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# **DPM CLASSES**

6th to 10th (Math's & Science), 11th & 12th (Physics, Chemistry, Math's)

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**BASIC NOTES (CBSE/NCERT)**

## **RATIO, DIRECT AND INVERSE PROPORTIONS**

**PART -1 OUT OF 1**

**6<sup>th</sup>, 7<sup>th</sup> & 8<sup>th</sup>**

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# DPM CLASSES

6th to 10th (Math's & Science), 11th & 12th (Physics, Chemistry, Math's)

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# DPM CLASSES

6th to 10th (Math's &amp; Science), 11th &amp; 12th (Physics, Chemistry, Math's)

- : Direct and inverse proportion : -

Q. Direct proportion :- Two quantities  $x$  and  $y$  are said to be in direct proportion if they increase or decrease together in such a manner that the ratio of their corresponding values remains constant.

$$\frac{x_1}{y_1} = \frac{x_2}{y_2} \quad y_1, y_2 \text{ are values of } y \text{ corresponding to the values } x_1, x_2 \text{ of } x$$

$$\text{or } x_1 y_2 = x_2 y_1 \quad \text{respectively.}$$

Ex - An electric pole, 14 metres high, casts a shadow of 10 metres. Find the height of a tree that casts a shadow of 15 metres under similar conditions.

Sol.

|                                  |    |     |
|----------------------------------|----|-----|
| Height of the object (in metres) | 14 | $x$ |
| length of the shadow (in metres) | 10 | 15  |



$$\frac{14}{10} = \frac{x}{15}$$

$$\frac{14}{10} \times 15 = x$$

$$\frac{14 \times 3}{2} = x$$

$$7 \times 3 = x$$

$$21 = x$$



(Also use cross multiplication)

Therefore, height of the tree is 21 metres.

# DPM CLASSES

6th to 10th (Math's &amp; Science), 11th &amp; 12th (Physics, Chemistry, Math's)

- Direct and Inverse proportion -

Q. Inverse proportion :- Two quantities  $x$  and  $y$  are said to be in inverse proportion if an increase in  $x$  causes a ~~propto~~ proportional decrease in  $y$  (and vice-versa) in such a manner that the product of their corresponding values remain constant.

$$\frac{x_1}{x_2} = \frac{y_2}{y_1} \quad \text{or} \quad x_1 y_1 = x_2 y_2$$

Ex - 6 pipes are required to fill a tank in 1 hour 20 minutes. How long will it take if only 5 pipes of the same type are used.

Sol. If pipes less then time increase (Inverse)

|                   |    |     |       |       |
|-------------------|----|-----|-------|-------|
| No. of pipes      | 6  | 5   | $x_1$ | $x_2$ |
| Time (in minutes) | 80 | $x$ | $y_1$ | $y_2$ |

$$\frac{6}{5} = \frac{x}{80}$$

$$6 \times 80 = x \times 5$$

$$\frac{6 \times 80}{5} = x$$

$$96 = x$$

$$\frac{x_1}{x_2} = \frac{y_2}{y_1}$$

$$x_1 y_1 = x_2 y_2$$

Therefore, Time Taken to fill the tank by 5 pipes is 96 minutes or  $60 + 36 = 1 \text{ hour } 36 \text{ minutes}$



# DPM CLASSES

6th to 10th (Math's &amp; Science), 11th &amp; 12th (Physics, Chemistry, Math's)

∴ Direct and Inverse proportion :-

Q. length and breadth of a rectangular field are 50m and 15m respectively. Find the ratio of the length to the breadth of the field.

Sol. length of the rectangular field = 50 m  
breadth of the rectangular field = 15 m



$$\text{ratio} = \frac{\text{length}}{\text{breadth}}$$



$$= \frac{50}{15} = \frac{10 \times 5}{3 \times 5} = \frac{10}{3} = 10:3$$

Thus, required ratio = 10:3

Q. Find the ratio of 90 cm to 1.5 m

Sol. [For find ratio both quantities in the same unit]

$$1.5 \text{ m} = 1.5 \times 100 = 150 \text{ cm}$$

$$\text{ratio} = \frac{90 \text{ cm}}{1.5 \text{ m}}$$

$$= \frac{90 \text{ cm}}{1.5 \times 100 \text{ cm}}$$

$$= \frac{90}{150}$$

$$= \frac{9 \times 10}{15 \times 10}$$

$$= \frac{9}{15} = \frac{3 \times 3}{3 \times 5} = \frac{3}{5} = 3:5$$

Thus, required ratio is 3:5



# DPM CLASSES

6th to 10th (Math's &amp; Science), 11th &amp; 12th (Physics, Chemistry, Math's)

∴ Direct and inverse proportion :-

Q. There are 45 persons working in an office. If the number of females is 25 and the remaining are males, find the ratio of :

(a) The number of females to number of males.

(b) The number of males to number of females.

Sol.

Total number of workers = 45

Number of females = 25

Number of males =  $45 - 25 = 20$

(a) ratio =  $\frac{\text{female}}{\text{male}} = \frac{25}{20} = \frac{5 \times 5}{5 \times 4} = \frac{5}{4} = 5:4$

(b) ratio =  $\frac{\text{male}}{\text{female}} = \frac{20}{25} = \frac{5 \times 4}{5 \times 5} = \frac{4}{5} = 4:5$

Q. Give two equivalent ratio of 6:4

Sol. 6:4

$$\frac{6}{4} \times \frac{2}{2} = \frac{12}{8}$$

$$\frac{6}{4} \times \frac{3}{3} = \frac{18}{12}$$

Therefore, two equivalent ratio of 6:4 are 12:8, 18:12

Note: We can get equivalent ratio by multiplying or dividing the numerator and denominator by the same number.

# DPM CLASSES

6th to 10th (Math's &amp; Science), 11th &amp; 12th (Physics, Chemistry, Math's)

∴ Direct and Inverse proportion :-

Q. Fill in the missing numbers :-

$$\frac{14}{21} = \frac{\square}{3} = \frac{6}{\square}$$

Sol.

$$\frac{14}{21} = \frac{\square}{3}$$

$$21 \times \square = 14 \times 3$$

$$\square = \frac{14 \times 3}{21}$$

$$\boxed{\square = 2}$$

$$\frac{2}{3} = \frac{6}{\square}$$

$$2 \times \square = 3 \times 6$$

$$\square = \frac{3 \times 6}{2}$$

$$\square = 3 \times 3 = 9$$



Q. Divide ₹ 60 in the ratio 1:2 between Kirti & Kiran.

Sol. Two parts are 1 and 2

$$\text{Sum of the parts} = 1 + 2 = 3$$

$$\text{Total Amount} = ₹ 60$$



$$\text{Therefore, Kirti's share} = \frac{1}{3} \times 60 = ₹ 20$$

$$\text{Kiran's share} = \frac{2}{3} \times 60 = ₹ 40$$



# DPM CLASSES

6th to 10th (Math's &amp; Science), 11th &amp; 12th (Physics, Chemistry, Math's)

:- Direct- and inverse proportion :-

Q. There are 20 girls and 15 boys in a class.

(a) What is the ratio of number of girls to the number of boys?

(b) What is the ratio of number of girls to the total number of students in the class?

