

CHAPTER-8

COMPARING QUANTITIES

STD-7
MATHEMATICS
(NCERT TEXTBOOK)

*“THE ONLY WAY TO LEARN MATHEMATICS IS
TO DO MATHEMATICS.”*

PAUL HALMOS

LEARNING OUTCOMES:

- *To acquire conceptual understanding on comparing quantities.*
- *To do drill on the topics involved through varied illustrations.*
- *To get acquainted with application of the concepts in day-to-day life situations.*

HIGHLIGHTS OF THE CHAPTER:

- *EQUIVALENT RATIOS*
- *PERCENTAGE - ANOTHER WAY OF COMPARING QUANTITIES*
- *USE OF PERCENTAGES*
- *PRICES RELATED TO AN ITEM*
- *SIMPLE INTEREST & AMOUNT*

LEARNING OBJECTIVES:

- *To determine the required ratio, proportion of given quantities.*
- *To examine whether the given four numbers are in proportion or not.*
- *To solve simple problems by using unitary method.*
- *To illustrate the meaning of percentage.*
- *To convert fractions & decimals into percentages.*
- *To convert percentages into fractions or decimals.*
- *To find percentage of a number & vice-versa.*
- *To express ratios to percents.*

- To determine **profit** or **loss**.
- To determine **profit percent** or **loss percent**.
- To determine **selling price** (or **cost price**) when **cost price** (or **selling price**) & **profit** or **loss percent** are given.
- To calculate **Simple Interest & Amount** on money borrowed.

COMPARING QUANTITIES

COMPARISON BY DIFFERENCE

(to see how much more or less is one quantity than other)

COMPARISON BY DIVISION

(to see how many times is one quantity than other)

* RATIO is the comparison by division of two quantities of same kind and in same units.

* The ratio a is to b is the fraction & can be written as $a:b$.

* The ratio $a:b$ is said to be in the lowest terms or simplest form if HCF of a & b is 1.

* EQUIVALENT RATIO is obtained by multiplying or dividing the numerator & denominator of a given ratio by the same number

EX-1: Find the ratio of 3 km to 300 m.

Ans: As, 3 km = 3×1000 m = 3000 m

So, 3 km to 300 m

$$= 3000 \text{ m} : 300 \text{ m}$$

$$= \frac{3000 \text{ m}}{300 \text{ m}}$$

$$= \frac{3000 \text{ m} \div 300 \text{ m}}{300 \text{ m} \div 300 \text{ m}}$$

$$= \frac{10}{1}$$

$$= 10:1 \text{ (Simplest form)}$$

EX-2: Find two equivalents of $12:8$.

$$\text{Ans: } 12:8 = \frac{12}{8} = \frac{12 \div 4}{8 \div 4} = \frac{3}{2} = 3:2$$

$$12:8 = \frac{12}{8} = \frac{12 \times 2}{8 \times 2} = \frac{24}{16} = 24:16$$

Here, $12:8 = 3:2 = 24:16$ (Equivalent fractions)

**COMPARISON OF RATIOS can be done by expressing each of them in simplest form & then comparing these fractions by making their denominators equal.*

EX-3: Compare $5:12$ & $3:5$

Ans: As, $5:12 = \frac{5}{12} = \frac{5 \times 5}{12 \times 5} = \frac{25}{60}$

[LCM of 12 & 5 = $12 \times 5 = 60$]

& $3:5 = \frac{3}{5} = \frac{3 \times 12}{5 \times 12} = \frac{36}{60}$

Clearly, $36 > 25$

So, $\frac{36}{60} > \frac{25}{60}$

Hence, $3:5 > 5:12$

- * PROPORTION is an equality of two ratios.
- * Four quantities a, b, c, d are said to be in proportion if $a : b = c : d$.
- * We can write it as $a : b :: c : d$.

EX-4: A map is given with a scale of $2 \text{ cm} = 1000 \text{ km}$. What is the actual distance between the two places in km, if the distance in the map is 2.5 cm ?

Ans: (Keeping things in proportion & getting solution)

Let, required distance be ' x ' km.

Then, $1000 : x = 2 : 25$

$$\frac{1000}{x} = \frac{2}{25}$$

$$\frac{1000}{x} \times 2.5 = \frac{2}{2.5} \times 2.5$$

$$1000 \times 2.5 = 2 \times x$$

So, $x = 1250 \text{ km}$

Hence, actual distance between the two places is 1250 km .

*In UNITARY METHOD we first find the value of one unit & then the value of required number of units.

EX-5: In a computer lab, there are 3 computers for every 6 students. How many computers will be needed for 24 students?

Ans: (Unitary Method)

NUMBER OF STUDENTS	NUMBER OF COMPUTERS
6	3
1	$\frac{3}{6}$
24	$\frac{3}{6} \times 24 = 3 \times 4 = 12$

Hence, 24 students will need 12 computers.

