By. Er. Dharmendra Sir 7974073108, 9584873492

DPM CLASSES

6th to 10th (Math's & Science), 11th & 12th (Physics, Chemistry, Math's)

BASIC NOTES (CBSE/NCERT)

COMPARING QUANTITIES

PART -1 OUT OF 1

6^{th}, 7^{th} & 8^{th}

JOIN TODAY FOR ADVANCE CONCEPTS

ONLY IN ₹1000 PER MONTH

MRP: ₹ 100/- ONLY

ALSO, BASIC CONCEPTS CLASSES IN SUMMER VACATION Apr, May & Jun (Every Year)

Add: Block -B, Near Glory Villa, 60 feet Road (Nearest land mark Scindia Statue), Shatabdipuram, Gwalior

—: Comparing Quantities :—

Q. Ratio :- We Compared the two quantities in term of "How many times". this Comparison is known as the ratio. We denote ratio using Symbol ":"

Q. Two quantities can be Compared only if they are in the same unit.

Q. Same ratio in different situations is called Equivalent ratios.

Q. We can get Equivalent ratio by multiplying or dividing the numerator and denominator by the same number.

Q. proportion : If two ratios are equal, We say that they are in proportion and use the Symbol "::" or "=" to equate the two ratios.

Q. Unitary method :- The method in which first we find the value of one unit and then the value of required number of units is known as unitary method.

Q. Meaning of percentage : percent is derived from Latin word "per centum" meaning "per hundred".
Percentages are numerators of fractions with denominator 100

$$100\% = \frac{100}{100}, \quad 10\% = \frac{10}{100} \text{ etc } \left[\% = \frac{1}{100}\right]$$

:- Comparing quantities :-

Q. Converting fractional numbers to percentage :-

Ex - Write $\frac{1}{3}$ as percent. (proper fraction)

Sol. $\frac{1}{3} = \frac{1}{3} \times \frac{100}{100} = \frac{1}{3} \times 100\%$

$= 33\frac{1}{3}\%$

Ex - Convert $\frac{5}{4}$ to percent :

Sol. $= \frac{5}{4} \times 100^{25}\%$

$= 5 \times 25\%$

$= 125\%$

Q. Converting Decimal to percentage :-

Ex - Convert 0.09 to percent.

Sol. $0.09 = \frac{0.09}{100} = \frac{9}{100} = 9\%$ $\left[\frac{1}{100} = \%\right]$

Ex - Convert 0.2 to percent

Sol. $0.2 = \frac{0.2}{10} = \frac{2}{100} \times 100\%$

$= 2 \times 10\%$

$= 20\%$

:- Comparing quantities :-

(3). Interpreting percentages :-

Ex - 5% of the income is saved by Ravi.

Sol. by 5% We mean 5 parts out of 100 or We write $\frac{5}{100}$.

it means Ravi is saving ₹ 5 out of every ₹ 100 that he earn.

(4). Converting percentages to "How many" :-

Ex - A Survey of 40 Students showed that 25% like playing foot ball. How many students liked playing football ?

Sol. $= 25\% \text{ of } 40 \quad \left[\% = \frac{1}{100}, \text{ of} = \times\right]$

$= \frac{25^{5}}{\cancel{100}_{\cancel{20}}} \times \cancel{40}^{2}$

$= 10$

Hence, No. of Students like football are 10.

Ex - Rahul bought a Sweater and saved ₹ 200 when a discount of 25% was given. What was the price of the Sweater before discount ?

Sol. Let the price is x

$25\% \text{ of } x = 200$

$\frac{25}{100} \times x = 200$

$x = 200 \times \frac{\cancel{100}^{4}}{\cancel{25}}$

$x = ₹800$

Hence, price is ₹ 800.

₹ 25 is saved for every ₹ 100

Amt for which ₹ 200 is saved

$\frac{100}{25} \times 200 = ₹800$

Note: ₹ 25 Saved = ₹ 100

₹ 1 Saved = ₹ $\frac{100}{25}$

₹ 200 Saved = ₹ $\frac{100}{25} \times 200$

-: Comparing quantities :-

②. Ratio to percents :-

EX- If ₹250 is to be divided amongst Ravi, Raju, and Roy, So that Ravi gets 2 parts, Raju three parts and Roy five parts. How much money will get each ? What will it be in percentages ?

