CHAPTER 7

FRACTIONS

Comprehensive Notes with Step-by-Step Solutions

All Figure it Out Solved

TOPICS COVERED	
7.1 Fractional Units & Equal Shares	7.5 Mixed Fractions
7.2 Fractions as Parts of a Whole	7.6 Equivalent Fractions
7.3 Measuring Using Fractional Units	7.7 Expressing in Lowest Terms
7.4 Fractions on Number Line	7.8 Comparing & Adding/Subtracting Fractions

What is a Fraction?

A fraction represents equal shares. When a whole is divided into equal parts, each part is a fraction. Fractions tell us how much each share is when things are shared equally.

Example: If 1 roti is shared equally between 2 children, each child gets 1/2 roti.

Example: If 1 roti is shared among 4 children, each child gets 1/4 roti.

Key Rule: Comparing Unit Fractions

The more people share the same 1 thing, the SMALLER each person's share. So: 1/2 > 1/4 > 1/6 > 1/8 > 1/9 > ... Larger denominator = Smaller fraction (for unit fractions)

7.1 FRACTIONAL UNITS AND EQUAL SHARES

Concept: What are Fractional Units?

When 1 whole unit is divided into several EQUAL parts, each part is called a FRACTIONAL UNIT.

Fractional units are: 1/2, 1/3, 1/4, 1/5, 1/6, ..., 1/10, ..., 1/50, ..., 1/100, etc.

These are also called UNIT FRACTIONS (numerator is always 1).

Comparing Unit Fractions

Which is greater: 1/5 or 1/9? Think of sharing 1 roti: • 5 children share → each gets 1/5 • 9 children share → each gets 1/9 More people = smaller share Therefore: 1/5 > 1/9

RULE: Among unit fractions, the one with the SMALLER denominator is GREATER.
1/2 > 1/3 > 1/4 > 1/5 > 1/6 > ...

Figure it Out

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Q1. Three guavas together weigh 1 kg. If they are roughly of the same size, each guava will roughly weigh ____ kg.

Step 1: Total weight = 1 kg, Number of guavas = 3, Size is roughly equal

Step 2: Each guava weight = 1 ÷ 3 = 1/3 kg

Final Answer: Each guava weighs 1/3 kg

Q2. A wholesale merchant packed 1 kg of rice in four packets of equal weight. The weight of each packet is ___ kg.

Step 1: Total rice = 1 kg, Number of packets = 4, Equal weight each

Step 2: Each packet = 1 ÷ 4 = 1/4 kg

Final Answer: Each packet weighs 1/4 kg

Q3. Four friends ordered 3 glasses of sugarcane juice and shared it equally among themselves. Each one drank ____ glass of sugarcane juice.

Step 1: Total glasses = 3, Number of friends = 4, Equal sharing

Step 2: Each friend's share = 3 ÷ 4 = 3/4 glass

Final Answer: Each friend drank 3/4 glass

Q4. The big fish weighs 1/2 kg. The small one weighs 1/4 kg. Together they weigh ____ kg.

Step 1: Big fish = 1/2 kg, Small fish = 1/4 kg

Step 2: 1/2 = 2/4 (converting to same denominator)

Step 3: Total = 2/4 + 1/4 = 3/4 kg

Final Answer: Together they weigh 3/4 kg

Q5. Arrange these fraction words in order of size from the smallest to the biggest: One and a half, three quarters, one and a quarter, half, quarter, two and a half.

Step 1: Convert to fractions:

- Quarter = 1/4
- Half = 1/2 = 2/4
- Three quarters = 3/4
- One and a quarter = 1 + 1/4 = 5/4
- One and a half = 1 + 1/2 = 3/2 = 6/4
- Two and a half = 2 + 1/2 = 5/2 = 10/4

Step 2: Arrange from smallest to biggest:

Final Answer: 1/4, 1/2, 3/4, 1(1/4), 1(1/2), 2(1/2) (Quarter < Half < Three Quarters < One & a Quarter < One & a Half < Two & a Half)

7.2 FRACTIONAL UNITS AS PARTS OF A WHOLE

Key Concept

When we divide a WHOLE into equal parts, each part is a fractional unit. The number of equal parts the whole is divided into = DENOMINATOR The number of parts we are considering = NUMERATOR Important: Equal parts can have DIFFERENT SHAPES but the SAME SIZE!

Visual Understanding: Chikki Model

If a whole chikki is divided into 6 equal parts → each part = 1/6 chikki
The parts can be of different shapes (rectangle, triangle, etc.) but all equal in size.

