

MATHEMATICS NOTES FOR 7TH CLASS (FOR ISLAMABAD)

Chapter 03

RATIO, RATE AND PROPORTION

Exercise 3.1

1. A disaster relief team consists of engineers and doctors in the ratio of 2 : 5.

- (a) If there are 18 engineers, find the number of doctors.
(b) If there are 65 doctors, find the number of engineers.

Ans. (a) Engineers : Doctors

$$\begin{array}{ccc} \uparrow & 2 & : & 5 \\ & 18 & : & x \end{array}$$

$$x : 5 :: 18 : 2$$

$$\frac{2x}{2} = \frac{5 \times 18}{2}$$

$$x = 5 \times 9 = 45 \text{ doctors}$$

- (b) Engineers : Doctors

$$\begin{array}{ccc} \uparrow & 2 & : & 5 \\ & x & : & 65 \end{array}$$

$$x : 2 :: 65 : 5$$

$$5x : 2 \times 65$$

$$x = \frac{2 \times 65}{5}$$

$$x = \frac{2 \times 65}{5}$$

$$x = 2 \times 13 = 26 \text{ doctors}$$

2. The ratio of two angles in a triangle is 3 : 1. Find the:

- (a) larger angle if the smaller is 18°.
(b) smaller angle if the larger is 63°.

Ans. (a) Larger angle : smaller

$$\begin{array}{ccc} \uparrow & 3 & : & 1 \\ & x & : & 18 \end{array}$$

$$x : 3 :: 18 : 1$$

$$x = 18 \times 3 = 54^\circ$$

- (b) Larger angle : smaller

$$\begin{array}{ccc} \uparrow & 3 & : & 1 \\ & 63 & : & x \end{array}$$

$$x : 1 :: 63 : 3$$

$$3x : 63 \times 1$$

$$x = \frac{63 \times 1}{3} = 21^\circ$$

3. The ratio of teachers to students in a school is 1:15. If there are 675 students, how many teachers are there?

Ans. Teachers : Students

$$\begin{array}{ccc} \uparrow & 1 & : & 15 \\ & x & : & 675 \end{array}$$

$$x : 1 :: 675 : 15$$

$$x = \frac{675 \times 1}{15}$$

$$x = 45 \text{ teachers}$$

4. An MP3 player is bought for Rs. 24000 and sold for Rs. 27000. Find the ratio of the cost price to the selling price.

Ans. C.P. : Sale Price

$$24000 : 27000$$

$$\begin{array}{ccc} \uparrow & 24 & : & 27 \\ & 8 & : & 9 \end{array}$$

5. The maximum speeds of a boat and a car are in the ratio 2 : 7. If the maximum speed of the boat is 30 km per hour, find the maximum speed of the car.

Ans. Speed of boat : Speed of car

$$\begin{array}{ccc} \uparrow & 2 & : & 7 \\ & 30 & : & x \end{array}$$

$$x : 7 :: 30 : 2$$

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$$2x = 7 \times 30$$

$$\text{So } x = \frac{7 \times 30}{2} = 105 \text{ km/hr}$$

6. *My Fortuner of Rs. Rs. 810000 is to be divided in the ratio 4 : 3 : 2. How much does each person receive?*

Ans. Total amount = Rs. 810000

Ratio = 4 : 3 : 2

Sum of ratio = 4 + 3 + 2 = 9

$$\text{A's share} = \frac{4 \times 810000}{9}$$

$$= 4 \times 90000$$

$$= \text{Rs. } 360000$$

$$\text{B's share} = \frac{3 \times 810000}{9}$$

$$= 3 \times 90000$$

$$= \text{Rs. } 270000$$

$$\text{C's share} = \frac{2 \times 810000}{9}$$

$$= 2 \times 90000$$

$$= \text{Rs. } 180000$$

7. *If the price of petrol is increased from Rs. 120 to Rs. 150 per litre. Find the ratio in which the price increases.*

Ans. Price increase ratio = 120 : 150

12 : 15

4 : 5

8. *The price of a book is increased in the ratio 6 : 5. Find the new price if the old price was Rs. 1500.*

Ans. Price increase $\begin{array}{ccc} & 6 : 5 & \\ \uparrow & & \uparrow \\ x : 1500 & & \end{array}$

$$x : 6 :: 1500 : 5$$

$$5x = 6 \times 1500$$

$$x = \frac{6 \times 1500}{5}$$

$$= 6 \times 300 = \text{Rs. } 1800$$

9. *In a sale, the prices of all stationery articles were reduced in the ratio 4 : 5. Find the sale price of*

(a) *a pen whose original price was Rs. 250.*

(b) *a pencil box whose original price was Rs. 150,*

(c) *a clipboard whose original price was Rs. 375.*

Ans. Reduction in price in ratio 4 : 5

(a) original price : new price

$$\begin{array}{ccc} & 5 & : & 4 & \\ \uparrow & & & & \uparrow \\ 250 & & : & & x \end{array}$$

$$x : 4 :: 250 : 5$$

$$5x = 4 \times 250$$

$$x = \frac{4 \times 250}{5} = 4 \times 50 = \text{Rs. } 200$$

(b) original price : new price

$$\begin{array}{ccc} & 5 & : & 4 & \\ \uparrow & & & & \uparrow \\ 150 & & : & & x \end{array}$$

$$x : 4 :: 150 : 5$$

$$5x = 4 \times 150$$

$$x = \frac{4 \times 150}{5} = 4 \times 30 = \text{Rs. } 120$$

(c) original price : new price

$$\begin{array}{ccc} & 5 & : & 4 & \\ \uparrow & & & & \uparrow \\ 375 & & : & & x \end{array}$$

$$x : 4 :: 375 : 5$$

$$5x = 4 \times 375$$

$$x = \frac{4 \times 375}{5}$$

$$x = 4 \times 75$$

$$= \text{Rs. } 300$$

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10. A picture measuring 8.5cm by 5.5cm is enlarged in the ratio 7 : 5. Find the dimensions of the new picture.

