

1

FRACTIONS IN DISGUISE

SUMMARY OF CONCEPTS & DEFINITIONS



1. UNDERSTANDING PERCENTAGES

- The symbol '%' is read as per cent.
- 'Per cent' comes from the Latin "per centum", meaning "by the hundred" or "out of hundred".
- z% means z out of every 100.

Key Idea

$$z\% \text{ of a quantity } s = \frac{z}{100} \times s$$

Example: 50% of $s = \frac{50}{100} \times s = \frac{1}{2}s$

Percentages are fractions with denominator 100.

Examples:

$$20\% = \frac{20}{100} = \frac{2}{10} = \frac{1}{5}$$

$$33\% = \frac{33}{100}$$



Percentages help us express parts of a whole in a common and easy-to-understand form.

3. RATIOS

A ratio compares two quantities of the same kind. Written as $a : b$ and read as "a is to b".

- a and b are the terms of the ratio.
- In $a : b$, for every ' a ' units of the first quantity, there are ' b ' units of the second quantity.

Ratio of width : height

$$\text{Image A} = 60 : 40$$

$$\text{Image C} = 30 : 20$$

$$\text{Image D} = 90 : 60$$

Example

In image A:
For every 60 mm of width,
there are 40 mm of height.



2. OBSERVING SIMILARITY IN CHANGE

Digital images can be resized (changed in size or orientation). Some images look similar, while others look different.



Image A



Image B



Image C



Image D



Image E

Measurements (in mm)

Image	Width	Height
Image A	60	40
Image B	40	20
Image C	30	20
Image D	90	60
Image E	60	60

- Images A, C and D look similar. Their widths and heights change by the same factor (through multiplication).
- Images B and E look different. Their widths and heights do not change by the same factor.

If width and height change by the same factor, the images look similar. Such changes are **PROPORTIONAL**.

4. RATIOS IN THEIR SIMPLEST FORM

Two ratios are **PROPORTIONAL** if their simplest forms are the same. To get simplest form → divide both terms by their HCF.

Image	Ratio (W : H)	HCF	Simplest Form
A	60 : 40	20	3 : 2
B	40 : 20	20	2 : 1
C	30 : 20	10	3 : 2
D	90 : 60	30	3 : 2
E	60 : 60	60	1 : 1

Images A, C and D have the same simplest form (3 : 2). So, their ratios are proportional.

Images B and E have different simplest forms → not proportional to A, C and D.

Use ':' to show proportional ratios.

Example: $60 : 40 :: 30 : 20$ and $60 : 40 :: 90 : 60$

5. INCREMENTS IN PRODUCTS (USING DISTRIBUTIVITY)

Let the initial two numbers be a and b (product = ab).

Distributive Property

$$a(b + c) = ab + ac$$

$$(a + b)c = ac + bc$$

- 1 If second number b is increased by 1:

$$a(b + 1) = ab + a$$

$$\text{Increase} = a$$

- 2 If first number a is increased by 1:

$$(a + 1)b = ab + b$$

$$\text{Increase} = b$$

- 3 If both a and b are increased by 1:

$$(a + 1)(b + 1) = ab + (a + b + 1)$$

$$\text{Increase} = a + b + 1$$

- 4 If a is increased by 1 and b is decreased by 1:

$$(a + 1)(b - 1) = ab + b - a - 1$$

$$\text{Increase} = b - a - 1$$

General Case

If a is increased by m and b by n :

$$(a + m)(b + n) = ab + mb + an + mn$$

$$\text{Increase} = an + bm + mn$$

(Identity 1)

	b columns	n columns
a rows	ab	an
m rows	mb	mn

Product = sum of products of each term of $(a + m)$ with each term of $(b + n)$.

6. EXPRESSING FRACTIONS AS PERCENTAGES

To express a fraction as a percentage, make the denominator 100.

