

CHAPTER 8

WORKING WITH FRACTIONS

Comprehensive Notes with Step-by-Step Solutions



KEY FORMULAS AT A GLANCE

1. Fraction $\times$ Whole Number: $(a/b) \times n = (a \times n) / b$
2. Fraction $\times$ Fraction (Brahmagupta's Formula): $(a/b) \times (c/d) = (a \times c) / (b \times d)$
3. Reciprocal of $a/b = b/a$ (Product of fraction & reciprocal = 1)
4. Division of Fractions: $(a/b) \div (c/d) = (a/b) \times (d/c) = (a \times d) / (b \times c)$
5. Area of Rectangle = length $\times$ breadth (works with fractional sides too!)

SECTION 1: MULTIPLICATION OF FRACTIONS

1A. Multiplying a Fraction by a Whole Number

When we multiply a fraction by a whole number, we follow two simple steps:



Method (Fraction $\times$ Whole Number)

- Step 1: Divide the whole number (multiplicand) by the denominator of the fraction.
Step 2: Multiply the result by the numerator of the fraction.

OR simply: $(a/b) \times n = (a \times n) / b$

EXAMPLE 1

Aaron walks 3 km in 1 hour. How far does he walk in 5 hours?

Given	Speed = 3 km per hour, Time = 5 hours
To Find	Total distance covered
Formula	Distance = Speed $\times$ Time

Step 1: Distance = 5×3 km

Step 2: $= 3 + 3 + 3 + 3 + 3 = 15$ km

✓ Answer: Aaron can walk 15 km in 5 hours.

EXAMPLE 2

Aaron's pet tortoise walks $1/4$ km in 1 hour. How far can it walk in 3 hours?

Given	Speed = $1/4$ km per hour, Time = 3 hours
To Find	Distance in 3 hours
Formula	$(a/b) \times n = (a \times n) / b$

Step 1: Distance = $3 \times (1/4)$ km

Step 2: = $1/4 + 1/4 + 1/4 = 3/4$ km

✓ **Answer:** The tortoise walks $3/4$ km in 3 hours.

➡ EXAMPLE 3

Aaron can walk 3 km in 1 hour. How far can he walk in $2/5$ hours?

Given	Speed = 3 km/hr, Time = $2/5$ hours
To Find	Distance in $2/5$ hours
Formula	$(a/b) \times n = (a \times n) / b \rightarrow (2/5) \times 3 = (2 \times 3) / 5$

Step 1: Find distance in $1/5$ hour: $3 \text{ km} \div 5 = 3/5 \text{ km}$

Step 2: Since $2/5$ is twice $1/5$, multiply by 2: $2 \times (3/5) = 6/5 \text{ km}$

$$\therefore (2/5) \times 3 = 6/5 \text{ km}$$

✓ **Answer:** Aaron can walk $6/5$ km (= $1 \frac{1}{5}$ km) in $2/5$ hours.

➡ EXAMPLE 4 (Farmer's Land Problem)

A farmer had 5 grandchildren. She gave $2/3$ acre of land to each. How much land in total?

Given	Grandchildren = 5, Land per child = $2/3$ acre
To Find	Total land distributed
Formula	$5 \times (2/3) = (5 \times 2) / 3$

Step 1: Total land = $5 \times (2/3)$

Step 2: = $2/3 + 2/3 + 2/3 + 2/3 + 2/3$

Step 3: = $(5 \times 2) / 3 = 10/3$

✓ **Answer:** Total land given = $10/3$ acres = $3 \frac{1}{3}$ acres.

➡ EXAMPLE 5 (Mixed Fraction)

1 hour of internet costs Rs. 8. How much will $1 \frac{1}{4}$ hours cost?

Given	Cost = Rs. 8/hr, Time = $1 \frac{1}{4}$ hrs = $5/4$ hrs
To Find	Total cost for $5/4$ hours
Formula	$(5/4) \times 8 = (5 \times 8) / 4$

Step 1: Convert mixed fraction: $1 \frac{1}{4} = 5/4$ hours

Step 2: Cost = $(5/4) \times 8 = (5 \times 8) / 4 = 40 / 4$

Step 3: $= 5 \times 2 = 10$

✓ **Answer:** Cost = Rs. 10 for 1 1/4 hours.