Sol. Number of girls = 20

Number of boys = 15

Total number of students =  $20 + 15 = 35$ 

$$(a) \text{ ratio} = \frac{\text{girls}}{\text{boys}} = \frac{20}{15} = \frac{5 \times 4}{5 \times 3} = \frac{4}{3} = 4:3$$

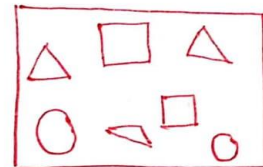
$$(b) \text{ ratio} = \frac{\text{girls}}{\text{Total}} = \frac{20}{35} = \frac{5 \times 4}{5 \times 7} = \frac{4}{7} = 4:7$$

Q. See the figure and find the ratio of.

(a) Number of triangles to the number of circles

(b) Number of square to all the figures

(c) Number of circles to all the figures



Sol. No. of triangles = 3, No. of circle = 2,

No. of square = 2, Total no. of figure =  $3 + 2 + 2 = 7$ 

$$(a) \text{ ratio} = \frac{\text{triangles}}{\text{circles}} = \frac{3}{2} = 3:2$$

$$(b) \text{ ratio} = \frac{\text{square}}{\text{All}} = \frac{2}{7} = 2:7$$

$$(c) \text{ ratio} = \frac{\text{Circles}}{\text{All}} = \frac{2}{7} = 2:7$$



# DPM CLASSES

6th to 10th (Math's &amp; Science), 11th &amp; 12th (Physics, Chemistry, Math's)

∴ Direct and inverse proportion:-

Q. Out of 30 students in a class, 6 like football, 12 like cricket and remaining like tennis, find the ratio of:

(a) Number of students liking football to number of students liking tennis.

(b) Number of students liking cricket to total number of students.

Sol.

Like football = 6

Like cricket = 12

Like Tennis =  $30 - 6 - 12 = 30 - 18 = 12$

$$(a) \text{ ratio} = \frac{\text{Football}}{\text{Tennis}} = \frac{6}{12} = \frac{6 \times 1}{6 \times 2} = \frac{1}{2} = 1:2$$

$$(b) \text{ ratio} = \frac{\text{Cricket}}{\text{Total}} = \frac{12}{30} = \frac{6 \times 2}{6 \times 5} = \frac{2}{5} = 2:5$$

Q. Distance travelled by Hamid and Akhtar in an hour are 9 km and 12 km. Find the ratio of speed of Hamid to the speed of Akhtar.

Sol. Distance travelled by Hamid = 9 km

Distance travelled by Akhtar = 12 km

Hamid's speed = 9 km/hr

Akhtar's speed = 12 km/hr

$$\text{ratio} = \frac{\text{Hamid's speed}}{\text{Akhtar's speed}} = \frac{9}{12} = \frac{3 \times 3}{3 \times 4} = \frac{3}{4} = 3:4$$

# DPM CLASSES

6th to 10th (Math's &amp; Science), 11th &amp; 12th (Physics, Chemistry, Math's)

∴ Direct and inverse proportion :-

Q. Fill in the following blanks :-

$$\frac{15}{18} = \frac{\square}{6} = \frac{10}{\square} = \frac{\square}{30}$$

Sol. (i)  $\frac{15}{18} = \frac{\square}{6}$  (cross multiplication ✕)

$$18 \times \square = 15 \times 6$$

$$\square = \frac{15 \times 6}{18}$$

$$\square = \frac{155}{3}$$

$$\boxed{\square = 5}$$



$$(ii) \frac{5}{6} = \frac{10}{\square}$$

$$5 \times \square = 10 \times 6$$

$$\square = \frac{10 \times 6}{5}$$

$$\square = 2 \times 6$$

$$\boxed{\square = 12}$$



$$(iii) \frac{10}{12} = \frac{\square}{30}$$

do itself

# DPM CLASSES

6th to 10th (Math's &amp; Science), 11th &amp; 12th (Physics, Chemistry, Math's)

∴ Direct and inverse proportion :-

Q. Find the ratio of the following :-

(a) 81 to 108 (b) 98 to 63

(c) 33 km to 121 km (d) 30 minutes to 45 minutes

Sol. (a) 81 to 108



$$\text{ratio} = \frac{81}{108} = \frac{9 \times 9}{9 \times 12} = \frac{9}{12} = \frac{3 \times 3}{3 \times 4} = \frac{3}{4}$$

(b) 98 to 63

$$\text{ratio} = \frac{98}{63} = \frac{7 \times 14}{7 \times 9} = \frac{14}{9} = 14:9$$

(c) 33 km to 121 km



$$\text{ratio} = \frac{33}{121} = \frac{11 \times 3}{11 \times 11} = \frac{3}{11} = 3:11$$

(d) 30 minutes to 45 minutes

$$\text{ratio} = \frac{30}{45} = \frac{5 \times 6}{5 \times 9} = \frac{6}{9} = \frac{2 \times 3}{3 \times 3} = \frac{2}{3} = 2:3$$





# DPM CLASSES

6th to 10th (Math's &amp; Science), 11th &amp; 12th (Physics, Chemistry, Math's)

∴ Direct and Inverse proportion :-

Q. Find the ratio of the following

(a) 30 minutes to 1.5 hours (b) 40cm to 1.5 m

(c) 55 paise to ₹ 1 (d) 500mL to 2 litres

Sol. [unit always same for find ratio]

(a) 30 minutes to 1.5 hours.

1 hour = 60 minutes

1.5 hours =  $60 \times 1.5 = 90.0 = 90$  minutes

$$\text{ratio} = \frac{30}{90} = \frac{3 \times 10}{9 \times 10} = \frac{3}{9} = \frac{3 \times 1}{3 \times 3} = \frac{1}{3} = 1:3$$

(b) 1 m = 100 cm

1.5 m =  $1.5 \times 100 = 150$  cm

do itself

(c) ₹ 1 = 100 paise

do itself

(d) 1 litre = 1000 mL

2 litre =  $1000 \times 2 = 2000$  mL

do itself

# DPM CLASSES

6th to 10th (Math's &amp; Science), 11th &amp; 12th (Physics, Chemistry, Math's)

∴ Direct and Inverse proportion :-

Q. In a year, Seema earn ₹ 1,50,000 and saves ₹ 50,000.

Find the ratio of

(a) money that Seema earns to the money she saves.

(b) money that she saves to the money she spends.

Sol. Money earned = ₹ 1,50,000

Money saved = ₹ 50,000

Money spent = 1,50,000 - 50,000  
= ₹ 1,00,000

$$(a) \text{ ratio} = \frac{\text{earn}}{\text{saves}} = \frac{1,50,000}{50,000} = \frac{15 \times 10000}{5 \times 10000} = \frac{15}{5}$$

$$= \frac{3 \times 5}{1 \times 5} = \frac{3}{1} = 3:1$$

$$(b) \text{ ratio} = \frac{\text{saves}}{\text{spent}} = \frac{50000}{100000} = \frac{5 \times 10000}{10 \times 10000} = \frac{5}{10}$$

$$= \frac{5 \times 1}{5 \times 2} = \frac{1}{2} = 1:2$$

Q. There are 102 teachers in a school of 3300 students.  
Find the ratio of the number of teachers to the number of students.

$$\text{Sol. Ratio} = \frac{\text{teachers}}{\text{students}} = \frac{102}{3300} = \frac{3 \times 34}{3 \times 1100} = \frac{34}{1100}$$

$$= \frac{2 \times 17}{2 \times 550} = \frac{17}{550} = 17:550$$

# DPM CLASSES

6th to 10th (Math's &amp; Science), 11th &amp; 12th (Physics, Chemistry, Math's)

∴ Direct and inverse proportion :-

Q. In a college, out of 4320 students, 2300 are girls, find the ratio of

- Number of girls to the total number of students.
- Number of boys to the number of girls.
- Number of boys to the total number of students.

