MULTIPLICATION AND DIVISION OF DECIMAL NUMBERS

MULTIPLICATION OF DECIMAL NUMBERS

I. Multiplication of a decimal number by a whole number.

Multiply 0.2×3

$2 \times 3 = 6$ ——— Multiply the numbers ignoring the decimal point.

So, $0.2 \times 3 = 0.6$ ——— Number of decimal places in 0.2 is one. So, we keep only one decimal place in the product.

In the same way,

Let us multiply 4.18 by 5

$418 \times 5 = 2090$ ——— Multiply the numbers ignoring the decimal point.

So, $4.18 \times 5 = 20.90$

Same number of decimal places in the product as in the multiplicand.

Worksheet 1

1. Find the product.

(a) 0.3×3

(d) 0.005×15

(g) 71.8×248

(b) 0.3×4

(e) 2.4×23

(h) 7.37×56

(c) 0.412×2

(f) 16.3×17

(i) 1.001×96

2. If $3,485 \times 16 = 55,760$, find–

(a) 348.5×16

(c) 3.485×16

(b) 34.85×16

(d) 0.3485×16

II. Multiplication of one decimal number by another decimal number.

Let us multiply 4.2 by 0.56

$$4.2 = \frac{42}{10}$$

$$0.56 = \frac{56}{100}$$

$$\begin{aligned}
\text{Now, } 4.2 \times 0.56 &= \frac{42}{10} \times \frac{56}{100} \\
&= \frac{42 \times 56}{10 \times 100} \\
&= \frac{2352}{1000} \\
&= 2.352
\end{aligned}$$

Remember
In order to multiply two decimal numbers,
- multiply the numbers ignoring the decimal points.
- make the decimal places in the product equal to the sum of decimal places in the multiplicand and multiplier.

Worksheet 2

1. Find the product of the following:

   (a) 0.2×0.3

   (b) 0.5×0.4

   (c) 3.1×0.04

   (d) 8.1×5.3

   (e) 3.4×23.6

   (f) 10.15×10.04

   (g) 8.24×19.7

   (h) 13.62×35.1

   (i) 10.05×0.6

2. If $1,135 \times 72 = 81,720$, find the value of:

   (a) 113.5×7.2

   (b) 11.35×7.2

   (c) 11.35×0.72

   (d) 1.135×7.2

   (e) 1.135×0.72

   (f) 0.1135×0.72

100

III. Multiplication of a decimal number by 10, 100, 1000

Remember

In order to multiply a decimal number by 10, 100 or 1000, we just shift the decimal point in the product to the right by as many places as there are zeroes in the multiplier.

Let us study these questions.

$6.92 \times 10 = 69.2$

Multiplier having one zero

Decimal point shifts one place to the right.

$3.481 \times 100 = 348.1$

Multiplier having two zeroes

Decimal point shifts two places to the right.

$16.846 \times 1000 = 16846.0$

Multiplier having three zeroes

Decimal point shifts three places to the right.

Worksheet 3

1. Find the product orally.

(a) 0.2×10

(b) 1.18×10

(c) 13.293×10

(d) 16.25×100

(e) 4.02×100

(f) 19.32×100

(g) 71.821×1000

(h) 45.01×1000

(i) 0.1×100

(j) 7.538×100

2. Complete the following:

(a) 1.5 × ☐ = 15

(b) 2.61 × ☐ = 261

(c) 14.326 × ☐ = 14326

(d) 0.8 × ☐ = 80

(e) 0.5 × ☐ = 500

(f) 10.3 × ☐ = 10300

(g) 3.08 × ☐ = 30.8

(h) 0.001 × ☐ = 1

PROPERTIES OF MULTIPLICATION OF DECIMAL NUMBERS

Multiplication of two decimal numbers in either order.

$1.2 × 3.8 = 4.56$ ┐ Product is

$3.8 × 1.2 = 4.56$ ┘ the same

⌐ If two decimal numbers are multiplied in
└ either order, the product remains the same.

Multiplication of a decimal number by one.

$3.29 × 1 = 3.29$

$19.3 × 1 = 19.3$

⌐ Product of a decimal number and one
└ is the decimal number itself.