FIGURE IT OUT — Solutions (Page 176–177)

Q1. Tenzin drinks 1/2 glass of milk every day. How many glasses in a week? In January?

Step 1: In a week (7 days): $7 \times 1/2 = 7/2$ glasses

Step 2: In January (31 days): $31 \times 1/2 = 31/2$ glasses

✓ **Answer:** Week = $7/2 = 3 \frac{1}{2}$ glasses; January = $31/2 = 15 \frac{1}{2}$ glasses

Q2. A team makes 1 km canal in 8 days. How much in 1 day? In 5 days?

Step 1: In 1 day: $1 \div 8 = 1/8$ km

Step 2: In 5 days: $5 \times (1/8) = 5/8$ km

✓ **Answer:** 1 day = $1/8$ km; 5 days = $5/8$ km

Q3. Manju and 2 neighbours share 5 litres oil equally. How much per family per week? In 4 weeks?

Step 1: Per week per family: $5 \div 3 = 5/3$ litres

Step 2: In 4 weeks: $4 \times (5/3) = 20/3$ litres

✓ **Answer:** Per week = $5/3$ litres; In 4 weeks = $20/3 = 6 \frac{2}{3}$ litres

Q4. Moon sets 5/6 hour later every day. Started at 10 pm Monday. When on Thursday (3 days later)?

Step 1: Extra hours = $3 \times (5/6) = 15/6 = 5/2 = 2 \frac{1}{2}$ hours

Step 2: Moon sets at: 10 pm + $2 \frac{1}{2}$ hours = 12:30 am (midnight + 30 min)

✓ **Answer:** Moon sets $2 \frac{1}{2}$ hours after 10 pm = 12:30 am on Thursday

Q5. Multiply and convert to mixed fraction: (a) $7 \times 3/5$ (b) $4 \times 1/3$ (c) $9/7 \times 6$ (d) $13/11 \times 6$

(a) $7 \times 3/5$	(b) $4 \times 1/3$	(c) $9/7 \times 6$	(d) $13/11 \times 6$
$21/5 = 4 \frac{1}{5}$	$4/3 = 1 \frac{1}{3}$	$54/7 = 7 \frac{5}{7}$	$78/11 = 7 \frac{1}{11}$

SECTION 1B: MULTIPLYING TWO FRACTIONS

When both the multiplier and multiplicand are fractions, we use Brahmagupta's formula.

$$(a/b) \times (c/d) = (a \times c) / (b \times d) \quad \text{— Brahmagupta (628 CE)}$$

How to Multiply Two Fractions — Step by Step

Step 1: Multiply the NUMERATORS together → new numerator

Step 2: Multiply the DENOMINATORS together → new denominator

Step 3: Simplify the resulting fraction to its lowest form.

Shortcut: Before multiplying, CANCEL common factors between any numerator and denominator!
This is called 'cancelling common factors' (Apavartana in ancient Indian mathematics).

➡ EXAMPLE 6

Tortoise walks $\frac{1}{4}$ km in 1 hour. How far in $\frac{1}{2}$ hour?

Given	Speed = $\frac{1}{4}$ km/hr, Time = $\frac{1}{2}$ hr
To Find	$(\frac{1}{2}) \times (\frac{1}{4}) = ?$
Formula	$(\frac{a}{b}) \times (\frac{c}{d}) = (\frac{a \times c}{b \times d})$

Step 1: Numerators: $1 \times 1 = 1$

Step 2: Denominators: $2 \times 4 = 8$

Step 3: $(\frac{1}{2}) \times (\frac{1}{4}) = \frac{1}{8}$

✓ **Answer:** Tortoise walks $\frac{1}{8}$ km in half an hour.

Unit Square Visualization

Think of a unit square (1×1) as 'the whole'.

