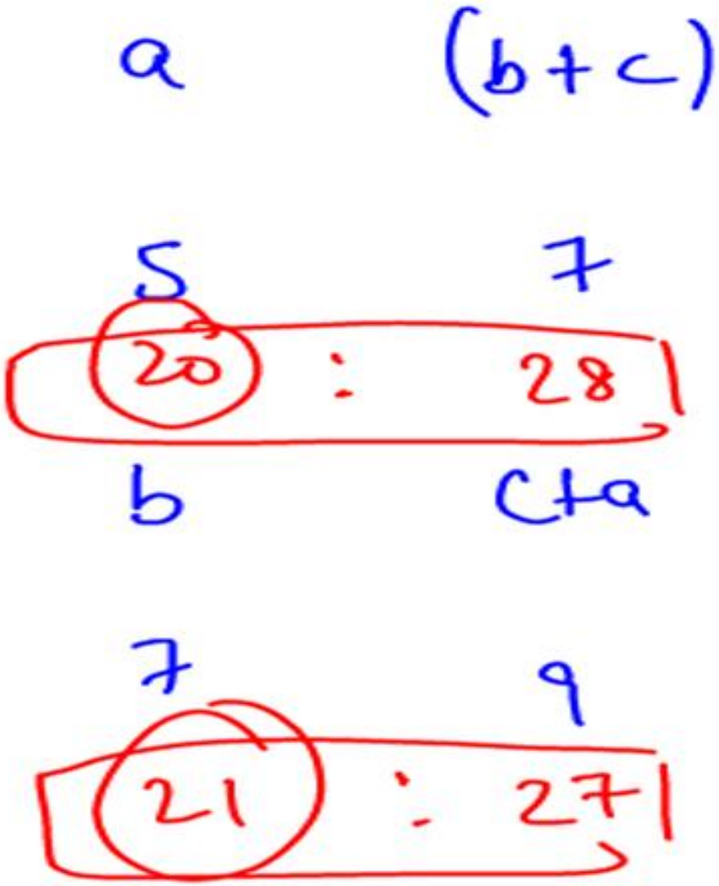
Ans. 16 : 24 : 30 : 35

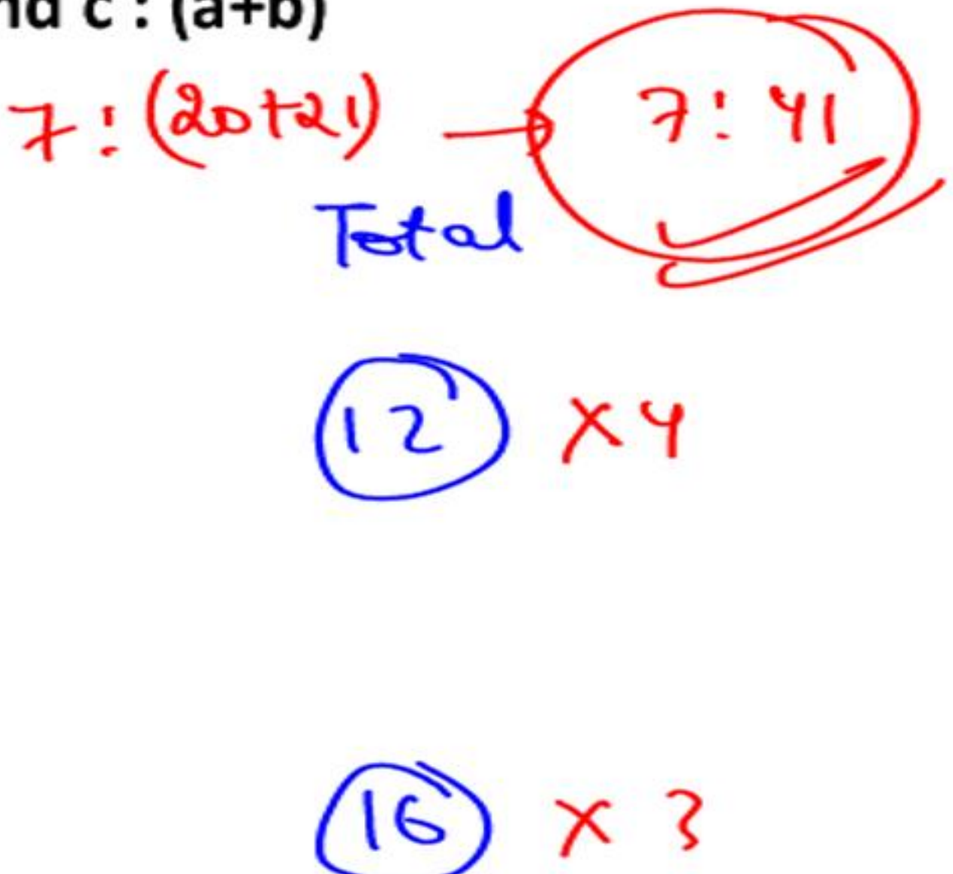
gradeup

Eg14. If, a : (b+c) = 5 : 7

b : (c+a) = 7 : 9

Find c : (a+b)