Sol. Parts of three boys 2 : 3 : 5

Total of the parts is 2+3+5 = 10

Amt Recived by each

Ravi = $\frac{2}{10} \times 250 = 2 \times 25 = ₹50$

Raju = $\frac{3}{10} \times 250 = 3 \times 25 = ₹75$

Roy = $\frac{5}{10} \times 250 = 5 \times 25 = ₹125$

Percentage of money for each

Ravi = $\frac{2}{10} \times 100\% = 2 \times 10 = 20\%$

Raju = $\frac{3}{10} \times 100\% = 3 \times 10 = 30\%$

Roy = $\frac{5}{10} \times 100\% = 5 \times 10 = 50\%$

Try :- Divide 15 Sweets between Manu and Sonu so that they get 20% and 80% of them respectively.

Try :- If angles of a triangle are in the ratio 2 : 3 : 4. Find the value of each angle.

-: Comparing quantities :-

Q. Increase or decrease as percent :-

EX – A school team won 6 games this year against 4 games won last year. What is percent increase?

Sol. Increase in the number of wins $= 6 - 4 = 2$
(amount of change)

$$\text{Percentage increase} = \frac{\text{amount in change}}{\text{original amount or base}} \times 100\%$$

$$= \frac{\text{increase in the no. of wins}}{\text{original number of wins}} \times 100\%$$

$$= \frac{2}{4} \times 100\%$$

(written above: 25 for $100 \div 4$)

$$= 2 \times 25\%$$

$$= 50\%$$

Try :- My mother says, in her childhood petrol was ₹1 a litre. It is ₹52 per litre today. By what % has the price gone up?

Q. Prices Related to an Item or buying and selling :-

- Cost price (CP)
- Selling price (SP)

SP > CP (Profit)

CP > SP (loss)

Profit = SP – CP [SP = CP + Profit]

loss = CP – SP [SP = CP – loss]

$$\text{profit}\% = \frac{\text{Profit}}{CP} \times 100 \Rightarrow \text{profit} = \frac{\text{Profit}\% \times CP}{100}$$

$$\text{loss}\% = \frac{\text{loss}}{CP} \times 100 \Rightarrow \text{loss} = \frac{\text{loss}\% \times CP}{100}$$

Add: Block -B, Near Glory Villa, 60 feet Road (Nearest land mark Scindia Statue), Shatabdipuram, Gwalior

:- Comparing quantities :-

Ex – The cost of a flower vase is ₹120. If the shopkeeper sells it at a loss of 10%, find the price at which it is sold.

Sol. CP = ₹120
Loss% = 10%
SP = ?

$$Loss\% = \frac{Loss}{CP} \times 100$$

$$10 = \frac{Loss}{120} \times 100$$

$$\frac{10 \times 120}{100} = Loss$$

$$12 = Loss$$

This is simple way by formula.

SP = CP − Loss
= 120 − 12
= ₹108

Alternate way or method :–

Loss of 10% means if CP is ₹100
Loss is ₹10
therefore, SP would be = 100 − 10 = ₹90

When CP is ₹100 then SP is = ₹90
CP is ₹1 then SP is = ₹ $\frac{90}{100}$
CP is ₹120 then SP is = ₹ $\frac{90}{100} \times 120$
= 9 × 12
= ₹108

-: Comparing quantities :-

(1). charge given on Borrowed money or simple interest :

P = principal
A = Amount
I = Interest
R = Rate
T = time

Principal and amount are in ₹
Interest and Compound interest
Rate in % (yearly or Half yearly)
Time in years, six monthly etc.
Principal also called borrowed Amt

Ex - Anita takes a loan of ₹5,000 at 15% per year as rate of interest. Find the interest she has to pay at the end of one year.

Sol. P = ₹ 5000
R = 15% per year
I = ?
T = one year

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

$$= \frac{5000 \times 15 \times 1}{100}$$

$$= 50 \times 15$$

$$= ₹750$$

$$A = P + SI$$

$$= 5000 + 750$$

$$= ₹5750$$

Hence, Anita pay at the end ₹ 5750

Try :- ₹ 7,000 is borrowed at 3.5% rate of Interest P.a. borrowed for 2 years. Find the amount to be paid at the end of the second year.

Try :- ₹ 3500 is given at 7% P.a. rate of Interest. Find the interest and the amount to be paid at the end of 3 years.

:- Comparing quantities :-

(3). Finding discounts :- Discount is a reduction given on the marked price (MP) of the article.