$\frac{1}{4}$ of the square = 1 row of 4 equal parts highlighted.

Then divide THAT into 2 equal parts → you get 1 out of 8 total parts.

∴ $\frac{1}{2} \times \frac{1}{4} = \frac{1}{8}$ ✓

➡ EXAMPLE 7

Tortoise walks $\frac{2}{5}$ km in 1 hour. How far in $\frac{3}{4}$ of an hour?

Given	Speed = $\frac{2}{5}$ km/hr, Time = $\frac{3}{4}$ hr
To Find	$(\frac{3}{4}) \times (\frac{2}{5}) = ?$
Formula	$(\frac{a \times c}{b \times d})$

Step 1: Distance in $\frac{1}{4}$ hr: $(\frac{2}{5}) \div 4 = \frac{2}{20}$

Step 2: Multiply by 3 (since $\frac{3}{4} = 3 \times \frac{1}{4}$): $3 \times (\frac{2}{20}) = \frac{6}{20}$

Step 3: Simplify: $\frac{6}{20} = \frac{3}{10}$

∴ $(\frac{3}{4}) \times (\frac{2}{5}) = \frac{6}{20} = \frac{3}{10}$

✓ **Answer:** Distance = $\frac{3}{10}$ km in $\frac{3}{4}$ of an hour.

SECTION 1C: SIMPLIFICATION — LOWEST FORM

Key Technique: Cancelling Common Factors (Cross-Cancellation)

Before multiplying, find common factors between ANY numerator and ANY denominator.

Divide both by the common factor first — this keeps numbers smaller!

This ancient Indian technique is called 'APAVARTANA'.

Example: $12/7 \times 5/24 \rightarrow \text{GCD}(12, 24)=12$, cancel to get $1/7 \times 5/2 = 5/14$

➡ EXAMPLE 8 (with Simplification)

Multiply: $12/7 \times 5/24$ [Simplify first]

Step 1: Write: $(12 \times 5) / (7 \times 24)$

Step 2: $\text{GCD}(12, 24) = 12$. Divide: $12 \div 12 = 1$ and $24 \div 12 = 2$

Step 3: Simplified: $(1 \times 5) / (7 \times 2) = 5/14$

✓ Answer: $12/7 \times 5/24 = 5/14$

➡ EXAMPLE 9

Multiply: $14/15 \times 25/42$ [Simplify first]

Step 1: Write: $(14 \times 25) / (15 \times 42)$

Step 2: $\text{GCD}(14, 42) = 14 \rightarrow 14 \div 14=1, 42 \div 14=3$

Step 3: $\text{GCD}(25, 15) = 5 \rightarrow 25 \div 5=5, 15 \div 5=3$

Step 4: Simplified: $(1 \times 5) / (3 \times 3) = 5/9$

✓ Answer: $14/15 \times 25/42 = 5/9$

FIGURE IT OUT — Solutions (Page 183–184)

Q1. Tap fills $7/10$ of tank in 1 hour. Find amount filled in: (a) $1/3$ hr (b) $2/3$ hr (c) $3/4$ hr (d) $7/10$ hr

(a) $1/3$ hr	(b) $2/3$ hr	(c) $3/4$ hr	(d) $7/10$ hr
$(1/3) \times (7/10) = 7/30$	$(2/3) \times (7/10) = 14/30 = 7/15$	$(3/4) \times (7/10) = 21/40$	$(7/10) \times (7/10) = 49/100$

(e) For tank to be full: tap must run for $10/7$ hours = $1 \frac{3}{7}$ hours

Q2. Government took $1/6$ of Somu's land for road. She gave half the remaining to Krishna, $1/3$ to Bora.

Step 1: Land remaining with Somu = $1 - 1/6 = 5/6$

Step 2: (a) Krishna gets: $1/2 \times (5/6) = 5/12$ of original

Step 3: (b) Bora gets: $1/3 \times (5/6) = 5/18$ of original

Step 4: (c) Somu's share: $5/6 - 5/12 - 5/18 = 30/36 - 15/36 - 10/36 = 5/36$ of original

✓ Answer: Krishna = $\frac{5}{12}$, Bora = $\frac{5}{18}$, Somu = $\frac{5}{36}$

Q3. Find area of rectangle: sides $3\frac{3}{4}$ ft and $9\frac{3}{5}$ ft.

