Chapter - 12 Fractions – 3

12. Work with fractions:
Even college students make mistakes in handling fractions. Students will benefit if they do all the problems given here.

12.1 Addition of fractions:

A. (1) $\frac{1}{3}+\frac{2}{3}$ (2) $\frac{2}{3}+\frac{2}{3}$ (3) $\frac{1}{3}+\frac{5}{3}$ (4) $\frac{2}{3}+\frac{7}{3}$

B. (1) $\frac{1}{6}+\frac{2}{6}$ (2) $\frac{2}{6}+\frac{4}{6}$ (3) $\frac{4}{6}+\frac{8}{6}$ (4) $\frac{4}{6}+\frac{14}{6}$

C. (1) $\frac{1}{7}+\frac{6}{7}$ (2) $\frac{3}{7}+\frac{4}{7}$ (3) $\frac{4}{7}+\frac{10}{7}$ (4) $\frac{9}{7}+\frac{12}{7}$

D. (1) $\frac{1}{17}+\frac{16}{17}$ (2) $\frac{10}{17}+\frac{7}{17}$ (3) $\frac{10}{17}+\frac{24}{17}$ (4) $\frac{24}{17}+\frac{27}{17}$

(Did you notice that the denominators are the same?)

12.2 Subtraction of fractions:

A. (1) $\frac{2}{3}-\frac{1}{3}$ (2) $\frac{2}{3}-\frac{2}{3}$ (3) $\frac{5}{3}-\frac{1}{3}$ (4) $\frac{7}{3}-\frac{2}{3}$

B. (1) $\frac{2}{6}-\frac{1}{6}$ (2) $\frac{7}{6}-\frac{1}{6}$ (3) $\frac{12}{6}-\frac{8}{6}$ (4) $\frac{18}{6}-\frac{14}{6}$

C. (1) $\frac{8}{7}-\frac{1}{7}$ (2) $\frac{4}{7}-\frac{3}{7}$ (3) $\frac{10}{7}-\frac{3}{7}$ (4) $\frac{21}{7}-\frac{14}{7}$

D. (1) $\frac{17}{17}-\frac{1}{17}$ (2) $\frac{10}{17}-\frac{7}{17}$ (3) $\frac{24}{17}-\frac{7}{17}$ (4) $\frac{51}{17}-\frac{34}{17}$

(This is wrong: $\frac{2}{3}-\frac{1}{3}=\frac{2-1}{3+3}=\frac{1}{6}$ Not Ok)
After 12.1 & 12.2 stress that the denominator simply sits.
Operations are on the upper side (nominator) only.

12.3 Addition:

Show that $1+\frac{1}{2}=1\frac{1}{2}=\frac{3}{2}$, $2+\frac{1}{2}=2\frac{1}{2}=\frac{5}{2}$

$5+\frac{1}{2}=5\frac{1}{2}=\frac{11}{2}$ etc

Now show $\frac{2}{2}+\frac{1}{2}=\frac{2+1}{2}=\frac{3}{2}$ Also $1+\frac{1}{2}=\frac{2}{2}+\frac{1}{2}=$ ……
Students can see and understand that,

$\therefore$ $1=\frac{1}{1}=\frac{2}{2}=\frac{3}{3}=\frac{4}{4}$ etc Similarly $2=\frac{2}{1}=\frac{4}{2}=\frac{6}{3}=\frac{8}{4}$ etc

$\therefore$ To do $2+\frac{1}{2}$ write 2 as $\frac{4}{2}$. Reason is we want the denominators equal.

$\therefore$ $2+\frac{1}{2}=\frac{4}{2}+\frac{1}{2}=\frac{4+1}{2}=\frac{5}{2}$

12.4 Additions, in 12.3 above, use other simple denominators.

12.4.1 $1 + \frac{1}{3} = \frac{3}{3} + \frac{1}{3} = \frac{3+1}{3} = \frac{4}{3}$

$2 + \frac{1}{3} = \frac{6}{3} + \frac{1}{3} = \frac{6+1}{3} = \frac{7}{3}$

$11 + \frac{1}{3} = \frac{33}{3} + \frac{1}{3} = \frac{33+1}{3} = \frac{34}{3}$

12.4.2 Short cut for mixed fractions.

a. $1\frac{1}{3}$ is really equal to $1 + \frac{1}{3}$ $\therefore = \frac{4}{3}$

$\therefore\ 1\frac{1}{3} = (3 \text{ X } 1 + 1) \div 3 = \frac{4}{3}$

b. Similarly $1\frac{2}{3} = (3 + 2) \div 3 = \frac{5}{3}$

12.4.3 Exercises:

1. Express as mixed fraction:

a. $\frac{12}{5}$ b. $\frac{12}{7}$ c. $\frac{12}{8}$ d. $\frac{12}{9}$ e. $\frac{13}{4}$ f. $\frac{13}{3}$

g. $\frac{13}{2}$ h. $\frac{121}{4}$ i. $\frac{121}{2}$ j. $\frac{121}{3}$ k. $\frac{121}{9}$

2. Express as a fraction: Eg - $2\frac{1}{5} = \frac{11}{5}$

a. $2\frac{2}{5}$ b. $1\frac{5}{7}$ c. $1\frac{1}{2}$ d. $1\frac{4}{8}$ e. $1\frac{1}{3}$ f. $1\frac{3}{9}$

g. $3\frac{1}{4}$ h. $4\frac{1}{3}$ i. $6\frac{1}{2}$ j. $30\frac{1}{4}$ k. $40\frac{1}{3}$ l. $13\frac{4}{9}$

m. $4000\frac{1}{3}$ n. $300\frac{1}{4}$

12.5 Subtraction: see that

$1 - \frac{1}{2} = \frac{1}{2}$, $2 - \frac{1}{2} = 1\frac{1}{2} = \frac{3}{2}$, $5 - \frac{1}{2} = 4\frac{1}{2} = \frac{9}{2}$ etc

Now show that $\frac{2}{2} - \frac{1}{2} = \frac{2-1}{2} = \frac{1}{2}$

See that $2 = \frac{4}{2}$ and $5 = \frac{10}{2}$ $\therefore\ 2 - \frac{1}{2} = \frac{4}{2} - \frac{1}{2} = \frac{4-1}{2} = \frac{3}{2} = 1\frac{1}{2}$

Similarly $5 - \frac{1}{2} = \frac{10}{2} - \frac{1}{2} = \frac{10-1}{2} = \frac{9}{2} = 4\frac{1}{2}$

(See that we need the denominator to be the same)

12.6 In 12.5 use other denominators

$1 - \frac{1}{2} = \frac{3-1}{3} = \frac{2}{3}$, $3 - \frac{1}{3} = \frac{9}{3} - \frac{1}{3} = \frac{9-1}{3} = \frac{8}{3}$

(Here 3 can be $\frac{6}{2}$ or $\frac{9}{3}$ or $\frac{12}{4}$ etc. We take $\frac{9}{3}$ because after – sign ($\frac{1}{3}$) is there. It has denominator 3).