Example: $\frac{3}{4}$

Method 1: $\frac{3}{4} = \frac{3 \times 25}{4 \times 25} = \frac{75}{100} = 75\%$

Method 2: $\frac{3}{4} = \frac{x}{100}$
 $\Rightarrow x = \frac{3}{4} \times 100 = 75$

Method 3 (Bar Model):
 Multiply $\frac{3}{4}$ of 100 = $\frac{3}{4} \times 100 = 75$

Other Example: $\frac{2}{5}$

Method 1: $\frac{2}{5} = \frac{2 \times 20}{5 \times 20} = \frac{40}{100} = 40\%$

Method 2: $\frac{2}{5} = \frac{x}{100}$
 $\Rightarrow x = \frac{2}{5} \times 100 = 40$

Method 3 (Bar Model):
 Multiply $\frac{2}{5}$ of 100 = $\frac{2}{5} \times 100 = 40$



A fraction is of a unit, while a percentage is per 100. So, Fraction → Percentage = $\times 100$.

7. EXPRESSING PERCENTAGES AS FRACTIONS

A percentage $z\%$ is the same as $\frac{z}{100}$.

Example: $24\% = \frac{24}{100}$

Equivalent forms:

$$\frac{24}{100} = \frac{12}{50} = \frac{6}{25} = \frac{48}{200}$$

In general, $z\%$ can be expressed

by any fraction equivalent to $\frac{z}{100}$.

8. WHY USE PERCENTAGES?

- Same information in fractions may not be easy to compare.
- Percentages make comparison quicker and clearer.

Example:

$$\frac{9}{34} = 26.47\% \quad \text{vs} \quad \frac{13}{45} = 28.88\%$$

It is easier to see that 28.88% is larger!



KEY TAKEAWAYS

- ✓ Percent means "out of 100".
- ✓ Fractions ↔ Percentages ($\times 100$ or $\div 100$).
- ✓ Ratios compare two quantities.

- ✓ Ratios in simplest form tell if they are proportional.
- ✓ Same factor change in dimensions ⇒ proportional change.
- ✓ Distributive property helps in understanding change in products.



MCQs (Part-2) ($10 \times 1 = 10$ marks)

11. 40 is what % of 50
(a) 30% (b) 40% (c) 50% (d) 80%
12. 0.24 when changed to percent-
(a) 24 % (b) 240% (c) 2.4 % (d) 20%
- 13.. $23\% + 64\% + x\% = 100\%$, here x will be
(a) 10% (b) 15 % (c) 20% (d) 100%
14. S.p. = Rs. 785, loss = Rs. 52, cost price is
(a) 833 (b) 733 (c) 700 (d) 737
- 15.. 30% of 3 hours is ____ min
(a) 34 (b) 40 (c) 54 (d) 60
16. A fruit seller buys 80 apples. He finds that 12 apples are spoiled before selling. What percentage of the apples are still good?
(a) 12% (b) 15% (c) 85% (d) 88%
17. A school library has 240 books. During a book donation drive, the number of books increases by 25%. How many books are there now?
(a) 260 (b) 280 (c) 300 (d) 320
18. A jacket marked at ₹2400 is sold after a 15% discount. The customer pays
(a) ₹2040 (b) ₹2100 (c) ₹2160 (d) ₹2200
19. Ravi deposits ₹10,000 in a bank that offers 10% interest per year compounded annually. What will be the amount after 2 years?
(a) ₹11,000 (b) ₹12,000 (c) ₹12,100 (d) ₹12,200
20. A student scored 72 marks out of 90 in Mathematics and 64 marks out of 80 in Science. Which statement is correct?
(a) The student performed better in Mathematics. (b) The student performed better in Science.
(c) The performance is the same in both subjects. (d) It cannot be compared.