Ans. original : enlarged (New)

$$\begin{array}{ccc} 5 & : & 7 \\ \uparrow & & \uparrow \\ 8.5 & : & x \end{array}$$

$$x : 4 :: 8.5 : 5$$

$$5x = 7 \times 8.5$$

$$x = \frac{7 \times 8.5}{5} = \frac{7 \times 17}{10}$$

$$\text{Length} = \frac{119}{10} = 11.9\text{cm}$$

original : enlarged

$$\begin{array}{ccc} 5 & : & 7 \\ \uparrow & & \uparrow \\ 5.5 & : & x \end{array}$$

$$x : 7 :: 5.5 : 5$$

$$5x = 7 \times 5.5$$

$$x = \frac{7 \times 5.5}{5} = \frac{7 \times 11}{10} = 7.7\text{cm}$$

Exercise 3.2

1. Amjad earns Rs. 2500 in 5 days. What is his pay for 3 days?

Ans. Days : Earning (Rs.)

$$\begin{array}{ccc} 5 & : & 2500 \\ \uparrow & & \uparrow \\ 3 & : & x \end{array}$$

$$x : 2500 :: 3 : 5$$

$$5x = 2500 \times 3$$

$$x = \frac{2500 \times 3}{5} = 500 \times 3 = \text{Rs. } 1500$$

2. A shopkeeper buys 70 packets of biscuits for Rs. 2800. How much will he have to pay if he buys 150 such packets?

Ans. Packets : Cost (Rs.)

$$\begin{array}{ccc} 70 & : & 2800 \\ \uparrow & & \uparrow \\ 150 & : & x \end{array}$$

$$x : 2800 :: 150 : 70$$

$$70x = 2800 \times 150$$

$$x = \frac{2800 \times 150}{70}$$

$$= 40 \times 150 = \text{Rs. } 6000$$

3. A car uses 20 liters of petrol to travel 170km. How far can it travel if it has only 16 liters of petrol?

Ans. Liters : km (distance)

$$\begin{array}{ccc} 20 & : & 170 \\ \uparrow & & \uparrow \\ 16 & : & x \end{array}$$

$$x : 170 :: 16 : 20$$

$$20x = 170 \times 16$$

$$x = \frac{170 \times 16}{20} = 17 \times 8 = 136\text{ km}$$

4. Uzair drives 232 km in 4 hours. At this rate how far can he drive in 7 hours?

Ans. km : hours

$$\begin{array}{ccc} 232 & : & 4 \\ \uparrow & & \uparrow \\ x & : & 7 \end{array}$$

$$x : 232 :: 7 : 4$$

$$4x = 232 \times 7$$

$$x = \frac{232 \times 7}{4} = 58 \times 7 = 406\text{km}$$

5. The cost of 10m pipe is Rs. 2200. What is the cost of 22m of such a pipe?

Ans. Metre : Rs.

$$\begin{array}{ccc} 10 & : & 2200 \\ \uparrow & & \uparrow \\ 22 & : & x \end{array}$$

$$x : 2200 :: 22 : 10$$

$$10x = 2200 \times 22$$

$$x = \frac{2200 \times 22}{10}$$

$$x = 220 \times 22 = \text{Rs. } 4840$$

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6. An amusement park has 350 visitors over the course of 7 hours. At this rate, how many visitors would they expect over 15 hours?

Ans. Hours : Visitor's

$$\begin{array}{ccc} \uparrow & 7 & : & 350 & \uparrow \\ & 15 & : & x & \end{array}$$

$$x : 350 :: 15 : 7$$

$$7x = 350 \times 15$$

$$x = \frac{350 \times 15}{7}$$

$$x = 50 \times 15 = 750 \text{ visitors}$$

7. Moeed pays total of Rs. 60,000 rent for three months of a flat. Find his annual rent of flat.

Ans. Period (months) : Rent (Rs.)

$$\begin{array}{ccc} \uparrow & 3 & : & 60,000 & \uparrow \\ & 12 & : & x & \end{array}$$

$$x : 60,000 :: 12 : 3$$

$$3x = 60,000 \times 12$$

$$x = \frac{60000 \times 12}{3}$$

$$x = 60000 \times 4 = \text{Rs. } 240,000$$

8. Rs. 500 is charged for 50 units of electricity. Find the cost of 20 units of electricity.

Ans. Units : Cost (Rs.)

$$\begin{array}{ccc} \uparrow & 50 & : & 500 & \uparrow \\ & 20 & : & x & \end{array}$$

$$x : 500 :: 20 : 50$$

$$50x = 500 \times 20$$

$$x = \frac{500 \times 20}{50} = 10 \times 20 = \text{Rs. } 200$$

9. Cost of 10 books is Rs. 1640. What is the cost of 4 books?

Ans. Book : Cost (Rs.)