$3 - \frac{1}{5} = ?$, $3 - \frac{1}{7} = ?$ $3 - \frac{3}{8} = ?$

12.7 Mixed fractions (same denominator)

$5\frac{1}{2} - 3\frac{1}{2} = ?$ Directly 2 is OK

The same problem is done in 2 ways below:

(a) Integers 5 – 3 = 2

Fractions $\frac{1}{2} - \frac{1}{2} = 0$

Total 2 ∴ Ans = 2 OK

(b) $5\frac{1}{2} = \frac{10+1}{2} = \frac{11}{2}$, $3\frac{1}{2} = \frac{6+1}{2} = \frac{7}{2}$

$\therefore\ 5\frac{1}{2} - 3\frac{1}{2} = \frac{11}{2} - \frac{7}{2} = \frac{11-7}{2} = \frac{4}{2} = 2$ This is also OK.

12.7.1 Do in 2 methods as shown above:

a. $3\frac{2}{3} - 1\frac{1}{3}$ b. $18\frac{5}{7} - 16\frac{3}{7}$ c. $20\frac{7}{10} - 6\frac{3}{10}$ d. $1\frac{2}{3} + 2\frac{2}{3}$

e. $10\frac{3}{7} + 8\frac{2}{5}$ f. $3\frac{1}{10} + 3\frac{2}{10}$ g. $1\frac{2}{3} + 2\frac{1}{3} - 1\frac{1}{3}$

h. $10\frac{3}{7} + 8\frac{2}{5} - 16\frac{3}{7}$ i. $20\frac{7}{10} - 3\frac{1}{10} - 3\frac{2}{10}$

Exercises - Chapter 12

Ex. XII.1 Example: $3 + 2\frac{1}{3} = 5\frac{1}{3}$

Do: a. $8 + 2\frac{1}{4}$ b. $9 + 1\frac{1}{4}$ c. $6 + 4\frac{2}{3}$ d. $2\frac{1}{4} + 8$ e. $4\frac{2}{3} + 5$ f. $1\frac{1}{5} + 9$

Ex. XII.2 Example: $3 + \frac{7}{3} = 3 + 2\frac{1}{3} = 5\frac{1}{3}$ or

$3 + \frac{7}{3} = \frac{9}{3} + \frac{7}{3} = \frac{9+7}{3} = \frac{16}{3} = 5\frac{1}{3}$

Can do whichever is easier for the students. Many persons find the first method easier.

Do:

a. $8 + \frac{9}{4}$ b. $9 + \frac{5}{4}$ c. $6 + \frac{4}{3}$ d. $\frac{9}{4} + 7$ e. $\frac{14}{3} + 5$ f. $\frac{6}{5} + 9$

Ex. XII.3 Example: $3\frac{2}{3} + \frac{7}{3}$ =?

Ans: Method A: $3 + \frac{2}{3}+\frac{7}{3} = 3 + (\frac{7+2}{3}) = 3+ \frac{9}{3} = 3 + 3 = 6$

Method B: $3\frac{2}{3}+\frac{7}{3} = \frac{11}{3} + \frac{7}{3} = (\frac{11+7}{3}) = \frac{18}{3} = 6$

Even here, method A is better because smaller numbers come as numerator.

Do:

a. $8\frac{3}{4} + \frac{9}{4}$ b. $9\frac{3}{4} + \frac{5}{4}$ c. $6\frac{1}{3}+\frac{14}{3}$ d. $\frac{9}{4} + 7\frac{1}{4}$ e. $\frac{14}{3} + 5\frac{2}{3}$ f. $\frac{6}{5} + 9\frac{2}{5}$

Ex. XII.4 Example: $3 – 2\frac{1}{3}$ =?

Ans: $3 - 2\frac{2}{3} = 2 + 1 - 2\frac{1}{3} = 2-2+ 1 - \frac{1}{3}$

$= 1 - \frac{1}{3} = \frac{3-1}{3} = \frac{2}{3}$

Do:

a. $8 - 2\frac{1}{4}$ b. $9 - 1\frac{1}{4}$ c. $6 - 4\frac{2}{3}$ d. $2\frac{1}{4} - 1\frac{1}{4}$ e. $1\frac{1}{4} - \frac{3}{4}$ f. $4\frac{2}{3} - \frac{1}{3}$

Ex. XII.5 Example: $3 - \frac{7}{3}$ =?

Method A: $3 - \frac{7}{3} = 3 - 2\frac{1}{3} = 1 - \frac{1}{3} = \frac{2}{3}$

Method B: $3 - \frac{7}{3} = \frac{9}{3} - \frac{7}{3} = \frac{9-7}{3} = \frac{2}{3}$

Use whichever is easier:

Do:

a. $8 - \frac{9}{4}$ b. $9 - \frac{5}{4}$ c. $6 - \frac{14}{3}$ d. $\frac{9}{4} - 1\frac{1}{4}$ e. $\frac{5}{4} - \frac{3}{4}$ f. $\frac{14}{3} - 3\frac{1}{3}$

Ex. XII.6 Mixed addition and subtraction:

Example: $\frac{1}{3}+\frac{4}{3}-\frac{2}{3}=\frac{1+4-2}{3}=\frac{5-2}{3}=\frac{3}{3}=1$

a. $\frac{3}{5}+\frac{4}{5}-\frac{2}{5}-\frac{1}{5}=?$ b. $\frac{15}{7}+\frac{22}{7}-\frac{14}{7}-\frac{20}{7}=?$ c. $\frac{9}{11}-\frac{8}{11}+\frac{10}{11}-\frac{5}{11}=?$

Chapter - 13 Fractions - 4

13. Fractions (Contd.)

13.1 Try $\frac{1}{2} + \frac{1}{4}$ orally, say (half + quarter).
Students will answer correctly (In local language it works better).
The SECRET of doing right is: **"MAKE THE BOTTOM NUMBERS EQUAL".**

$\therefore \frac{1}{2} + \frac{1}{4}$ Let us write $\frac{1}{2}$ as $\frac{2}{4}$

$$\therefore \frac{1}{2} + \frac{1}{4} = \frac{2}{4} + \frac{1}{4} = \frac{2 + 1}{4} = \frac{3}{4}$$

13.2 Caution: Before going any farther, student should learn HOW TO ADD FRACTIONS when the denominators are equal.

13.2.1 Take $\frac{1}{2} + \frac{1}{2}$ =?
Say it in words (local language also OK)
(Half) + (Half) equal one.
Now write this down:

$$\frac{1}{2} + \frac{1}{2} = 1$$

Now let us do by steps:

$$\frac{1}{2} + \frac{1}{2} = \frac{1+1}{2} = \frac{2}{2} = 1$$

13.2.2 Now try $\frac{1}{4} + \frac{1}{4}$ in words and by mathematical steps

$$\frac{1}{4} + \frac{1}{4} = \frac{1+1}{4} = \frac{2}{4} = \frac{1}{2}$$

13.3 Extra Caution: Primary and middle school children, very often write as below:

$\frac{1}{2} + \frac{1}{2} = \frac{2}{4}$ (Why?)