Step 1: Convert: $3\frac{3}{4} = \frac{15}{4}$ ft and $9\frac{3}{5} = \frac{48}{5}$ ft

Step 2: Area = $(\frac{15}{4}) \times (\frac{48}{5})$

Step 3: Cancel: $\text{GCD}(15,5)=5 \rightarrow 3,1$; $\text{GCD}(48,4)=4 \rightarrow 12,1$

Step 4: = $3 \times 12 = 36$ sq ft

✓ Answer: Area = 36 sq ft

Q4. Four saplings in a row. Distance between two = $\frac{3}{4}$ m. Distance: first to last?

Step 1: Number of gaps between 4 saplings = 3

Step 2: Total distance = $3 \times (\frac{3}{4}) = \frac{9}{4}$ m = $2\frac{1}{4}$ m

✓ Answer: Distance = $\frac{9}{4}$ m = $2\frac{1}{4}$ m

Q5. Which is heavier: $\frac{12}{15}$ of 500 g OR $\frac{3}{20}$ of 4 kg?

Step 1: $\frac{12}{15}$ of 500 g = $(\frac{12}{15}) \times 500 = \frac{6000}{15} = 400$ g

Step 2: 4 kg = 4000 g. So $\frac{3}{20}$ of 4000 g = $(\frac{3 \times 4000}{20}) = \frac{12000}{20} = 600$ g

Step 3: Compare: 400 g vs 600 g

✓ Answer: $\frac{3}{20}$ of 4 kg (= 600 g) is heavier than $\frac{12}{15}$ of 500 g (= 400 g)

SECTION 2: DIVISION OF FRACTIONS

Key Idea: Division can always be rewritten as multiplication!

$12 \div 4$ asks: 'What times 4 = 12?' $\rightarrow$ Answer: 3

Similarly, $(\frac{a}{b}) \div (\frac{c}{d})$ asks: 'What times $(\frac{c}{d}) = (\frac{a}{b})$?'

💡 RECIPROCAL — The Key to Division

The RECIPROCAL of a fraction $\frac{a}{b}$ is $\frac{b}{a}$.

When you multiply a fraction by its reciprocal, you get 1.

Example: $(\frac{2}{3}) \times (\frac{3}{2}) = 1$ ✓

Reciprocals: $\frac{3}{5} \rightarrow \frac{5}{3}$, $7 \rightarrow \frac{1}{7}$, $\frac{1}{4} \rightarrow 4$, $\frac{9}{11} \rightarrow \frac{11}{9}$

$$(\frac{a}{b}) \div (\frac{c}{d}) = (\frac{a}{b}) \times (\frac{d}{c}) = \frac{(a \times d)}{(b \times c)} \quad -$$

Brahmagupta / Bhaskara II

Steps to Divide Two Fractions

Step 1: Keep the DIVIDEND as it is.

Step 2: Change the DIVISION sign ($\div$) to MULTIPLICATION sign ($\times$).

Step 3: Write the RECIPROCAL of the DIVISOR.

Step 4: Multiply the two fractions and simplify.

➡ EXAMPLE 10

Find: $1 \div \frac{2}{3}$

Given	Dividend = 1, Divisor = $\frac{2}{3}$
Reciprocal of Divisor	Reciprocal of $\frac{2}{3} = \frac{3}{2}$
Formula	$1 \div (\frac{2}{3}) = 1 \times (\frac{3}{2}) = \frac{3}{2}$