***PERCENTAGES are numerators of fractions with denominator 100.**

***Percent means per hundred.**

i. When we convert a fraction into percentage, we multiply the fraction by 100 & put the percent sign(%).

EX-6: $\frac{1}{8} = \frac{1}{8} \times 100\% = \frac{100}{8}\% = \frac{25}{2}\% = 12.5\%$

ii. When we convert a decimal into percentage, we multiply the decimal by 100 & put the percent sign(%).

EX-7: $0.56 \times 100\% = (0.56 \times 100)\% = 56\%$

iii. When we convert a percentage into fraction, we divide it by 100 & omit the percent sign(%).

EX-8: $45\% = \frac{45}{100} = \frac{9}{20}$

iv. When we convert a percentage into decimal, we first convert it into fraction & then put it into decimal form.

EX-9: $6\% = \frac{6}{100} = 0.06$

v. Converting percentage to 'How many'.

EX-10: A local cricket team played 20 matches in a season. It won 25% of them. How many matches did they win?

Ans: As, 25% of 20 = $\frac{25}{100} \times 20 = \frac{25}{5} = 5$

So, they won 5 matches.

vi. When we convert ratio into percentage, we will first convert it into fraction, then multiply by 100 & put the percent sign(%).

EX-11: Ratio = 3 : 1

Total parts = $3 + 1 = 4$

Required fractions are $\frac{3}{4}$ & $\frac{1}{4}$

Here, $\frac{3}{4} = (\frac{3}{4} \times 100)\% = (3 \times 25)\% = 75\%$

& $\frac{1}{4} = (\frac{1}{4} \times 100)\% = (1 \times 25)\% = 25\%$

vii. Increase or Decrease as percentage.

$$\text{Percentage Increase/Decrease} = \frac{\text{Amount of change}}{\text{Original Amount}} \times 100$$

EX-12: Marks in a test increased from 20 to 30.

$$\text{Percentage increase in marks} = \frac{30-20}{20} \times 100 = \frac{10}{20} \times 100 = 50$$

viii. Profit or Loss as percentage.

***COST PRICE(C.P.) is the price at which an article is purchased.**

***SELLING PRICE(S.P.) is the price at which an article is sold.**

***PROFIT (P) is when selling price is more than cost price.**

$$\text{*Profit} = \text{S.P.} - \text{C.P.}$$

$$\text{*Profit percent} = \frac{P}{\text{C.P.}} \times 100$$

***LOSS(L) is selling price is less than cost price.**

$$\text{*Loss} = \text{C.P.} - \text{S.P.}$$

$$\text{*Loss percent} = \frac{L}{\text{C.P.}} \times 100$$

EX-13: An article was purchased for ₹500 & sold for ₹550. Find the gain & gain percent.

Ans: C.P. = ₹500 & S.P. = ₹550

As, $S.P. > C.P.$

$$\text{So, } P = S.P. - C.P. = ₹550 - ₹500 = ₹50$$

$$\text{Hence, } P\% = \frac{P}{C.P.} \times 100 = \frac{50}{500} \times 100 = 10\%$$

EX-14: Juhi sells a washing machine for ₹13,500. She loses 20% in the bargain. What was the price at which she bought it?

Ans: $L\% = 20\%$

C.P. (₹)	S.P. (₹)
100	$100 - 20 = 80$
x	13,500

$$X \times 80 = 13,500 \times 100$$

$$X = \frac{13,500 \times 100}{80} = ₹ 16,875 \text{ (COST PRICE)}$$

***PRINCIPAL (P) is the money borrowed.**

***SIMPLE INTEREST (I) is calculated on the original principal throughout the loan period(T).**

***The interest is the extra money usually a percentage of the borrowed money.**

***The interest paid on ₹100 for 1 year is called rate percent per annum(R).**

***AMOUNT (A) is the sum of money borrowed and the interest.**

$$* I = \frac{P \times R \times T}{100}$$

$$* A = P + I$$

EX-15: Find the amount to be paid at the end of 3 years on ₹7,500 at 5%p.a.

Ans: $P = ₹7,500$, $R = 5\% \text{p.a.}$, $T = 3 \text{ years}$

$$I = \frac{P \times R \times T}{100} = \frac{₹7500 \times 5 \times 3}{100} = ₹1,125$$

$$A = P + I = ₹7,500 + ₹1,125 = ₹8,625$$

EX-16: What rate gives ₹280 as interest on a sum of ₹56,000 in 2 years?

Ans: $P = ₹56,000$, $I = ₹280$, $T = 2 \text{ years}$

$$I = \frac{P \times R \times T}{100}$$

$$₹280 = \frac{₹56,000 \times R \times 2}{100}$$

$$R = \frac{₹280 \times 100}{₹56,000 \times 2} = \frac{1}{4}\% = 0.25\%$$

THANK YOU