Sol. Total number of students = 4320

Number of girls = 2300

Number of boys =  $4320 - 2300 = 2020$

$$(a) \text{ ratio} = \frac{\text{girls}}{\text{Total}} = \frac{2300}{4320} = \frac{230 \times 10}{432 \times 10} = \frac{230}{432}$$

$$= \frac{2 \times 115}{2 \times 216} = \frac{115}{216} = 115 : 216$$

$$(b) \text{ ratio} = \frac{\text{boys}}{\text{girls}} = \frac{2020}{2300} = \frac{202 \times 10}{230 \times 10} = \frac{202}{230}$$

$$= \frac{2 \times 101}{2 \times 115} = \frac{101}{115} = 101 : 115$$

$$(c) \text{ ratio} = \frac{\text{boys}}{\text{Total}} = \frac{2020}{4320} = \frac{202 \times 10}{432 \times 10} = \frac{202}{432}$$

$$= \frac{2 \times 101}{2 \times 216} = \frac{101}{216} = 101 : 216$$



# DPM CLASSES

6th to 10th (Math's &amp; Science), 11th &amp; 12th (Physics, Chemistry, Math's)

- Direct and inverse proportion! -

Q. Out of 1800 students in a school, 750 opted basketball, 800 opted cricket and remaining opted table Tennis, If a student can opt only one game, find the ratio of

(a) Number of students who opted basketball to the number of students who opted table tennis.

(b) Number of students who opted cricket to the number of students opting basketball.

(c) Number of students who opted basketball to the total number of students. [table tennis =  $1800 - 800 - 750 = 1800 - 1550 = 250$ ]

Sol. Total students = 1800, opted cricket = 800  
 opted basketball = 750, opted table tennis = 250

$$(a) \text{ Ratio} = \frac{\text{basketball}}{\text{Table Tennis}} = \frac{750}{250} = \frac{75 \times 10}{25 \times 10} = \frac{75}{25}$$

$$= \frac{5 \times 15}{5 \times 5} = \frac{15}{5} = \frac{3 \times 5}{1 \times 5} = \frac{3}{1}$$

$$(b) \text{ ratio} = \frac{\text{cricket}}{\text{basketball}} = \frac{800}{750} = \frac{80 \times 10}{75 \times 10} = \frac{80}{75}$$

$$= \frac{5 \times 16}{5 \times 15} = \frac{16}{15} = 16:15$$

$$(c) \text{ ratio} = \frac{\text{basket}}{\text{Total}} = \frac{750}{1800} = \frac{75 \times 10}{180 \times 10} = \frac{75}{180}$$

$$= \frac{5 \times 15}{5 \times 36} = \frac{15}{36} = \frac{3 \times 5}{3 \times 12} = \frac{5}{12}$$

# DPM CLASSES

6th to 10th (Math's &amp; Science), 11th &amp; 12th (Physics, Chemistry, Math's)

-! Direct and inverse proportion!-

Q. Cost of a dozen pens is ₹ 180 and cost of 8 ball pens is ₹ 56. Find the ratio of the cost of a pen to the cost of a ball pen. [1 dozen = 12]

Sol. Cost of a dozen pens = ₹ 180

$$\text{Cost of 1 pen} = \frac{180}{12} = ₹ 15$$

Cost of 8 ball pens = ₹ 56

$$\text{Cost of 1 ball pen} = \frac{56}{8} = ₹ 7$$



$$\text{Required ratio} = \frac{\text{Pen}}{\text{ball pen}} = \frac{15}{7}$$

Q. Divide 20 pens b/w Sheela and Sangeeta in the ratio of 3:2. [do itself]

Q.

|                         |    |                          |                          |
|-------------------------|----|--------------------------|--------------------------|
| Breadth of the hall (m) | 10 | <input type="checkbox"/> | 40                       |
| Length of the hall (m)  | 25 | 50                       | <input type="checkbox"/> |



Consider the statement: Ratio of breadth and length of a hall is 2:5. Complete the following table that shows some possible breadth and length of the hall.

Sol. [do itself.]





# DPM CLASSES

6th to 10th (Math's &amp; Science), 11th &amp; 12th (Physics, Chemistry, Math's)

∴ Direct and inverse proportion :-

Q. Mother wants to divide ₹ 36 b/w her daughters Shreya and Bhoomika in the ratio of their ages. If age of Shreya is 15 years and age of Bhoomika is 12 years, find how much Shreya and Bhoomika will get.

Sol. 
$$\text{Ratio} = \frac{\text{Shreya}}{\text{Bhoomika}} = \frac{15}{12} = \frac{3 \times 5}{3 \times 4} = \frac{5}{4}$$

Terms of 5:4 are 5 and 4

Sum of these terms = 5+4 = 9

Shreya's part =  $\frac{5}{9}$

Bhoomika's part =  $\frac{4}{9}$

Amount that Shreya will get =  $\frac{5}{9} \times 36$

=  $5 \times 4$

= ₹ 20

Amount that Bhoomika will get =  $\frac{4}{9} \times 36$

=  $4 \times 4$

= ₹ 16



# DPM CLASSES

6th to 10th (Math's &amp; Science), 11th &amp; 12th (Physics, Chemistry, Math's)

∴ Direct and inverse proportion :-

Q. present age of father is 42 years and that of his son is 14 years. Find the ratio of :

(a) present age of father to the present age of son.

(b) Age of the father to the age of son, when son was 12 years old.

(c) Age of father after 10 years to the age of son after 10 years.

(d) Age of father to the age of son when father was 30 years old.

Sol. (a) present age of father = 42 years

present age of son = 14 years



$$\text{Required ratio} = \frac{42}{14} = \frac{14 \times 3}{14 \times 1} = \frac{3}{1}$$

(b) Two years ago, the age of son was 12 years

the age of father =  $42 - 2 = 40$

$$\text{Required ratio} = \frac{40}{12} = \frac{4 \times 10}{4 \times 3} = \frac{10}{3}$$

(c) do itself

(d) 12 years ago, the father was 30 years old then

the age of son =  $14 - 12 = 2$  years

$$\text{Required ratio} = \frac{30}{2} = \frac{2 \times 15}{2 \times 1} = \frac{15}{1}$$

# DPM CLASSES

6th to 10th (Math's &amp; Science), 11th &amp; 12th (Physics, Chemistry, Math's)

∴ Direct and Inverse proportion :-

Proportion : If two ratio are equal, we say that they are in proportion and use the symbol " $::$ " or " $=$ " to equate the two ratios.

Q. Are the ratio 25g : 30g and 40kg : 48kg in proportion?



$$25g : 30g = \frac{25}{30} = \frac{5 \times 5}{5 \times 6} = \frac{5}{6} = 5:6$$

$$40kg : 48kg = \frac{40}{48} = \frac{8 \times 5}{8 \times 6} = \frac{5}{6} = 5:6$$

$$\text{So, } 25:30 = 40:48$$

Therefore, the ratio are in proportion.



