Chapter - 6   Division –2

6.1   How to write A ÷ B means A is divided by B. Also written as A/B or $\dfrac{A}{B}$ (/ is the computer

key). Some persons call $\dfrac{A}{B}$ as fraction and A ÷ B as division. But both are the same. There

is an advantage if one writes division as $\dfrac{A}{B}$.

$\dfrac{A}{B} = A\left(\dfrac{1}{B}\right)$. When $\left(\dfrac{1}{B}\right)$ is a known quantity, $\dfrac{A}{B}$ (i.e., division) can be considered as A x $\left(\dfrac{1}{B}\right)$.

When $\left(\dfrac{1}{B}\right)$ is a known quantity, $\dfrac{A}{B}$ (i.e., division) can be considered as A x $\left(\dfrac{1}{B}\right)$ (i.e.,
multiplication).

Example: $\dfrac{12345}{3}$ is the same as 12345 ÷ 3.

12345 is the dividend, 3 is the divisor.

In this form: $\dfrac{12345}{3}$ = (12345) is called numerator, 3 is called denominator.

6.1.1   For Convenience, we can say: $\dfrac{A}{B}$ is division when A > B

$\dfrac{A}{B}$ is a fraction when A < B. Thus $\dfrac{12}{3}$ is division (Ans: 4). $\dfrac{2}{3}$ is a fraction.

Do $\dfrac{13}{3}$ Ans = 4 (remainder= 1). This remainder is a fraction $\left(=\dfrac{1}{3}\right)$.

6.1.2   Write A ÷ B in $\dfrac{A}{B}$ form. Write down the numerator and denominator.

Example: 9876 ÷ 76 Ans= $\dfrac{9876}{76}$; Numerator = 9876, Denominator = 76

Do:
   a. 15 ÷ 3   b. 1501 ÷ 501   c. 999 ÷ 9   d. 101 ÷ 101
   e. 1010 ÷ 10

6.1.3   Exercises

Write $\dfrac{A}{B}$ in A ÷ B form.

a. $\dfrac{15}{5}$ b. $\dfrac{10}{3}$ c. $\dfrac{123123}{123}$

6.1.4 Exercises

Write $\dfrac{A}{B}$ as (quotient) + fraction

Example: $\dfrac{7}{3} = 2 + \dfrac{1}{3}$ or $2\dfrac{1}{3}$

Do:
   a. $\dfrac{9}{2}$ b. $\dfrac{10}{3}$ c. $\dfrac{17}{4}$ d. $\dfrac{19}{5}$ e. $\dfrac{15}{6}$ f. $\dfrac{20}{7}$

   g. $\dfrac{31}{8}$ h. $\dfrac{17}{9}$

6.2   Dividing by single digit number.

Example: $\dfrac{10}{3} = ?$ $\dfrac{10}{3} = 3\,(remainder\,1) = 3 + \dfrac{1}{3}$

Do:

a. $\dfrac{10}{2}$ b. $\dfrac{11}{3}$ c. $\dfrac{10}{4}$ d. $\dfrac{12}{4}$ e. $\dfrac{10}{5}$ f. $\dfrac{11}{5}$

g. $\dfrac{12}{6}$ h. $\dfrac{13}{6}$ i. $\dfrac{14}{7}$ j. $\dfrac{15}{7}$ k. $\dfrac{15}{8}$ l. $\dfrac{16}{8}$

m. $\dfrac{17}{9}$ n. $\dfrac{18}{9}$ o. $\dfrac{10}{10}$ p. $\dfrac{10}{9}$ q. $\dfrac{10}{8}$ r. $\dfrac{10}{7}$

s. $\dfrac{10}{6}$

6.3   We have seen:

0 x 5 = 0   and   5 x 0 = 0
0 x 1 = 0,   0 x 10 = 0 etc

(Anything) x 0 = 0   and   0 x (Anything) = 0

Similarly

$0 \div 1 = 0$ i.e. $\dfrac{0}{1} = 0$

$0 \div 5 = 0$ i.e. $\dfrac{0}{5} = 0$

$0 \div 10 = 0$ i.e. $\dfrac{0}{10} = 0$

$\therefore$ $\dfrac{0}{(anything)} = 0$

BUT $\dfrac{anything}{0}$ is NOT ZERO. It has a special meaning.