gradeup

Ans. 7 : 41

gradeup

2 : 3

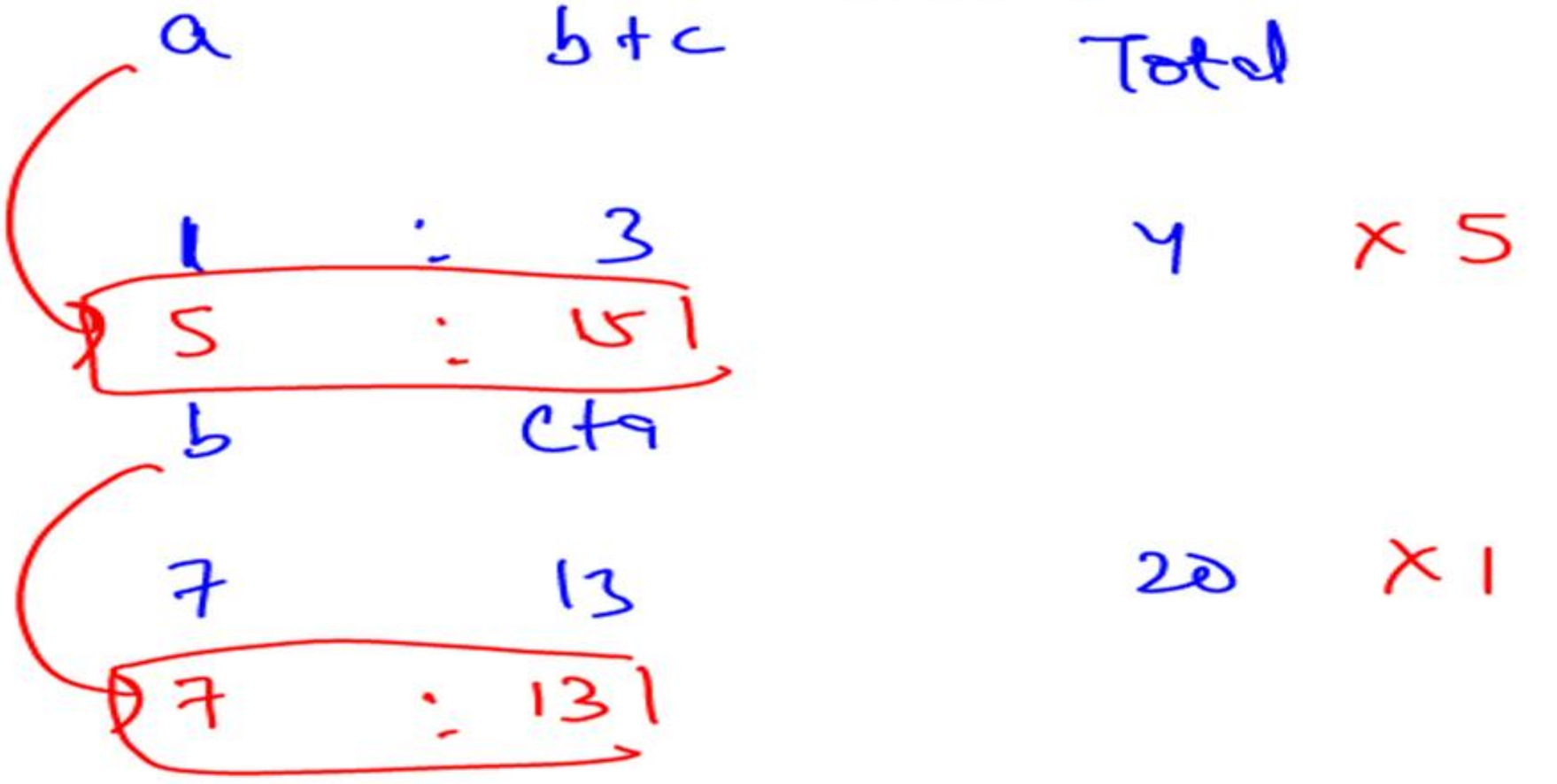
Eg15. If, a : (b+c) = 1 : 3

b : (c+a) = 7 : 13

Find c : (a+b)

8 : (5+7)

~~8 : 12~~



gradeup

Ans. 2 : 3

gradeup

Ans 4 : 1

Eg16. If, $(a + b + c) : d = 17 : 3$

$(a + c + d) : b = 3 : 1$

$(a + b + d) : c = 3 : 2$

Find $(b + c + d) : a$

$(a+b+c) : d$

$17 : 3$

$(a+c+d) : b$

$3 : 1$

$15 : 5$

$(a+b+d) : c$

$3 : 2$

$12 : 8$

$(5+8+3) : 4$

Total

$16 : 4$

$4 : 1$

20 × 1

4 × 5

5 × 4

gradeup

Ans. 4 : 1

gradeup

Eg17. If (a+b+c):(b+c+d):(c+d+a):(d+a+b) = 23:25:20:22.

Find the value of 2a + 3b + 4c + 5d.

$a+b+c = 23x$

$b+c+d = 25x$

$c+d+a = 20x$

$d+a+b = 22x$

Can't be determined

gradeup

Ans. Can't be determined

gradeup

Eg18. If xy : yz : zx = 3 : 4 : 5

Find $x^2 : y^2 : z^2$ = ??

225 : 144 : 400

$xy : yz : zx$ $\quad 3 : 4 : 5$

Divide by xyz

$\frac{1}{z} : \frac{1}{x} : \frac{1}{y}$ $\quad 3 : 4 : 5$

$z : x : y$ $\quad \frac{1}{3} : \frac{1}{4} : \frac{1}{5}$