Q. Are 30, 40, 45 and 60 in proportion?

$$\text{Sol. } 30:40 = \frac{30}{40} = \frac{3 \times 10}{4 \times 10} = \frac{3}{4} = 3:4$$

$$45:60 = \frac{45}{60} = \frac{15 \times 3}{15 \times 4} = \frac{3}{4} = 3:4$$

$$\text{Since, } 30:40 = 45:60$$

Therefore, 30, 40, 45, 60 are in proportion.





# DPM CLASSES

6th to 10th (Math's &amp; Science), 11th &amp; 12th (Physics, Chemistry, Math's)

-! Direct and inverse proportion!-

Q. Do the ratio 15cm to 2m and 10 sec to 3 minutes form a proportion?

Sol. [If find ratio or proportion then unit are same.]

$$2m = 2 \times 100 = 200 \text{ cm}$$

$$\text{ratio} = \frac{15\text{cm}}{2m} = \frac{15}{200} = \frac{3 \times 5}{40 \times 5} = \frac{3}{40} = 3:40$$

$$3 \text{ minutes} = 3 \times 60 = 180 \text{ sec}$$

$$\text{ratio} = \frac{10\text{sec}}{3 \text{ minutes}} = \frac{10}{180} = \frac{10 \times 1}{10 \times 18} = \frac{1}{18} = 1:18$$

Since  $3:40 \neq 1:18$ 

therefore, the given ratios do not form a proportion.

Q. Determine if the following are in proportion.

(a) 15, 45, 40, 120 (b) 33, 121, 9, 96 (c) 24, 28, 36, 48

(d) 32, 48, 70, 210 (e) 4, 6, 8, 12 (f) 33, 44, 75, 100

Sol. (f) 33, 44, 75, 100

$$33:44 :: 75:100$$

$$33:44 = \frac{33}{44} = \frac{11 \times 3}{11 \times 4} = \frac{3}{4} = 3:4$$

$$75:100 = \frac{75}{100} = \frac{25 \times 3}{25 \times 4} = \frac{3}{4} = 3:4$$

Therefore,  $33:44 = 75:100$  (do other it self)

Hence, these are in proportion



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Q. Write true (T) or False (F) against each of the following statements:

(a)  $16:24 :: 20:30$  (b)  $21:6 :: 35:10$  (c)  $12:18 :: 28:12$

(d)  $8:9 :: 24:27$  (e)  $5.2:3.9 :: 3:4$  (f)  $0.9:0.36 :: 10:4$

Sol. (e)  $5.2:3.9 :: 3:4$

$$\frac{5.2}{3.9} = \frac{52}{39} = \frac{13 \times 4}{13 \times 3} = \frac{4}{3} = 4:3$$

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

So,  $5.2:3.9 \neq 3:4$ , Hence False.

(f)  $0.9:0.36 :: 10:4$

$$0.9:0.36 = \frac{0.90}{0.36} = \frac{90}{36} = \frac{9 \times 10}{9 \times 4} = \frac{10}{4} = 10:4$$

So,  $0.9:0.36 = 10:4$ , Hence True.

[do other itself]

Q. Are the following statements true?

(a) 40 persons : 200 persons =  $\neq$  15 :  $\neq$  75

(b) 7.5 litres : 15 litres = 5 kg : 10 kg

(c) 99 kg : 45 kg =  $\neq$  44 :  $\neq$  20

(d) 32 m : 64 m = 6 sec : 12 sec

(e) 45 km : 60 km = 12 hours : 15 hours

# DPM CLASSES

6th to 10th (Math's &amp; Science), 11th &amp; 12th (Physics, Chemistry, Math's)

∴ Direct and Inverse proportion :-

Sol. (d)  $32m : 64m = 6sec : 12sec$

$$32m : 64m = \frac{32}{64} = \frac{16 \times 2}{16 \times 4} = \frac{2}{4} = \frac{2 \times 1}{2 \times 2} = \frac{1}{2}$$

$$6sec : 12sec = \frac{6}{12} = \frac{6 \times 1}{6 \times 2} = \frac{1}{2}$$

$$32m : 64m = 6sec : 12sec$$

Hence, the given statement is true



[other do itself]

Q. Determine if the following ratios form a proportion. Also, write the middle (inner) terms and extreme terms where the ratios form a proportion.

(a)  $25cm : 1m$  and  $₹40 : ₹60$

(b)  $39litres : 65litres$  and  $6bottles : 10bottles$

(c)  $2kg : 80kg$  and  $25g : 625g$

(d)  $200mL : 2.5litre$  and  $₹4 : ₹50$



Sol. (d)  $2.5litre = 2.5 \times 1000 = 2500mL$

$$200mL : 2.5litre = \frac{200}{2500} = \frac{2 \times 100}{25 \times 100} = \frac{2}{25}$$

$$₹4 : ₹50 = \frac{4}{50} = \frac{2 \times 2}{2 \times 25} = \frac{2}{25}$$

$200mL : 2.5litre = ₹4 : ₹50$ , ∴ These are in proportion

middle terms are  $2.5litres$  and  $₹4$

Extreme terms are  $200mL$  and  $₹50$



# DPM CLASSES

6th to 10th (Math's &amp; Science), 11th &amp; 12th (Physics, Chemistry, Math's)

∴ Direct and inverse proportion :-

Q. Unitary method :- The method in which first we find the value of one unit and then the value of required number of units is known as unitary method.

Q. If the cost of 6 cans of juice is ₹ 210, then what will be the cost of 4 cans of juice?

Sol.

$$\text{Cost of 6 cans of juice} = ₹ 210$$

$$\text{Cost of 1 can of juice} = \frac{210}{6} = ₹ 35$$

$$\text{Cost of 4 cans of juice} = 35 \times 4 = ₹ 140$$



Q. A motorbike travels 220 km in 5 litres of petrol. How much distance will it cover in 1.5 litres of petrol?

Sol.

$$\text{Travel in 5 litre of petrol} = 220 \text{ km}$$

$$\text{Travel in 1 litre of petrol} = \frac{220}{5} = 44 \text{ km}$$



$$\text{Travel in 1.5 litre of petrol} = 44 \times 1.5$$

$$= 66.0$$

$$= 66 \text{ km}$$

Q. If the cost of a dozen soaps is ₹ 153.60, what will be the cost of 15 such soaps?

Sol. [do itself]



# DPM CLASSES

6th to 10th (Math's &amp; Science), 11th &amp; 12th (Physics, Chemistry, Math's)

∴ Direct and inverse proportion :-

Q. cost of 105 Envelopes is ₹ 350. How many envelopes can be purchased for ₹ 100 ?

Sol. Purchase Envelopes in ₹ 350 = 105

$$\text{Purchase Envelopes in ₹ 1} = \frac{105}{350}$$

$$\text{Purchase Envelopes in ₹ 100} = \frac{105}{350} \times 100$$

$$= \frac{105 \times 100}{350}$$

$$= 15 \times 2$$

$$= 30$$

Q. If the cost of 7 m of cloth is ₹ 1470, find the cost of 5 m of cloth.

Sol. Cost of 7m = ₹ 1470

$$\text{Cost of 1m} = \frac{1470}{7} = ₹ 210$$

$$\text{Cost of 5m} = 210 \times 5$$

$$= ₹ 1050$$

# DPM CLASSES

6th to 10th (Math's &amp; Science), 11th &amp; 12th (Physics, Chemistry, Math's)

∴ Direct and inverse proportion :-

Q. A car travels 90 km in  $2\frac{1}{2}$  hours.

(a) How much time is required to cover 30 km with the same speed?