6.4   Dividing by 10, 20, etc

6.4.1   Dividing by 10

Compare with multiplying by 10
5 x 10 = 50
51 x 10 = 510
60 x 10 = 600
12345000 x 10 = 123450000

i.e. Add one zero for multiplying by 10. Similarly cut one zero for dividing by 10.

$\therefore$ $\dfrac{50}{10} = 5$ $\dfrac{510}{10} = 51$ $\dfrac{600}{10} = 60$ $\dfrac{1234500}{10} = 1234500$

Exercises:

a. 123 x 10   b. 132 x 10   c. 1001 x 10   d. 10101 x 10
e. 9080701 x 10   f. 1230 ÷ 10   g. 1231 ÷ 10   h. 1320 ÷10
i. 10010 ÷ 10   j. 100105 ÷ 10   k. 101010 ÷ 10   l. 101026 ÷ 10

m. 908070 ÷ 10 n. 9080701 ÷ 10

6.4.2   Dividing by 20

a. $\dfrac{120}{20} = \dfrac{12}{2} = 6$. Cut one zero for 10 first and then divide by 2.

b. $\dfrac{121}{10}$ To do this divide 121 by 10

        i.e. $\dfrac{121}{10} = 12$ and (remainder 1)

        ∴ $\dfrac{121}{20} = \dfrac{12}{2} = 6$ and (remainder 1)

c. $\dfrac{129}{20}$ first $\dfrac{129}{10} = 12$ (+ remainder 9)

Then $\dfrac{12}{2} = 6.$ ∴ 6 (+ remainder 9)

d. Exercises:

d1. $\dfrac{40}{20}$ d2. 80 ÷ 20   d3. $\dfrac{100}{20}$ d4. $\dfrac{2000}{20}$

d5. 2020 ÷20   d6. 12340 ÷ 20   d7. 88880 ÷ 20   d8. 99980 ÷ 20

d9. 10101020 ÷ 20

e. Exercises:

        e1. $\dfrac{41}{20}$ e2. $\dfrac{81}{20}$ e3. $\dfrac{99}{20}$ e4. $\dfrac{2009}{20}$

        e5. 2025 ÷ 20   e6. 12348 ÷ 20   e7. 88888 ÷ 20

        e8. 99989 ÷ 20

6.4.3   Dividing by 20 (Contd) [This is difficult to understand ∴ optional].

6.4.3a $\dfrac{130}{20} = \dfrac{130}{2 \times 10} = \dfrac{13}{2} = 6$ (+ remainder 1)

        But this remainder 1 is really = 10.

        ∴ Ans. = 6 (+ remainder 10)

        Now Do: i. $\dfrac{90}{20}$ ii. $\dfrac{30}{20}$ iii. $\dfrac{990}{20}$

6.4.3b $\dfrac{130}{20} = \dfrac{139}{2 \times 10}$

        First $\dfrac{139}{10} = 13$ (+ remainder 9)

        Next $\dfrac{13}{2} = 6$ (+ remainder 1) But this last remainder is really = 10

$$\therefore \quad \frac{130}{20} = 6 \quad (+ \text{ remainder } 10 + 9 = 19)$$

Now Do: i. $\dfrac{98}{20}$ ii. $\dfrac{36}{20}$ iii. $\dfrac{988}{20}$

6.5   **Don't do:** Splitting the numbers as you like

6.5.1 $\dfrac{20}{7} = 2$ (+ remainder 6)   This is Correct

Now try $\dfrac{20}{2 + 5} = (\dfrac{20}{2})$ first 2 then by 5

$= \dfrac{20}{2} = 10$ then $\dfrac{10}{5} = 2$ (no remainder)   This is Wrong

6.5.2   Try $\dfrac{70}{7} = 10$ (OK)

Now $\dfrac{70}{2 + 5} = \dfrac{35}{5} = 7$ (wrong)

i.e. the bottom number (=denominator) **should not** be split into **addition** of 2 numbers.