Step 1: Divisor = $\frac{2}{3}$, Reciprocal = $\frac{3}{2}$

Step 2: $1 \div (\frac{2}{3}) = 1 \times (\frac{3}{2}) = \frac{3}{2}$

✓ Answer: $1 \div (\frac{2}{3}) = \frac{3}{2} = 1 \frac{1}{2}$

➡ EXAMPLE 11

Find: $3 \div \frac{2}{3}$

Step 1: Divisor = $\frac{2}{3}$, Reciprocal = $\frac{3}{2}$

Step 2: $3 \div (\frac{2}{3}) = 3 \times (\frac{3}{2}) = \frac{9}{2}$

✓ Answer: $3 \div (\frac{2}{3}) = \frac{9}{2} = 4 \frac{1}{2}$

➡ EXAMPLE 12

Find: $\frac{1}{5} \div \frac{1}{2}$

Step 1: Divisor = $\frac{1}{2}$, Reciprocal = 2

Step 2: $(\frac{1}{5}) \div (\frac{1}{2}) = (\frac{1}{5}) \times 2 = \frac{2}{5}$

✓ Answer: $(\frac{1}{5}) \div (\frac{1}{2}) = \frac{2}{5}$

➡ EXAMPLE 13

Find: $\frac{2}{3} \div \frac{3}{5}$

Given	Dividend = $\frac{2}{3}$, Divisor = $\frac{3}{5}$
Reciprocal of $\frac{3}{5}$	$\frac{5}{3}$

Formula

$$(2/3) \div (3/5) = (2/3) \times (5/3)$$

Step 1: Reciprocal of $3/5 = 5/3$

Step 2: $(2/3) \times (5/3) = (2 \times 5)/(3 \times 3) = 10/9$

✓ **Answer:** $(2/3) \div (3/5) = 10/9 = 1 \frac{1}{9}$

FIGURE IT OUT — Division Solutions (Page 196)

Q1. Evaluate the following:

$3 \div 7/9$	$14/4 \div 2$	$2/3 \div 2/3$	$14/6 \div 7/3$
$= 27/7$	$= 7/4$	$= 1$	$= 1$
$4/3 \div 3/4$	$7/4 \div 1/7$	$8/2 \div 4/15$	
$= 16/9$	$= 49/4$	$= 15$	
$1/5 \div 1/9$	$1/6 \div 11/12$	$3 \frac{2}{3} \div 1 \frac{3}{8}$	
$= 9/5$	$= 2/11$	$= 8/3 = 2 \frac{2}{3}$	

Q2. Word Problems — Choose correct expression and simplify:

(a) Maria used $1/4$ m lace per bag from 8 m total. How many bags?

Step 1: Correct expression: $8 \div (1/4)$ [Total $\div$ per bag]

Step 2: $= 8 \times 4 = 32$

✓ **Answer:** Maria decorated 32 bags. (Answer: option iii)

(b) $1/2$ m ribbon for 8 badges. Length per badge?

Step 1: Correct expression: $(1/2) \div 8$ [Total $\div$ number of badges]

Step 2: $= (1/2) \times (1/8) = 1/16$ m

✓ **Answer:** Each badge needs $1/16$ m ribbon. (Answer: option iv)

(c) Baker needs $1/6$ kg flour per loaf. Has 5 kg. How many loaves?

Step 1: Correct expression: $5 \div (1/6)$ [Total $\div$ per loaf]

Step 2: $= 5 \times 6 = 30$ loaves

✓ **Answer:** Baker can make 30 loaves. (Answer: option iii)

Q3. $1/4$ kg flour makes 12 rotis. How much for 6 rotis?

Step 1: Flour per roti $= (1/4) \div 12 = 1/48$ kg

Step 2: Flour for 6 rotis $= 6 \times (1/48) = 6/48 = 1/8$ kg

✓ **Answer:** Flour needed for 6 rotis $= 1/8$ kg

Q4. Patiganita: Find $1 \div (1/6) + 1 \div (1/10) + 1 \div (1/13) + 1 \div (1/9) + 1 \div (1/2)$

Step 1: $1 \div (1/6) = 6$; $1 \div (1/10) = 10$; $1 \div (1/13) = 13$

Step 2: $1 \div (1/9) = 9$; $1 \div (1/2) = 2$

Step 3: Sum = $6 + 10 + 13 + 9 + 2 = 40$

✓ **Answer: The friend should say: 40**

Q5. Mira's novel has 400 pages. Read $1/5$ yesterday, $3/10$ today. Pages left?