$$\begin{array}{ccc} \uparrow & 10 & : & 1640 & \uparrow \\ & 4 & : & x & \end{array}$$

$$x : 1640 :: 4 : 10$$

$$10x = 1640 \times 4$$

$$x = \frac{1640 \times 4}{10}$$

$$x = 164 \times 4 = \text{Rs. } 656$$

10. Mubeen planted 600 trees in 30 days. How much trees will he plant in next 25 days.

Ans. Trees : Days

$$\begin{array}{ccc} \uparrow & 600 & : & 30 & \uparrow \\ & x & : & 25 & \end{array}$$

$$x : 600 :: 25 : 30$$

$$30x = 600 \times 25$$

$$x = \frac{600 \times 25}{30}$$

$$x = 20 \times 25 = 500 \text{ trees}$$

11. Fatima has to pay Rs. 3900 for 650 minutes for out going call made using her mobile. Find

- (i) the amount she is charged for each minute of out going calls,
(ii) the amount she has to pay if she makes 460 minutes for out going calls.

Ans. (i) Minutes : Cost (Rs.)

$$\begin{array}{ccc} \uparrow & 650 & : & 3900 & \uparrow \\ & 1 & : & x & \end{array}$$

$$x : 3900 :: 1 : 650$$

$$650x = 3900$$

$$x = \frac{3900}{650} = \frac{8}{13} = \text{Rs. } 6$$

(b) Minutes : Cost (Rs.)

$$\begin{array}{ccc} \uparrow & 650 & : & 3900 & \uparrow \\ & 460 & : & x & \end{array}$$

$$x : 3900 :: 460 : 650$$

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$$650x = 3900 \times 460$$

$$x = \frac{3900 \times 460}{650}$$

$$x = \frac{3900 \times 46}{65} = \text{Rs. } 2760$$

12. For each shirt that a tailor makes, he is paid Rs. 1150. He makes 4 shirts every 15 minutes. Find the amount earned by the tailor if he works for 3 hours.

Ans. Shirts : Minutes

$$\begin{array}{ccc} \uparrow & 4 & : & 15 \\ & x & : & 60 \times 3 \end{array}$$

$$x : 4 :: 180 : 15$$

$$650x = 3900$$

$$15x = 4 \times 180$$

$$x = \frac{4 \times 180}{15} = 4 \times 12 = 48 \text{ shirts}$$

Shirts : Cost (Rs.)

$$\begin{array}{ccc} \uparrow & 1 & : & 1150 \\ & 48 & : & x \end{array}$$

$$x : 1150 :: 48 : 1$$

$$x = 1150 \times 48 = \text{Rs. } 55200$$

Exercise 3.3

1. Find the cost of 10kg of tea leaves when 3kg of tea leaves cost Rs. 18.

Ans. kg : cost (Rs.)

$$\begin{array}{ccc} \uparrow & 3 & : & 18 \\ & 10 & : & x \end{array}$$

$$x : 18 :: 10 : 3$$

$$3x = 18 \times 10$$

$$x = \frac{18 \times 10}{3} = 6 \times 10 = \text{Rs. } 60$$

2. A student can read 7 pages of a book in 10 minutes. How many

pages of the book can the student read in 30 minutes?

Ans. pages : minutes

$$\begin{array}{ccc} \uparrow & 7 & : & 10 \\ & x & : & 30 \end{array}$$

$$x : 7 :: 3 : 10$$

$$10x = 7 \times 30$$

$$x = \frac{7 \times 30}{10} = 3 \times 7 = 21 \text{ pages}$$

3. In the 1st four games, a football team scored a total of 10 goals. If this trend continues, how many goals will the team scores in the 18 remaining games?

Ans. Games : Goals

$$\begin{array}{ccc} \uparrow & 4 & : & 10 \\ & 18 & : & x \end{array}$$

$$x : 10 :: 18 : 4$$

$$4x = 10 \times 18$$

$$x = \frac{10 \times 18}{4} = 5 \times 9 = 45 \text{ goals}$$

4. A recipe requires 2 cups of flour to make 12 butter milk biscuits. How much flour is needed to make 30 biscuits?

Ans. Flour (cups) : Biscuits

$$\begin{array}{ccc} \uparrow & 2 & : & 12 \\ & x & : & 30 \end{array}$$

$$x : 2 :: 30 : 12$$

$$12x = 2 \times 30$$

$$x = \frac{2 \times 30}{12} = \frac{30}{6} = 5 \text{ cups}$$

5. It took 7.2 minutes to upload 8 photo graphs from your computer to a website. At this rate, how long will it take to upload 20 photographs?

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Ans. Minutes : Photographs

$$\begin{array}{ccc} \uparrow & 7.2 & : & 8 & \uparrow \\ & x & : & 20 & \end{array}$$

$$x : 7.2 :: 20 : 8$$

$$8x = \frac{72 \times 20}{10} = 9 \times 2 = 18 \text{ minutes}$$

6. Jamil works 36 hours for Rs. 172800. If he is paid at the same rate, how long will it take him to earn?

(i) Rs. 96000

(ii) Rs. 288000

Ans. (i) Hours : Amount (Rs.)

$$\begin{array}{ccc} \uparrow & 36 & : & 172800 & \uparrow \\ & x & : & 96000 & \end{array}$$

$$x : 36 :: 9600 : 172800$$

$$172800x = 36 \times 9600$$

$$x = \frac{36 \times 96000}{172800}$$

$$x = \frac{36 \times 960}{1728} = 20 \text{ hours}$$

(ii) Hours : Amount (Rs.)

$$\begin{array}{ccc} 36 & : & 172800 \\ x & : & 288000 \end{array}$$

$$x : 36 :: 288000 : 172800$$

$$172800x = 36 \times 288000$$

$$x = \frac{36 \times 288000}{172800}$$

$$x = \frac{36 \times 2880}{1728} = 6 \text{ hours}$$

7. Sarah has a collection of 42 jewel-cased CD's. Their total mass is 2436g.

(i) If she decides to post 28 of them to her cousin, what is the mass of CDs she would be posting?