Q. By dividing the whole chikki into 6 equal parts in different ways, we get 1/6 chikki pieces of different shapes. Are they of the same size? (Page 154)

Observation: Each piece is 1/6 of the whole chikki.

Reason: Even if shapes differ, equal division means equal size.

Answer: YES, they are of the same size. Division into equal parts ensures equal area/size, regardless of shape.

Figure it Out

Page No. 155 — How much of a whole chikki is each piece?

Q. The figures below show different fractional units of a whole chikki. How much of a whole chikki is each piece? (a through h)

Piece	Reasoning	Answer
(a)	The piece is formed by cutting the chikki into 12 equal parts	**1/12 of a whole chikki**
(b)	The piece is formed by cutting into 4 equal parts	**1/4 of a whole chikki**
(c)	The piece is formed by cutting into 8 equal parts (diagonal cut)	**1/8 of a whole chikki**
(d)	The piece is formed by cutting into 6 equal parts	**1/6 of a whole chikki**
(e)	The irregular L-shaped piece from 8 equal parts	**1/8 of a whole chikki**
(f)	The triangular piece from 6 equal parts	**1/6 of a whole chikki**
(g)	Very small square piece from 24 equal parts	**1/24 of a whole chikki**

(h)	Small triangular piece from 24 equal parts	**1/24 of a whole chikki**

7.3 MEASURING USING FRACTIONAL UNITS

Paper Folding Activity

Take a strip of paper (= 1 unit). • Fold once → 2 equal parts → each part = 1/2 • Fold again → 4 equal parts → each part = 1/4 • Fold once more → 8 equal parts → each part = 1/8 Key Idea: We can MEASURE fractional quantities using fractional units! 3/4 = 3 times 1/4 = 1/4 + 1/4 + 1/4

Counting Fractional Units (Halves Table)

Fractional Units	Value
1 time 1/2	1/2
2 times 1/2	2/2 = 1 (one whole)
3 times 1/2	3/2
4 times 1/2	4/2 = 2
5 times 1/2	5/2
6 times 1/2	6/2 = 3
7 times 1/2	7/2

Eighths Table (Paper Folded 3 Times)

Fractional Units	Value
1 time 1/8	1/8
2 times 1/8	2/8
3 times 1/8	3/8
4 times 1/8	4/8 = 1/2
5 times 1/8	5/8
6 times 1/8	6/8 = 3/4
7 times 1/8	7/8
8 times 1/8	8/8 = 1 (one whole)

Figure it Out

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Q1. Continue this table of 1/2 for 2 more steps.

Given: Table goes up to 5 times 1/2 = 5/2. We need 2 more steps.

Step 6: 1/2 + 1/2 + 1/2 + 1/2 + 1/2 + 1/2 = 6 times 1/2 = 6/2 = 3

Step 7: 1/2 + 1/2 + 1/2 + 1/2 + 1/2 + 1/2 + 1/2 = 7 times 1/2 = 7/2

Answer: 6th step: 6 times 1/2 = 6/2 = 3 7th step: 7 times 1/2 = 7/2

Q2. Can you create a similar table for 1/4?

Pattern: Each step adds one more 1/4

Table for 1/4: 1 time 1/4 = 1/4 2 times 1/4 = 2/4 = 1/2 3 times 1/4 = 3/4 4 times 1/4 = 4/4 = 1 5 times 1/4 = 5/4 6 times 1/4 = 6/4 = 3/2 ...and so on

Q3. Make 1/3 using a paper strip. Can you use this to also make 1/6?

Step 1: Fold paper into 3 equal parts → each part = 1/3

Step 2: Take ONE 1/3 part and fold it into 2 equal parts → each = 1/6

Reason: 1/3 ÷ 2 = 1/6, so folding a third in half gives a sixth

Answer: Yes! Fold the 1/3 strip in half to get 1/6 pieces.

Q4. Draw a picture and write an addition statement to show: a. 5 times 1/4 of a roti b. 9 times 1/4 of a roti

Part (a): 5 times 1/4 of a roti

Statement: 1/4 + 1/4 + 1/4 + 1/4 + 1/4 = 5/4

This equals 1 whole roti + 1/4 roti = 1(1/4) rotis

Part (a) Answer: 5 × (1/4) = 5/4 = 1(1/4) rotis

Part (b): 9 times 1/4 of a roti

Statement: 1/4 + 1/4 + 1/4 + 1/4 + 1/4 + 1/4 + 1/4 + 1/4 + 1/4 = 9/4

9/4 = 8/4 + 1/4 = 2 + 1/4 = 2(1/4) rotis

Part (b) Answer: 9 × (1/4) = 9/4 = 2(1/4) rotis

Q5. Match each fractional unit with the correct picture: 1/3, 1/5, 1/8, 1/6

Matching Rule: Count the number of equal parts the circle is divided into:

Matching Answers: 1/3 → Circle divided into 3 equal parts (1 shaded) 1/5 → Circle divided into 5 equal parts (1 shaded) 1/6 → Circle divided into 6 equal parts (1 shaded) 1/8 → Circle divided into 8 equal parts (1 shaded)

7.4 MARKING FRACTION LENGTHS ON THE NUMBER LINE

Number Line Concept

A number line shows fractions as distances from 0. • Divide the unit length (0 to 1) into equal parts based on the denominator. • Count the required number of parts from 0 to reach the fraction. Example: For 3/5: divide 0–1 into 5 equal parts, count 3 parts from 0. Fractions greater than 1 go BEYOND the point '1' on the number line.

Key Observations

- Fractions with numerator < denominator: lie BETWEEN 0 and 1
- Fractions with numerator = denominator: equal to 1 (e.g., 4/4 = 1)
- Fractions with numerator > denominator: greater than 1 (lie BEYOND 1)
- Between any two numbers on a number line, there are INFINITE fractions!

Figure it Out

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Q1. Here, the fractional unit is dividing a length of 1 unit into three equal parts. Write the fraction that gives the length of the blue line.

Given: Unit divided into 3 equal parts. Each part = 1/3. Blue line spans 2 parts.

Count: Blue line = 2 × (1/3) = 2/3

Answer: The blue line is 2/3 units long.

Q2. Here, a unit is divided into 5 equal parts. Write the fraction that gives the length of the blue lines.

Given: Unit divided into 5 equal parts. Each part = 1/5.

Blue line 1: Spans 2 parts = 2/5

Blue line 2: Spans 4 parts = 4/5

Answer: Blue line 1 = 2/5 units, Blue line 2 = 4/5 units

Q3. Now, a unit is divided into 8 equal parts. Write the appropriate fractions.

Each part: = 1/8 of a unit

Answer: The fractions are: 1/8, 2/8, 3/8, 4/8, 5/8, 6/8, 7/8, 8/8 = 1

Figure it Out

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Q1. On a number line, draw lines of lengths 1/10, 3/10, and 4/5.

Step 1: Divide the number line from 0 to 1 into 10 equal parts (each = 1/10).

Step 2: 4/5 = 8/10, so mark at 8th division.

Number Line Positions: 0 ——————————— 1 1/10 3/10 4/5=8/10
Line 1/10: mark at 1st division Line 3/10: mark at 3rd division Line 4/5 (= 8/10): mark at 8th division

Q3. How many fractions lie between 0 and 1?

Think: Between 0 and 1, we can always find more fractions by using larger denominators.

Example: Between 0 and 1: 1/2, 1/3, 1/4, 1/100, 1/1000, ...

Answer: INFINITE (uncountable) fractions lie between 0 and 1.

Q4. The blue line is 1/2 units long. Write the fraction that gives the length of the black line.

Given: Unit = 0 to 1, divided into 2 equal parts. Black line extends past 1.

Observation: Black line goes from 0 to 3/2. It spans 3 halves.

Answer: The black line is 3/2 units long.

Q5. Write the fraction that gives the lengths of the black lines in the respective boxes. (Unit divided into 5 equal parts, lines extend past 1)

Each part: = 1/5. Lines extend beyond 1 into the second unit.

Answers: Line 1 (longest): 9/5 Line 2: 8/5 Line 3: 7/5 Line 4: 6/5 (counting from 0, each line spans the given number of fifths)

7.5 MIXED FRACTIONS

Types of Fractions

PROPER FRACTION: Numerator < Denominator (e.g., 3/4, 2/5) → Lies BETWEEN 0 and 1 on number line IMPROPER FRACTION: Numerator > Denominator (e.g., 7/3, 5/2) → Greater than 1 on number line MIXED FRACTION: Whole number + Proper fraction (e.g., 2(1/3), 3(3/4)) → Another way to write improper fractions

Conversion: Improper → Mixed

Divide numerator by denominator: QUOTIENT becomes the whole number REMAINDER becomes the new numerator DENOMINATOR stays the same Example: 8/3 → 8 ÷ 3 = 2 remainder 2 → Mixed: 2(2/3)

Conversion: Mixed → Improper

Multiply whole number × denominator, then add numerator: New numerator = (Whole × Denominator) + Numerator Denominator stays the same Example: 3(1/4) → (3 × 4) + 1 = 13 → Improper: 13/4

Figure it Out

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Q1. How many whole units are there in 7/2?