(Why?) I guess they put the plus everywhere. Thus $\frac{1}{2} + \frac{1}{2} = \frac{1+1}{2+2} = \frac{2}{4}$
If you explain the same sum in words they realize their mistake.

Rule: Never Add Denominators.

13.4 Let us clarify the caution given above. Let us try to understand.

13.4.1 Denominator (hereafter Dr.) is only a tag (=symbol, label etc). It just says how the big piece is. Numerator (Nr. Hereafter) says how many.

13.4.2 Statement made above can be said in other words also. Nr. Indicates how many are taken. Dr. says how small (or what kind) each piece is. Thus Nr. and Dr. together say, how many pieces of what type of item was taken.

13.4.3 If you are selling milk in packets you can understand what is stated above.
A person A takes 1 item of 1 liter milk packet (Item = bag, packet)
How much money will you collect? Say, Rs.15 (as on May, 2009)

Another person B takes 6 packets of the same.
You will collect; 6 x 15 = Rs. 90. Right?
3rd person C takes 1 packet (or item) of ½ liter packet.
How much money will you collect? Rs. 7.50. Right?
4th person D takes 2 packets (=items) of ½ liter milk packet.

Money collected = 2 x $7\frac{1}{2}$ = Rs. 15

A took 1 bag	Paid Rs. 15
D took 2 bags	Paid Rs. 15 (same)
C took 1 bag	Paid Rs. 7.50 (only)

C took ½ liter only. $\therefore$ Less i.e., Rs. $\frac{15}{2}$ = 7.50
D took ½ liter + ½ liter = 1 liter $\therefore$ Rs.15
A took 1 liter packet $\therefore$ Rs. 15

This means ½ < 1 $\frac{1}{2}+\frac{1}{2}=1$

13.5 Exercise:

Some students have answered a few questions on fractions. You have to find right or wrong.
Right - √ or Wrong – X

a. $\frac{1}{2}+\frac{1}{2}=\frac{1+1}{2}=\frac{2}{1}$

b. $\frac{1}{2}+\frac{1}{2}=\frac{1+1}{2+2}=\frac{2}{4}$

c. $\frac{1}{3}+\frac{5}{3}=\frac{5+1}{3+3}=\frac{6}{6}=1$

d. $\frac{2}{7}+\frac{5}{7}=1$

e. $\frac{2}{7}+\frac{5}{7}=\frac{7}{14}=\frac{1}{2}$

f. $\frac{1}{2}+\frac{1}{4}+\frac{3}{4}=\frac{5}{10}=\frac{1}{2}$

g. $\frac{1}{2}+\frac{1}{4}+\frac{3}{4}=\frac{1}{2}+\frac{4}{4}=\frac{5}{6}$

h. $\frac{1}{2}+\frac{1}{4}+\frac{3}{4}=\frac{2+1+3}{4}=\frac{6}{4}$

i. $\frac{27}{50}+\frac{33}{50}=1$

j. $\frac{27}{50}+\frac{33}{50}=1\frac{1}{5}$

k. $\frac{27}{50}+\frac{33}{50}=\frac{50}{100}$

l. Collect wrong answers from your friends, remove their names and explain how to do it right.

13.6 (a) $\frac{2}{3}+\frac{1}{6}$. Here $\frac{2}{3}$ should be written as $\frac{4}{6}$

$$\therefore \frac{2}{3}+\frac{1}{6}=\frac{4}{6}+\frac{1}{6}=\frac{4+1}{6}=\frac{5}{6}$$

Standard method:

$$\frac{2}{3}+\frac{1}{6}=\frac{?+1}{6}$$

(?) is decided by the question. If 3 becomes 6, 2 becomes what? The answer is 2 x 2 = 4

$$=\frac{4+1}{5}$$

How to get $\frac{2}{3}=\frac{4}{6}$ Ask $\frac{2}{3}=\frac{?}{6}$ $?=\frac{6}{3}\text{ X } 2 = 2 \text{ X } 2 = 4$

(b) (i) $\frac{1}{4}+\frac{5}{8}=\frac{1\text{X }2}{4\text{ X }2}+\frac{5}{8}$ $=\frac{2}{8}+\frac{5}{8}=\frac{7}{8}$

(ii) $\frac{1}{4} + \frac{5}{8} = \frac{1 \text{ X } (\frac{8}{4})}{8} + \frac{5}{8} \qquad = \frac{2}{8} + \frac{5}{8} = \frac{7}{8}$

(c) To make the above (i.e. 13.6.b (ii)) more useful.

$\frac{2}{17} + \frac{39}{102} = \frac{2 \text{X}(\frac{102}{17})}{102} + \frac{39}{102}$ To find 102/17 $\begin{array}{r} 6 \\ 17\overline{)102} \\ \underline{102} \\ 0 \end{array}$

$$= \frac{2 \text{ X } 6}{102} + \frac{39}{102} = \frac{12}{102} + \frac{39}{102} = \frac{51}{102}$$

13.7 The above (viz 13.6 c) is a very long leap in maths, some who can understand can go ahead. Others please follow in smaller steps.

13.8 Bigger & smaller

13.8.1 Given 2 fractions find, which is bigger.

E.g.: $\frac{2}{3}$ & $\frac{1}{3}$ Obvious $\frac{2}{3} > \frac{1}{3}$

$\frac{1}{2}, \frac{3}{4}$ Obvious $\frac{3}{4} > \frac{1}{2}$. But this could be done more logically as

$\frac{1}{2}, \frac{3}{4}$ is the same as $\frac{2}{4}, \frac{3}{4}$. Now $\frac{3}{4} > \frac{2}{4}$

In the above, if you take $(\frac{1}{4})$ as one piece or unit.

3 pieces = $\frac{3}{4}$ 2 pieces = $\frac{2}{4}$ 3 pieces > 2 pieces

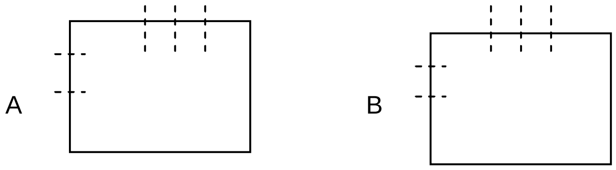
$\therefore \frac{3}{4} > \frac{2}{4}$

Making the measuring "unit" the same is the principle behind this. The same is the principle in making denominators identical.

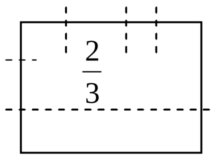
13.8.2 Which is bigger $\frac{2}{3}$ or $\frac{3}{4}$?