6.6   Now you see **WHAT YOU CAN DO.**

6.6.1 $\dfrac{24}{4} = ?$ Ans = 6 (by 'maggi')

Can also do $\dfrac{20 + 4}{4} = \dfrac{20}{4} + \dfrac{4}{4}$
$$= 5 + 1 = 6$$

i.e., TOP NUMBER can be written as a SUM (i.e., addition). But division should be done for each one on the top.

Do (by converting numerator as addition of 2 number):

a. $\dfrac{205}{5}$ b. $\dfrac{2025}{5}$ c. $\dfrac{5555}{11}$ d. $\dfrac{2821}{7}$ e. $\dfrac{333378}{3}$

f. $\dfrac{17171734}{17}$ g. $\dfrac{34516817}{17}$

(For some of these, sum can be more than two numbers).

6.6.2   Splitting the numerator (as a sum). This is ALLOWED. Thus $\dfrac{24}{4}$ can be written as $\dfrac{20 + 4}{4}$.

This is possible because 20 is divisible by 4.

Similarly $\dfrac{225}{5}$ can be written as $\dfrac{200 + 25}{5}$ $= \dfrac{200}{5} + \dfrac{25}{5} = 40 + 5 = 45$

This is because 200 can be divided by 5.

$\dfrac{3577}{7} = ?$ If you split as 3000 + 577 it does not help.

But you can split it as $\dfrac{3500 + 77}{7} = \dfrac{3500}{7} + \dfrac{77}{7} = 500 + 11 = 511$

Do by suitable splitting of numerator:

a. $30021 \div 3$ b. $\dfrac{1339}{13}$ c. $\dfrac{2200121}{11}$

6.6.3   Splitting need not be at 10 or 100. It can be anywhere.

Eg: $\dfrac{49}{7} = ?$ If we are not sure of our maggi and we know 7 x 5 = 35.

Do 49 = 35 +14 $\therefore \dfrac{49}{7} = \dfrac{35+14}{7} = 5 + 2 = 7$

Do as suggested by clues:

a. $\dfrac{156}{12}$ (We know 12 x 12=144)   b. $\dfrac{143}{11}$ (Clue 11 x 10 = 110)

c. $\dfrac{169}{13}$ (We know 13 X 10 = 130)   d. $\dfrac{209}{19}$ (Clue 19 X 10 = 190)

e. $\dfrac{544}{17}$ (Clue 17 X 3 = 51)

6.7   **Can Do**: $\dfrac{70}{14} = $

> 14 is a tough number
> $\therefore$ 14 = 2 x 7

6.7.1 $\dfrac{70}{2 \times 7} = \dfrac{10}{2} = 5$ Answer

6.7.2 $\dfrac{48}{6} = 8$ (OK)

Try this wrong method: $\dfrac{48}{6} = \dfrac{48}{4 + 2}$

$= \dfrac{48}{4} = 12$ then $\dfrac{12}{2} = 6$ (Wrong)

Instead 6 = 2 x 3. $\therefore \dfrac{48}{6} = \dfrac{48}{2 \times 3}$

First $\dfrac{48}{2} = 24$ then $\dfrac{24}{3} = 8$ (OK)

6.7.3   Rule: DENOMINATOR can be split as product of 2 or more numbers (i.e., factorization is OK). Sum (i.e., +) in denominator is not correct.

6.7.4   Exercises:

a. $\dfrac{12345}{55}$ b. $\dfrac{12321}{33}$ c. $\dfrac{10094}{98}$ d. $\dfrac{16807}{49}$ e. $\dfrac{2401}{49}$ f. $\dfrac{16807}{343}$

6.8.1   Top number (= numerator) can be split into two parts. It can be addition or subtraction or multiplication.

6.8.2   Top numbers 25 = 20 + 5

a. $\dfrac{25}{5} = 5$ (OK)