Step 1: 7/2 = 1/2 + 1/2 + 1/2 + 1/2 + 1/2 + 1/2 + 1/2

Step 2: 7 ÷ 2 = 3 remainder 1, so 7/2 = 3 + 1/2 = 3(1/2)

Answer: There are 3 whole units in 7/2. (7/2 = 3½)

Q2. How many whole units are there in 4/3 and in 7/3?

For 4/3: 4 ÷ 3 = 1 remainder 1, so 4/3 = 1(1/3) → 1 whole unit

For 7/3: 7 ÷ 3 = 2 remainder 1, so 7/3 = 2(1/3) → 2 whole units

Answer: 4/3 has 1 whole unit. 7/3 has 2 whole units.

Figure it Out

Page No. 162 — Figure out whole units

Q1. Figure out the number of whole units in each of the following fractions: a. 8/3 b. 11/5 c. 9/4

Part (a): 8/3

Divide: 8 ÷ 3 = 2 with remainder 2

Mixed: 8/3 = 2(2/3) → 2 whole units

Part (b): 11/5

Divide: 11 ÷ 5 = 2 with remainder 1

Mixed: 11/5 = 2(1/5) → 2 whole units

Part (c): 9/4

Divide: 9 ÷ 4 = 2 with remainder 1

Mixed: 9/4 = 2(1/4) → 2 whole units

Answers: a. 8/3 = 2(2/3) → 2 whole units b. 11/5 = 2(1/5) → 2 whole units c. 9/4 = 2(1/4) → 2 whole units

Q2. Can all fractions greater than 1 be written as mixed numbers?

Analysis: Not all! If the numerator is an exact multiple of denominator, result is a whole number.

Example: 8/4 = 2 (a whole number, NOT a mixed number)

Answer: NO. Fractions like 8/4 = 2, 6/3 = 2 are whole numbers and cannot be written as mixed fractions.

Q3. Write the following fractions as mixed fractions: a. 9/2 b. 9/5 c. 21/19 d. 47/9 e. 12/11 f. 19/6

Fraction	Division	Mixed Number
(a) 9/2	9 ÷ 2 = 4 remainder 1	9/2 = 4(1/2)
(b) 9/5	9 ÷ 5 = 1 remainder 4	9/5 = 1(4/5)
(c) 21/19	21 ÷ 19 = 1 remainder 2	21/19 = 1(2/19)

(d) 47/9	47 ÷ 9 = 5 remainder 2	**47/9 = 5(2/9)**
(e) 12/11	12 ÷ 11 = 1 remainder 1	**12/11 = 1(1/11)**
(f) 19/6	19 ÷ 6 = 3 remainder 1	**19/6 = 3(1/6)**

Q (Page 163). Write the following mixed numbers as fractions: a. 3(1/4) b. 7(2/3) c. 9(4/9) d. 3(1/6) e. 2(3/11) f. 3(9/10)

Mixed Number	Calculation	Improper
(a) 3(1/4)	(3 × 4) + 1 = 12 + 1	**13/4**
(b) 7(2/3)	(7 × 3) + 2 = 21 + 2	**23/3**
(c) 9(4/9)	(9 × 9) + 4 = 81 + 4	**85/9**
(d) 3(1/6)	(3 × 6) + 1 = 18 + 1	**19/6**
(e) 2(3/11)	(2 × 11) + 3 = 22 + 3	**25/11**
(f) 3(9/10)	(3 × 10) + 9 = 30 + 9	**39/10**

7.6 EQUIVALENT FRACTIONS

What are Equivalent Fractions?

Fractions that represent the SAME amount or the SAME point on the number line are called EQUIVALENT FRACTIONS. Example: 1/2 = 2/4 = 3/6 = 4/8 = 5/10 = ... All these fractions represent the same share — HALF! They have different numerators and denominators but equal VALUE.

How to Find Equivalent Fractions

METHOD 1: MULTIPLY — Multiply both numerator and denominator by the SAME number 2/3 = (2×2)/(3×2) = 4/6 = (2×3)/(3×3) = 6/9 = ... METHOD 2: DIVIDE — Divide both numerator and denominator by the SAME number 12/18 = (12÷2)/(18÷2) = 6/9 = (6÷3)/(9÷3) = 2/3

Fraction Wall — Visual Understanding

The fraction wall shows that:

- 1/2 = 2/4 = 3/6 = 4/8 = 5/10 (all same length)
- 1/3 = 2/6 = 3/9 (all same length)
- 1/4 = 2/8 (same length)

Figure it Out

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Q1. Are the lengths 1/2 and 3/6 equal?