WORKSHEET-2

Section B: Short Answer ($10 \times 2 = 20$ marks)

1. Convert 145% into a fraction in simplest form.

2. Convert (a) 0.6 (b) 2.23 into a percentage.

3. If 5% of x is ₹ 80, find x ?

4. A class has 40 students, out of which 8 are absent. What percentage of students are absent?

5. The article is Sold at loss of 15% On cost price of 1000, what is the S.P. ?

6. A product costs ₹500. If its price is increased by 10%, what is the increase in price and new price?

7. How much Simple Interest on a Principal of Rs 5000 at 5% p.a. will be collected for 3 years?

8.A school has 600 students, of whom 54% are girls. Find the number of girls.

9.The population of a village increased from 4000 to 4600. Find the percentage increase.

10.In a school of 800 students, 50.00 students use school bus. What percentage of students don't come by bus ?

Section C: Short Answer ($6 \times 3 = 18$ marks)

11.A library has 500 books. If 150 books are issued to students,.How many and what percentage of the books are still available in the library?

12.In a test, Riya scored 80% marks out of 500 and Rehana scored 75% marks out of 600.Find their scores and compare them.

13.A shirt costing ₹1200 is sold at a discount of 15%. Find the discount amount and its S.P.

14. In a school, there are 800 students. If 55% are boys:

a. Find the number of boys.

b. Find the number of girls.

15. The price of a bicycle decreased from ₹8000 to ₹7200. Find the percentage decrease. After one year again the price was up by 15%, now what is the new price?

16. Calculate the simple Interest and amount on 3500 at the rate of 2.5% per annum For 4 years.

Section D: Long Answer ($4 \times 5 = 20$ marks)

17. In a survey of 120 students: 45% preferred football, 35% preferred cricket and the remaining preferred badminton. Find the number of students who preferred each sport.

18. During a sale, a customer receives a 25% discount on an item marked ₹ 3000 or above and 15% off on articles priced between 2000 to 3000. If Nafisa purchased one article for rupees 2800 and other for 3400, then how much total amount after discount she gained ?

19. A water tank contains 800 litres of water. If 15% of the water is used:

- a. How much water is used? b. How much water remains?

20. In a local library, 40% of the total books are on Fiction, 35% books are on Science, and the rest are on History. If the total number of History books is 2,340, calculate:

The total number of books in the library and the number of Fiction books in the library.

Case Study Based Questions ($2 \times 4 = 8$ marks)

21. An electronics dealer bought a smartphone for ₹12,000 and spent ₹500 on its transport and handling. He then sold it for ₹14,375. Calculate his profit or loss percentage.

22. A bakery called Cakely is offering a 30% + 20% discount on all cakes. Another bakery called Cakify is offering a 50% discount on all cakes. Would you rather choose Cakely or Cakify if you want the cheaper cost. Ramandeep wants to buy a cake worth ₹ 400. Check offers given by both bakeries, and find which deal is better ?

Self Assessment:

I understood all the concepts: ☐ Yes ☐ No

I need more practice: ☐ Yes ☐ No

Name of Concepts having doubts/Not Cleared: _____

Parent's Assessment:

My ward understood all the concepts: ☐ Yes ☐ No

He/She need more practice: ☐ Yes ☐ No

Name of Concepts having doubts/Not Cleared: _____

Signature of Parent:

Teacher's Assessment

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Answers of Worksheet-1:

Q	1	2	3	4	5	6	7	8	9	10
Ans	c	b	b	d	a	b	c	b	c	d
Q	11	12	13	14	15	16	17	18	19	20
Ans	d	a	b	d	c	c	c	a	c	c

Answers of Worksheet-2:

Q	1	2	3	4	5	6
Ans	29/20	60%, 223%	1600	20%	850	50
Q	7	8	9	10	11	12
Ans	750	324	15%	12.5%	350, 70%	400; 450
Q	13	14	15	16	17	18
Ans	180, 1028	440 boys	10%, 8280	350, 3850	54; 42; 24	4930; 1270
Q	19	20	21	22		
Ans	120 L 680 L	9360; 3744	15%	224; 200		