NOTES

CLASS 8
MATHS

aglasem.com
Study Material

DOWNLOAD PDF

DIRECT AND INVERSE PROPORTIONS

1. **DIRECT PROPORTION**:- Two quantities x and y are said to be in **direct proportion** if they increase (decrease) together in such a manner that the ratio of their corresponding values remains constant.
That is, $\frac{x}{y} = k$, where k is a positive number, if x and y are in direct proportion or vary directly.
In case of direct proportion, if y_1 and y_2 are the values of y corresponding to the values x_1 and x_2 of x respectively, then $\frac{x_1}{y_1} = \frac{x_2}{y_2}$.

Real-life examples of direct proportion are:

1. The weight of a person can be related to the clothing size that they might use.
2. The number of construction workers that are working can be related to how much time it takes to finish a project.
3. The number of bananas can be related to the number of boxes needed to store them.

2. **Inverse proportion**

Two quantities x and y are said to be in inverse proportion if an increase in x causes a proportional decrease in y and vice-versa, in such a manner that the product of their corresponding values remains constant.
That is, xy = k where k is a positive number, if x and y are in inverse proportion. In this case, if y_1, y_2 are the values of y corresponding to the values x_1, x_2 of x respectively,
then $x_1 y_1 = x_2 y_2$ Or $\frac{x_1}{x_2} = \frac{y_1}{y_2}$.

Real-life examples of inverse proportion are:

1. As the speed of the car increases the time taken to cover a certain distance decreases.
2. More people in the room means less space in the room.
3. The number of people doing something and the time it takes to do it. As the number of people increases, the time it takes to finish decreases.

II. Examples Questions:-

1. If the weight of 12 sheets of thick paper is 40 grams, how many sheets of the same paper would weigh 2500 grams?
A. 750 B. 800 C. 850 D. 950

Ans: option A 750

2.The scale of a map is given as 1:300. Two cities are 4 km apart on the map. The actual distance between them is:
A. 1000 km B. 1100 km C. 1200 km D. 1300 km

Ans: option C 1200 km

3.If 12 workers can build a wall in 50 hours, how many workers will be required to do the same work in 40 hours?
A. 10 B. 13 C. 14 D. 15

Ans: option D 15 workers

4. A man walks 20 km in 5 hours. How much time will it take for him to walk 32 km?
A. 3 hours B. 4 hours C. 6 hours D. 8 hours

Ans: option D 8 hours

5.Case based question:-

The students of Anju's class sold posters to raise money. Anju wanted to create a ratio for finding the amount of money her class would make for different numbers of posters sold. She knew they could raise Rs 250 for every 60 posters sold.
(a) How much money would Anju's class make for selling 102 posters?
(b) Could Anju's class raise exactly Rs 2,000? If so, how many posters would they need to sell? If not, why?
(c) suppose her classmates sell 40 posters for Rs. 400, how much money would they make for selling 25 posters?



Ans: (a) On selling 1 poster anju's class make =Rs $\frac{250}{60}$
For selling 102 posters, money raised = $\frac{250}{60}$ x 102 = Rs. 425

(b) To raise 2000 they need to sell = $\frac{60}{250}$ x 2000 = 480 posters

(c) for one poster, money raised = $\frac{400}{40}$
Money raised for 25 posters = $\frac{400}{40}$ x 25 = 250 posters

Short answer type question:

6. A packet of sweets was distributed among 10 children and each of them received 4 sweets. If it is distributed among 8 children, how many sweets will each child get?
Ans:

No. of children	10	8
No. of sweets received by each child	4	y

Since, it is inverse proportion $x_1 y_1 = x_2 y_2$

$\Rightarrow 10 \times 4 = 8 \times y$

$\Rightarrow y = 5$ sweets

7. At a particular time, the length of the shadow of Qutub Minar whose height is 72 m is 80 m. What will be the height of an electric pole, the length of whose shadow at the same time is 1000 cm?

Ans: Length of Qutub Minar =72 m

At a particular time its shadow =80 m

Shadow of the electric pole has a length of =1000 cm=10 m

Length of electric pole = $\frac{72}{80} \times 10 = 9$ m

8. 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?

Ans: Let the number of days be x

Total number of animals = 20 + 10 = 30

No. of animals	20	6
No. of days	30	y

Here the number of animals and the number of days are in inverse proportion.

$$\frac{20}{30} = \frac{y}{6}$$

$y = \frac{20*6}{30} = 4$

Hence the food will last 4 days.