$\dfrac{20 + 5}{5} = \dfrac{20}{5} + \dfrac{5}{5} = 4 + 1 = 5$ (OK)

b.   Top number 25 = 5 x 5

$$\frac{25}{5} = \frac{5 \times 5}{5} \quad \text{(Here only once)}$$

$$= \frac{5}{5} \times 5 = 1 \times 5 = 5 \quad \text{(OK)}$$

c. $\dfrac{15}{5} = 3$ (OK).   Now top number 15 = 20 − 5

$$\frac{15}{5} = \frac{20 - 5}{5}$$

$$= \frac{20}{5} - \frac{5}{5} = 4 - 1 = 3 \text{ (OK)}$$

d. $\dfrac{63}{7} = ?$ Top number 63 = 3 x 21

$$\frac{63}{7} = \frac{3 \times 21}{7} = 3 \times 3 = 9$$

e. $\dfrac{35}{7} = ?$ Top number 35 = $\dfrac{70}{2}$

$$\therefore \frac{35}{7} = \frac{70}{7} \div 2 = 10 \div 2 = 5 \text{ (OK)}$$

6.8.3 Exercises: Do by at least 2 different methods for each problem.

a. $\dfrac{28}{14}$ b. $\dfrac{650}{26}$ c. $\dfrac{154}{11}$ d. $\dfrac{12321}{33}$ e. $\dfrac{9595}{5}$ f. $\dfrac{95}{5}$

g. $\dfrac{9595}{95}$

Exercises - Chapter 6

Ex. VI.1   a. $\dfrac{456780}{4}$ b. $\dfrac{456780}{3}$ c. $\dfrac{456780}{5}$ d. $\dfrac{456780}{20}$ e. $\dfrac{456780}{12}$

f. $\dfrac{456780}{15}$ g. $\dfrac{456780}{60}$ h. $\dfrac{45678}{6}$

Ex. VI.2   Fill up using +, -, x, ÷ only

1. 10 □ 10 □ 10= 10
2. 10 □ 10 □ 10= 2
3. 10 □ 10 □ 10= 200
4. 10 □ 10 □ 10= 0
5. 10 □ 10 □ 10= 1000
6. 10 □ 10 □ 10= 90
7. 10 □ 10 □ 10= 30
8. 10 □ 10 □ 10= 110
9. 10 □ 10 □ 10= 11

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Chapter - 7   Basic Operations

7.   **Four basic operations**

These are   +,   -,   x,   and   ÷
When do we use them? Other than in the classroom? Yes, we use them almost daily, almost everywhere.

7.1   **Addition** of many numbers is a very common phenomenon.

a.   Accounts book of any company
b.   Daily accounts of any household
c.   Daily sales of any small shop
d.   Totaling of marks in an exam papers
e.   Counting of total number of students in a school

Students can make this list and make it longer.

7.2   Real life **subtraction** also will be similar to 7.1.

7.3   Multiplication events:

a.   Bus conductor
b.   Any shopkeeper
c.   Budget planner, accountant

Let the students make this list longer.

7.4   Division events:

a.   Markets – per unit price.
b.   Calculating property share
c.   Calculating run rate – runs / over etc

7.5   Play a game

Make 8 groups of students.
Let there be a panel of judges consisting of students from each group.
Allot mark for each idea given and bonus marks for every good idea
Find a winning team etc.

Exercises - Chapter 7

Ex. VII.1   Example: Select the right one:
8 x (9876) =?   a. 7200058   b. 790008   c. 79008   d. 79004

Ans: c

How did you arrive at this selection? Not by actual working, but by guessing. 9876 is almost 10000 (but less) 8 times 10000 = 80000. Answer should be less than 80000. So Ans ≠ (a) or (b). Out of (c) & (d) which one? Last digit is (8x 6) = 48. ∴ Last digit in the answer should be 8. ∴ (c) Is the answer?

        Now do:
a. 19 x 99=?   a. 1881   b. 18081   c. 19991   d. 1991
b. 21 x 101=?   a. 2101   b. 2121   c. 21011   d. 2221
c. 41 x 19=?   a. 719   b. 819   c. 779   d. 829
d. 3 x 18=?   a. 21   b. 34   c. 74   d. 54
e. Let the student use a calculator and make his own questions.

Ex. VII.2   E.g.: If the product of two numbers is 21, which are these numbers?

Ans: 3 and 7 (21 and 1) also.

Now Do:
a. Product = 9   b. 15   c. 49   d. 55   e. 299
f. 8   g. Student can make own questions.