Discount = marked price - Sale price.

$$\text{Discount \%} = \frac{\text{Discount}}{\text{marked price}} \times 100\%$$

(4). Estimation in percentages :-

Your bill in a shop is ₹ 577.80 and the shopkeeper gives a discount of 15%. Then estimate the amount :-

(i) Round of the bill to the nearest tens of ₹ 577.80 i.e. to ₹ 580

(ii) Find 10% of this i.e. $\frac{10}{100} \times 580 = ₹58$ (10%)

(iii) Take off of this i.e. $\frac{1}{2} \times 58 = ₹29$ (5%)

(iv) Add the amount in (ii) and (iii) to get ₹87

Your could therefore reduce your bill amount by ₹87 or by about ₹85, which will be ₹495 Approximately.

- Try estimate 20% of the same bill Amount.
- Try finding 15% of ₹375

:- Comparing quantities :-

Q. GST Tax :- (Goods and Services Tax) :-

Ex- Ram bought an article for ₹ 784 which included GST of 12%. What is the price of the article before GST was added. (Answer just like discount and MP Q.)

Sol. Let original price of the article be ₹ 100

GST = 12%.

Price after GST is included = ₹ (100 + 12)
= ₹ 112

When the selling price ₹ 112 then original price = ₹ 100

When the selling price ₹ 1 then original price = ₹ $\frac{100}{112}$

When the selling price ₹ 784 then original price = ₹ $\frac{100}{112} \times 784$
= ₹ 700

Q. Compound Interest :- The interest is calculated on the amount of the previous year. This is known as Interest Compounded or Compound Interest.

Amount : $A = P\left(1+\frac{R}{100}\right)^n$

$CI = A - P$

for finding CI firstly find Amount by above given formula or simple interest formula year-wise-year.

∴ Comparing quantities :-

(2). Rate Compounded Annually or Half yearly : If interest is compounded half yearly, we compute the interest two times. So time period becomes twice and rate is taken Half.

Ex — What amount is to be paid on a loan of ₹12000 for $1\frac{1}{2}$ years at 10% per annum Compounded half yearly.

Sol. $P = ₹12000$

$R = 10\%$ p.a. $= 5\%$ Half yearly (Rate Half)

(n) $T = 1\frac{1}{2}$ years $= \frac{3}{2} \times 2 = 3$ Half yearly (Time twice)

$$A = P\left(1+\frac{R}{100}\right)^n$$

$$= 12000\left(1+\frac{5}{100_{20}}\right)^3$$

$$= 12000 \times \left(\frac{21}{20}\right)^3$$

$$\overset{6}{\cancel{12000}} \times \frac{21}{\cancel{20}} \times \frac{21}{\cancel{20}} \times \frac{21}{\cancel{20}}$$

$$\frac{3 \times 21 \times 21 \times 21}{2}$$

$$= \frac{27,783}{2} = 13891.50$$

Fractions Addition

$$\left[\begin{array}{l} \frac{1}{1}+\frac{1}{20} \\ \frac{20+1}{20} \\ \frac{21}{20} \end{array}\right]$$

Note: for find CI and Amount complete knowledge of :-
(i) fractional no.
(ii) multiplication

$$CI = A - P = 13891.50 - 12000$$

$$= ₹1891.50$$

Q. In a city 30% are females, 40% are male and remaining are children. What percent are children?

Sol. female % = 30%
male % = 40%
children % = 100 − 30 − 40
= 100 − 70
= 30%

Q. Out of 15,000 voters in a constituency, 60% voted. Find the percentage of voters who did not vote. Can you now find how many actually did not vote?

Sol. Percentage of voters who voted = 60%
Percentage of voters who did not voted = 100 − 60
= 40%

No. of people did not vote = 40% of 15,000
= $\frac{40}{100} \times 15000$
= 40 × 150
= 6000

Q. Meena saved ₹ 4000 from her Salary. If this is 10% of her Salary. What is her Salary?

Sol. Let meena's Salary = ₹ x

10% of $x = 400$

$\frac{10}{100} \times x = 400$

$x = \frac{400 \times 10\cancel{0}}{1\cancel{0}}$

$x = 400 \times 10$

$x = 4000$

Therefore, meena's Salary is ₹ 4000

Q. A Local cricket team played 20 matches in one season. It won 25% of them. How many matches did they win?

Sol. Won % = 25%

No. of Total match = 20

No. of games won = 25% of 20

$= \frac{25}{\cancel{100}_5} \times \cancel{20}$

$= \frac{25}{5}$

$= 5$

Therefore, the team won 5 matches.