Long answer type questions:

9. By travelling at a speed of 48 kilometres per hour, a car can finish a certain journey in 10 hours. To cover the same distance in 8 hours, what should be the speed of the car?

Ans: Let x km/hr be the speed. Then

Time (in hours)	10	8
Speed (in km/hr)	48	y

By inverse variation, $x_1 y_1 = x_2 y_2$

$\Rightarrow 10 \times 48 = 8 \times y$

$\Rightarrow y = 480 / 8 = 60$

speed required = 60 km/hr.

10. Rehman is making a wheel using spokes. He wants to fix equal spokes so that the angles between any pair of consecutive spokes are equal. Help him by completing the following table.



Number of spokes	4	6	8	10
Angle between a pair of consecutive spokes	90°	60°	….	…..

(i) Are the number of spokes and the angles formed between the pairs of consecutive spokes inversely proportional?
(ii) Find out the angle between a pair of consecutive spokes on a wheel with 15 spokes.
(iii) If the angle between a pair of consecutive spokes is 40 degrees, how many spokes would be needed?

Sol:- Here, we can see that the number of spokes is inversely proportional to the angle between the pair of consecutive spokes as the number of spokes increases and the angle between the pair of consecutive spokes decreases.
And we know that the centre of a circle is 360°.
Therefore, When the number of spokes is 8, then the angle between the pair of consecutive spokes = 360°/8 = 45°

And when the number of spokes is 10, then the angle between a pair of consecutive spokes = 360°/10 = 36°

And when the number of spokes is 12, then the angle between a pair of consecutive spokes = 360°/12 = 30°

Number of spokes	4	6	8	10
Angle between a pair of consecutive spokes	90°	60°	45°	36°

(i) Yes. The number of spokes is inversely proportional to the angle between a pair of consecutive spokes.
(ii) When the number of spokes is 15, the angle between the pair of consecutive spokes = 360°/15° = 24°
(iii) Number of spokes needed if the angle between the pair of consecutive spokes is 40° = 360°/40° = 9

III. Questions for Practice:

MCQ

1. y is directly proportional to x, and y = 24 when x = 4. What is the value of y when x = 3?

a. 18 b. 20 c. 23 d. 43

2. The circumference (C cm) of a circle is directly proportional to its diameter (d cm). The circumference of a circle of diameter 3.5 cm is 11 cm What is the circumference of a circle of diameter 4.2 cm?

a. 9.17 b. 11.7 c. 14 d. 13.2

3. Which of the following vary inversely with each other?

a. speed and distance covered. b. distance covered and taxi fare.

c. distance travelled and time taken. d. speed and time taken.

4. 100 persons had food provision for 24 days. If 20 persons left the place, the provision will last for how many days?

a. 30 b. 120 c. 40 d. $\frac{96}{5}$

5. Five people complete 10 jobs in 20 minutes. How many minutes will 30 people take to complete 30 similar jobs?

a. 40 b. 180 c. 10 d. 360



6. A boy runs 1 km in 5 minutes. How long will it take to run 600 m?

a. 2 minutes b. 3 minutes c. 4 minutes d. 6 minutes

7. 8 grams of sandalwood cost ₹ 400. What will 54 gram sandalwood cost?

a. ₹ 200 b. ₹ 100 c. ₹ 2700 d. ₹ 800

8. If x and y vary inversely with respect to each other such that x = 15 when y = 6. Find the value of x when y = 15.

a. 2 b. 4 c. 5 d. 6

9. Both x and y are in direct proportion, then $\frac{1}{x}$ *and* $\frac{1}{y}$ are in

a. in indirect proportion.

b. in inverse proportion.

c. neither in direct nor in inverse proportion.

d. sometimes in direct and sometimes in inverse proportion.

10. If 8 men can do a piece of work in 20 days, in how many days could 20 men do the same work?

a. 4 days b. 6 days c. 8 days d. 10 days

SHORT ANSWER TYPE QUESTION:

11. A car travels 14 km in 25 minutes. Find out how far the car can travel in 5 hours if the speed remains the same?

12. If 15 workers can finish a task in 42 hours, calculate the number of workers required to complete the same task in 30 hours.