(ii) If the ratio of the mass of a CD to the mass of an empty jewel case is 15 to 43, what is the mass of one of Sarah's CD's?

Ans. (i) CD's : Mass (g)

$$\begin{array}{ccc} \uparrow & 42 & : & 2436 & \uparrow \\ & 28 & : & x & \end{array}$$

$$x : 2436 :: 28 : 42$$

$$42x = 2436 \times 28$$

$$x = \frac{2436 \times 28}{42}$$

$$x = \frac{2436 \times 2}{3}$$

$$x = 812 \times 2 = 1624 \text{ gm}$$

$$\text{Mass of each box} = \frac{1624}{28} = 58 \text{ gm}$$

(ii) Mass of CD's : Mass of box

$$15 : 43$$

$$\text{Sum of ratio} = 15 + 43 = 58 \text{ gm}$$

$$\text{Mass one CD} = \frac{15 \times 58}{58}$$

$$\text{Mass one CD} = 15 \text{ gm}$$

8. The expenses "E" of a tea party are directly proportional to the number of guests "N" present. When there are 30 guests present at the tea party, the expenses incurred are Rs. 210.

Calculate the expense incurred when there are 80 guests present at the tea party.

Ans. Expenses (E) : Number of guests (N)

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$$\begin{array}{ccc} \uparrow & 42 & : & 30 & \uparrow \\ & x & : & 80 & \\ x : 210 :: 80 : 30 \\ 30x = 210 \times 80 \\ x = \frac{210 \times 80}{30} = 7 \times 800 = \text{Rs. } 560 \end{array}$$

9. In each of the following tables, the quantities given are in direct proportion. Complete the tables:

(i)

x	1	3		7
y	9		45	

(ii)

M	10	20	50	
E	5			40

Ans.

(i)

x	1	3	5	7
y	9	27	45	63

(ii)

M	10	20	50	80
E	5	10	25	40

10. Zeb works 36 hours for Rs. 17280. If he is paid at the same rate, how long will it take him to earn:

(i) Rs. 96000?

(ii) Rs. 28800?

Ans. (i) Hours : Rs. (Earning)

$$\begin{array}{ccc} \uparrow & 36 & : & 17280 & \uparrow \\ & x & : & 96000 & \\ x : 36 :: 96000 : 17280 \\ 17280x = 36 \times 96000 \\ x = \frac{36 \times 96000}{17280} \\ x = \frac{36 \times 9600}{1728} = 200 \text{ hours} \end{array}$$

(ii) Hours : Rs. (Earning)

$$\begin{array}{ccc} \uparrow & 36 & : & 17280 & \uparrow \\ & x & : & 28800 & \\ x : 36 :: 28800 : 17280 \\ 17280x = 36 \times 28800 \\ x = \frac{36 \times 28800}{17280} \\ x = \frac{36 \times 2880}{1728} = 60 \text{ hours} \end{array}$$

Exercise 3.4

1. Eight men can build a bridge in 12 days. Find the time taken for 6 men to build the same bridge.

Ans. Men : Days

$$\begin{array}{ccc} \downarrow & 8 & : & 12 & \uparrow \\ & 6 & : & x & \\ x : 12 :: 8 : 6 \\ 6x = 12 \times 8 \\ x = \frac{12 \times 8}{6} = 2 \times 8 = 16 \text{ Men} \end{array}$$

2. If 12 workers can paint a building in 20 days, how many workers would it take to complete in

(i) 15 days?

(ii) 48 days?

Ans. (i) Workers : Days

$$\begin{array}{ccc} \uparrow & 12 & : & 20 & \downarrow \\ & x & : & 15 & \\ x : 12 :: 20 : 15 \\ 15x = 12 \times 20 \\ x = \frac{12 \times 20}{15} = \frac{12 \times 4}{3} \\ x = 4 \times 4 = 16 \text{ workers} \end{array}$$

(ii) Workers : Days

$$\begin{array}{ccc} \uparrow & 12 & : & 20 & \downarrow \\ & x & : & 48 & \\ x : 12 :: 20 : 48 \end{array}$$

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$$48x = 12 \times 20$$

$$x = \frac{12 \times 20}{48} = \frac{20}{4} = 5 \text{ workers}$$

3. Three identical pumps can fill a tank in 40 minutes. What is the time taken to fill the tank if there are:

(i) 2 pumps?

(ii) 8 pumps?

Ans. (i) Pumps : Time (Minutes)

$$\begin{array}{ccc} 3 & : & 40 \\ \downarrow & & \uparrow \\ 8 & : & x \end{array}$$

$$x : 40 :: 3 : 2$$

$$2x = 40 \times 3$$

$$x = \frac{40 \times 3}{2} = 20 \times 3 = 60 \text{ minutes}$$

(ii) Pumps : Time (Minutes)

$$\begin{array}{ccc} 3 & : & 40 \\ \downarrow & & \uparrow \\ 8 & : & x \end{array}$$

$$x : 40 :: 3 : 8$$

$$8x = 40 \times 3$$

$$x = \frac{40 \times 3}{8} = 5 \times 3 = 15 \text{ minutes}$$

4. If a soldier's ration is 650g/day and there are enough supplies to last 12 days, how long would the supplies last if his ration is 780g/day?