Multiplication of a decimal number by zero.

$2.4 × 0 = 0$

$13.182 × 0 = 0$

⌐ Product of a decimal number and zero is
└ always zero.

Worksheet 4

1. Complete the following:

(a) 5.8 × 6 = 6 × 5.8

(b) 0.8 × 0 = 0

(c) 9.3 × 3.4 = 9.3 × 3.4

(d) 13.26 × 1 = 13.26

(e) 1 × 15.6 = 15.6

(f) 4.7 × 1 = 4.7

(g) 15.5 × 1.8 = 15.5 × 1.8

(h) 95.601 × 0 = 0

Let us study the following word problem.

Example 1: One box of apples weighs 25.25 kg. Find the weight of seven such boxes of apples.

Solution: Weight of one box of apples = 25.25 kg

Weight of seven such boxes of apples = 25.25

$$\begin{array}{r} 25.25 \\ \times\ 7 \\ \hline 176.75\ \text{kg} \\ \hline \end{array}$$

Seven boxes of apples weigh 176.75 kg.

Worksheet 5

1. Solve the following word problems.

   (a) Renu needs five pieces of ribbon of length 7.5 cm. What is the total length of ribbon needed?

   (b) One Mathematics book of Class–V costs ₹ 75.50. What is the cost of 15 such books?

   (c) It needs 2.75 metres of cloth to stitch one shirt. What is the total length of cloth needed to stitch six such shirts?

   (d) The weight of one chair is 3.75 kg. Find the weight of three dozen chairs.

   (e) The cost of one kilogram of mangoes is ₹ 65. Find the cost of 2.5 kg mangoes.

   (f) A bag has 85.7 kg wheat. How much wheat will be there in 1,000 such bags?
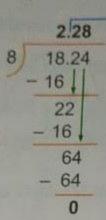
DIVISION OF DECIMAL NUMBERS

I. Division of a decimal number by a whole number.

Division of decimal numbers is similar to division of whole numbers.

Example 2: Divide 18.24 by 8

Solution:

$$18.24 \div 8$$

Here, dividend = 18.24, divisor = 8

```
      2.28
  8 ) 18.24
     - 16 ↓
       22
     - 16 ↓
         64
       - 64
          0
```

Decimal point will come directly above the decimal point in the dividend.

We get, **Quotient = 2.28, Remainder = 0**

Example 3: Divide 0.695 ÷ 5

Solution: Here, dividend = 0.695, divisor = 5

There is no whole number.

```
       0.139
   5 ) 0.695
      -  5 ↓
         19
       - 15 ↓
          45
        - 45
           0
```

Decimal point will come directly above the decimal point in the dividend.

We get, **Quotient = 0.139, Remainder = 0**

1. Divide the following:

(a) $0.95 \div 5$

(b) $3.44 \div 8$

(c) $4.9 \div 7$

(d) $25.41 \div 11$

(e) $31.5 \div 9$

(f) $16.5 \div 15$

(g) $0.077 \div 7$

(h) $88.88 \div 22$

(i) $35.49 \div 13$

(j) $57.5 \div 25$

Study this example.

Example 4: $4.23 \div 5$

Solution:

$$
\begin{array}{r}
0.846 \\
5{\overline{\smash{)}4.23}} \\
-4\,0 \\
\hline
23 \\
-20 \\
\hline
30 \\
-30 \\
\hline
0
\end{array}
$$

Keep on adding zeroes and divide till no remainder is left.

Worksheet 7

1. Divide the following:

(a) $0.5 \div 2$

(b) $3.4 \div 4$

(c) $12.6 \div 5$

(d) $6.05 \div 25$

(e) $11.7 \div 6$

(f) $12.06 \div 12$

(g) $9.2 \div 16$

(h) $3.75 \div 6$

(i) $8.5 \div 17$

(j) $14.4 \div 12$

II. Division of a decimal number by 10, 100, 1000

> **Remember**
> In order to divide a decimal number by 10, 100, 1000, we just shift the decimal point in the quotient to the left by as many places as there are zeroes in the divisor.