13. If 3 kg of sugar contains 9×10^8 crystals. How many sugar crystals are there in 4 kg of sugar?

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

15. Mohit deposited a sum of ₹ 12000 in a Bank at a certain rate of interest for 2 years and earned an interest of ₹ 900. How much interest would be earned for a deposit of ₹ 15000 for the same period and at the same rate of interest?
(ANS 5: the required amount of interest = ₹ 1125)

16. A garrison of 120 men has provisions for 30 days. At the end of 5 days, 5 more men joined them. How many days can they sustain on the remaining provision?

17. If two cardboard boxes occupy 500 cubic centimetres space, then how much space is required to keep 200 such boxes?



18. Find the value of x and y if x : y = 2 : 3 and 2 : x = 1 : 2.

19. Ranjith has enough money to buy 75 machines worth Rs. 200 each. How many machines can he buy if he gets a discount of Rs.50 on each machine?

20. A worker is paid Rs. 420 for 2 days work. If his total income of the month is Rs. 1890, For how many days did he work?

LONG ANSWER TYPE QUESTIONS

21. A water tanker can finish a certain journey in 10 hours at the speed of 40 km/hr. By how much should its speed be increased so that it may take only 8 hours to cover the same distance?

22. The amount of extension in the length of the elastic string directly varies as the weight hangs on it. If a weight of 500 gm produces an extension of 3 cm, then what weight would produce an extension of 36 cm. Write the solution in Kg.

23. 1200 children in a hostel had enough food for 28 days. After 4 days, some children were shifted to another hostel. As a result, the food now lasted for 32 days. How many students were shifted?

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

25. In a Television game show, total prize money of Rs. 1,00,000 has to be divided equally among the winners. Complete the below table and find out whether the prize money given to one individual winner is directly or inversely proportional to the total number of winners:

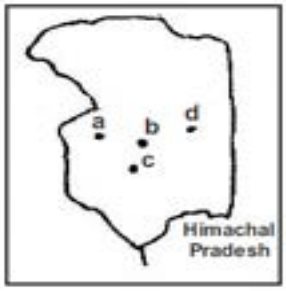
No. of winners	1	2	4	5	8	10	20
Prize for each winner (in rupees)	1,00,000	50,000	…….	……..	……	…….	……

26. Two people could fit new windows in a house in 3 days.
(i) One of the persons fell ill before the work started. How long would the job take now?
(ii) How many people would be needed to fit the windows in one day?

CASE BASED QUESTIONS :-

27. Many schools have a recommended students-teacher ratio as 35:1. Next year, the school expects an increase in enrolment by 280 students.
(i) How many new teachers will they have to appoint to maintain the students-teacher ratio?
(ii) Board members of school XYZ decided to keep the ratio as 30:1. Total how many teachers will be appointed if the strength of the school is 1800?
(iii) A school has 15 teachers working. How many more teachers will be needed if the total strength of school is 735 and they want to maintain a ratio of 35:1?

28. Jagmeet has a road map with a scale of 1 cm = 20 km.
(i) He drives on a road for 72 km.What would be his distance covered in the map?
(ii)Suppose the distance between two places on the map is 3.5cm, find the exact distance between the two places.
(iii) Jagmeet went from place a to b to meet his parents and then b to c to join his office.If the distance between a and b is 4cm and the distance between b and c is 2 cm on the map, total how much distance is covered by Jagmeet.



IV. ANSWERS

1. a
2. d
3. d
4. a
5. c
6. b
7. c
8. d
9. b
10. c
11. 168km
12. 21 workers
13. 1.2×10^9 crystals
14.

Length of cloth (m)	5	2	4	10	13
Cost (in Rs.)	210	84	168	420	546

15.Rs.1125
16. 24 days
17. 50,000 cm^3
18. y=6
19. 100
20. 9 days
21. 10km/h
22. 6 kg
23. 300 students
24.

Length of pole (m)	5.6	10.5	8.75
Length of shadow (m)	3.2	6	5

25.

No. of winners	1	2	4	5	8	10	20
Prize for each winner (in rupees)	1,00,000	50,000	25000	20000	12500	10000	5000

26. (i) 6 days (ii) 6 persons
27. (i) 8 teachers (ii) 60 teachers (iii) 6 teachers
28. (i) 3.6 cm (ii) 70 km (iii) 120 k

TEST 1 (MM:20)

Section A (MCQ 1 MARK EACH)

1. If 15 oranges cost Rs. 70, what do 39 oranges cost?
(a) Rs. 180 (b) Rs. 182 (c) Rs. 190 (d) none of these

2. If 22.5 m of a uniform iron rod weighs 85.5 kg, what will be the length of 22.8 kg of the same rod?
(a) 5 m (b) 6 m (c) 7 m (d) none of these