(b) Find the distance covered in 2 hours with the same speed.

Sol.  $2\frac{1}{2}$  hours =  $\frac{5}{2}$  hours =  $\frac{5}{2} \times \frac{30}{60} = 150$  minutes

(a) 90 km distance covered = 150 minutes

1 km distance covered =  $\frac{150}{90}$  minutes30 km distance covered in =  $\frac{150}{90} \times 30$   
=  $\frac{150}{3} = 50$  minutes

Thus, 30 km can be covered in 50 minutes

(b) Distance covered in  $2\frac{1}{2}$  hours = 90 kmDistance covered in  $\frac{5}{2}$  hours = 90 kmDistance covered in 1 hour =  $90 \times \frac{2}{5}$ Distance covered in 2 hours =  $90 \times \frac{2}{5} \times 2$   
= 72 km

Thus, in 2 hours, distance covered is 72 km

Q5.

# DPM CLASSES

6th to 10th (Math's &amp; Science), 11th &amp; 12th (Physics, Chemistry, Math's)

∴ Direct and inverse proportion :-

Q. Ekta earns ₹ 3000 in 10 days. How much will she earn in 30 days?

Sol. Ekta earned in 10 days = ₹ 3000

$$\text{Ekta earned in 1 day} = \frac{3000}{10} = ₹ 300$$

$$\text{Ekta earned in 30 days} = 300 \times 30 \\ = ₹ 9000$$



Q. If it has rained 276 mm in the last 3 days, how many cm of rain will fall in one full week (7 days)? Assume that the rain continues to fall at the same rate.

Sol. measure of rain in 3 days = 276 mm

$$\text{measure of rain in 1 day} = \frac{276}{3} = 92 \text{ mm}$$

$$\text{measure of rain in 7 days} = 92 \times 7 \\ = 644 \text{ mm}$$

$$= \frac{644}{10} \text{ cm}$$

$$= 64.4 \text{ cm}$$



Thus, rain in 1 full week is 64.4 cm



# DPM CLASSES

6th to 10th (Math's &amp; Science), 11th &amp; 12th (Physics, Chemistry, Math's)

-! Direct and inverse proportion :-

Q. cost of 5 kg of wheat is ₹ 91.50

(a) What will be the cost of 8 kg of wheat ?

(b) What quantity of wheat can be purchased in ₹ 183

Sol.

(a) cost of 5 kg of wheat = ₹ 91.50

$$\text{cost of 1 kg of wheat} = \frac{91.50}{5} = ₹ 18.30$$

$$\begin{aligned} \text{cost of 8 kg of wheat} &= 18.30 \times 8 \\ &= 146.40 \\ &= ₹ 146.40 \end{aligned}$$



(b) in ₹ 91.50 wheat purchased = 5 kg

$$\begin{aligned} \text{in ₹ 1 wheat purchased} &= \frac{5}{91.50} \\ &= \frac{1}{18.30} \text{ kg} \end{aligned}$$

$$\text{in ₹ 183 wheat purchased} = \frac{1}{18.30} \times 183$$



$$\begin{aligned} &= \frac{1}{18.30} \times 183 \times 100 \\ &= 10 \text{ kg} \end{aligned}$$

# DPM CLASSES

6th to 10th (Math's &amp; Science), 11th &amp; 12th (Physics, Chemistry, Math's)

∴ Direct and inverse proportion :-

Q. The temperature dropped 15 degree celsius in the last 30 days. If the rate of temperature drop remains the same, How many degrees will the temperature drop in the next ten days?

Sol. Temp. drop in 30 days =  $15^{\circ}\text{C}$

$$\text{Temp. drop in 1 day} = \frac{15}{30} = \left(\frac{1}{2}\right)^{\circ}\text{C}$$

$$\text{Temp. drop in 10 days} = \frac{1}{2} \times 10 = 5^{\circ}\text{C}$$

Q. Shaina pays ₹ 15000 as rent for 3 months. How much does she has to pay for a whole year, if the rent per month remains same?

Sol. Pay rent in 3 months = ₹ 15000

$$\text{Pay rent in 1 month} = ₹ \frac{15000}{3}$$

$$= ₹ 5000$$

$$\text{Pay rent in whole year (12 months)} = 5000 \times 12$$

$$= ₹ 60,000$$

# DPM CLASSES

6th to 10th (Math's &amp; Science), 11th &amp; 12th (Physics, Chemistry, Math's)

~! Direct and inverse proportion! -

Q. Cost of 4 dozen bananas is ₹ 180. How many bananas can be purchased for ₹ 90.

Sol.

$$\begin{aligned} \text{bananas in ₹ 180} &= 4 \text{ dozen} \\ &= 4 \times 12 \\ &= 48 \text{ bananas} \end{aligned}$$

$$\text{bananas in ₹ 1} = \frac{48}{180} \text{ bananas}$$

$$\text{bananas in ₹ 90} = \frac{48}{180} \times 90$$



$$= \frac{48}{2} = 24 \text{ bananas.}$$

Thus 24 bananas can be purchased for ₹ 90

Q. The weight of 72 books is 9 kg. What is the weight of 40 such books?

Sol.

$$\text{Weight of 72 books} = 9 \text{ kg}$$

$$\text{Weight of 1 book} = \frac{9}{72} \text{ kg}$$



$$= \frac{1}{8} \text{ kg}$$

$$\text{Weight of 40 books} = \frac{1}{8} \times 40$$

$$= 5 \text{ kg.}$$

Thus, 5 kg is the weight of 40 such books.



# DPM CLASSES

6th to 10th (Math's &amp; Science), 11th &amp; 12th (Physics, Chemistry, Math's)

∴ Direct and inverse proportion! -

Q. A truck requires 108 litres of diesel for covering a distance of 594 km. How much diesel will be required by the truck to cover a distance of 1650 km?

Sol. Diesel required for 594 km = 108 litres

Diesel required for 1 km =  $\frac{108}{594}$  litres

Diesel required for 1650 km =  $\frac{108}{594} \times 1650$

$$= \frac{108^2}{54} \times 150$$

$$= 2 \times 150$$

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



Q. Raju purchases 10 pens for ₹ 150 and Manish buys 7 pens for ₹ 84. Can you say who got the pens cheaper?

Sol. Raju purchased 10 pens = ₹ 150

Raju purchased 1 pen =  $\frac{150}{10} = ₹ 15$

Manish purchased 7 pens = ₹ 84

Manish purchased 1 pen =  $\frac{84}{7} = ₹ 12$



Therefore, Manish got the pens cheaper.

# DPM CLASSES

6th to 10th (Math's &amp; Science), 11th &amp; 12th (Physics, Chemistry, Math's)

∴ Direct and inverse proportion! -

Q. Anish made 42 runs in 6 overs and Anup made 63 runs in 7 overs. Who made more runs per over?

Sol.

$$\text{Runs made by anish in 6 overs} = 42$$

$$\text{Runs made by Anish in 1 over} = \frac{42}{6}$$

$$= 7$$

$$\text{Runs made by Anup in 7 overs} = 63$$

$$\text{Runs made by anup in 1 over} = \frac{63}{7}$$

$$= 9$$

clearly, Anup made more runs per over.