Ans. Ration (g / day) : Days

$$\begin{array}{ccc} 650 & : & 12 \\ \downarrow & & \uparrow \\ 780 & : & x \end{array}$$

$$x : 12 :: 650 : 780$$

$$780x = 12 \times 650$$

$$x = \frac{12 \times 650}{780}$$

$$x = \frac{12 \times 65}{78} = \frac{1/2^2 \times 65^1}{7/8^1} = 10 \text{ Days}$$

5. Sixty chickens have enough feed for 30 days. After 10 days, twelve chickens were sold. How much longer can the remaining feed last?

Ans. Total Days = 30

Days Passed = 10

Balance Days = 30 - 10 = 20 Days

Balance chicken = 60 - 12 = 48

Days : Chicken

$$\begin{array}{ccc} 20 & : & 60 \\ \uparrow & & \uparrow \\ x & : & 48 \end{array}$$

$$x : 20 :: 60 : 48$$

$$48x = 20 \times 60$$

$$x = \frac{20 \times 60}{48} = \frac{20^1 \times 60^1}{4/8^1} = 25 \text{ Days}$$

Days longer = 25 - 20 = 5 Days longer

6. A school teacher is organizing a camp for 72 scouts. He ordered enough food to last the scouts 7 days.

(a) How much longer can the food last if 9 scouts did not turn up for the camp?

(b) If the duration of the camp is reduced to 4 days, how many more scouts can the food cater for?

Ans. (a) Scouts : Days

$$\begin{array}{ccc} 72 & : & 7 \\ \downarrow & & \uparrow \\ 63 & : & x \end{array}$$

$$x : 7 :: 72 : 63$$

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$$63x = 7 \times 72$$

$$x = \frac{7 \times 72}{63} = \frac{1 \times 72^8}{63} = 8 \text{ Days}$$

$$8 - 7 = 1 \text{ One more day}$$

(b) Scouts : Days

$$\begin{array}{ccc} 72 & : & 7 \\ \uparrow & & \downarrow \\ x & : & 4 \end{array}$$

$$x : 72 :: 7 : 4$$

$$4x = \frac{72 \times 7}{4} = \frac{72^{18} \times 7}{4} = 126$$

$$\text{More scouts} = 126 - 72 = 54$$

7. Given that y is inversely proportional to x . Complete the table below:

(i)

x	2	4		6
y	8		2	

(ii)

x	2	3		8
y	5			

Ans.

(i)

x	2	4	8	6
y	8	4	2	$\frac{8}{3}$

(ii)

x	2	3	4	8
y	6	4	3	$\frac{3}{2}$

8. 100 men eat a certain quantity of food in one month. For how many days will that food be sufficient if 25 men join them?

Ans. Men : Days

$$\begin{array}{ccc} 100 & : & 30 \\ \downarrow & & \uparrow \\ 125 & : & x \end{array}$$

$$x : 30 :: 100 : 125$$

$$125x = 30 \times 100$$

$$x = \frac{30 \times 100}{125}$$

$$x = \frac{30 \times 4}{125} = 6 \times 4 = 24 \text{ Days}$$

9. A water tank can be emptied in 50 minutes by 5 pumps. How long will it take if 1 pump is out of order?

Ans. Pumps : Minutes

$$\begin{array}{ccc} 5 & : & 50 \\ \downarrow & & \uparrow \\ 4 & : & x \end{array}$$

$$x : 50 :: 5 : 4$$

$$4x = 50 \times 5$$

$$x = \frac{50 \times 5}{4} = \frac{25 \times 5}{2} = \frac{125}{2}$$

$$x = 62.5 \text{ minutes}$$

10. A project can be completed by 75 workers in 40 days. But project manager brought 15 more workers after 8 days. In how many days will the remaining work be finished?

Ans. Workers : Days

$$\begin{array}{ccc} 75 & : & 32 \\ \downarrow & & \uparrow \\ 90 & : & x \end{array}$$

$$x : 32 :: 75 : 90$$

$$90x = 32 \times 75$$

$$x = \frac{32 \times 75}{90}$$

$$x = \frac{32^{16} \times 75^5}{90}$$

$$x = \frac{80}{3}$$

$$x = 26.7 \text{ Days}$$

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Exercise 3.5

1. Express the following in m/s.

(i) 18 km/h

(ii) 90 km/h

(iii) 367 km/h

Ans. (i) 18 km/h

$$= \frac{18 \times 1000}{60 \times 60} = \frac{18^{\cancel{3}} \times 1000^{\cancel{5}}}{60^{\cancel{2}} \times 60^{\cancel{2}}} = 5 \text{ m/s}$$

(ii) 90 km/h

$$= \frac{90 \times 1000}{60 \times 60} = \frac{90^{\cancel{2}} \times 1000^{\cancel{5}}}{60^{\cancel{2}} \times 60^{\cancel{2}}} = 25 \text{ m/s}$$