3. Travelling 900 km by rail costs Rs. 280. What would be the fare for a journey of 360 km when a person travels by the same class?
(a) Rs. 118 (b) Rs. 112 (c) Rs. 119 (d) none of these

4. If 25 metres of cloth costs Rs. 1575, how many metres of it can be bought for Rs. 2016?
(a) 30 m (b) 32 m (c) 36 m (d) none of these

SECTION B (2 MARKS EACH)

5. A machine in a soft drink factory fills 840 bottles in six hours. How many bottles will it fill in five hours? (the machine will fill up 700 bottles in 5 hours.)

6.A loaded truck travels 14 km in 25 minutes. If the speed remains the same, how far can it travel in 5 hours?



7. 3 lambs finish eating turnips in 8 days. How many days will it take for 2 lambs to finish?

SECTION C (3 MARKS EACH)

8. Suppose 2 kg of sugar contains 9×10^6 crystals. How many sugar crystals are there in
(i) 5 kg of sugar? (2.25×10^7 crystals)
(ii) 1.2 kg of sugar? (5.4×10^6)

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

SECTION D (4 MARKS)

10. If 25 metres of cloth costs Rs 337.50, then
(i) What will be the cost of 40 metres of the same type of cloth?
(ii) What will be the length of the cloth bought for Rs 810?

TEST 2 (MM:30)

Section A (MCQ 1 MARK EACH)

1. If the cost of 9 toys is Rs. 333, find the cost of 16 such toys.
(a) Rs. 594 (b) Rs. 596 (c) Rs. 592 (d) none of these

2. A car can cover a distance of 522 km on 36 litres of petrol. How far can it travel on 14 litres of petrol?
(a) 230 km (b) 232 km (c) 203 km (d) none of these

3. A train covers a distance of 51 km in 45 minutes. How long will it take to cover 221 km?
(a) 3 hours (b) 3 hrs 15 min (c) 3 hrs 30 min (d) 2 hrs 45 min

4. If the thickness of a pile of 16 cardboards is 44mm, how many cardboards will be there in a pile which is 71.5 cm thick?
(a) 270 (b) 260 (c) 250 (d) none of these

5. In a hospital, the monthly consumption of milk of 60 patients is 1350 litres. How many patients can be accommodated in the hospital if the monthly ration of milk is raised to 1710 litres, assuming that the quota per head remains the same?
(a) 75 (b) 76 (c) 77 (d) none of these



6. Shreya cycles to her school at an average speed of 12 km/hr. It takes her 20 minutes to reach the school. If she wants to reach her school in 15 minutes, what should be her average speed?
(a) 15 km/hr (b) 16 km/hr (c) 18 km/hr (d) none of these

SECTION B (2 MARKS EACH)

7. A photograph of a bacteria enlarged 50,000 times attains a length of 5 cm. What is the actual length of the bacteria?

8. A car travels 432 km on 48 litres of petrol. How far would it travel on 20 litres of petrol?

9. If 40 metres of a cloth costs Rs. 1940, how many metres can be bought for Rs. 727.50?

10. If x and y vary inversely as each other and x = 10 when y = 6. Find y when x = 15.

SECTION C (3 MARKS EACH)

11. 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?

12. A train is moving at a uniform speed of 75 km/hour.
(i) How far will it travel in 20 minutes?

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

13. Six pumps working together empty a tank in 28 minutes. How long will it take to empty the tank if 4 such pumps are working together?

14. 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 number of articles in 54 days?
(49 machines are required for 54 days.)

SECTION D (4 MARKS)

15. Ravi starts for his school at 8:20 a.m. on his bicycle. If he travels at a speed of 10 km/h, then he reaches his school late by 8 minutes but on travelling at 16 km/h he reaches the school 10 minutes early. At what time does school start?



Study Materials

aglasem.com

Model Papers

Sample Papers

Half Yearly Sample Papers

Important Resources

Periodic Table

Writing Skills / Formats

Maps of India / World

Notes

- [ ] Class 6 Notes
- [ ] Class 7 Notes
- [ ] Class 8 Notes
- [ ] Class 9 Notes
- [ ] Class 10 Notes
- [ ] Class 11 Notes
- [ ] Class 12 Notes

Books and Solutions

NCERT Books

NCERT Book Solutions

HC Verma Chapter Wise Solutions

RD Sharma Solutions

CGBSE Solutions