Step 1: Pages read yesterday = $1/5 \times 400 = 80$

Step 2: Pages read today = $3/10 \times 400 = 120$

Step 3: Total read = $80 + 120 = 200$ pages

Step 4: Pages left = $400 - 200 = 200$ pages

✓ **Answer: Mira has 200 pages left to read.**

Q6. Car runs 16 km per litre. How far with $2 \frac{3}{4}$ litres?

Step 1: Convert: $2 \frac{3}{4} = 11/4$ litres

Step 2: Distance = $16 \times (11/4) = 176/4 = 44$ km

✓ **Answer: Car travels 44 km.**

Q7. Train: $5 \frac{1}{6}$ hrs. Plane: $1/2$ hr. How much time does plane save?

Step 1: Train time = $5 \frac{1}{6} = 31/6$ hrs

Step 2: Time saved = $31/6 - 1/2 = 31/6 - 3/6 = 28/6 = 14/3 = 4 \frac{2}{3}$ hours

✓ **Answer: Plane saves $4 \frac{2}{3}$ hours.**

Q8. $4/5$ of cake eaten. Remaining shared equally by 3 friends. Each friend's share?

Step 1: Cake remaining = $1 - 4/5 = 1/5$

Step 2: Each friend's share = $(1/5) \div 3 = 1/15$

✓ **Answer: Each friend gets $1/15$ of the whole cake.**

Q10. What fraction of the square is shaded? (Half of the lower-right quarter)

Step 1: Lower-right quarter = $1/4$ of square

Step 2: Triangle = $1/2$ of that quarter = $1/2 \times 1/4 = 1/8$

Step 3: Shaded region = $3/4 \times 1/8 = 3/32$

✓ **Answer: Shaded region = $3/32$ of the whole square.**

SECTION 3: CLASSIC WORD PROBLEMS WITH SOLUTIONS

➡ **PROBLEM 1: The Four Fountains (Brahmagupta, 628 CE)**

Four fountains fill a cistern. They fill it in 1 day, $1/2$ day, $1/4$ day, $1/5$ day. All together — how long?

Given	Filling times: 1, 1/2, 1/4, 1/5 days
To Find	Time when all 4 work together
Idea	Find how many times each fills in 1 day, then add.

Step 1: Fountain 1: $1 \div 1 = 1$ time/day

Step 2: Fountain 2: $1 \div (1/2) = 2$ times/day

Step 3: Fountain 3: $1 \div (1/4) = 4$ times/day

Step 4: Fountain 4: $1 \div (1/5) = 5$ times/day

Step 5: Together per day: $1 + 2 + 4 + 5 = 12$ times

Step 6: Time to fill once together: $1 \div 12 = 1/12$ day

✓ **Answer: All four fountains together fill the cistern in 1/12 of a day.**

➡ **PROBLEM 2: The Square Bricks (Sulbasutra, 800 BCE)**

Cover $7 \frac{1}{2}$ sq. units with square bricks of side $1/5$ unit. How many bricks?

Step 1: Area of each brick = $(1/5) \times (1/5) = 1/25$ sq. units

Step 2: Total area = $7 \frac{1}{2} = 15/2$ sq. units

Step 3: Number of bricks = Total area $\div$ Area per brick

Step 4: = $(15/2) \div (1/25) = (15/2) \times 25 = 375/2 = 187.5$

✓ **Answer: Number of bricks needed = $375/2 = 187.5$ (≈ 188 bricks)**

➡ **PROBLEM 3: Leena's Tea (Applications)**

Leena made 5 cups of tea using $1/4$ litre of milk. Milk per cup?

Step 1: Total milk = $1/4$ litre for 5 cups

Step 2: Milk per cup = $(1/4) \div 5 = (1/4) \times (1/5) = 1/20$

✓ **Answer: Each cup has $1/20$ litre of milk.**

SECTION 4: IS THE PRODUCT ALWAYS GREATER?