For this, one has to go to a little "paper work" i.e. take 2 identical rectangles of paper 3 units by 4 units, i.e. take 3 inch x 4 inch piece of paper.

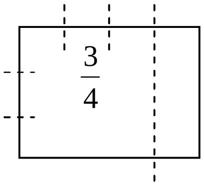
Two such rectangles



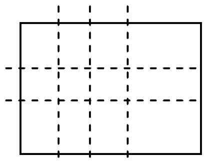
Fold $\frac{2}{3}$ from A



Fold $\frac{3}{4}$ from B



Now, you can SEE which is bigger?
How much bigger? Cut & give
Now take an identical piece of paper C, fold both ways & open



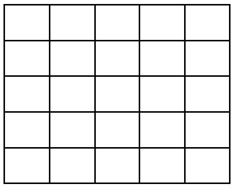
C

You get 12 equal pieces. Each = $\frac{1}{12}$.

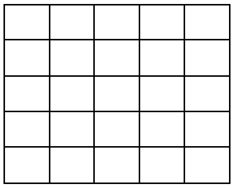
Comparing A, B & C, you get $\frac{3}{4} - \frac{2}{3} = \frac{1}{12}$

13.8.3 Cutting squares (or rectangles) into smaller squares is an easy method of understanding. This is the reason graph papers contain big squares and small squares. Which is bigger, $\frac{2}{3}$ or $\frac{3}{4}$. This can be done "graphically" also. Take 1 big square each on 2 graph papers.

A

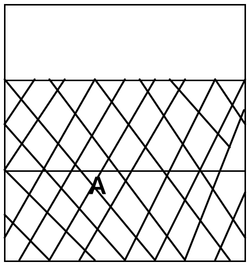


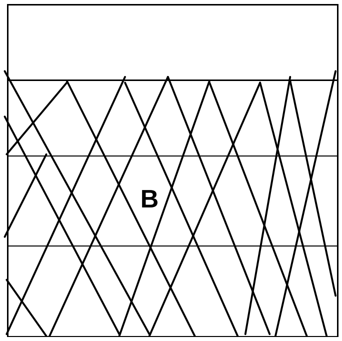
B



Mark $\frac{2}{3}$ on A Shade the area.

Mark $\frac{3}{4}$ on B Shade the area.





Cut shaded A & B and place one over the other. You can find big / small. How much bigger also can be found by counting the smaller squares.

13.9 Do the same problem by standard method [Same problem as in 13.8.2. Viz which is bigger $\frac{2}{3}$ or $\frac{3}{4}$?

$\frac{2}{3}$ can be written as $\frac{?}{12} = \frac{8}{12}$

$\frac{3}{4}$ can be written as $\frac{?}{12} = \frac{9}{12}$

$\therefore \frac{3}{4} = \frac{9}{12}$ $\quad \frac{2}{3} = \frac{8}{12}$ $\quad \therefore \frac{3}{4} > \frac{2}{3}$ because $\frac{9}{12} > \frac{8}{12}$

Now how much bigger?

$$\frac{3}{4} - \frac{2}{3} = \frac{9}{12} - \frac{8}{12} = \frac{9 - 8}{12} = \frac{1}{12}$$

Here, why did we write $\frac{2}{3}$ as $\frac{8}{12}$ instead of $\frac{4}{6}$ or $\frac{6}{9}$?

Why did we not write $\frac{3}{4}$ as $\frac{6}{8}$ or $\frac{15}{20}$?

Because we wanted a common denominator between 3 & 4. That is 12. ie 12 is such a number which can be achieved either by 3 or by 4 (by multiplying). Go to the paper and show the small squares are useful either to make 3 parts or 4 parts.

13.10 The above is called **Least Common Multiple** (LCM). LCM of two numbers is easy to find.

(3, 4) LCM = 12 (=3 X 4) (2, 3) LCM = 6 (=2 X 3) (2, 5) LCM = 10
(3, 5) LCM = 15 (4, 5) LCM = 20 (6, 7) LCM = 42
(7, 8) LCM = 56 etc (x, y) LCM = x X y

Exercise: Find LCM

a. (2,3) b. (2,5) c. (2,7) d. (2,9) e. (2,11) f. (3,4)
g. (3,5) h. (30,50) i. (30,5) j. (3,30) k. (5,50) l. (4,12)
m. (4,3) n. (6,4) o. (3,8)

13.11 Find which is bigger:

a. $(\frac{2}{3},\frac{4}{5})$ b. $(\frac{5}{7},\frac{4}{5})$ c. $(\frac{1}{2},\frac{4}{9})$ d. $(\frac{2}{3},\frac{6}{5})$ e. $(\frac{3}{4},\frac{11}{12})$ f. $(\frac{5}{6},\frac{4}{5})$

g. $(\frac{4}{5},\frac{23}{30})$

13.12 **ASIDE on LCM**

LCM is needed for addition & subtraction of fractions. In other places also it is needed. Concept of LCM comes from (integer) factors of given numbers.
i.e. 10 = 2 x 5

If you have 10 items it can be equally shared by 5 persons (i.e. 2 each) or by
2 persons (i.e. 5 each)

20 = 2 x 10 = 2 x 5 x 2 = 5 x 4. Numbers Involved are 2, 4, 5, 10.

Here 2, 4, 5, 10 these four numbers have LCM = 20
Even 4, 5 these two numbers have LCM = 20
Even 2, 4, 5 these three numbers have LCM = 20
Even 4, 5, 10 these three numbers have LCM = 20

In the above example, take only some pairs.

(2, 4) LCM = 8 (i.e. 2 X 4) OK but not necessary.
LCM = 4 is OK (This is because 4 is divisible by 2 and 4 is divisible by 4)

(2, 10) LCM = 2 x 10 = 20 OK. But not necessary
LCM = 10 is OK

(5, 10) LCM = 10 need not be 50
(4, 10) LCM = 20 need not be 40

13.13 Using LCM of the denominators, addition (or subtraction) can be done:

$$\frac{1}{3}+\frac{1}{2}=\frac{2 \text{ X } 1+3 \text{ X } 1}{6}=\frac{2+3}{6}=\frac{5}{6}$$

$$\frac{1}{4} + \frac{1}{2} = \frac{1 + (2 \text{ X}1)}{4} = \frac{1 + 2}{4} = \frac{3}{4}$$

$$\frac{1}{3} + \frac{1}{4} = \frac{(4 \text{ X } 1) + (3 \text{ X } 1)}{12} = \frac{7}{12}$$

$$\frac{1}{2} + \frac{1}{5} = \frac{5 + 2}{10} = \frac{7}{10}$$

All these can be shown by cutting paper, box full of balls, counting coins, materials etc.

