Class 7 Ratio & Proportion Worksheet

Thinking Juggernaut

Name: _____   Date: _____   **Total Marks:** 24

📐 Advanced Ratio & Proportion Concepts

COMPOUND RATIOS: The ratio of the product of antecedents to the product of consequents.

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Compound ratio of a:b and c:d = (a×c):(b×d)
Example: Compound ratio of 2:3 and 4:5 = (2×4):(3×5) = 8:15
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DIRECT PROPORTION: When one quantity increases, the other also increases (or both decrease together).

Symbol: ∝

If $x \propto y$, then x/y = constant (k)

Examples: Distance ∝ Time (at constant speed), Cost ∝ Quantity

INVERSE PROPORTION: When one quantity increases, the other decreases.

Formula: x × y = constant (k)

Examples: Speed × Time = Distance (constant), Workers × Days = Work (constant)

CONTINUED PROPORTION: Three quantities a, b, c are in continued proportion if a:b = b:c

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If a:b = b:c, then b² = ac (b is the mean proportional)
Example: 4:6 = 6:9 → 6² = 36 and 4×9 = 36 ✓
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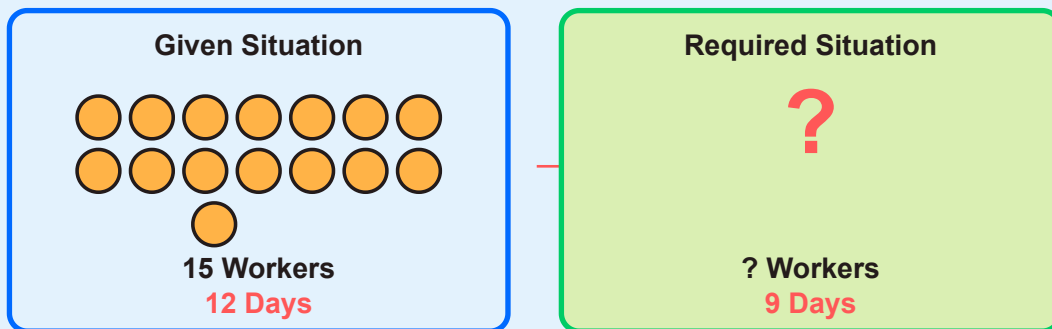
KEY PROPERTIES:

- **Invertendo:** If a:b = c:d, then b:a = d:c
- **Alternendo:** If a:b = c:d, then a:c = b:d
- **Componendo:** If a:b = c:d, then (a+b):b = (c+d):d
- **Dividendo:** If a:b = c:d, then (a-b):b = (c-d):d

📝 Sample Problem

Problem: 15 workers can build a wall in 12 days. How many workers are needed to build the same wall in 9 days?

Inverse Proportion: Workers ∝ 1/Days

Given Situation	Required Situation
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15 Workers **12 Days**	**? Workers** **9 Days**

Less time → More workers needed (Inverse Proportion)

Solution:

This is **inverse proportion** because fewer days require more workers.

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Method 1: Using the formula W₁ × D₁ = W₂ × D₂

15 × 12 = W₂ × 9

180 = 9W₂

W₂ = 20 workers
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Method 2: Using proportion

Workers are inversely proportional to days

15:W₂ = 9:12 (inverse ratio)

15 × 12 = W₂ × 9

W₂ = 20 workers
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Answer: 20 workers are needed to complete the wall in 9 days

Part A: Fundamental Concepts

⭐ **Foundation Level**

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1. Find the compound ratio of 3:4 and 5:6

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2. Check if 4, 6, 9 are in continued proportion.

For continued proportion: 4:6 should equal 6:9

Verify: 4×9 _____ 6×6

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3. If a:b = 2:3 and b:c = 4:5, find a:b:c

Hint: Make b equal in both ratios

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4. Identify if the following is direct or inverse proportion: "The number of pages typed increases with time."

Answer: _____

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5. Find the mean proportional between 4 and 16.

If x is mean proportional: 4:x = x:16

$x^2 =$ _____

x = _____

6. Three numbers are in the ratio 2:3:4. If their sum is 27, find the numbers.

Let numbers be 2x, 3x, 4x

7. If 5 pens cost ₹125, how much will 8 pens cost? (Direct proportion)

8. Divide ₹2400 in the ratio 3:5

First part: _____
Second part: _____

Part B: Applied Problem Solving

⭐⭐ **Intermediate Level**

9. A car travels 240 km in 4 hours. At the same speed, how far will it travel in 6.5 hours?

Direct Proportion: Distance ∝ Time

Given		Find
240 km in 4 hours	→	**? km in 6.5 hours**

10. 20 men can complete a work in 15 days. How many days will 25 men take?