Check: 1/2 = (1×3)/(2×3) = 3/6

Answer: YES. 1/2 and 3/6 are equivalent fractions. They represent the same length.

Q2. Are 2/3 and 4/6 equivalent fractions? Why?

Check: 2/3 = (2×2)/(3×2) = 4/6

Verify: In the fraction wall, both bars have the same total length.

Answer: YES. 2/3 and 4/6 are equivalent because multiplying numerator and denominator of 2/3 by 2 gives 4/6.

Q3. How many pieces of length 1/6 will make a length of 1/2?

Find: How many sixths = one half?

Compute: 1/2 = 3/6 (multiply top and bottom by 3)

Answer: 3 pieces of length 1/6 make a length of 1/2.

Q4. How many pieces of length 1/6 will make a length of 1/3?

Find: 1/3 = ?/6

Compute: 1/3 = 2/6 (multiply top and bottom by 2)

Answer: 2 pieces of length 1/6 make a length of 1/3.

Figure it Out

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Q1. Are 3/6, 4/8, and 5/10 equivalent fractions? Why?

Simplify each:

3/6 = 1/2 (divide by 3)

4/8 = 1/2 (divide by 4)

5/10 = 1/2 (divide by 5)

Answer: YES. All three simplify to 1/2, so they are equivalent fractions. They all represent the same length in the fraction wall.

Q2. Write two equivalent fractions for 2/6.

Method 1 (divide): 2/6 ÷ 2 = 1/3

Method 2 (multiply): 2/6 × 3/3 = 6/18 OR 2/6 × 2/2 = 4/12

Answer: Two equivalent fractions for 2/6 are: 1/3 and 3/9 (Also valid: 4/12, 5/15, etc.)

Q3. 4/6 = __ = __ = __ = __ = ... (Write as many as you can)

Pattern: Multiply/divide numerator and denominator by same number:

4/6 = 2/3 = 6/9 = 8/12 = 10/15 = 12/18 = 14/21 = 16/24 = ... (infinitely many)

Figure it Out

Page No. 166 — Understanding equivalent fractions using equal shares

Q1. Three rotis are shared equally by four children. Write a fraction for how much each child gets. Also write division, addition, and multiplication facts.

Sharing: 3 rotis ÷ 4 children = 3/4 roti each

Each child gets: 3/4 roti Division fact: 3 ÷ 4 = 3/4 Addition fact: 3 = 3/4 + 3/4 + 3/4 + 3/4 Multiplication fact: 3 = 4 × (3/4)

Q2. Draw a picture to show how much each child gets when 2 rotis are shared equally by 4 children. Also write division, addition, and multiplication facts.

Sharing: 2 rotis ÷ 4 children = 2/4 = 1/2 roti each

Each child gets: 1/2 roti Division fact: 2 ÷ 4 = 2/4 = 1/2 Addition fact: 2 = 1/2 + 1/2 + 1/2 + 1/2 Multiplication fact: 2 = 4 × (1/2)

Q3. Anil was in a group where 2 cakes were divided equally among 5 children. How much cake would Anil get?

Sharing: 2 cakes ÷ 5 children = 2/5 cake each

Answer: Anil gets 2/5 of a cake.

Figure it Out

Page No. 168 — Find the missing numbers

Q1a. 5 glasses of juice shared equally among 4 friends is the same as ___ glasses of juice shared equally among 8 friends. So, 5/4 = □/8

Method: 4 × 2 = 8, so multiply numerator by 2: 5 × 2 = 10

5/4 = 10/8 → Missing number = 10

Q1b. 4 kg of potatoes divided equally in 3 bags is the same as 12 kgs of potatoes divided equally in ___ bags. So, 4/3 = 12/□

Method: 12/3 = 4, so 4 × 3 = 12; denominator must also × 3: 3 × 3 = 9

4/3 = 12/9 → Missing number = 9

Q1c. 7 rotis divided among 5 children is the same as ___ rotis divided among ___ children. So, 7/5 = □/□

Method: Multiply both by any same number, e.g., 2:

7/5 = 14/10 (multiply by 2)

7/5 = 21/15 (multiply by 3)

One answer: 7/5 = 14/10 → 14 rotis among 10 children (Many answers possible)

Figure it Out

Page No. 172 — Find equivalent fractions with same fractional units

Find equivalent fractions for each pair such that the fractional units (denominators) are the same.