Q. During a Sale, a shop offered a discount of 10% on the marked prices of all the items. What would a customer have to pay for a pair of jeans marked at ₹ 1450 and two shirts marked at ₹ 850 each? (~~₹~~.2 Q.1)

Sol.

Total marked price = ₹ (1450 + 2×850)
= ₹ (1450 + 1700)
= ₹ 3150

Discount % = 10%

Discount = $\left(\frac{\text{discount\%}}{100} \times MP\right)$

= $\frac{10}{100} \times 3150$

= ₹315

Sales price = marked price - Discount
= 3150 - 315
= ₹2835

Therefore, The customer will have to pay ₹2835

Q. The price of a TV is ₹ 13,000. The Sales Tax charged on it is at the rate of 12%. Find the amount that Vinod will have to pay if he buys it.

Sol.

on ₹ 100, The tax to be paid = ₹ 12

on ₹ 1, the tax to be paid = ₹ $\frac{12}{100}$

on ₹ 13000, the tax to paid = ₹ $\frac{12}{100} \times 13000$

$= 12 \times 130$

$= ₹ 1560$

required Amt = Cost + Sales Tax

$= 13000 + 1560$

$= ₹ 14560$

Therefore, Vinod will have to pay ₹ 14560 for the TV

Q. Arun bought a pair of skates at a sale where the discount given was 20%. If the amount he pays is ₹ 1600, find the marked price.

Sol. Let marked price = ₹ x

$$\text{Discount} = \frac{\text{Discount\%}}{100} \times \text{marked price}$$

$$= \frac{20}{100} \times x$$

$$= ₹ \frac{1}{5}x$$

Discount = marked price − Sales price

$$\frac{1}{5}x = x - 1600$$

$$\frac{1}{5}x - \frac{x}{1} = -1600$$

$$\frac{x - 5x}{5} = -1600$$

$$₹ \frac{4x}{5} = ₹ 1600$$

$$\frac{4}{5}x = 1600$$

$$x = \frac{1600 \times 5}{4}$$

$$x = 400 \times 5$$

$$x = 2000$$

Therefore, marked price is ₹ 2000

Q. I purchased a hair-dryer for ₹ 5400 including 8% vat. find the price before VAT was added.

Sol. When price including VAT of ₹ 108 = ₹ 100

When price including VAT of ₹ 1 = ₹ $\frac{100}{108}$

When price including VAT of ₹ 5400 = ₹ $\frac{100}{108} \times 5400$

$= 50 \times 100$

$= ₹ 5000$

Q. An Article was purchased for ₹ 1239 including GST of 18%. Find the price of the article before GST was added. ?

Sol. When price including GST of ₹ 118 = ₹ 100

When price including GST of ₹ 1 = ₹ $\frac{100}{118}$

When price including GST of ₹ 1239 = ₹ $\frac{100}{118} \times 1239$

$= \frac{123900}{118}$

59 | 61950 | 1050
59↓↓
295
-295
000

$= ₹ 1050$

Q. The population of a place increased to 54,000 in 2003 at a rate of 5% per annum
(i) find the population in 2001
(ii) what should be its population in 2005

Sol. (i) population in the year 2003 = ₹ 54,000 (A)
then let population in 2001 = P
Time = 2 years
Rate = 5% p.a.

$A = P\left(1+\frac{r}{100}\right)^n$

$54000 = P\left(1+\frac{5}{100}\right)^2$

$54000 = P\left(\frac{21}{20}\right)^2$

$54000 = P \times \frac{21}{20} \times \frac{21}{20}$

$54000 \times \frac{20}{21} \times \frac{20}{21} = P$

$48979.59 = P$

Population in 2001 are 48980

(ii) population in year 2003 = ₹ 54000 (P)
Then let populatation in 2005 = P
Time = 2 years
Rate = 5% p.a

$A = P\left(1+\frac{r}{100}\right)^n$ find itself (59535)(59535)

:- Comparing quantities :-

Q. In a Laboratory, the count of bacteria in a certain experiment was increasing at the rate 2.5 % per hour. Find the bacteria at the end of 2 hours if the count was initially 5,06,000.