(iii) 367 km/h

$$= \frac{367 \times 1000}{60 \times 60} = \frac{367 \times 1000^{\cancel{5}}}{60^{\cancel{2}} \times 60^{\cancel{2}}}$$

$$= \frac{367 \times 5}{18} = 101.94 \text{ m/s}$$

2. Express the following in km/h.

(i) 10 m/s

(ii) 35 m/s

(iii) 315 m/s

Ans. (i) 10 m/s

$$= \frac{10 \times 60 \times 60}{1000} = \frac{10^{\cancel{1}} \times 60^{\cancel{2}} \times 60^{\cancel{2}}}{1000}$$

$$= 36 \text{ km/h}$$

(ii) 35 m/s

$$= \frac{35 \times 60 \times 60}{1000} = \frac{35^{\cancel{1}} \times 60^{\cancel{2}} \times 60^{\cancel{2}}}{1000^{\cancel{3}}}$$

$$= 42 \times 3 = 126 \text{ km/h}$$

(iii) 315 m/s

$$= \frac{315 \times 60 \times 60}{1000} = \frac{315 \times 60^{\cancel{2}} \times 60^{\cancel{2}}}{1000^{\cancel{3}}}$$

$$= \frac{315 \times 6 \times 3}{5} = 63 \times 6 \times 3$$

$$= 1134 \text{ km/h}$$

3. A journey of 65 km takes $2\frac{1}{2}$ hours. What is the speed of this journey?

Ans. Journey = 65 km

$$\text{Time} = 2\frac{1}{2} \text{ hour} = \frac{5}{2}$$

Speed = ?

$$= \frac{\text{Journey}}{\text{Time}} = \frac{65}{2.5} = \frac{650}{25}$$

$$= 26 \text{ km/hour}$$

4. A bus left city A at 10:45 and arrived at city B at 22:15 on the same day. How long was the bus journey?

Ans.

$$\text{Time Taken} = 22:15 - 10:45 = 11:30$$

$$= 11\frac{1}{2} \text{ hours}$$

$$\text{Speed} = \frac{\text{Distance}}{\text{Time}} = \frac{65}{11.5} = 5.7 \text{ km/hr}$$

5. An athlete runs a 1000 m race in 3 minutes 20 seconds. Find his speed in meters per second.

Ans. Distance = 1000 m

$$\text{Time} = 3 \text{ minute } 20 \text{ seconds} = 200 \text{ sec}$$

MATHEMATICS NOTES FOR 7TH CLASS (FOR ISLAMABAD)

$$\begin{aligned}\text{Speed} &= \frac{\text{Distance}}{\text{Time}} \\ &= \frac{1000}{200} = 5 \text{ m/sec}\end{aligned}$$

6. A train journey covered 205km at a speed of 100km/h. Find the time taken in hours and minute.

Ans. Speed = 100 km/hr
Distance = 205km
Time taken = $\frac{\text{Distance}}{\text{Speed}}$
 $= \frac{205}{100} = \frac{41}{20} = 2 \frac{1}{20}$ hours
 $= 2 \text{ hours} + 3 \text{ minutes}$

7. Junaid drove 85km from Wazirabad to Sialkot at a speed of 51 km/h. How long did his journey take in hours and minutes?

Ans. Speed = 51 km/hr
Distance = 85km
Time taken = $\frac{\text{Distance}}{\text{Speed}}$
 $= \frac{85}{51} = \frac{5}{3} = 1 \frac{2}{3}$
 $= 1 \text{ hour} + 40 \text{ minutes}$

8. Amir drove 275km from Islamabad to Lahore at a speed of 50km/h. Work out the time his journey took.

Ans. Speed = 50 km/hr
Distance = 275km
Time taken = $\frac{\text{Distance}}{\text{Speed}}$
 $= \frac{275}{50} = \frac{55}{10} = 5.5$
 $= 5 \text{ hours and } 30 \text{ minutes}$

9. Badar rode his bike for 4 hours 15 minutes at a speed of 20km/h. What distance did he ride?

Ans. Time = 4 hr + 15 minutes
 $= 4 \frac{15}{60} \text{ hour} = 4 \frac{1}{4} \text{ hours}$
Speed = 20 km/hr
Distance = Speed $\times$ time
 $= 4 \frac{1}{4} \times 20$
 $= \frac{17}{4} \times 20 = 85 \text{ km}$

10. A bus traveled 140km at an average speed of 70 km/h.

- (i) How long did the bus take?
(ii) If the bus traveled at an average speed of 35 km/h, how long would it take?

Ans. (i) Speed = 70 km/hr
Distance = 140km
Time taken = $\frac{\text{Distance}}{\text{Speed}}$
 $= \frac{140}{70} = 2 \text{ hours}$

(ii) New Speed = 35 km/hr
Distance = 140km
Time taken = $\frac{\text{Distance}}{\text{Speed}}$
 $= \frac{140}{35} = \frac{20}{5} = 4 \text{ hours}$

11. The flight time from Islamabad Airport to London Airport is 8 hours 20 minutes. The speed of the jumbo jet is 540km/h. What is the distance between Islamabad and London Airport?

Ans. Time = 8 hours 20 minutes

MATHEMATICS NOTES FOR 7TH CLASS (FOR ISLAMABAD)

$$= 8\frac{20}{60} = 8\frac{2}{6} = 8\frac{1}{3} = \frac{25}{3} \text{ hours}$$

$$\text{Speed} = 540 \text{ km/hr}$$

$$\text{Distance} = \text{Speed} \times \text{time}$$

$$= \frac{540 \times 25}{3}$$

$$= 180 \times 25 = 4500 \text{ km}$$

12. A car traveled 160km at an average speed of 40km/h.

(a) How long did the car take?