Ex. VII.3   E.g.: If the product of two numbers is 42. Which are the numbers?
Answers: 42 = 42 x 1(Omit this simple answer).
           = 2 x 21   = 6 x 7 = 3 x 14
Any of the three above is correct.

Now Do: Let the product be = P
a. P = 18   b. 60   c. 98   d. 165   e. 1495   f. 16
g. Students own questions.

Ex. VII.4   Example: 7 x 49=?   Do not start multiplying. Do mentally (or by shortcut with a
paper). 49 is almost equal to 50. 7 x 50 = 350.
Less (7 x 1). ∴ 350 – 7 =343.

Do:
a. 4 x 19   b. 14 x 9   c. 99 x3d. 8 x 15   e. 8 x 151   f. 18 x 15
g to J – students can make his own questions and answer.

Ex. VII.5 E.g.: if 50 x 12 = 600, 49 x 12 =?
Ans.: Mentally 12 less than 600 = 588

Do:
a.   If 41 x 19 = 779,   41 x 18 =?
b.   If 3 x 18 = 54,   103 x 18 =?
c.   Student can extend the same questions.

Ex. VII.6 Example: if 3 X 18 = 54, 54 ÷ 3 =?   Ans.: 18

Do:
a.   If 7 x 19 = 133, 133 ÷ 19 =?
b.   If 7 x 19 = 133, 133 ÷ 7 =?
c.   If 41 x 19 = 779, 779 ÷19 =?
d.   If 41 x 19 = 779, 779 ÷ 41 =?
e.   If 41 x 19 = 779, 7790 ÷ 41 =?
f.   41 x 19 = 779, 779000 ÷19 =?
g.   If 103 x 18 = 1854, 1854 ÷ 18 =?
h.   If 103 x 18 = 1854, 1854 ÷ 206 =?
i.   If 103 x 18 = 1854, 1854 ÷ 618 =?

Ex. VI.7 Example: Let 2 x 3 x 4 x 5 x7 = 840. Then,

$$\frac{840}{2} =(3 \times 4 \times 5 \times 7) =$$

$$\frac{840}{6} =(4 \times 5 \times 7) =$$

Do: Given 6 x 7 x 8 x 9= 3024

a. $\dfrac{3024}{9}$ b. $\dfrac{3024}{72}$ c. $\dfrac{3024}{504}$ d. $\dfrac{3024}{42}$ e. $\dfrac{3024}{56}$ f. $\dfrac{3024}{54}$

Ex. VII.8

Students should know how to convert written words into mathematical problems. E.g.: You are a conductor in a bus. There are 50 passengers, 20 are children. There are adults. Adult ticket is Rs. 5/- Half ticket is Rs. 3 /-. How much do you collect?

No. of children = 20, Ticket per child = Rs. 3   ∴ Total = 20 x 3   = Rs. 60
No. of adults = 50 – 20 = 30, Ticket per adult = Rs. 5
     ∴ Total = 30 x 5   = Rs. 150
     Total money collected = Rs. 60 + Rs. 150 = Rs. 210.

Questions:

a. In the example above 10 adults have pass. How much money is collected?

b. You are a sales person. One pencil costs Rs. 3 and sale price of a pen is
Rs. 7. If a person buys 4 pens and 4 pencils and gives you a fifty rupee note, how much will you return?

c. You are treating your friends in a hotel. Everyone gets 2 vadas, 1 Gobi and 1 ice cream. Cost of vada is Rs. 6, Gobi is Rs. 10, ice-cream is Rs. 15. How much will be the bill? (Clue: Ask how many persons).

d. 1 kg of glucose biscuits packet was bought. We opened and counted. There were 100 biscuits. 20 students were present in the class. How many biscuits each student will get? If 5 more students come and join in, how many biscuits per person?

e. A company was run using the capital raised by 50 shareholders. All have equal number of shares. Profits are shared equally. Annual profit was Rs. 25,000. How much profit share will each shareholder get?

f. 1 dozen mangoes cost Rs. 72. What is the cost of each mango?
1 dozen pens cost Rs. 72. Each pen?
Now put notebook, sweet, etc., in place of mango (Clue: 1 dozen = 12 items).

g. A quintal of rice costs Rs. 3000 (as in May 2009). What is the cost of 1 kg
Rice? (Clue: 1 quintal = 100 Kg).

h. Students can form their own questions, taking from day-to-day life.
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Chapter - 8   Rule of Three

8.   **Rule of three.**
    This is very common – is very important and is always bothering (giving trouble) the students.