Sol. Initially count $P = 5,06,000$

Time $= 2$ hours

Rate $= 2.5\% = \frac{25}{10} = \frac{5}{2}\%$ per hour

$$A = P\left(1+\frac{r}{100}\right)^n$$

$$= 506000\left(1+\frac{5}{2\times 100}\right)^2$$

$$= 506000\left(1+\frac{1}{40}\right)^2$$

$$= 506000 \times \frac{41}{40} \times \frac{41}{40}$$

$$= \frac{1265}{\cancel{5060}} \times \frac{41 \times 41}{\cancel{16}\ 4}$$

$$= \frac{1265 \times 1681}{4}$$

$$= \frac{2126465}{4}$$

$$= 531616.25$$

$$= 531616 \text{ (Approx)}$$

Q. Tell what is the profit or loss in the following transaction. Also find profit percent or loss percent in each case.

(a) Gardening Shears bought for ₹ 250 and sold for ₹ 325
(b) A refrigerator bought for ₹ 12,000 and sold at ₹ 13,500.
(c) A cupboard bought for ₹ 2500 and sold at ₹ 3000
(d) A skirt bought for ₹ 250 and sold ₹ 150

Sol. (a) cost price = ₹ 250
Selling price = ₹ 325 SP > CP

Profit = SP − CP
= 325 − 250
= ₹ 75

$$\text{Profit \%} = \frac{\text{profit}}{CP} \times 100\%$$

$$= \frac{75^{3}}{250} \times 100$$

$$= 3 \times 10$$

$$= 30\%$$

If SP < CP

$$\text{loss \%} = \frac{\text{loss}}{CP} \times 100$$

do all above it self

Q. Convert each part of the ratio to percentage :-

(a) 3:1 (b) 2:3:5 (c) 1:2:5

Sol. (a) 3:1

Total part $3+1=4$

I^st part $= \frac{3}{4}\times 100\% = 3\times 25\% = 75\%$

2nd part $= \frac{1}{4}\times 100\% = 1\times 25\% = 25\%$

(b) 2:3:5

Total part $= 2+3+5 = 10$

I^st part $= \frac{2}{10}\times 100\% = 2\times 10\% = 20\%$

2nd part $= \frac{3}{10}\times 100\% = 3\times 10 = 30\%$

3rd part $= \frac{5}{10}\times 100\% = 5\times 10 = 50\%$

(c) 1:2:5

Total part $= 1+2+5 = 8$

I^st part $= \frac{1}{8}\times 100\% = 12.5\%$

2nd part $= \frac{2}{8}\times 100 = 25\%$

3rd part $= \frac{5}{8}\times 100 = 62.5\%$

Q. A Scooter was bought at ₹ 42,000, its value depreciated at the rate of 8% per annum. find its value after 1 year?

Sol.

Principal = Cost price of the Scooter = ₹ 42000

Depreciation = 8% p.year

Time = 1 year

$A = P\left(1+\frac{r}{100}\right)^1$

$= 42000\left(1+\frac{8}{100}\right)$

$= 42000\left(1+\frac{2}{25}\right)$

$= \frac{42000}{8400} \times \frac{27}{25}$

$= \frac{1680}{8400} \times 27$

$= 1680 \times 27$

$= 45,360$

$CI = A - P$

$= 45360 - 42000$

$= 3360$

Simple way for I year

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

$= \frac{42000 \times 8 \times 1}{100}$

$= 3360$

value after 1 year

$= 42000 - 3360$

$= ₹ 38640$

After Depreciation value of Scooter = 42000 - 3360 = ₹ 38640

Q. The population of a city decreased from 25,000 to 24,500. find the percentage decrease.

Sol. Initial population = 25000
Final population = 24500 (F < I)

Decrease = 25000 − 24500
= 500

$$\text{decrease \%} = \frac{\text{decrease}}{\text{initial}} \times 100\%$$

$$= \frac{500^{2}}{25000} \times 100$$

$$= 2\%$$

Q. Arun bought a car for ₹ 3,50,000. The next year, the price went upto ₹ 3,70,000. What was the percentage of price increase?

Sol. Initial price = ₹ 3,50,000
Final price = ₹ 3,70,000 (F > I)

Increase = 3,70,000 − 3,50,000
= ₹ 20000

$$\text{Increase \%} = \frac{\text{Increase}}{\text{Initial}} \times 100\%$$

$$= \frac{20000}{350000} \times 100^{20}\%$$

$$= \frac{40}{7} = 5\frac{5}{7}\%$$