Q. Find the ratio of 3 km to 300 m

Sol. First convert both the distance to the same unit

$$3 \text{ km} = 3 \times 1000 = 3000 \text{ m}$$

$$\text{required ratio} = \frac{3 \text{ km}}{300 \text{ m}}$$

$$= \frac{3000 \text{ m}}{300 \text{ m}}$$

$$= \frac{3010}{3}$$

$$= \frac{10}{1}$$

$$= 10:1$$

# DPM CLASSES

6th to 10th (Math's &amp; Science), 11th &amp; 12th (Physics, Chemistry, Math's)

-! Direct and inverse proportion! -

Q. Are the ratio 1:2 and 1:3 equivalent?

$$\frac{1}{2} = \frac{1}{2} \times \frac{3}{3} = \frac{3}{6}$$

$$\frac{1}{3} = \frac{1}{3} \times \frac{2}{2} = \frac{2}{6}$$

$$\frac{3}{6} > \frac{2}{6}, \text{ which means } \frac{1}{2} < \frac{1}{3}$$



Therefore, the ratio 1:2 is not equivalent to the ratio 1:3

Q. Following is the performance of a cricket team in the matches it played:

| Year      | Wins | Losses |
|-----------|------|--------|
| Last year | 8    | 2      |
| This year | 4    | 2      |

in which year was the record better? How can you say so?

Sol. Last year =  $\frac{\text{Wins}}{\text{Losses}} = \frac{8}{2} = \frac{4}{1} = 4:1$

This year =  $\frac{\text{Wins}}{\text{Losses}} = \frac{4}{2} = \frac{2}{1} = 2:1$

$\frac{4}{1} > \frac{2}{1}$  Hence, we can say that the team performed better last year.





# DPM CLASSES

6th to 10th (Math's &amp; Science), 11th &amp; 12th (Physics, Chemistry, Math's)

∴ Direct and inverse proportion! -

Q. A map is given with a scale of 2 cm = 1000 km. What is the actual distance b/w the two places in kms, if the distance in the map is 2.5 cm?

Sol. Let distance = x km

$$1000 : x = 2 : 2.5$$

$$\frac{1000}{x} = \frac{2}{2.5}$$

$$2x = 1000 \times 2.5$$

$$x = \frac{1000 \times 2.5}{2}$$

$$= 500 \times 2.5$$

$$= 1250.0$$

$$x = 1250$$

Also use unitary method

$$1000 \text{ km} = 2 \text{ cm}$$

$$2 \text{ cm} = 1000 \text{ km}$$

$$1 \text{ cm} = \frac{1000}{2} \text{ km}$$

$$2.5 \text{ cm} = \frac{1000}{2} \times 2.5$$

$$= 1250 \text{ km.}$$

# DPM CLASSES

6th to 10th (Math's &amp; Science), 11th &amp; 12th (Physics, Chemistry, Math's)

∴ Direct and inverse proportion :-

Q. 6 bowls cost ₹ 90. What would be the cost of 10 such bowls ?

Sol. Cost of 6 bowls = ₹ 90  
 Cost of 1 bowl =  $\frac{90}{6}$  = ₹ 15  
 Cost of 10 bowls =  $15 \times 10$   
 = ₹ 150



Q. The Car that I own can go 150 km with 25 litres of petrol. How far can it go with 30 litres of petrol ?

Sol. Car go in 25 litres = 150 km  
 Car go in 1 litres =  $\frac{150}{25}$  = 6 km  
 Car go in 30 litres =  $6 \times 30$  = 180 km.



Q. Find the ratio of :

(a) ₹ 5 to 5 paise      (b) 15 kg to 210 g  
 (c) 9 m to 27 cm      (d) 30 days to 36 hours

Sol. (a) ₹ 1 = 100 paise

$$\text{Ratio} = \frac{₹ 5}{5 \text{ paise}} = \frac{500 \text{ paise}}{5 \text{ paise}} = \frac{100}{1} = 100:1$$

[Other do itself]

# DPM CLASSES

6th to 10th (Math's &amp; Science), 11th &amp; 12th (Physics, Chemistry, Math's)

-! Direct and inverse proportion :-

Q. in a Computer lab, there are 3 computers for every 6 students. How many computers will be needed for 24 students?

Sol. for every 6 students = 3 Computers  
 for every 1 student =  $\frac{3}{6}$  computers  
 for every 24 students =  $\frac{3}{6} \times 24$   
 $= 3 \times 4$   
 $= 12$  computers.



Thus 12 computers will be needed for 24 students.

Q. population of Rajasthan = 570 Lakhs and population of UP = 1660 Lakhs.

Area of Rajasthan = 3 Lakh/km<sup>2</sup>

Area of UP = 2 Lakh/km<sup>2</sup>



(i) How many people are there per km<sup>2</sup> in both these states?

(ii) Which state is less populated?

Sol. (i) population of Rajasthan in 3 km<sup>2</sup> Area = 570 Lakh  
 population of Rajasthan in 1 km<sup>2</sup> Area =  $\frac{570}{3} = 190$  Lakh  
 population of UP in 2 km<sup>2</sup> Area = 1660 Lakh  
 population of UP in 1 km<sup>2</sup> Area =  $\frac{1660}{2} = 830$  Lakh

(ii) Rajasthan is less populated.



# DPM CLASSES

6th to 10th (Math's &amp; Science), 11th &amp; 12th (Physics, Chemistry, Math's)

∴ Direct and inverse proportion! -

Q. The cost of 5 metres of a particular quality of cloth is ₹ 210. Tabulate the cost of 2, 4, 10 and 13 metres of cloth of the same type.

Sol.

|   |                |                |     |                |                |
|---|----------------|----------------|-----|----------------|----------------|
| x | 2              | 4              | 5   | 10             | 13             |
| y | y <sub>2</sub> | y <sub>3</sub> | 210 | y <sub>4</sub> | y <sub>5</sub> |

$$\frac{x_1}{y_1} = \frac{x_2}{y_2}$$

$$\frac{2}{y_2} = \frac{5}{210} \Rightarrow 5 \times y_2 = 2 \times 210 \Rightarrow y_2 = \frac{2 \times 210}{5} = 84$$

$$\frac{4}{y_3} = \frac{5}{210} \Rightarrow 5 \times y_3 = 4 \times 210 \Rightarrow y_3 = \frac{4 \times 210}{5} = 168$$

do other similar.



Q. An electric pole, 14 metres high, casts a shadow of 10 metres. Find the height of a tree that casts a shadow of 15 metres under similar conditions.

Sol.

|                                  |    |    |
|----------------------------------|----|----|
| height of the object (in metres) | 14 | x  |
| length of the shadow (in metres) | 10 | 15 |

$$\frac{x_1}{y_1} = \frac{x_2}{y_2}$$

$$\frac{x_1}{y_1} = \frac{x_2}{y_2}$$

$$\frac{14}{10} = \frac{x}{15}$$

$$10 \times x = 14 \times 15$$

$$x = \frac{14 \times 15}{10}$$

$$x = 7 \times 3 = 21$$



# DPM CLASSES

6th to 10th (Math's &amp; Science), 11th &amp; 12th (Physics, Chemistry, Math's)

∴ Direct and inverse proportion :-

Q. If the Weight of 12 sheets of thick paper is 40 grams.  
how many sheet of the same paper would weigh  $2\frac{1}{2}$  kg?