8.1   If a box of 10 pencils costs Rs. 22. What is the cost of 3 pencils?
    Go to price of one by division and get price of 3 by multiplication.
    [This is also called UNITARY method].

8.2   A box of 3 dozen Alphonso mangoes costs Rs. 720.
    What is the cost of 3 mangoes?

8.3   If a quintal of dhal costs Rs. 5000.
    What is the lowest possible retail price of 1 kg of dhal?
    [1 quintal = … kg   should know].

8.4   Basava has 2 acres and 20 guntas of land. If land cost is settled at Rs. 5 lakhs per acre. How much will Basava get?
    [Teacher can put in real life jokes of document cost, chai-pani cost, dalal's fees etc for fun and keeping the class of rural students alive].

8.5   Unitary method or **Rule Of Three** is very important. It has applications in business, commerce, economics, politics, budgeting and certainly in engineering. **METHOD of SOLVING** is important

8.6   Examples:

  a.   IF 1" = 2.5 cm, 1 foot = ? Cm

  b.   If 1 mile = 1.6 km, marathon runner of 26 miles runs how many kilometers?

  c.   If 1.6 km = 1 mile, what is the mph of a car running at 80 kmph.

  d.   Give a fast bowler's ball speed in both the units
                  or
       What is Nadal's ace service speed?

  e.   Someone's weight is 40 kg. How much in pounds (1 kg = …..)

  f.   If 1 US Dollar = Rs. 45, $ 100 = Rs ?.

  g.   If you have Rs. 10000, how may US dollars?

  h.   If a 300 gm biscuit packet of Parle costs Rs. 24 and a 90 gm packet of Britannia costs Rs. 8, which is cheaper? By how much per kilogram?

8.7   Rule of TWO or UNIT VALUE
        E.g.: 10 items is worth 20.
        Unit value (or 1 item) is worth how much?

$$10 \longrightarrow 20$$

$$1 \longrightarrow \frac{20}{10} = 2 \quad \text{Ans} = 2$$

        Do:
  1. Pencils cost Rs. 10, each =?
  2. 3 shirts for Rs.99, each=?
  3. 40 students ate a total of 200 idles. How many each?
  4. 30 days (one month) electricity use was 240 KWH (i.e., units). How many   per day?
  5. In (4) above what is annual consumption?
  6. Old (ancestral) house was sold for 12 lakhs. 4 sons equally share. How   many each one will get?
  7. In (6) above if 2 daughters also should be given equal share, how much   each son will get? How much each daughter will get?
  8. In (7) above, 8 lakhs was used for starting a business. What was each   Son's contribution?
  9. In (8) above, the capital was increased to 9 lakhs and daughters also join   in, what is each person's share?

8.8   **Rule of three;** Unitary method (or many to one and then one to many).
        E.g.: 1 dozen bananas cost Rs. 24. What is the cost of of 4 bananas?

        Ans.: (1 dozen) = 12 bananas $\longrightarrow$ Rs. 24

$$1 \text{ banana} \longrightarrow \frac{24}{12} = 2$$

        4 bananas$\longrightarrow$ 2 x 4 = 8

        Do:
  1. 5 kg of sugar Rs. 120. How many for 2 kg of sugar?
  2. Annual salary of an IT professional is Rs. 10 lakhs. What is his monthly Salary? (Approximate also OK).
  3. In (2) above, if he saves 3 months total salary, can he buy a scooter? Or a Car?
  4. An office workers monthly income (total) is Rs. 5000. She gets 2 month bonus during Diwali. She could same only 1 month's average income? Can she buy a car? Scooter?
  5. A vegetable seller gets 100 kgs from wholesale market by paying Rs. 600. 10 kgs are wasted. He sells the remaining for Rs. 8 / kg. Is this OK?
  6. In (5) above another 15 kg are not sold? Is this OK? What should he have done?