Type of proportion: _____

11. The ratio of boys to girls in a school is 7:5. If there are 84 boys, find:

a) Number of girls: _____
b) Total students: _____
c) Ratio of girls to total students: _____

12. If a:b = 3:4 and b:c = 8:9, find a:c

Make b equal: a:b = 6:8 and b:c = 8:9

13. A recipe for 4 people uses 300g flour and 200g sugar. Adjust quantities for 10 people.

Flour: _____g
Sugar: _____g

14. The monthly salaries of A and B are in the ratio 5:6. If A's salary increases by 20% and B's by 10%, find the new ratio.

A's original salary: 5x, New: _____
B's original salary: 6x, New: _____

New ratio: _____

15. A cistern can be filled by pipe A in 6 hours and by pipe B in 8 hours. If both pipes are opened together, in how many hours will the cistern be filled?

Part filled by A in 1 hour: _____
Part filled by B in 1 hour: _____
Combined in 1 hour: _____
Time to fill: _____

16. Two numbers are in the ratio 5:7. If each number is increased by 10, the ratio becomes 3:4. Find the numbers.

Let numbers be 5x and 7x

17. Divide ₹5600 among A, B, and C such that A gets half of what B gets, and B gets half of what C gets.

Find ratio A:B:C first

18. The cost of 12 books is ₹420. What will be the cost of 18 such books?

Part C: Complex Applications

⭐⭐⭐ **Challenge Level**

19. A sum of money is divided among A, B, and C in the ratio 2:3:5. If C receives ₹3000 more than A, find the total amount and individual shares.

Difference in parts between C and A: _____
Value of 1 part: _____
Total amount: _____
A gets: _____, B gets: _____, C gets: _____

20. The ratio of the ages of a father and son is 5:2. Five years ago, the ratio was 3:1. Find their present ages.

Present: 5x and 2x
5 years ago: (5x-5):(2x-5) = 3:1

21. A mixture contains milk and water in 7:5. If 9 liters of mixture is removed and replaced with water, the new ratio becomes 7:9. Find the original quantity of mixture.

Let original quantity = x liters

22. The incomes of A and B are in 5:4 and their expenditures are in 7:5. If each saves ₹9000, find their incomes.

Income of A: 5x, B: 4x
Expenditure of A: 7y, B: 5y
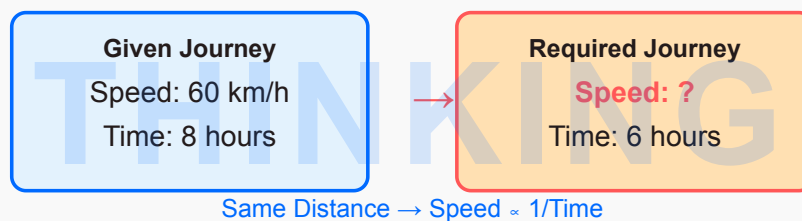Savings: 5x - 7y = 9000, 4x - 5y = 9000

23. If 36 men can do a piece of work in 25 days, in how many days will 15 men do it?

Total work in man-days: _____

Days required: _____

24. A car covers a certain distance at 60 km/h in 8 hours. At what speed should it travel to cover the same distance in 6 hours?

Inverse Proportion: Speed × Time = Constant

Given Journey	→	**Required Journey**
Speed: 60 km/h		**Speed: ?**
Time: 8 hours		Time: 6 hours

Same Distance → Speed ∝ 1/Time

Distance = Speed × Time = _____

Required speed = _____

🔑 Answer Key

Part A: Fundamental Concepts

1. 15:24 or 5:8 (Compound ratio = (3×5):(4×6) = 15:24 = 5:8)

2. No (4×9 = 36, 6×6 = 36... wait, 36 = 36, so YES they are in continued proportion)

3. a:b:c = 8:12:15 (Make b = 12: a:b = 8:12 and b:c = 12:15)

4. Direct proportion (More time → More pages)

5. 8 (x^2 = 4×16 = 64, x = 8)

6. 6, 9, 12 (2x+3x+4x = 27, 9x = 27, x = 3)

7. ₹200 (Cost of 1 pen = ₹25, 8 pens = ₹200)

8. First part: ₹900, Second part: ₹1500 (Total parts = 8, 3/8 × 2400 = 900, 5/8 × 2400 = 1500)

Part B: Applied Problem Solving

9. 390 km (Speed = 60 km/h, Distance = 60×6.5 = 390 km)

10. 12 days (Inverse proportion: 20×15 = 25×x, 300 = 25x, x = 12)