Pair	Method (LCM)	Equivalent Fractions
(a) 7/2 and 3/5	LCM of 2 and 5 = 10	**35/10 and 6/10**
(b) 8/3 and 5/6	LCM of 3 and 6 = 6	**16/6 and 5/6**
(c) 3/4 and 3/5	LCM of 4 and 5 = 20	**15/20 and 12/20**
(d) 6/7 and 8/5	LCM of 7 and 5 = 35	**30/35 and 56/35**
(e) 9/4 and 5/2	LCM of 4 and 2 = 4	**9/4 and 10/4**
(f) 1/10 and 2/9	LCM of 10 and 9 = 90	**9/90 and 20/90**
(g) 8/3 and 11/4	LCM of 3 and 4 = 12	**32/12 and 33/12**
(h) 13/6 and 1/9	LCM of 6 and 9 = 18	**39/18 and 2/18**

7.7 EXPRESSING FRACTIONS IN LOWEST TERMS (SIMPLEST FORM)

What is Lowest Terms / Simplest Form?

A fraction is in LOWEST TERMS (simplest form) when: • The numerator and denominator have NO common factor other than 1 • The fraction cannot be reduced further HOW TO REDUCE: Divide both numerator and denominator by their HCF (Highest Common Factor) Example: 16/20 → HCF(16,20) = 4 → 16÷4 / 20÷4 = 4/5 ✓

WORKED EXAMPLE: Reduce 36/60 to lowest terms

Step 1: Both 36 and 60 are even → divide by 2: 36/60 = 18/30

Step 2: Both 18 and 30 are even → divide by 2: 18/30 = 9/15

Step 3: 9 and 15 are both multiples of 3 → divide by 3: 9/15 = 3/5

Check: HCF(3,5) = 1 ✓ → Cannot reduce further

36/60 = 3/5 (lowest terms) Alternate Method: HCF(36,60) = 12 → 36÷12/60÷12 = 3/5 (same answer in one step!)

Figure it Out

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Express the following fractions in lowest terms: a. 17/51 b. 64/144 c. 126/147 d. 525/112

Fraction	HCF	Division	Answer
(a) 17/51	HCF(17,51) = 17	17÷17 / 51÷17	**1/3**
(b) 64/144	HCF(64,144) = 16	64÷16 / 144÷16	**4/9**
(c) 126/147	HCF(126,147) = 21	126÷21 / 147÷21	**6/7**
(d) 525/112	HCF(525,112) = 7	525÷7 / 112÷7	**75/16**

7.8 COMPARING FRACTIONS

Steps to Compare Fractions

STEP 1: Find equivalent fractions with the SAME DENOMINATOR (use LCM of denominators) STEP 2: Compare the NUMERATORS — larger numerator = larger fraction Quick comparison rules: • Same denominator: compare numerators directly • Same numerator: larger denominator = smaller fraction • Different both: find LCM of denominators first

WORKED EXAMPLE: Compare 4/5 and 7/9

Step 1: LCM of 5 and 9 = 45

Step 2: 4/5 = (4×9)/(5×9) = 36/45

Step 3: 7/9 = (7×5)/(9×5) = 35/45

Step 4: Compare: 36/45 vs 35/45 → 36 > 35

4/5 > 7/9

Figure it Out

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Q1. Compare the following fractions: a. 8/3, 5/2 b. 4/9, 3/7 c. 7/10, 9/14 d. 12/5, 8/5 e. 9/4, 5/2

Fractions	LCM Method	Compare	Result
(a) 8/3 vs 5/2	LCM(3,2)=6; 16/6 vs 15/6	16 > 15	**8/3 > 5/2**
(b) 4/9 vs 3/7	LCM(9,7)=63; 28/63 vs 27/63	28 > 27	**4/9 > 3/7**
(c) 7/10 vs 9/14	LCM(10,14)=70; 49/70 vs 45/70	49 > 45	**7/10 > 9/14**
(d) 12/5 vs 8/5	Same denominator (5)	12 > 8	**12/5 > 8/5**
(e) 9/4 vs 5/2	LCM(4,2)=4; 9/4 vs 10/4	9 < 10	**9/4 < 5/2**

Q2. Write the following fractions in ascending order: a. 7/10, 11/15, 2/5 b. 19/24, 5/6, 7/12