A very important observation about multiplication with fractions:

Situation	Example	Result
Both numbers > 1	$(4/3) \times 4 = 16/3$	Product $>$ BOTH numbers
Both numbers between 0 and 1	$(3/4) \times (2/5) = 3/10$	Product $<$ BOTH numbers
One between 0–1, one > 1	$(3/4) \times 5 = 15/4$	Product is between the two

Fill in the Blanks — Conclusion

When one number being multiplied is BETWEEN 0 and 1:
→ The product is LESS THAN the other number.

When one number being multiplied is GREATER THAN 1:
→ The product is GREATER THAN the other number.

Similarly for DIVISION:

- Divisor between 0 and 1 → Quotient > Dividend
- Divisor greater than 1 → Quotient < Dividend

SECTION 5: PRACTICE QUESTIONS

Instructions

Attempt all questions independently. Show all steps clearly.
Questions marked (*) are slightly challenging.

PART A — Multiplication (Fraction × Whole Number)

- Q1.** Multiply $\frac{3}{7} \times 14$ and express as a whole number.
- Q2.** A machine produces $\frac{2}{5}$ kg of product per minute. How much in 20 minutes?
- Q3.** Convert to mixed fraction: (a) $5 \times \frac{4}{3}$ (b) $8 \times \frac{7}{5}$ (c) $\frac{3}{11} \times 44$
- Q4.** A pipe fills $\frac{3}{8}$ of a tank per hour. How much in 4 hours? How long to fill the tank?
- Q5.** Seema jogs $\frac{3}{4}$ km each day. How far does she jog in: (a) 5 days (b) a week (c) 30 days?

PART B — Multiplication (Fraction × Fraction)

- Q6.** Find: (a) $\frac{3}{5} \times \frac{5}{9}$ (b) $\frac{7}{12} \times \frac{4}{7}$ (c) $\frac{5}{8} \times \frac{16}{25}$
- Q7.** Find the area of a rectangle with sides $\frac{5}{6}$ m and $\frac{3}{10}$ m.
- Q8.** (*) A square has side $\frac{2}{3}$ m. Find its area.
- Q9.** Simplify using cross-cancellation: $\frac{18}{25} \times \frac{35}{54}$
- Q10.** A field is $\frac{4}{5}$ km long and $\frac{3}{8}$ km wide. Find its area.

PART C — Division of Fractions

- Q11.** Find the reciprocal of: (a) $\frac{7}{9}$ (b) 5 (c) $\frac{1}{13}$ (d) $2\frac{3}{4}$
- Q12.** Divide: (a) $\frac{5}{8} \div \frac{5}{4}$ (b) $7 \div \frac{7}{3}$ (c) $\frac{3}{10} \div \frac{9}{20}$
- Q13.** A rope $15\frac{1}{2}$ m is cut into pieces of $\frac{3}{4}$ m each. How many pieces?
- Q14.** (*) $\frac{1}{3}$ of a journey is completed in 2 hours. How long for the full journey?
- Q15.** A worker can dig $\frac{3}{5}$ m of trench per hour. How many hours to dig 9 m?

PART D — Mixed Word Problems

- Q16.** A painter paints $\frac{2}{5}$ of a wall in 1 hour. How much in $\frac{3}{2}$ hours?
- Q17.** (*) Three pipes fill a tank in 3, $\frac{1}{2}$, and $\frac{3}{4}$ of a day. Together, how long to fill?
- Q18.** Mohan earns Rs. 4500 per week. He saves $\frac{2}{5}$. How much does he spend in 4 weeks?
- Q19.** A library has 6000 books. $\frac{3}{8}$ are in English, $\frac{1}{4}$ in Hindi, rest in other languages. How many in each?

Q20. (*) Pattern: $(1 - 1/2) \times (1 - 1/3) \times (1 - 1/4) \times \dots \times (1 - 1/n) = ?$ Guess the pattern.