(b) If the car traveled twice as fast, how long would it take?

Ans. (a) Speed = 40 km/hr

$$\text{Distance} = 160 \text{ km}$$

$$\text{Time taken} = \frac{\text{Distance}}{\text{Speed}}$$

$$= \frac{160}{40} = 4 \text{ hours}$$

(b) New Speed = $40 \times 2 = 80 \text{ km/hr}$

$$\text{New Time} = \frac{\text{Distance}}{\text{Speed}}$$

$$= \frac{160}{80} = 2 \text{ hours}$$

13. A motor cyclist took 1.5 hour to travel 143km from town P to town Q. He then took another 1.5 hour to reach his destination town R which was 96km from town Q. Find his average.

Ans. Distance I = 143 km

$$\text{Time I} = 1.5 \text{ hour}$$

$$\text{Distance II} = 96 \text{ km}$$

$$\text{Time II} = 1.5 \text{ hour}$$

$$\text{Total distance} = 143 + 96 = 239 \text{ km}$$

$$\text{Total time taken} = 1.5 + 1.5 = 3 \text{ hours}$$

$$\text{Average speed} = \frac{\text{Total distance}}{\text{total time}}$$

$$= \frac{2039}{3} = 79.66 \text{ km/hour}$$

$$= 80 \text{ km/hour}$$

14. A car traveling at a uniform speed started at noon and covered the first 150km of a journey by 3 p.m. Find the time when it had completed the whole journey of 600km.

Ans. Time taken = Noon to 3 p.m. = 3 hours

$$\text{Distance} = 150 \text{ km}$$

$$\text{Speed} = \frac{\text{Distance}}{\text{Time}} = \frac{150}{3} = 50 \text{ km/hour}$$

$$\text{Total journey} = 600 \text{ km}$$

$$\text{Speed} = 50 \text{ km/hr}$$

$$\text{Total time} = \frac{\text{Total distance}}{\text{speed}}$$

$$= \frac{600}{50} = \frac{60}{5} = 12 \text{ hours at midnight}$$

Review Exercise 3

1. Choose the correct option.

(i) The ratio 16 seconds : 2 minutes as a single fraction in its lowest terms is:

- ✓(a) 1 : 7.5 (b) 1 : 6
(c) 8 : 1 (d) 1 : 8

(ii) 8 workers can paint a building in 24 days. How many days will 18 workers take?

- (a) 54 ✓(b) $10\frac{2}{3}$

- (c) $10\frac{1}{3}$ (d) 6

(iii) A car is traveling at a speed of 25 metres per second. Then the speed in kilometres per hour is:

- (a) 25 km/h (b) 45 km/h
(c) 60 km/h ✓(d) 90 km/h

MATHEMATICS NOTES FOR 7TH CLASS (FOR ISLAMABAD)

- (iv) Sara's class was sorting books in the library. The class sorted 45 books in 90 minutes. If they continue sorting at this rate, how long will it take them to sort 120 books?

- (a) 5 hours (b) $4\frac{1}{2}$ hours
 ✓(c) 4 hours (d) $3\frac{1}{2}$ hours

- (v) The ratio of cats to dogs seen by a vet in a day is about 2 to 5. If a vet saw 40 animals in one day, about how many were dogs?

- (a) 5 (b) 12
 ✓(c) 29 (d) 40

- (vi) At a sports camp, there is 1 counselor for every 12 campers. If there are 156 campers attending the camp, which proportion can be used to find x , the number of counselors?

- (a) $\frac{x}{12} = \frac{1}{156}$ (b) $\frac{12}{1} = \frac{x}{156}$
 ✓(c) $\frac{1}{12} = \frac{x}{156}$ (d) $\frac{x}{1} = \frac{12}{156}$

- (vii) Ahmed buys 12 cans of orange juice for Rs. 600. At this rate, how much would she pay for 48 cans of orange juice?

- ✓(a) Rs. 2000 (b) Rs. 2200
 (c) Rs. 2400 (d) Rs. 3000

- (viii) Annika can run 2km in 15 minutes. At this rate, about how long will it take her to run $3\frac{1}{2}$ km?

- ✓(a) 26 minutes (b) 36 minutes
 (c) 32 minutes (d) 42 minutes

2. When Rs. 143 is divided in the ratio 2 : 4 : 5. What is the difference between the largest and the smallest share?

Ans. Ratio = 2 : 4 : 5

$$\text{Sum of ratio} = 2 + 4 + 5 = 11$$

$$\text{Total amount} = \text{Rs. } 143$$

$$\text{A's share} = \frac{2 \times 143}{11} = 2 \times 13 = \text{Rs. } 26$$

$$\text{B's share} = \frac{4 \times 143}{11} = 4 \times 13 = \text{Rs. } 52$$

$$\text{C's share} = \frac{5 \times 143}{11} = 5 \times 13 = \text{Rs. } 65$$

Difference between

Largest and smallest share = ?

