06

Unitary Method

What is Unitary Method?

A method in which the value of unit quantity is first obtained to find the value of any required quantity, then it is called unitary method.

e.g. If the price of 5 articles worth ₹ 20, then to find the price of 17 same articles, first of all the value of 1 article is found out.

∵ Worth of 5 articles = ₹ 20

∴ Worth of 1 article $= \dfrac{20}{5} = ₹4$

Hence, worth of 17 articles $= 4 \times 17 = ₹68$

Two Sub-laws of Unitary Method

1. Proportional Law (Direct Proportion)

Two quantities are said to be in direct proportion, if on the increase of the one, the other also increases with the same rate and vice-versa.

e.g. If the price of 6 oranges is ₹ 24, what will be the price of 5 dozen oranges?

∵ Price of 6 oranges = ₹ 24

∴ Price of 1 orange $= \dfrac{24}{6} = ₹4$

Hence, price of 5 dozen (60 oranges) $= 60 \times 4$

$\qquad\qquad = ₹240 \qquad [∵\ 1 \text{ dozen} = 12 \text{ unit}]$

Example 1 If 8 books cost ₹ 680. What will be the cost of such 15 books?

(a) ₹ 1275　　　　　(b) ₹ 1225
(c) ₹ 1250　　　　　(d) ₹ 1375

Sol. *(a)* ∵ Cost of 8 books = ₹ 680

∴ Cost of 1 book $= ₹\dfrac{680}{8}$

∴ Cost of 15 books $= ₹\dfrac{680}{8} \times \dfrac{15}{1} = ₹1275$

Example 2 15 chairs cost ₹ 1530. How many such chairs, can be bought with ₹ 4590?

(a) 46　　　　(b) 50　　　　(c) 45　　　　(d) 35

Sol. *(c)* ∵ Number of chairs can be bought with ₹ 1530 = 15 chairs

∴ Number of chairs can be bought with ₹1 $= \dfrac{15}{1530}$

∴ Number of chairs can be bought with

$\qquad ₹ 4590 = \dfrac{15}{1530} \times 4590 = 45$ chairs

2. Inverse Proportional Law (Indirect Proportion)

Two quantities are said to be inversely proportional, if on the increase of the one, the other decreases at the same rate and *vice-versa*.

e.g. If 5 men can do a work in 10 days, in how many days will 25 men complete the same work?

Men	Days
5 ↑	10 ↓
25	x

∴ $\qquad \dfrac{x}{10} = \dfrac{5}{25} \Rightarrow x = \dfrac{5 \times 10}{25} = 2$ days

Hence, 25 men complete the same work in 2 days.

Alternate Method

∵ 5 men complete the work = 10 days

∴ 1 man complete the work = 10 × 5 days

Hence, 25 men will complete the work

$$= \frac{10 \times 5}{25} = 2 \text{ days}$$

Example 3 If 6 men can do a work in 32 days, in how many days will 24 men complete the same work?

(a) 6   (b) 8   (c) 5   (d) 9

Sol. *(b)* ∵ 6 men complete the work = 32 days

∴   1 man complete the work = 32 × 6 days

∴ 24 men complete the work = $\frac{32 \times 6}{24}$ = 8 days

Example 4 Cost of 3 chairs and 5 tables is ₹ 444. If each table cost ₹ 60, then find out the cost of each chair.

(a) ₹ 45   (b) ₹ 80

(c) ₹ 50   (d) ₹ 48

Sol. *(d)* ∵ Cost of one table = ₹ 60

∴ Cost of 5 tables = ₹ 60 × 5 = ₹ 300

∵ Cost of 3 chairs + 5 tables = ₹ 444

So, cost of 3 chairs = 444 − 300 = ₹ 144

∴ Cost of 1 chair = ₹ $\frac{144}{3}$ = ₹ 48

⏰ Practice Exercise

1. 15 m of cloth costs ₹ 195. How many metres of cloth we have for ₹ 585?
   (a) 50   (b) 100
   (c) 45   (d) 48

2. The cost of 5 tables is the same as the cost of 7 chairs. If the cost of one table is ₹ 210. Find the cost of each chair.
   (a) ₹ 165   (b) ₹ 185
   (c) ₹ 160   (d) ₹ 150

3. If 12 men could complete a work in 16 days, then in how many days, 3 men will complete the same work?
   (a) 60   (b) 64   (c) 75   (d) 50