Exercises: Use LCM Values given in 13.12 above. DO:

a. $\frac{1}{2}+\frac{1}{4}$ b. $\frac{1}{2}-\frac{1}{4}$ c. $\frac{1}{2}+\frac{3}{10}$ d. $\frac{1}{2}-\frac{3}{10}$ e. $\frac{4}{5}+\frac{7}{10}$ f. $\frac{4}{5}-\frac{7}{10}$

g. $\frac{3}{4}+\frac{7}{10}$ h. $\frac{3}{4}-\frac{7}{10}$

13.14 A separate session on how to find LCM can be given.
Many teachers think this knowledge is necessary for doing fractions.
Because of this problem, many students find fractions as a difficult subject. Therefore even without mentioning LCM one can go about handling fractions. Teachers, please do so, even if this leads to some large numbers and many steps.

Example:

Add: $\frac{1}{4}+\frac{3}{10}$

Method A: Regular Method:

Find LCM of the 2 denominators (4,10) LCM = 20. Convert the two fraction with this LCM as denominator.

Thus $\frac{1}{4}=\frac{5}{20}$

$\frac{1}{10}=\frac{2}{20}$ $\therefore \frac{3}{10}=\frac{3\text{X}2}{20}=\frac{6}{20}$

Now Add:

$$\frac{1}{4}+\frac{3}{10}=\frac{5}{20}+\frac{6}{20}=\frac{5+6}{20}=\frac{11}{20}$$

Method B: I' m afraid of LCM or GCM". Do not worry. Multiply both the denominators. Use this as the new denominator.
Thus, 4 x 10 = 40

$$\frac{1}{4}+\frac{3}{10}=\frac{10}{40}+3\text{X}\frac{1}{10}$$

$$= \frac{10}{40}+\frac{3\text{x}4}{40}=\frac{10}{40}+\frac{12}{40}$$

$= \frac{22}{40}$ (Divide both Nr. and Dr. by 2)

$$= \frac{11}{20}$$

Exercise: Do the following by both the methods:

a. $\frac{1}{2}+\frac{1}{4}$ b. $\frac{1}{2}-\frac{1}{4}$ c. $\frac{1}{2}+\frac{3}{10}$ d. $\frac{1}{2}-\frac{3}{10}$ e. $\frac{4}{5}+\frac{7}{10}$ f. $\frac{4}{5}-\frac{7}{10}$

g. $\frac{3}{4}+\frac{7}{10}$ h. $\frac{3}{4}-\frac{7}{10}$ i. $\frac{4}{9}+\frac{5}{12}$ j. $\frac{4}{9}-\frac{5}{12}$

Chapter - 14

Decimals - 1

14. Decimals:

14.1 Decimate as per dictionary means "**to destroy a great number or proportion**". The earliest English sense of decimate is "**to select by lot and execute every tenth soldier of a unit"**).

Decimal = one tenth = $\frac{1}{10}$ Shown as .1

14.2 Our usual number system is also known as **decimal number system**. This is because the number (an integer) starting from one (=1) goes in steps of 10 as it is written.

i.e. 1
2
.
.
8
9 units
10 = 1 X 10 + 0
51 = 5 X 10 + 1
98 = 9 x 10 + 8
100 = 1 x 100 + 0 + 0
123 = 1 X 100 + 2 x 10 + 3 x 1

∴ If you write	a	b	c	d	e
	X	X	X	X	X
	10000	1000	100	10	1

14.2.1 Exercises:

Eg: 10010 = 1 x 10000 + 10 x 10
50403 = 5 X 10000 + 4 x 100 + 3 x 1

Write down in expanded form:
a. 12345 b. 10234 c. 10023 d. 10002 e. 908040

14.2.2 Exercises:

Which is bigger?

a. 98231, 100001 b. 8924, 9024 c. 88, 190

14.2.3 Exercises:

Write in ascending order (Take all the numbers given in 14.2.1, 14.2.2)

14.3 Decimals are fractions obtained by extending this system on the right side.

Thus .1 = 1 X $\frac{1}{10}$

$$.4 = 4 \text{ X } \frac{1}{10}$$

$$.8 = 8 \text{ X } \frac{1}{10}$$

Then $.01 = \frac{1}{100}$

$$.05 = \frac{5}{100}$$

$$.09 = \frac{9}{100}$$

Together $.12 = \frac{1}{10} + \frac{2}{100}$

$$.89 = \frac{8}{10} + \frac{9}{100}$$

3rd level $.001 = \frac{1}{1000}$

$$.123 = \frac{1}{10} + \frac{2}{100} + \frac{3}{1000}$$

If you write :

$$\begin{array}{ccccccccc} a & & b & & c & & d & & e \\ \text{X} & & \text{X} & & \text{X} & & \text{X} & & \text{X} \\ \frac{1}{10} & + & \frac{1}{100} & + & \frac{1}{1000} & + & \frac{1}{10000} & + & \frac{1}{100000} \end{array}$$

14.3.1 Note that .34 is the same as 0.34.
Also note that .34 is the same as .340
is the same as .3400
is the same as .340000
But not the shames as .341 or .3401 etc. .34 is the same as 0.34, 00.34 etc. But not the same as 10.34 etc.

14.3.2 Exercises:

E.g.: $.1001 = \frac{1}{10} + \frac{1}{10000}$

$$.50403 = \frac{5}{10} + \frac{4}{1000} + \frac{3}{100000}$$

[Note: $0.1001 \equiv .1001 \equiv 0.10010 \equiv .100100$]

Write down in expanded form:
a) .12345 b) .10234 c) .10023 d) .01002 e) .090804

14.3.3 Exercises:

Which is bigger?
a. (.982, .101) b. (.98231, .100001) c. (.89, .90)
d. (.893, .90) e. (.8, .91) f. (.9, .81)
g. (.88, .190) h. (.880, .199)

14.3.4 Exercises:

Write down in ascending order:
a. (.12345, .10234, .10023) b. (.01002, .090804, .10023)
c. Now take all the numbers in (a), (b).
d. Take (c) and also .1001, .50403
e. Collect all the numbers given in 14.3.3 and write in ascending order.

14.4 The **NUMBER SYSTEM**

1000000
100000
10000
1000
100
10
1
0 Here is zero
$\frac{1}{10}$
$\frac{1}{100}$
$\frac{1}{1000}$
$\frac{1}{10000}$
$\frac{1}{100000}$

Thus 123456789.123456 …… Each place can have 0 to 9.

14.5 Decimals everywhere:

Decimal system is the most convenient to write, understand, approximate etc.
It is also the best system to be accurate up to any desired level. So, it is used everywhere starting from science, engineering to daily life.

14.5.1 Unit of length is meter (m) $\frac{1}{10}$th of a meter is decimeter (dm). $\frac{1}{10}$th of a (dm) is centimeter (cm). $\frac{1}{10}$th of a (cm) is millimeter (mm). This whole set of lengths are in a decimal system.

Question:(millimeter and meter) are they in the decimal system? Ans: Yes.