$$= 65 - 26 = \text{Rs. } 39$$

3. Divide 180 kg in the ratio 1:2:3:4.

Ans. Ratio = 1 : 2 : 3 : 4

$$\text{Sum of ratio} = 1 + 2 + 3 + 4 = 10$$

$$\text{Total weight} = 180\text{kg}$$

$$\text{A's weight} = \frac{1 \times 180}{10} = 18\text{kg}$$

$$\text{B's weight} = \frac{2 \times 180}{10} = 36\text{kg}$$

$$\text{C's weight} = \frac{3 \times 180}{10} = 54\text{kg}$$

$$\text{D's weight} = \frac{4 \times 180}{10} = 72\text{kg}$$

4. Divide Rs. 4000 in the ratio 2:5:8.

Ans. Ratio = 2 : 5 : 8

$$\text{Sum of ratio} = 2 + 5 + 8 = 15$$

$$\text{Total amount} = \text{Rs. } 4000$$

$$\text{A's share} = \frac{2 \times 4000}{15}$$

$$= \frac{2 \times 4000}{15} = \frac{8000}{15} = \text{Rs. } 533.33$$

$$\text{B's share} = \frac{5 \times 4000}{15}$$

$$= \frac{4000}{3} = \text{Rs. } 1333.33$$

MATHEMATICS NOTES FOR 7TH CLASS (FOR ISLAMABAD)

$$\begin{aligned} \text{C's share} &= \frac{8 \times 4000}{15} \\ &= \frac{32000}{15} = \text{Rs. } 2133.33 \end{aligned}$$

5. *Mehak traveled 600km from P to Q. She left P at 11:30 and arrived at Q at 19:00.*

(a) *How long did the journey take? Give your answer in hours and minutes.*

(b) *Find the average speed, in kilometers per hour, for Mehak's journey.*

Ans. Distance = 600km

(a) Left P = at 11:30

Reached Q = at 19:00

Time taken = 19:00 – 11:30

= 7:30

= 7 hours and 30 minutes

(b) Average speed = $\frac{\text{Distance}}{\text{Time}}$

$$= \frac{600}{7\frac{1}{2}} = 600 \div 7.5$$

$$= \frac{600 \times 10}{75} = 80 \text{ km/hr}$$

6. *Sarmad traveled 400km from A to B. He left A at 10:45 and arrived at B at 16:05.*

(a) *How long did the journey take? Give your answer in hours and minutes.*

(b) *Find the average speed, in kilometers per hour, for Sarmad's journey.*

Ans. Total distance = 400km

(a) Left A = 10:45

Reached B = 16:05

Time taken = 16:05 – 10:45

= 5:20

= 5 hours + 20 minutes

(b) Average speed = $\frac{\text{Distance}}{\text{Time}}$

$$= \frac{400}{5\frac{20}{60}} = 400 \div 5\frac{2}{6}$$

$$= 400 \div 5\frac{1}{3} = 400 \div \frac{16}{3}$$

$$= \frac{400 \times 3}{16} = 75 \text{ km/hr}$$

7. *If a car travels 36 km on 1.5 liter of petrol, how far can the car travel on 2.4 liters of petrol?*

Ans. Distance km : Liter

$$\begin{array}{ccc} 36 & : & 1.5 \\ \uparrow & & \uparrow \\ x & : & 2.4 \end{array}$$

$$x : 36 :: 2.4 : 1.5$$

$$15x = 36 \times 2.4$$

$$x = \frac{36 \times 2.4}{1.5} = \frac{36 \times 24}{15}$$

$$x = \frac{288}{5} = 57.6 \text{ km}$$

8. *8 workers are hired to build a house in 15 days. How many days are required if 2 additional workers are hired?*

Ans. Workers : Days

$$\begin{array}{ccc} 8 & : & 15 \\ \downarrow & & \downarrow \\ 10 & : & x \end{array}$$

$$x : 15 :: 8 : 10$$

$$10x = 15 \times 8$$

$$x = \frac{15 \times 8}{10} = \frac{3 \times 8}{2}$$

$$x = 4 \times 3 = 12 \text{ Days}$$

MATHEMATICS NOTES FOR 7TH CLASS (FOR ISLAMABAD)

9. A school's computer club has 350 boys and 175 girls. If the number of girls is decreased in the ratio 4 : 5 while the number of boys is increased in the ratio 6 : 5, what is the new ratio of boys to girls?

Ans. Boys = 350

Girls = 175

Girls decreased in the ratio $\Rightarrow \begin{matrix} 4 : 5 \\ \uparrow \\ x : 175 \end{matrix}$

$$x : 4 :: 175 : 5$$

$$5x = 4 \times 175$$

$$x = \frac{4 \times 175}{5} = 4 \times 35 = 140$$

Boys increased in a ratio $= \begin{matrix} 6 : 5 \\ \uparrow \\ x : 350 \end{matrix}$

$$x : 6 :: 350 : 5$$

$$5x = 6 \times 350$$

$$x = \frac{6 \times 350}{5} = 6 \times 70 = 420$$

New ratio:

Boys : Girls

420 : 140

3 : 1

10. A coach leave a station at 22:55 and arrive at its destination at 04:05 the next day. Find

- (i) the time taken for the journey,
(ii) the time if the coach reached 35 minutes before schedule.

Ans. Coach leaving station = 22 : 55

- (i) Till 24:00, time taken = ?

$$24:00 - 22:55 = 1:05$$

$$\text{Next day time taken} = 04:05$$

$$\text{Total time taken} = 1:05 + 04:05$$

$$= 5:10$$

$$= 5 \text{ hours} + 10 \text{ minutes}$$

- (b) If reached 35 minutes before the scheduled time = ?

$$= 04:05 \text{ hr} - 35 \text{ minutes}$$

$$= 03:30$$