4. An engine pumps out 475 L of water in 1 min. How much time will be taken by it to jump out 1396500 L of water?
   (a) 50 h   (b) 54 h
   (c) 49 h   (d) 47 h

5. If 60 bags of wheat can be loaded in a truck. In how many trucks will 4380 bags of wheat be loaded?
   (a) 73   (b) 85   (c) 76   (d) 63

6. The cost of 10 chairs is the same as the cost of 6 tables. If the cost of a table is ₹ 400. Find the total cost of 10 chairs and 3 tables.
   (a) ₹ 2500   (b) ₹ 3600
   (c) ₹ 4500   (d) ₹ 5000

7. A bus needs 27 L of diesel for running 324 km distance. How many kilometres will it go in 20 L?
   (a) 245   (b) 300   (c) 250   (d) 240

8. A watch and a pen together costs ₹ 140. If the cost of the watch be 6 times the cost of the pen. What is the cost of the watch?
   (a) ₹ 120   (b) ₹ 125
   (c) ₹ 130   (d) ₹ 135

9. If 30 men, working 9 h a day, can reap a field in 16 days, in how many days, will 36 men reap the field, working 8 h a day?
   (a) 15   (b) 25   (c) 18   (d) 10

10. In a race Ravi covers 5 km in 20 min. How much distance will he cover in 100 min?
    (a) 40 km   (b) 35 km
    (c) 26 km   (d) 25 km

11. Tanuja has 1/3 of a sack of wheat. She divides the wheat equally into 11 bags. What fraction of the full sack of wheat is in each bag?
    (a) 1/33   (b) 1/7
    (c) 1/28   (d) 2/11

12. A tree is 12 m tall and casts an 8 m long shadow. At the same time, a flagpole casts a 100 m long shadow. How long is the flagpole?
    (a) 150 m   (b) 200 m
    (c) 125 m   (d) 115 m

13. The cost of a pack of 20 pencils is ₹ 400 and a pack of 17 erasers is ₹ 119. If Krishna bought 1 pencil and 1 eraser, how much would he pay to shopkeeper?
(a) ₹ 27   (b) ₹ 25
(c) ₹ 26   (d) ₹ 30

14. Anaya poured $3\dfrac{7}{8}$ cups of rasna each in 8 glasses. What was the total amount of rasna Anaya poured in 8 glasses?
(a) 31 cups   (b) 32 cups
(c) 10 cups   (d) 29 cups

Answers

1	(c)	2	(d)	3	(b)	4	(c)	5	(a)	6	(b)	7	(d)	8	(a)	9	(a)	10	(d)
11	(a)	12	(a)	13	(a)	14	(a)												

Hints & Solutions

1. Quantity of cloth available for ₹ 195 = 15 m

Quantity of cloth available for ₹ 1 $= \dfrac{15}{195}$

∴ Quantity of cloth available for

₹ 585 $= \dfrac{15}{195} \times 585 = 45$ m

2. Cost of 5 tables = Cost of 7 chairs

∵ Cost of 1 table = ₹ 210

∴ Cost of 5 tables $= 210 \times 5 = ₹ 1050$

∵ Cost of 7 chairs = ₹ 1050

∴ Cost of 1 chair $= 1050 \div 7 = ₹ 150$

3. ∵ 12 men complete the work = 16 days

∴ 1 man complete the work $= 12 \times 16$ days

Hence, 3 men will complete the work

$= \dfrac{12 \times 16}{3} = 64$ days

4. Time taken by the engine to put out 1396500 L of water $= \dfrac{1396500}{475} = 2940$ min or $\dfrac{2940}{60} = 49$ h

5. ∵ 60 bags of wheat can be loaded = 1 truck

∴ 1 bag of wheat can be loaded = 1/60

∴ 4380 bags of wheat will be loaded

$= \dfrac{1}{60} \times 4380 = 73$ trucks

6. ∵ Cost of 6 tables = Cost of 10 chairs

∵ Cost of 1 table = ₹ 400

∴ Cost of 6 tables $= 400 \times 6 = ₹ 2400$

∴ Cost of 10 chairs = ₹ 2400

∴ Cost of 3 tables $= ₹ 400 \times 3 = ₹ 1200$

Hence, Cost of 10 chairs + Cost of 3 tables

$= ₹ 2400 + ₹ 1200 = ₹ 3600$

7. Distance covered in 27 L = 324 km

Distance covered in 1 L $= \dfrac{324}{27}$ km

Distance covered in 20 L $= \dfrac{324}{27} \times 20 = 240$ km

8. Cost of (1 watch + 1 pen) = ₹ 140

∵ Cost of 1 watch = Cost of 6 pens

∴ Cost of (6 pens + 1 pen) = ₹ 140

[∵ 6 pens = 1 watch]