Question: (1 crore and 1 lakh) are they in the decimal system? Ans : Yes.
(even though the names do not suggest)

14.5.2 Exercises: Are these in Decimal system?

a. Meter and kilometer
b. Millimeter and kilometer
c. Millimeter and liter
d. Kilogram and milligram
e. Cubic meter and cubic centimeter
f. Seconds and minutes
g. Minutes and hours
h. Days and week
i. Months and years
j. Volts and kilovolts
k. Ampere and milliampere

14.5.3 Exercises:

a. Do you know of any non-decimal systems of weights?

b. Can you write down different units for measuring areas and say which is decimal system?

14.6 Explanation: We saw that .89 is defined as $\frac{8}{10}+\frac{9}{100}$ (Defined meaning that we all agree to say so). Now let us try to see whether this definition is acceptable. We know how to ADD FRACTIONS.

Add $\frac{8}{9}+\frac{9}{100}$

This $= \frac{10 \text{ x } 80 + 9}{100} = \frac{80 + 9}{100} = \frac{89}{100}$ Now we should agree to put a (.) to denote (indicate, identify) decimal number.

Let us say $\frac{89}{100}$=.89

14.6.1 Exercises

Write in decimal form:

a. $\frac{1}{10}+\frac{2}{100}+\frac{3}{1000}$ b. $\frac{1}{10}+\frac{2}{10000}$ c. $\frac{5}{10}+\frac{4}{100}+\frac{3}{10000}$

d. $\frac{5}{10}+\frac{4}{1000}$ e. $\frac{5}{100}+\frac{3}{1000}$ f. $\frac{7}{1000}+\frac{8}{10000}$

g. $\frac{7}{100}+\frac{8}{10000}$ h. $\frac{7}{10}+\frac{8}{1000}$

Chapter - 15 Decimals - 2

15 Decimals (Contd.)

15.1 Fractions are natural way of expressing some division or some sharing or some fragmentation.

Decimals are fractions but always divided into 10 equal parts. One can say it is a specific or special type of fraction.

Both are usually less than 1. Decimals being special, they are written also in a special way (i.e. using a dot.). This is possible because the number system we generally use is also a decimal system. Otherwise called to **Base 10**. This will be appreciated by students when they come to know about powers and indices.

Also when measurements, calculations are involved decimals are convenient.

15.2 Activity:

a. Take a scale. See that it has both cm and inches. Usually they are on either side of the scale. Questions:

1. How many divisions (small) in 1 cm?
2. How many divisions (small) in 1 inch?
3. In your scale, are there different number of smaller divisions per inch? (Look at different parts of the scale).
4. Take a tape from a tailor and note down what you see.
5. Look at a thermometer and see how each degree is subdivided.

6. If a clinical thermometer is available, take your own temperature and state it accurately.

15.3 A fraction whose denominator is 10 can be called a decimal.

Thus $\frac{1}{10} = 0.1$ $\quad \frac{2}{10} = 0.2$ $\quad \frac{3}{10} = 0.3$

Then $\frac{1}{5} = \frac{2}{10}$ $\quad \therefore \frac{1}{5} = 0.2$

Take this case if 5 become 10, 1 becomes 2. How ?

Denominator is multiplied by 2 or $\frac{10}{5}$

15.4 How to get a general rule for this? $\frac{1}{2} = ?$ (in decimal)

Let 2 become 10 by multiplying by 5.

Then $\frac{1}{2} = \frac{5}{10}$ $\quad \therefore \frac{1}{2} = 0.5$

How did you get 5? $\frac{\text{Desired Denominator}}{\text{Actual Denominator}}$

In the case of decimal, desired denominator is 10.

$$\boxed{\therefore \textbf{ Factor needed} = \frac{\mathbf{10}}{\textbf{actual denominator}}}$$

15.5 Now compare 15.3 & 15.4

(a) $\frac{1}{5} = ?$ Factor needed = $\frac{10}{\text{actual denominator}} = \frac{10}{5} = 2$

$$\therefore \frac{1}{5} = \frac{2}{10} = 0.2$$

(b) $\frac{1}{2} = ?$ Factor needed = $\frac{10}{\text{actual denominator}} = \frac{10}{2} = 5$

$$\therefore \frac{1}{2} = \frac{5}{10} = 0.5$$

15.6 Exercises:

E.g. 1: Write $\frac{3}{5}$ as decimal: $\frac{3}{5} = \frac{?}{10} = \frac{6}{10}$

$$\therefore \frac{3}{5} = .6$$

E.g. 2: Write $\frac{13}{2}$ as decimal $\frac{13}{2} = 6 + \frac{1}{2}$

$$= 6 + \frac{?}{10}$$

$$= 6 + \frac{5}{10}$$

$= 6 + .5$
$= 6.5$

Write as a decimal number:

a. $\frac{1}{2}$
b. $\frac{2}{2}$
c. $\frac{3}{2}$
d. $\frac{7}{2}$
e. $\frac{55}{2}$
f. $\frac{1}{5}$
g. $\frac{2}{5}$
h. $\frac{3}{5}$
i. $\frac{4}{5}$
j. $\frac{5}{5}$
k. $\frac{55}{5}$
l. $\frac{56}{5}$
m. $\frac{59}{5}$

15.7 Problem cases: $\frac{1}{3}, \frac{1}{7}, \frac{1}{9}, \frac{1}{11}, \frac{1}{13}$ and many other denominators are real headaches. They are problem cases because; they cannot be converted to 10 easily. 2 x 5 will make 10 i.e., if you want to replace 2 by 10, just multiply by 5. Now, how will you make 3 into 10. The factor is not an integer. It is not only a complicated number, but number without any end.

Such fractions, when converted to decimals, become only APPROXIMATIONS.

E.g.: $\frac{1}{3} = .3333....$ (no end) $\frac{1}{7} = \frac{(10/7)}{10} = .1428571......$ (no end)

15.8 Extend the concept of 15.5 to other denominators.

$\frac{1}{4} = \frac{?}{10}$ $\frac{10}{4} = 2\frac{2}{4} = 2\frac{1}{2}$ But we know $\frac{1}{2} = 0.5$

$$\therefore \quad \frac{1}{4} = \frac{2\frac{1}{2}}{10} = \frac{25}{100} = .25$$

$\frac{1}{8} = \frac{?}{10}$ $\frac{10}{8} = 1\frac{2}{8} = 1\frac{1}{4}$ But we know $\frac{1}{4} = 0.25$

$$\therefore \quad \frac{1}{8} = \frac{1\frac{1}{4}}{10} = \frac{125}{1000} = .125$$

15.8.1 For an approximation, take

$\frac{1}{2} = .5;$ $\frac{1}{3} = .3;$ $\frac{1}{4} = .25;$ $\frac{1}{5} = .2$ $\frac{1}{6} = .6;$

$\frac{1}{7} = .14;$ $\frac{1}{8} = .125;$ $\frac{1}{9} = .11;$

15.8.2 Using the values given in 15.8.1 convert fractions into decimals:

a. $\frac{2}{3}$
b. $\frac{4}{3}$
c. $\frac{3}{4}$
d. $\frac{5}{4}$
e. $\frac{7}{4}$
f. $\frac{6}{5}$
g. $\frac{7}{5}$
h. $\frac{8}{5}$
i. $\frac{9}{5}$
j. $\frac{19}{5}$
k. $\frac{5}{6}$
l. $\frac{2}{7}$
m. $\frac{3}{7}$
n. $\frac{4}{7}$
o. $\frac{5}{7}$

p. $\frac{6}{7}$ q. $\frac{15}{6}$ r. $\frac{13}{7}$ s. $\frac{3}{8}$ t. $\frac{13}{8}$

u. $\frac{7}{9}$ v. $\frac{17}{9}$

15.9 Actual Conversion – Fraction to Decimal

From 15.8 it emerges that to get decimal from a fraction simply divide the numerator by denominator, supplying the decimal point where it is needed.