11. a) 60 girls (7:5 = 84:x, x = 60), b) 144 students, c) 5:12

12. 2:3 (a:b:c = 6:8:9, so a:c = 6:9 = 2:3)

13. Flour: 750g, Sugar: 500g (Multiply by 10/4 = 2.5)

14. 10:11 (A's new = 5x×1.2 = 6x, B's new = 6x×1.1 = 6.6x, Ratio = 6:6.6 = 10:11)

15. 3 3/7 hours or 24/7 hours (Combined rate = 1/6 + 1/8 = 7/24 per hour, Time = 24/7 hours)

16. 25 and 35 (Set up: (5x+10):(7x+10) = 3:4, solve: 20x+40 = 21x+30, x = 5)

17. A: ₹800, B: ₹1600, C: ₹3200 (If A = x, B = 2x, C = 4x. Ratio = 1:2:4, Total = 7 parts)

18. ₹630 (Cost of 1 book = ₹35, 18 books = ₹630)

Part C: Complex Applications

19. Difference = 3 parts (5-2), 1 part = ₹1000, Total = ₹10,000, A: ₹2000, B: ₹3000, C: ₹5000

20. Father: 50 years, Son: 20 years ((5x-5):(2x-5) = 3:1, 5x-5 = 6x-15, x = 10)

21. 36 liters (Original milk = 7x/12, After removal = 7x/12 - 9×7/12. Set up equation with new ratio)

22. A: ₹45,000, B: ₹36,000 (From 5x-7y = 9000 and 4x-5y = 9000, solve: x = 9000, y = 5400)

23. 60 days (Total work = 36×25 = 900 man-days, Days = 900÷15 = 60)

24. 80 km/h (Distance = 60×8 = 480 km, Speed = 480÷6 = 80 km/h)

📊 Performance Analysis & Learning Path

Total Questions: 24 | Total Marks: 24

Score Range	Performance Level	Recommended Action Plan
20-24	⭐⭐⭐ Excellent	**Advanced Mastery Achieved:** • Explore partnership problems and profit sharing • Practice time and work problems with multiple variables • Study percentage applications with ratios • Solve competitive exam-level proportion problems • Master mixture and alligation concepts
15-19	⭐⭐ Very Good	**Strengthen Advanced Concepts:** • Practice compound ratios and continued proportions • Master inverse proportion problems thoroughly • Work on multi-step word problems daily • Review properties of proportion (componendo, dividendo) • Solve 10 mixed problems daily for 2 weeks
10-14	⭐ Good Effort	**Build Core Understanding:** • Clearly understand difference between direct and inverse proportion • Practice basic ratio simplification daily • Master unitary method completely • Work through 15 basic proportion problems daily

		• Create visual representations for word problems • Review Class 6 ratio concepts if needed
0-9	Needs Improvement	**Fundamental Revision Required:** • Start with basic ratio concepts from Class 6 • Understand what proportion means with examples • Practice cross multiplication method extensively • Work with teacher/tutor for personalized help • Do 20 simple ratio problems daily • Use real-life examples (cooking, shopping, speed) • Watch educational videos on proportion concepts

🔍 Problem-Solving Framework

1. **Read & Identify:** What type of problem? Direct or inverse proportion? Ratio division?
2. **Extract Data:** List all given values and what needs to be found
3. **Check Units:** Convert everything to same units if needed
4. **Set Up Equation:** Use appropriate formula based on problem type
5. **Solve Step-by-Step:** Show all working clearly
6. **Verify Logic:** Does the answer make sense? If workers increase, should time decrease?
7. **Simplify:** Always express ratios in simplest form

⚠️ Common Mistakes to Avoid

- ❌ **Confusing Direct & Inverse:** Always ask: "If one doubles, what happens to the other?"
- ❌ **Wrong Formula Application:** Don't use $x_1/y_1 = x_2/y_2$ for inverse proportion
- ❌ **Forgetting to Simplify:** 12:18 should be written as 2:3
- ❌ **Unit Mismatch:** Can't compare 5 hours to 300 minutes without conversion
- ❌ **Order Confusion:** 3:5 is not the same as 5:3 - order matters!
- ❌ **Compound Ratio Error:** Don't add ratios: (2:3) + (4:5) ≠ 6:8
- ❌ **Not Finding LCM:** When combining ratios, make middle term equal
- ✅ **Best Practice:** Always write your reasoning - why is it direct/inverse?

✨ **Excellent Work Completing This Worksheet!** ✨

Ratio and proportion are everywhere - from cooking to construction to calculating discounts!

🔥 Download more Class 7 worksheets at thinkingjuggernaut.in

📘 Practice identifying direct vs inverse proportion in daily life

📚 Master these concepts - they're the foundation of advanced mathematics!

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