Part (a): 7/10, 11/15, 2/5

Step 1: LCM(10, 15, 5) = 30

Convert: 7/10 = 21/30, 11/15 = 22/30, 2/5 = 12/30

Compare: 12 < 21 < 22

Part (a) Ascending: 2/5 < 7/10 < 11/15

Part (b): 19/24, 5/6, 7/12

Step 1: LCM(24, 6, 12) = 24

Convert: 19/24 = 19/24, 5/6 = 20/24, 7/12 = 14/24

Compare: 14 < 19 < 20

Part (b) Ascending: 7/12 < 19/24 < 5/6

Q3. Write the following fractions in descending order: a. 25/16, 7/8, 13/4, 17/32 b. 3/4, 12/5, 7/12, 5/4

Part (a): 25/16, 7/8, 13/4, 17/32

Step 1: LCM(16, 8, 4, 32) = 32

Convert: 25/16 = 50/32, 7/8 = 28/32, 13/4 = 104/32, 17/32 = 17/32

Compare: 104 > 50 > 28 > 17

Part (a) Descending: 13/4 > 25/16 > 7/8 > 17/32

Part (b): 3/4, 12/5, 7/12, 5/4

Step 1: LCM(4, 5, 12, 4) = 60

Convert: 3/4 = 45/60, 12/5 = 144/60, 7/12 = 35/60, 5/4 = 75/60

Compare: 144 > 75 > 45 > 35

Part (b) Descending: 12/5 > 5/4 > 3/4 > 7/12

7.8 ADDITION AND SUBTRACTION OF FRACTIONS

Brahmagupta's Method (628 CE, India)

This method — still used today — was first described by the Indian mathematician Brahmagupta. For ADDITION: 1. Convert fractions to have the SAME denominator (LCM method) 2. Add the numerators, keep the denominator 3. Simplify to lowest terms if needed For SUBTRACTION: Same steps 1-3, but SUBTRACT the numerators in step 2

Case 1: Same Denominators

When fractions have the same denominator, simply add/subtract the numerators.

Example: 2/5 + 1/5 = 3/5 | 4/7 + 6/7 = 10/7 = 1(3/7)

Example: 6/7 − 4/7 = 2/7

Case 2: Different Denominators

Find LCM of denominators, convert to equivalent fractions, then add/subtract.

EXAMPLE: Find sum of 1/4 and 1/3

Step 1: LCM(4, 3) = 12

Step 2: 1/4 = 3/12 and 1/3 = 4/12

Step 3: 3/12 + 4/12 = 7/12

1/4 + 1/3 = 7/12

EXAMPLE: Find sum of 2/3 and 1/5

Step 1: LCM(3, 5) = 15

Step 2: 2/3 = 10/15 and 1/5 = 3/15
Step 3: 10/15 + 3/15 = 13/15

2/3 + 1/5 = 13/15

EXAMPLE: Subtraction — 3/4 − 2/3

Step 1: LCM(4, 3) = 12
Step 2: 3/4 = 9/12 and 2/3 = 8/12
Step 3: 9/12 − 8/12 = 1/12

3/4 − 2/3 = 1/12

Figure it Out

Page No. 181 — Same denominator subtraction

Q1. 5/8 − 3/8
Same denom.: Subtract numerators: 5 − 3 = 2

5/8 − 3/8 = 2/8 = 1/4 (in lowest terms)

Q2. 7/9 − 5/9
Same denom.: Subtract numerators: 7 − 5 = 2

7/9 − 5/9 = 2/9

Q3. 10/27 − 1/27
Same denom.: Subtract numerators: 10 − 1 = 9

10/27 − 1/27 = 9/27 = 1/3 (in lowest terms)

Figure it Out

Page No. 179 — Addition using Brahmagupta's method

Q1. Add using Brahmagupta's method:

Expression	Working	Answer
(a) 2/7 + 5/7 + 6/7	Same denom.; 2+5+6=13	**13/7**
(b) 3/4 + 1/3	LCM=12; 9/12+4/12	**13/12**
(c) 2/3 + 5/6	LCM=6; 4/6+5/6	**9/6 = 3/2**
(d) 2/3 + 2/7	LCM=21; 14/21+6/21	**20/21**
(e) 3/4 + 1/3 + 1/5	LCM=60; 45/60+20/60+12/60	**77/60**
(f) 2/3 + 4/5	LCM=15; 10/15+12/15	**22/15**
(g) 4/5 + 2/3	LCM=15; 12/15+10/15	**22/15**

(h) 3/5 + 5/8	LCM=40; 24/40+25/40	**49/40**
(i) 9/2 + 5/4	LCM=4; 18/4+5/4	**23/4**
(j) 8/3 + 2/7	LCM=21; 56/21+6/21	**62/21**
(k) 3/4 + 1/3 + 1/5	LCM=60; 45+20+12	**77/60**
(l) 2/3 + 4/5 + 3/7	LCM=105; 70+84+45	**199/105**
(m) 9/2 + 5/4 + 7/6	LCM=12; 54+15+14	**83/12**

Q2. Rahim mixes 2/3 litres of yellow paint with 3/4 litres of blue paint. What is the volume of green paint?