Sol.

|                         |    |      |
|-------------------------|----|------|
| Number of sheets        | 12 | x    |
| Weight of sheet (in gm) | 40 | 2500 |

$$\frac{12}{40} = \frac{x}{2500}$$

$$40 \times x = 12 \times 2500$$

$$x = \frac{12 \times 2500}{40}$$

$$= 3 \times 250$$

$$= 750$$

Thus, the required no. of sheets of paper = 750

Q. The scale of a map is given as 1:30000000, Two cities are 4 cm apart on the map. Find the actual distance between them.

Sol.

$$\frac{1}{30000000} = \frac{4}{y}$$

$$\frac{1}{3 \times 10^7} = \frac{4}{y}$$

$$y = 4 \times 3 \times 10^7$$

$$= 12 \times 10^7 \text{ cm}$$

$$= \frac{12 \times 10^7}{100000} = \frac{12 \times 10^7}{10^5} = 12 \times 10^2 = 1200 \text{ km}$$

$$1 \text{ km} = 1000 \text{ m}$$

$$1 \text{ km} = 1000 \times 100 \text{ cm}$$

$$1 \text{ km} = 100000 \text{ cm}$$



# DPM CLASSES

6th to 10th (Math's & Science), 11th & 12th (Physics, Chemistry, Math's)

∴ Direct and inverse proportion :-

Q. A train is moving at a uniform speed of 75 km/hr.

(i) How far will it travel in 20 minutes ?

(ii) Find the time required to cover a distance of 250 km.

Sol.

|                            |    |    |     |
|----------------------------|----|----|-----|
| Distance travelled (in km) | 75 | x  | 250 |
| Time taken (in minutes)    | 60 | 20 | y   |

$$(i) \frac{75}{60} = \frac{x}{20}$$

$$60 \times x = 75 \times 20$$

$$x = \frac{75 \times 20}{60}$$

$$[x = 25]$$

Therefore, the train will cover a distance of 25 km in 20 minutes

$$(ii) \frac{25}{20} = \frac{250}{y}$$

$$25 \times y = 250 \times 20$$

$$y = \frac{250 \times 20}{25}$$

$$[y = 200]$$

$$y = 3 \text{ hours } 20 \text{ minutes}$$

Therefore, 3 hours 20 minutes the time required to cover a distance of 250 km.

Q. Following are the car parking charges near a railway station upto

|          |       |
|----------|-------|
| 4 hours  | ₹ 60  |
| 8 hours  | ₹ 100 |
| 12 hours | ₹ 140 |
| 24 hours | ₹ 180 |

[do itself]

check if the parking charges are in direct proportion to the parking time



# DPM CLASSES

6th to 10th (Math's &amp; Science), 11th &amp; 12th (Physics, Chemistry, Math's)

∴ Direct and inverse proportion :-

Q. A mixture of paint is prepared by mixing 1 part of red pigment with 8 parts of base. in the following table, find the parts of base that needed to be added.

|                      |   |       |       |       |       |
|----------------------|---|-------|-------|-------|-------|
| Parts of red pigment | 1 | 4     | 7     | 12    | 20    |
| Part of base         | 8 | $y_2$ | $y_3$ | $y_4$ | $y_5$ |

Sol.

$$\frac{1}{8} = \frac{4}{y_2}$$

$$1 \times y_2 = 4 \times 8$$

$$y_2 = 32 \quad [\text{do other itself}]$$



Q. In above question, if 1 part of a red pigment requires 75 mL of base, how much red pigment should we mix with 1800 mL of base.

Sol.

$$\frac{1}{75} = \frac{x}{1800}$$

$$75 \times x = 1800 \times 1$$

$$x = \frac{1800 \times 1}{75}$$

$$x = \frac{72}{3} = 24$$



Thus, 24 red pigment should we mix with 1800 mL of base.

39.

# DPM CLASSES

6th to 10th (Math's &amp; Science), 11th &amp; 12th (Physics, Chemistry, Math's)

∴ Direct and inverse proportion :-

Q. A machine in a soft drinks factory fills 840 bottles in six hours. How many bottles will it fill in five hours?

Sol.

|                    |     |     |
|--------------------|-----|-----|
| Number of bottles  | 840 | $x$ |
| Time taken (in hr) | 6   | 5   |

$$\frac{840}{6} = \frac{x}{5}$$

$$6x = 5 \times 840$$

$$x = \frac{5 \times 840}{6}$$

$$x = 700$$

∴ Thus, 700 bottles will be filled in 5 hours.

Q. In a model of a ship, the mast is 9 cm high, while the mast of the actual ship is 12 m high. If the length of the ship is 28 m, how long is the model ship?

Sol.

|             |      |      |
|-------------|------|------|
| model ship  | 9 cm | $x$  |
| Actual ship | 12 m | 28 m |

$$\frac{9}{12} = \frac{x}{28}$$

$$12 \times x = 9 \times 28$$

$$x = \frac{9 \times 28}{12}$$

$$x = 3 \times 7 = 21 \text{ cm}$$

∴ Thus, the length of the model ship is 21 cm.



# DPM CLASSES

6th to 10th (Math's &amp; Science), 11th &amp; 12th (Physics, Chemistry, Math's)

∴ Direct and inverse proportion :-

Q. A photograph of bacteria enlarged 50,000 times attains a length of 5 cm as shown in the diagram. What is the actual length of the bacteria? If the photograph is enlarged 20,000 times only, what would be its enlarged length?

Sol.

|                            |       |   |       |
|----------------------------|-------|---|-------|
| length of bacteria (in cm) | 5     | x | y     |
| Bacteria was enlarged      | 50000 | 1 | 20000 |

$$\frac{5}{50000} = \frac{x}{1}$$

$$x \times 50000 = 5 \times 1$$

$$x = \frac{5}{50000}$$

$$x = \frac{1}{10000}$$

$$x = \frac{1}{10^4}$$

$$x = 10^{-4}$$

Hence, the actual length of bacteria is  $10^{-4}$  cm

$$\frac{5}{50000} = \frac{y}{20000}$$

$$y \times 50000 = 5 \times 20000$$

$$y = \frac{5 \times 20000}{50000}$$

$$y = 2$$

Hence, the enlarged length of bacteria is 2 cm

Q. Suppose 2 kg of sugar contains  $9 \times 10^6$  crystals. How many sugar crystals are there in (i) 5 kg of sugar? (ii) 1.2 kg of sugar? [do it self]



# DPM CLASSES

6th to 10th (Math's &amp; Science), 11th &amp; 12th (Physics, Chemistry, Math's)

∴ Direct and Inverse proportion :-

Q. Rashmi has a road map with a scale of 1 cm representing 18 km. She drives on a road for 72 km. What would be her distance covered in the map?

Sol.

|                                   |    |    |
|-----------------------------------|----|----|
| Distance covered on road (in km)  | 18 | 72 |
| Distance represent on map (in cm) | 1  | x  |

$$\frac{18}{1} = \frac{72}{x}$$

$$18 \times x = 72 \times 1$$

$$x = \frac{72 \times 1}{18}$$

$$x = 4$$

Hence, the distance represented on the map is 4 cm.

Q. A loaded truck travels 14 km in 25 minutes. If the speed remains the same, how far can it travel in 3 hours?

Sol.

|                            |    |     |
|----------------------------|----|-----|
| Distance travelled (in km) | 14 | x   |
| Time (in minutes)          | 25 | 300 |

$$\frac{14}{25} = \frac{x}{300}$$

$$25 \times x = 14 \times 300$$

$$x = \frac{14 \times 300}{25}$$

$$x = 14 \times 12$$

$$x = 168 \quad \text{Hence, the distance travelled is 168 km.}$$

42.