ANSWER KEY — Practice Questions

Q.No.	Answer	Q.No.	Answer
1	6	2	8 kg
3	(a) $6 \frac{2}{3}$ (b) $11 \frac{1}{5}$ (c) 12	4	$\frac{3}{2}$ tank; $\frac{8}{3}$ hrs
5	(a) $15\frac{1}{4}$ (b) $21\frac{1}{4}$ (c) $45\frac{1}{2}$ km	6	(a) $\frac{1}{3}$ (b) $\frac{1}{3}$ (c) $\frac{2}{5}$
7	$\frac{1}{4}$ sq m	8	$\frac{4}{9}$ sq m
9	$\frac{7}{15}$	10	$\frac{3}{10}$ sq km
11	(a) $\frac{9}{7}$ (b) $\frac{1}{5}$ (c) 13 (d) $\frac{4}{11}$	12	(a) $\frac{1}{2}$ (b) 3 (c) $\frac{2}{3}$
13	10 pieces	14	6 hours
15	15 hours	16	$\frac{3}{5}$ of wall
17	$\frac{4}{25}$ of a day	18	Rs. 10,800
19	English: 2250; Hindi: 1500; Others: 2250	20	$\frac{1}{n}$

IMPORTANT POINTS TO REMEMBER

☑ Summary — Working with Fractions

- To multiply fraction by a whole number: $(a/b) \times n = (a \times n)/b$
- To multiply two fractions: $(a/b) \times (c/d) = (a \times c)/(b \times d)$ [Brahmagupta, 628 CE]
- Always simplify to LOWEST FORM — cancel common factors BEFORE multiplying.
- The RECIPROCAL of (a/b) is (b/a) . Product of fraction and reciprocal = 1.
- To DIVIDE fractions: flip the divisor and multiply.
 $(a/b) \div (c/d) = (a/b) \times (d/c)$ [Brahmagupta / Bhaskara II]
- Multiplication by a number < 1 gives a SMALLER result.
- Multiplication by a number > 1 gives a LARGER result.
- Division by a number < 1 gives a LARGER result (quotient $>$ dividend).
- Division by a number > 1 gives a SMALLER result (quotient $<$ dividend).
- Area of rectangle = length $\times$ breadth (works perfectly with fractions!).
- Order of multiplication doesn't matter: $(a/b) \times (c/d) = (c/d) \times (a/b)$
- Mixed fractions MUST be converted to improper fractions before multiplying.

🕒 A Pinch of History

- Ancient Indians used fractions as far back as 800 BCE in the Shulbasutras.
- Brahmagupta (628 CE) gave the FIRST formal rules for multiplying and dividing fractions.
- Bhaskara II (1150 CE) clarified division using reciprocals in his book Lilavati.
- The reduction of fractions (Apavartana) was so common that Jain scholar Umasvati (150 BCE) used it as a simile in a philosophical work!
- These Indian methods spread to Arab mathematicians, then to Europe in the 17th century.

7th Class Math — Ganita Prakash

Semester 1 | 2026 – 27 | Notes & All Solutions

❖ WHAT'S INSIDE THIS BOOK ❖

■ **Complete Chapter Notes**
Detailed explanations for all 9 chapters with examples

■ **All Solutions Covered**
Step-by-step solutions to every exercise question

■ **Important Formulas**
Quick-reference formula sheets for each chapter

■ **Answer Keys**
Practice question answer keys for self-assessment

■ ■ **Historical Insights**
Pinch of History — Indian math heritage in each chapter

■ **Important Points**
Highlighted key points to remember for exams

❖ CHAPTERS COVERED ❖

Ch.1
Integers

Ch.2
Fractions & Decimals

Ch.3
Ratio & Proportion

Ch.4
Lines & Angles

Ch.5
Triangle

Ch.6
Area & Perimeter

Ch.7
Data Handling

Ch.8
Algebraic Expressions

Ch.9
Simple Equations

***"Mathematics is not about numbers, equations or algorithms;
it is about understanding."** — William Paul Thurston*

Remember: Practice makes you Perfect! ■



Understand the Concept • Practice Regularly • Score Excellent

