

Direct and Inverse Proportions

Mathematics · Class 8 · Topic-wise Practice Worksheet

TIME 45 minutes	QUESTIONS 18	TOTAL MARKS 24	MAX. SCORE ___ / 24
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Name: _____ Class/Sec: _____ Date: _____

INSTRUCTIONS

- There are **18 questions** in this worksheet. All questions are compulsory.
- Each question has four options (A), (B), (C) and (D). Exactly **one** option is correct.
- Questions 1–15 carry **1 mark** each. Questions 16–18 (Achievers Section) carry **3 marks** each.
- There is no negative marking. Use of a calculator is **not** allowed.
- Rough work may be done on the blank space at the side of each page.

Section A — Mathematical Reasoning

Q1–Q8 · 1 mark each

- If x and y are in **direct** proportion, then _____ stays constant.

(A) $\frac{x}{y}$

(B) $x \times y$

(C) $x + y$

(D) $x - y$
- If x and y are in **inverse** proportion, then _____ stays constant.

(A) $\frac{x}{y}$

(B) $x + y$

(C) $x \times y$

(D) $\frac{y}{x}$
- If 5 pens cost ₹75, then 8 such pens will cost _____.

(A) ₹100

(B) ₹110

(C) ₹135

(D) ₹120
- The number of workers on a job and the time taken to finish it are in _____ proportion.

(A) Direct

(B) Inverse

(C) Neither

(D) Sometimes direct, sometimes inverse
- For a fixed distance, speed and time taken are in _____ proportion.

(A) Direct

(B) Inverse

(C) Neither

(D) Equal
- A car travels 90 km in 3 hours. At the same speed, how far will it travel in 5 hours?

(A) 150 km

(B) 135 km

(C) 120 km

(D) 180 km
- If 6 taps can fill a tank in 8 hours, how long will 4 taps of the same kind take?

(A) 5 hours

(B) 10 hours

(C) 12 hours

(D) 16 hours

8. On a map, 1 cm represents 5 km. A road measuring 7 cm on the map is actually _____ long.

(A) 12 km

(B) 70 km

(C) 50 km

(D) 35 km

Section B — Everyday Mathematics and Reasoning

Q9–Q15 · 1 mark each

9. The table shows two quantities in **direct** proportion. Find the value of p.

x	4	6	10	p
y	10	15	25	40

Table 9.1 — Two quantities in direct proportion

(A) 12

(B) 16

(C) 18

(D) 20

10. 15 workers can build a wall in 48 hours. How long would 20 workers of the same ability take?

(A) 36 hours

(B) 30 hours

(C) 40 hours

(D) 64 hours

11. A vertical pole 6 m high casts a shadow 4 m long. At the same moment, a tower casts a shadow 28 m long. How tall is the tower?

(A) 18 m

(B) 24 m

(C) 42 m

(D) 48 m

12. A camp has enough food for 40 people for 30 days. If 50 people come instead, how long will the same food last?

(A) 20 days

(B) 37 days

(C) 25 days

(D) 24 days

13. A recipe uses 3 cups of flour to make 12 biscuits. How much flour is needed for 20 biscuits?

(A) 5 cups

(B) $4\frac{1}{2}$ cups

(C) 4 cups

(D) 6 cups

14. A car covers 240 km on 16 litres of petrol. How much petrol is needed for a 375 km journey?

(A) 20 litres

(B) 22 litres

(C) 25 litres

(D) 30 litres

15. Which of the following pairs of quantities is **not** in direct proportion?

(A) The number of books bought and the total cost

(B) The side of a square and its perimeter

(C) The number of hours worked and the wages earned at a fixed hourly rate

(D) The speed of a car and the time taken to cover a fixed distance

Achievers Section

Q16–Q18 · 3 marks each

16. Consider the following statements.

(i) If two quantities are in direct proportion, their graph is a straight line passing through the origin.

(ii) The area of a circle is in direct proportion to its radius.

(iii) If x and y are in inverse proportion, then doubling x halves y.

Which of the statements is/are correct?

(A) (i) and (ii) only

(B) (i) and (iii) only

(C) (ii) and (iii) only

(D) All three

17. 6 pipes can fill a tank in 1 hour 20 minutes. How long will 5 such pipes take to fill it?
- (A) 1 hour 36 minutes (B) 1 hour 30 minutes
(C) 1 hour 40 minutes (D) 2 hours
18. A contractor has enough food for 100 workers for 20 days. After 5 days, 25 more workers join. For how many **more** days will the remaining food last?
- (A) 10 days (B) 12 days
(C) 15 days (D) 16 days

Answer Key

1	A	2	C	3	D	4	B	5	B
6	A	7	C	8	D	9	B	10	A
11	C	12	D	13	A	14	C	15	D
16	B	17	A	18	B				

Solutions

1. Answer: (A) $\frac{x}{y}$

In direct proportion the two quantities increase and decrease together in the same ratio, so $\frac{x}{y} = k$, a constant.