$2 : x : y$ $\quad 20 : 15 : 12$

gradeup

Ans. 225 : 144 : 400

gradeup

P Y Q of SSC

Eg19. If (a+b) : (b+c) : (c+a) = 6 : 7 : 8

(a+b+c) = 14

Find the value of c.

$a+b = 6x$ — (1)

$b+c = 7x$ — (2)

$c+a = 8x$ — (3)

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

$2 \cdot 14 = 21x$

$x = \frac{2 \cdot 14}{21_3} = \frac{4}{3}$

$a+b = 6 \cdot \frac{4}{3}_1^2$

$= 8$

$a+b+c = 14$

$c = 6$

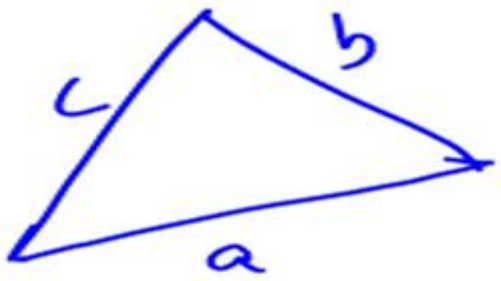
gradeup

Ans. 6

gradeup

V. Imp

Eg20. If (s – a) : (s – b) : (s – c) = 11:7:2 where, s is the semi-perimeter of the triangle and a, b & c are sides of triangle. Find a : b : c.



Perimeter = a+b+c

Semi Perimeter = $\frac{1}{2}(a+b+c)$

$s = \frac{a+b+c}{2}$

$2s = a+b+c$

I^st

$s-a = 11x$ -(1)

$s-b = 7x$ -(2)

$s-c = 2x$ -(3)

$3s - (a+b+c) = 20x$

$s = 20x$

$a = 9x \quad b = 13x \quad c = 18x$

9 : 13 : 18

gradeup

Ans. 9 : 13 : 18

$2s = a+b+c$

$(s-b) + (s-c)$

$2s - (b+c)$

(a)

$(s-a) : (s-b) : (s-c)$

$11 : 7 : 2$

$a : b : c$

$9 : 13 : 18$