# DPM CLASSES

6th to 10th (Math's & Science), 11th & 12th (Physics, Chemistry, Math's)

∴ Direct and inverse proportion :-

Q. A 5m 60cm high vertical pole casts a shadow 3m 20cm long. Find at the same time (i) the length of the shadow cast by another pole 10m 50cm high (ii) the height of a pole which casts a shadow 5m long.

Sol. (i)

|                         |      |       |   |
|-------------------------|------|-------|---|
| Height of pole (in m)   | 5.60 | 10.50 | y |
| length of shadow (in m) | 3.20 | x     | 5 |

$$\frac{5.60}{3.20} = \frac{10.50}{x}$$

$$5.60 \times x = 10.50 \times 3.20$$

$$x = \frac{10.50 \times 3.20}{5.60}$$

$$x = \frac{105 \times 32}{560} = \frac{56}{7} = 8$$

$$x = 15 \times 0.4$$

$$x = 6.0$$

$$x = 6$$

Therefore, the length of shadow will be 6m

$$\frac{5.60}{3.20} = \frac{y}{5}$$

$$\frac{56}{32} = \frac{y}{5}$$

$$\frac{7}{4} = \frac{y}{5}$$

$$4 \times y = 7 \times 5$$

$$y = \frac{7 \times 5}{4}$$

$$y = \frac{35}{4} = 8.75$$

Therefore, the height of pole is 8.75m or 8m 75cm





# DPM CLASSES

6th to 10th (Math's &amp; Science), 11th &amp; 12th (Physics, Chemistry, Math's)

∴ Direct and inverse proportion :-

Q. 6 pipes are required to fill a tank in 1 hour 20 minutes. How long will it take if only 5 pipes of the same type are used?

Sol.

|                |    |     |
|----------------|----|-----|
| No. of pipes   | 6  | 5   |
| Time (in mins) | 80 | $x$ |

inverse proportion  
 $x_1 y_1 = x_2 y_2$

$$6 \times 80 = 5 \times x$$

$$\frac{6 \times 80}{5} = x$$

$$6 \times 16 = x$$

$$96 = x$$



Thus, time taken to fill the tank by 5 pipes is 96 minutes or 1 hour 36 minutes

Q. There are 100 students in a hostel. food provision for them is for 20 days. How long will these provisions last, if 25 more students join the group?

Sol.

|                 |     |     |
|-----------------|-----|-----|
| No. of students | 100 | 125 |
| No. of days     | 20  | $y$ |

inverse proportion  
 $x_1 y_1 = x_2 y_2$

$$100 \times 20 = 125 \times y$$

$$\frac{100 \times 20}{125} = y$$

$$4 \times 4 = y$$

$$16 = y$$

Thus, the provisions will last for 16 days.





# DPM CLASSES

6th to 10th (Math's &amp; Science), 11th &amp; 12th (Physics, Chemistry, Math's)

-! Direct and Inverse proportion!-

Q. If a box of Sweets is divided among 24 children. They will get 5 sweets each. How many would each get, if the number of the children is reduced by 4?

Sol.

|                 |    |     |
|-----------------|----|-----|
| No. of students | 24 | 20  |
| No. of Sweets   | 5  | $x$ |

Inverse proportion  
 $x_1 y_1 = x_2 y_2$ 

$$24 \times 5 = 20 \times x$$

$$\frac{24 \times 5}{20} = x$$

$$6 = x$$

Hence, each student will get 6 sweets

Q. A farmer has enough food to feed 20 animals in his cattle for 6 days. How long would the food last if there were 10 more animals in his cattle?

Sol.

|                |    |                |
|----------------|----|----------------|
| No. of animals | 20 | $20 + 10 = 30$ |
| No. of days    | 6  | $x$            |

$$20 \times 6 = 30 \times x$$

$$\frac{20 \times 6}{30} = x$$

$$4 = x$$

$$4 = x$$

Thus, the food will last for 4 days.

# DPM CLASSES

6th to 10th (Math's &amp; Science), 11th &amp; 12th (Physics, Chemistry, Math's)

∴ Direct and inverse proportion :-

- Q. A contractor estimates that 3 persons could rewire Jaswinder's house in 4 days. If he uses 4 persons instead of three. How long should they take to complete the job?

Sol.

|                |   |     |
|----------------|---|-----|
| No. of days    | 4 | $x$ |
| No. of persons | 3 | 4   |



$$4 \times 3 = x \times 4$$

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

$$3 = x$$

Thus, The number of days required to complete the job is 3 days.

- Q. A batch of bottles were packed in 25 boxes with 12 bottles in each box. If the same batch is packed using 20 bottles in each box. How many boxes would be filled?

Sol.

|                   |    |     |
|-------------------|----|-----|
| Number of bottles | 12 | 20  |
| Number of box     | 25 | $x$ |

$$12 \times 25 = 20 \times x$$

$$\frac{12 \times 25}{20} = x$$

$$15 = x$$

$$15 = x$$

Hence, the no. of boxes required to pack these bottles is 15





# DPM CLASSES

6th to 10th (Math's &amp; Science), 11th &amp; 12th (Physics, Chemistry, Math's)

∴ Direct and inverse proportion :-

- ③. A factory requires 42 machines to produce a given number of articles in 63 days. How many machines would be required to produce the same no. of articles in 54 days?

Sol.

|                 |    |     |
|-----------------|----|-----|
| No. of machines | 42 | $x$ |
| No. of days     | 63 | 54  |

$$42 \times 63 = x \times 54$$

$$\frac{42 \times 63}{54} = x$$

$$7 \times 7 = x$$

$$49 = x$$

Therefore, required no. of machines are 49.

- ④. A car takes 2 hours to reach a destination by travelling at the speed of 60 km/h. How long will it take when the car travels at the speed of 80 km/h?

Sol.

|                     |    |     |
|---------------------|----|-----|
| Speed (in km/hr)    | 60 | 80  |
| Time taken (in hrs) | 2  | $x$ |

$$60 \times 2 = 80 \times x$$

$$\frac{60 \times 2}{80} = x$$

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

$$1\frac{1}{2} = x$$

Thus, the required time is  $1\frac{1}{2}$  hours.



# DPM CLASSES

6th to 10th (Math's &amp; Science), 11th &amp; 12th (Physics, Chemistry, Math's)

∴ Direct and inverse proportion :-

Q. Two persons could fit new windows in a house in 3 days.

(i) one of the person fell ill before the work started. How long would the job take now?

(ii) How many persons would be needed to fit the windows in one day?

Sol.

|                |   |     |   |
|----------------|---|-----|---|
| No. of persons | 2 | 1   | 4 |
| No. of days    | 3 | $x$ | 1 |



(i)  $2 \times 3 = 1 \times x$

$$6 = x$$

Thus, the no. of days are 6

(ii)  $2 \times 3 = y \times 1$

$$6 = y$$

Thus, required no. of persons are 6



Q. A school has 8 periods a day each of 45 minutes duration. How long would each period be, if the school has 9 periods a day, assuming the number of school hours to be the same

Sol.

|                                      |    |     |
|--------------------------------------|----|-----|
| Duration of each period (in minutes) | 45 | $x$ |
| No. of periods                       | 8  | 9   |

(do it self)