Thus $\frac{1}{4} =$

$$\begin{array}{r} 0.25 \\ 4\overline{)10} \\ 08 \\ \hline 020 \\ 020 \\ \hline 000 \end{array}$$

$\frac{1}{4} = 0.25$

$\frac{1}{2} = 0.5$

$$\begin{array}{r} 0.5 \\ 2\overline{)10} \\ 10 \\ \hline 00 \end{array}$$

$\frac{1}{8} = 0.125$

$$\begin{array}{r} 0.125 \\ 8\overline{)1000} \\ 08 \\ \hline 020 \\ 016 \\ \hline 0040 \\ 0040 \\ \hline 0000 \end{array}$$

15.9.1 Exercises:

Do all the conversions done earlier using actual division just now.

Thus $\frac{2}{10}, \frac{5}{10}, \frac{7}{10}, \frac{1}{5}$ (Given in 15.3) $\frac{1}{2}$ (Given in 15.4)

$\frac{3}{5}, \frac{13}{2}$ (Given in 15.6) $\frac{1}{8}$ (Given in 15.8)

15.10 Some more examples

a) $\frac{22}{5} = ?$ $\frac{22}{5} = 4\frac{2}{5}$ $\frac{2}{5} = .4$

$$\begin{array}{r} 0.4 \\ 5\overline{)2.0} \\ 0 \\ \hline 20 \\ 20 \\ \hline 00 \end{array}$$

This can be directly done also

$$\begin{array}{r} 4.4 \\ 5\overline{)22} \\ 20 \\ \hline 020 \\ 020 \\ \hline 000 \end{array} \qquad \frac{22}{5} = 4.4$$

b) $\frac{22}{8} = ?$

$$\begin{array}{r} 2.75 \\ 8\overline{)22} \\ 16 \\ \hline 060 \\ 056 \\ \hline 0040 \\ 0040 \\ \hline 0000 \end{array}$$

15.10.1 Exercises:

Eg: Write $\frac{56}{5}$ in decimal form.

Ans: $\frac{56}{5} = 11 + \frac{1}{5}$; $\frac{1}{5} = \frac{1.0}{5} =.2$

$\therefore \frac{56}{5} = 11 + .2 = 11.2$

Method B: $\begin{array}{r} 11.2 \\ 5\overline{)56.0} \\ 55\downarrow \\ \hline 10 \\ 10 \\ \hline 0 \end{array}$ $\therefore$ Ans: 11.2

Do by both the methods:

a. $\frac{7}{2}$ b. $\frac{20}{7}$ c. $\frac{59}{5}$ d. $\frac{27}{8}$ e. $\frac{25}{9}$ f. $\frac{2500}{9}$

15.11 Rule given in 15.8 applies to all numbers even if they are already decimals.

a) $\frac{.2}{2} = .1$ $\frac{.4}{2} = .2$ $\frac{.4}{4} = .1$

b) $\frac{4.2}{2} = 2.1$ $\frac{4.4}{2} = 2.2$ $\frac{4.4}{4} = 1.1$

c) $\frac{4.1}{2} = 2.05$ $\frac{4.5}{2} = 2.25$ $\frac{4.6}{4} = 1.15$

15.11.1 See examples given above. Do:

a. $\frac{2.2}{10}$ b. $\frac{2.33}{10}$ c. $\frac{2.404}{10}$ d. $\frac{5.15}{10}$

e. $\frac{5.001}{10}$ f. $\frac{1.1234}{2}$ g. $\frac{12.1234}{2}$ h. $\frac{3.330}{5}$

i. $\frac{6.6606}{10}$ j. $\frac{13.13}{2}$ k. $\frac{16.8}{8}$ l. $\frac{1.68}{8}$

m. $\frac{.168}{8}$ n. $\frac{8.0168}{8}$

15.12 Problem cases: we saw in 15.7 here we can convert by regular method.

Some divisions are endless. Then they have to be left at some point.

$\frac{10}{3} = ?$ $\frac{10}{3} = 3\frac{1}{3}$ This is OK

Division
$$\begin{array}{r} 3.333 \\ 3\overline{)10.000} \\ 09 \\ \hline 010 \\ 009 \\ \hline 0010 \\ 0009 \\ \hline 0001 \end{array}$$
$\therefore \frac{10}{3} = 3.333...3$

15.12.1 Exercises:

a. There are many like this try $\frac{1}{6}, \frac{1}{7}, \frac{1}{9}$

b. Try $\frac{22}{7}$

15.13 SHORTCUT to where to put the dot.

[Note to teachers: $\frac{1}{2}$=0.5. 1 cannot be divided by 2. 1 can be taken as 1.0. This is because o has no value and only zero after **.** (Decimal point) is acceptable. But 10 can be divided by 2.

$\therefore \frac{10}{2} = 5$; $\frac{1.0}{2} = \frac{10}{2}$ (With decimal point to be put later)

= 5 (With decimal point $\frac{1}{2}$ =.5

Similarly $\frac{1}{8} = \frac{1.0}{8}$ (This is not enough)

But $\frac{1}{8} = \frac{1.000}{8}$ (This is OK because 1000 can be divided by 8)

$\frac{100}{8} = 125$; $\frac{1}{8}$=125 (with **.** somewhere)

=.125]

===

Chapter - 16 Percent

16. Percent:

Percent means per hundred.

16.1 Make the dividing number (i.e. denominator) as 100, the numerator you get is called percent.

Thus $\frac{1}{2} = \frac{?}{100}$ $\frac{100}{2} = 50$ $\therefore \frac{1}{2} = \frac{50}{100}$

Or $\frac{1}{2} = 50\ \%$ (percent)

$\frac{1}{4} = \frac{25}{100}$ $\therefore = 25\ \%$

$\frac{1}{5} = \frac{20}{100}$ $\therefore = 20\ \%$

16.2 Exercises:

Convert the given fractions into percent:

a. $\frac{95}{100}$ b. $\frac{61}{100}$ c. $\frac{34}{100}$ d. $\frac{59}{100}$

b. In (a1) to (a4) above, assume they are marks obtained. Given $\geq 80\%$ distinction; $\geq 60\%$ is I class. < 35% fail. Write down who all got I class and who all failed.

c. Marks obtained by (a) to (d) out of maximum 10 are given below. Convert them into percent.

a. 3 b. 5 c. $7\frac{1}{2}$ d. 9

d. (a) to (d) are marks for total 25. What are the percentage values?

a. $7\ \frac{1}{2}$ b. $12\frac{1}{2}$ c. 23 d.18

16.3 In the case of decimals it is much simpler; this is because, for a decimal fraction, here is no denominator i.e. their denominator is 1.