∴ Cost of 7 pens = ₹ 140

∴ Cost of 1 pen $= ₹ \dfrac{140}{7} = ₹ 20$

∴ Cost of 1 watch $= ₹ 20 \times 6 = ₹ 120$

9. Let the required number of days = x.

More men, Less days (Indirect proportion)
Less hours, More days (Indirect proportion)

$$\left. \begin{array}{ll} \text{Men} & 36:30 \\ \text{Hours per day} & 8:9 \end{array} \right\} :: 16 : x$$

∴ $(36 \times 8 \times x) = (30 \times 9 \times 16)$

∴ $x = \dfrac{30 \times 9 \times 16}{36 \times 8} = 15$ days

10. ∵ Distance covered in 20 min = 5 km

∴ Distance covered in 1 min $= \dfrac{5}{20}$ km

∴ Distance covered in 100 min

$= \left(\dfrac{5}{20} \times 100 \right)$ km

$= 5 \times 5 = 25$ km

11. ∴ Required fraction $= \dfrac{1}{3} \times \dfrac{1}{11} = \dfrac{1}{33}$

12. $\because$ 8 m shadow means original height $= 12$ m

$\therefore$ 1 m shadow means original height $= \dfrac{12}{8}$ m

$\therefore$ 100 m shadow means original height

$$= \left(\dfrac{12}{8} \times 100\right) m$$

$$= \dfrac{6}{4} \times 100 = 6 \times 25 = 150 \text{ m}$$

13. Cost of 1 pencil $= \dfrac{400}{20} = ₹\,20$

cost of 1 eraser $= \dfrac{119}{17} = ₹\,7$

$\therefore$ Total amount $= 20 + 7 = ₹\,27$

14. $\therefore$ Total amount of rasna $= 3\dfrac{7}{8} \times 8$

$$= \dfrac{31}{8} \times 8 = 31 \text{ cups}$$

➡ Try Yourself

1) A car travelling at a speed of 40 km/h can complete a journey in 9 h. How long will it take to travel the same distance at 60 km/h?
(a) 5 h (b) 6 h
(c) 8 h (d) 9 h

2) If 45 m of a uniform rod weighs 171 kg, what will be the weight of 12 m of the same rod?
(a) 49 kg (b) 42.5 kg
(c) 55 kg (d) 45.6 kg

3) How much she will earn in 10 days, if a woman earns daily ₹ 50?
(a) ₹ 450 (b) ₹ 800
(c) ₹ 525 (d) ₹ 500

4) If 100 bags of wheat can be loaded in a truck. In how many trucks will 12000 bags of wheat be loaded?
(a) 125 (b) 119 (c) 120 (d) 118

5) Maganlal, a worker, makes an article in every $\dfrac{2}{3}$ h. If he works for $7\dfrac{1}{2}$ h, how many articles will he make?
(a) $11\dfrac{1}{4}$ (b) $11\dfrac{1}{3}$
(c) $11\dfrac{1}{6}$ (d) $11\dfrac{2}{5}$

6) A car travels a distance of 2784 km when its tank is completely filled. If the capacity of the tank is 58 litre, then how much distance will it cover if its fuel tank has only 22 litres of fuel?
(a) 1056 km (b) 1100 km
(c) 1080 km (d) 1000 km

7) A bus needs 30 L of diesel for running 120 km distance. How many kilometres will it go in 60 L?
(a) 245 (b) 240 (c) 280 (d) 225

8) If a shooter shoots 10 birds daily then how many days he will take to shoot 500 birds?
(a) 50 days (b) 40 days
(c) 30 days (d) 60 days

9) Piyush walks 160 m everyday, how many kilometres will he walk in 5 weeks.
(a) 5.6 (b) 7.6 (c) 6.5 (d) 11.2

10) The cost of a pack of 10 balls is ₹ 250 and a pack of 15 shuttle cock is ₹ 135. If Gaurav bought 1 ball and 1 shuttle cock, how much would he pay to shopkeeper?
(a) ₹ 25 (b) ₹ 30 (c) ₹ 34 (d) ₹ 35

Answers

1	(b)	2	(d)	3	(d)	4	(c)	5	(a)
6	(a)	7	(b)	8	(a)	9	(a)	10	(c)