Given: Yellow = 2/3 L, Blue = 3/4 L

Step 1: LCM(3, 4) = 12

Step 2: 2/3 = 8/12 and 3/4 = 9/12

Step 3: Total = 8/12 + 9/12 = 17/12 = 1(5/12) litres

Volume of green paint = 17/12 litres = 1(5/12) litres

Q3. Geeta bought 2/5 m of lace and Shamim bought 3/4 m of lace for a border of 1 m. Find total lace. Is it sufficient?

Given: Geeta = 2/5 m, Shamim = 3/4 m, Border needed = 1 m

Step 1: LCM(5, 4) = 20

Step 2: 2/5 = 8/20 and 3/4 = 15/20

Step 3: Total = 8/20 + 15/20 = 23/20 = 1(3/20) m

Total lace = 23/20 m = 1(3/20) m YES, the lace is SUFFICIENT since 1(3/20) > 1 m.

Figure it Out

Page No. 182 — Subtraction using Brahmagupta's method

Q1. Carry out the following subtractions: a. 8/15 − 3/15 b. 2/5 − 4/15 c. 5/6 − 4/9 d. 2/3 − 1/2

Expression	Working	Answer
(a) 8/15 − 3/15	Same denom.; 8−3=5	**5/15 = 1/3**
(b) 2/5 − 4/15	LCM=15; 6/15−4/15	**2/15**
(c) 5/6 − 4/9	LCM=18; 15/18−8/18	**7/18**
(d) 2/3 − 1/2	LCM=6; 4/6−3/6	**1/6**

Q2. Subtract as indicated: a. 13/4 from 10/3 b. 18/5 from 23/3 c. 29/7 from 45/7

Part (a): 10/3 − 13/4

LCM: LCM(3,4) = 12

Convert: 10/3 = 40/12, 13/4 = 39/12

Subtract: 40/12 − 39/12 = 1/12

(a) 10/3 − 13/4 = 1/12

Part (b): 23/3 − 18/5

LCM: LCM(3,5) = 15

Convert: 23/3 = 115/15, 18/5 = 54/15

Subtract: 115/15 − 54/15 = 61/15

(b) 23/3 − 18/5 = 61/15 = 4(1/15)

Part (c): 45/7 − 29/7

Same denom.: 45 − 29 = 16

(c) 45/7 − 29/7 = 16/7 = 2(2/7)

Q3a. Jaya's school is 7/10 km from home. She takes auto for 1/2 km. How much does she walk?

Given: Total = 7/10 km, Auto = 1/2 km

Step 1: LCM(10, 2) = 10

Step 2: 1/2 = 5/10

Step 3: Walking = 7/10 − 5/10 = 2/10 = 1/5 km

Jaya walks 1/5 km (= 0.2 km = 200 metres) daily.

Q3b. Jeevika takes 10/3 minutes and Namit takes 13/4 minutes for a park round. Who takes less time? By how much?

Compare: LCM(3,4) = 12

Convert: 10/3 = 40/12, 13/4 = 39/12

Compare: 40/12 > 39/12 → Namit takes LESS time

Difference: 40/12 − 39/12 = 1/12 minutes

Namit takes less time. Namit is faster by 1/12 minutes.

CHAPTER 7 — SUMMARY

CONCEPT	SUMMARY
Fraction as Equal Share	When a whole is divided equally, each part is a fraction.
Fractional Unit	One equal part of a whole unit (e.g., 1/3, 1/5, 1/8)
Unit Fraction Rule	1/5 > 1/9 — larger denominator means smaller fraction
Numerator	Top number — how many parts we have
Denominator	Bottom number — total equal parts the whole is divided into
Mixed Fraction	Whole number + proper fraction (e.g., 2¾)
Improper Fraction	Numerator > Denominator (e.g., 7/3)
Equivalent Fractions	Same value, different numbers (e.g., 1/2 = 2/4 = 3/6)
Simplest Form	HCF of numerator and denominator = 1
Comparing Fractions	Find LCM of denominators, compare numerators
Brahmagupta's Addition	Same denom: add numerators. Different: find LCM first.
Brahmagupta's Subtraction	Same denom: subtract numerators. Different: find LCM first.