Equivalently, $y = kx$.

2. Answer: (C) $x \times y$

In inverse proportion one quantity increases exactly as the other decreases, so their product $x \times y = k$ stays constant.

Equivalently, $y = k \div x$.

3. Answer: (D) ₹120

Cost is in direct proportion to the number of pens.

Cost of 1 pen = $75 \div 5 = ₹15$.

Cost of 8 pens = $8 \times 15 = ₹120$.

4. Answer: (B) Inverse

More workers means the job is finished in less time, so the two are in **inverse** proportion — their product (worker-hours) stays constant.

5. Answer: (B) Inverse

Since distance = speed $\times$ time, keeping the distance fixed means the product of speed and time is constant. Travelling faster takes less time, so they are in **inverse** proportion.

6. Answer: (A) 150 km

Distance is in direct proportion to time at constant speed.

Speed = $90 \div 3 = 30$ km/h.

Distance in 5 hours = $30 \times 5 = 150$ km.

7. Answer: (C) 12 hours

Taps and time are in inverse proportion, so tap-hours stay constant:

$$6 \times 8 = 4 \times t$$

$48 = 4t$, so $t = 12$ hours.

8. Answer: (D) 35 km

Map length and actual distance are in direct proportion.

Actual distance = $7 \times 5 = 35$ km.

9. Answer: (B) 16

In direct proportion $\frac{x}{y}$ is constant. From the first column, $\frac{4}{10} = \frac{2}{5}$.

So $\frac{p}{40} = \frac{2}{5}$, giving $5p = 80$ and $p = 16$.

Check the other columns: $\frac{6}{15} = \frac{2}{5} \checkmark$ and $\frac{10}{25} = \frac{2}{5} \checkmark$.

10. Answer: (A) 36 hours

Workers and time are in inverse proportion, so worker-hours stay constant:

$$15 \times 48 = 20 \times t$$

$720 = 20t$, so $t = 36$ hours.

11. Answer: (C) 42 m

At any given moment, height and shadow length are in direct proportion.

$$\frac{6}{4} = \frac{h}{28}$$

$4h = 6 \times 28 = 168$, so $h = 42$ m.

12. Answer: (D) 24 days

The number of people and the number of days are in inverse proportion, since the total amount of food is fixed:

$$40 \times 30 = 50 \times d$$

$$1200 = 50d, \text{ so } d = \mathbf{24 \text{ days.}}$$

13. Answer: (A) 5 cups

Flour and biscuits are in direct proportion.

$$\frac{3}{12} = \frac{f}{20}$$

$$12f = 60, \text{ so } f = \mathbf{5 \text{ cups.}}$$

14. Answer: (C) 25 litres

Distance and petrol used are in direct proportion.

$$\text{Distance per litre} = 240 \div 16 = 15 \text{ km.}$$

$$\text{Petrol needed} = 375 \div 15 = \mathbf{25 \text{ litres.}}$$

15. Answer: (D) The speed of a car and the time taken to cover a fixed distance

For a fixed distance, going faster takes *less* time, so speed and time are in **inverse** proportion, not direct. In each of the other three pairs, doubling one quantity doubles the other.

16. Answer: (B) (i) and (iii) only

Statement (i) is true — $y = kx$ is the equation of a straight line through the origin. Statement (ii) is false; $\text{area} = \pi r^2$, so the area is proportional to the *square* of the radius, and doubling r makes the area four times as large. Statement (iii) is true, since the product xy must stay constant. Hence **(i) and (iii)**.

17. Answer: (A) 1 hour 36 minutes

Pipes and time are in inverse proportion. First convert to minutes: 1 hour 20 minutes = 80 minutes.

$$6 \times 80 = 5 \times t$$

$$480 = 5t, \text{ so } t = 96 \text{ minutes} = \mathbf{1 \text{ hour } 36 \text{ minutes.}}$$

18. Answer: (B) 12 days

$$\text{Total food} = 100 \times 20 = 2000 \text{ worker-days.}$$

$$\text{Food eaten in the first 5 days} = 100 \times 5 = 500 \text{ worker-days.}$$

$$\text{Food left} = 2000 - 500 = 1500 \text{ worker-days.}$$

$$\text{Workers now} = 100 + 25 = 125.$$

$$\text{Days the food will last} = 1500 \div 125 = \mathbf{12 \text{ days.}}$$