Thus 0.5 = what % Ans: 0.5 X 100
= 50.00
= 50 %

0.25 = 0.25 x 100
= 25 %

0.2 = 0.2 x 100
= 20 %

16.4 Convert the given decimal numbers into percent.

Example: .125 = .125 x 100 = 12.5%

Do:

a) .55 b) .60 c) .6025 d) .01 e) .02
f) .05 g) .10 h) .99

16.5 Percent is very familiar to all the students. Their pass marks, mutual comparison of results are based on percent values.

Activity:
Students can bring their own mark sheets and verify the % marks calculation.

16.5.1 In a school, 80 students appeared for SSLC exam. 60 passed. What is the % result of the school?

16.6 Note to teachers:

Teachers, there are many real life examples of percent.

E.g.: Rebates, tax, commission, stamp duty, loan interest, economic growth rate. Use some of then to create interest in the subject.

16.7 Why percent?
Ans.: To remove the necessity of indicating any number.
E.g. 1: How Many persons voted? In different places, numbers will vary. These numbers will not be able to tell us whether many did not go to vote or not. Percent vote gives us an idea by which we can compare results of different places.
E.g. 2: How much allowance can we give to our employees? Any one answer (like Rs. 1000) will not be sufficient. Allowance may have to depend on the income (=salary) of each person. i.e., it should be appropriate So, instead of giving one number, we can say all will get 20% of their own salaries.
Thus percent is an easy way of comparing varying quantities; method of proportional allotment.

16.8 **Activity:** Go forward to the chapter on Graphs (in this book) and see how % can be shown in bar and pie chart.

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Chapter - 17 Profit and loss

17.1 A short note on what this chapter is: Students, do not think this is mathematics. It is not. It is commerce, business. Therefore easy? Yes, easy, if you go by steps. Necessary? Absolutely. Many activities depend on this subject. Many words like buying and selling, manufacturing and marketing, purchasing and retailing depend upon calculation of profit and loss. Many subjects like small-scale industry, large-scale industry, microeconomics, microeconomics national income. Global commerce etc refers to profit and loss. The subject is every big. So, some basic arithmetic will be shown here. Students and teachers may find their own examples and problems anywhere and everywhere.

17.2 Cost, Sale: Two terms buying price, selling price are very important.
[Price – not ‘prize’]
[‘Sale’ here does not mean cheap and below cost]
[Students from Mysore should be alert]
Let LHS = Cost
Let RHS = Sale Price (SP)
If you sell at cost, no gain, no loss
LHS = RHS (no gain)
If RHS > LHS, Profit
If LHS > RHS, Loss
Some persons write like this:
Sale price = cost price + profit
(Let SP be sale price, CP be cost price)
∴ Profit = SP – CP)

17.3 Student can do some simple exercises:

a. Bought a pen for Rs. 10, sold for Rs. 10, Profit/Loss?
b. Bought a shirt for Rs. 300 sold for Rs. 300, Profit/Loss?
c. Bought a cycle for Rs. 2000 sold for Rs. 2200, Profit/Loss?
d. Bought a saree for Rs. 500 sold Rs. 600, Profit/Loss?
e. Bought a scooter for Rs. 21000 sold Rs. 11,000, Profit/Loss?
f. Bought a site for Rs. 3 Lakhs sold Rs. 5 lakhs, Profit/Loss?

17.3.2 Instead of one item in the questions, we can buy many and sell one by one.

Eg: Buy 10 pens for Rs. 70 and sell each pen at Rs. 10. Students can make their own questions.

17.4 Bulk Buying and Selling: Every homemaker knows going to wholesale market and buying is cheaper. Many small scale vendors do this.

17.4.1 Exercises:

a. Bought a gross of pens for Rs. 1000. Sold each at Rs. 10. Profit? Percent? (Gross=12 Dozens. Dozen = 12 items).
b. Bought 1000 shirts for 1 lakh. Sold Rs. 150 per piece. Profit? Percent?
c. In (b) above 300 were small size 700 were adult sizes. Sold children's shirts at Rs.50. Sold adults shirts at Rs. 200. Profit or Loss? Percent?
d. Bought 100 sarees at Rs. 500 each. Selling Price was Rs. 600. But 20 Sarees were found defective. So only 80 should be sold. Profit or Loss? What can be done with 20 defective sarees, if there should be no loss?

17.5 Whole Sale and Retail: Retailing involves middleman, his profit or commission etc. In 17.4.1a above, 1 gross pens cost Rs. 1000. But sales man takes away Rs. 2 per pen. Sale price is the same Rs. 10 per pen. Now calculate profit percentage. Many such calculations are necessary students can easily manage them with the help of calculators.

17.6 Caution

17.6.1 The concept of cost price will change according to who you are. If you are a wholesaler your cost price can be small. If you buy from a wholesaler and want to sell, wholesaler's sale price is your cost price.

17.6.2 Calculation of loss or gain (especially) % calculations always refer to your cost price. Not sale price.

17.6.3 Discounts, concessions etc refer to sale price or the number written on the sales tag.

17.7 LHS = Cost RHS =Sale

17.7.1 (Cost price + all the expenditure made up to the point of selling) = LHS
RHS = Total money earned + any other benefit.
LHS includes transport cost, salaries of staff etc. This will be easily understood by ALL the students.

17.7.2 Now think of a bigger venture and associated heads of expenditure.
Cost price, transportation, insurance, godown and storage charges, cost of damaged articles. Now think of sale price required etc.

17.7.3 In addition to the items mentioned in 32.3, bigger ventures will have more heads of expenditure.
E.g.: Establishment charges, capital and its interest, advertisement expenditure, repacking, branding expenses, discounts and offers, if given.
So, the simple idea of profit or loss becomes very complicated.

17.7.4 Lastly take an example of a textile mill or car manufacture or any product of a factory and try to work out the final cost. It may be too much for high school level students. But it may be interesting to the students from a non-maths point of view. Teachers can discuss and help.

17.8 Problems are not given here. Any guidebook for competitive exams will have plenty of questions.

17.9 Students may realize many finance jargon (= technical terms) are related to profit and loss. Cost estimation, profit margin, price escalation, price reduction, profit share, returns on capital etc are all dependent on one another.

Activity: Collect some formulas from PUC (Commerce Students).