Let us study these questions.

$56.8 \div 10 = 5.68$ — Decimal point shifts one place to the left.

Divisor having one zero

$438.5 \div 100 = 4.385$ — Decimal point shifts two places to the left.

Divisor having two zeroes

$105.2 \div 1000 = 0.1052$ — Decimal point shifts three places to the left.

Divisor having three zeroes

Worksheet 8

1. Find the quotient orally.

(a) $1.7 \div 10$

(b) $4.9 \div 10$

(c) $19.2 \div 1000$

(d) $57.98 \div 100$

(e) $601.8 \div 1000$

(f) $44.81 \div 1000$

(g) $1.3 \div 100$

(h) $2.56 \div 1000$

(i) $148.5 \div 10$

(j) $708.13 \div 100$

2. Fill in the boxes. The first one is done for you.

(a) $6.5 \div \boxed{10} = 0.65$ Decimal has shifted one place to the left.

(b) $3.7 \div \boxed{} = 0.37$

(c) $15.81 \div \boxed{} = 1.581$

(d) $8.19 \div \boxed{} = 0.819$

(e) $77.1 \div \boxed{} = 0.771$

(f) $36.2 \div \boxed{} = 0.362$

(g) $710.3 \div \boxed{} = 7.103$

III. Division of a decimal number by another decimal number.

Example 5: Divide 1.6 by 0.4

Solution: Here, dividend = 1.6, divisor = 0.4

$$1.6 \div 0.4 = \frac{1.6}{0.4}$$ ——— Division expressed as a fraction.

Let us change the divisor into a whole number.

Now, we have, $\dfrac{1.6}{0.4} = \dfrac{1.6 \times 10}{0.4 \times 10}$ ——— 0.4 has one decimal place. So, multiply the numerator and denominator by 10 to get an equivalent fraction.

$$= \frac{16}{4}$$

$$= 4$$

Example 6: Divide 9.63 by 0.09

Solution: $9.63 \div 0.09 = \dfrac{9.63}{0.09}$

$$= \frac{9.63 \times 100}{0.09 \times 100}$$ ——— Divisor 0.09 has two decimal places. So, multiply numerator and denominator by 100.

$$= \frac{963}{9}$$

$$= 107$$

Worksheet 9

1. Divide the following:

(a) 2.8 ÷ 0.7

(b) 3.6 ÷ 0.4

(c) 3.2 ÷ 0.8

(d) 8.5 ÷ 1.7

(e) 0.75 ÷ 0.15

(f) 1.25 ÷ 2.5

(g) 5.6 ÷ 1.4

(h) 1.44 ÷ 1.2

(i) 0.993 ÷ 0.331

(j) 25.925 ÷ 0.425

IV. Division of a whole number by a decimal number.

Example 7: Let us divide 6 by 0.2

Solution:

$$6 \div 0.2 = \frac{6}{0.2}$$

Division expressed as a fraction

$$= \frac{6 \times 10}{0.2 \times 10}$$

Divisor has one decimal place. So, multiply both numerator and denominator by 10.

$$= \frac{60}{2}$$

$$= 30$$

Example 8: Divide 36 by 0.45

Solution:

$$36 \div 0.45 = \frac{36}{0.45}$$

$$= \frac{36 \times 100}{0.45 \times 100}$$

$$= \frac{3600}{45}$$

$$= 80$$

Example 9: Divide 65 by 0.013

Solution:

$$65 \div 0.013 = \frac{65}{0.013}$$

$$= \frac{65 \times 1000}{0.013 \times 1000}$$

$$= \frac{65000}{13}$$

$$= 5000$$

1. Find the quotient.

(a) 6   ÷ 0.2

(b) 15   ÷ 0.05

(c) 64   ÷ 0.32

(d) 822 ÷ 1.644

(e) 31   ÷ 0.5

(f) 81   ÷ 0.27

(g) 13   ÷ 0.13

(h) 225 ÷ 7.5

(i) 100 ÷ 2.5

(j) 112 ÷ 1.6

V. Conversion of a fraction into a decimal number.

Example 10: Convert $\dfrac{4}{5}$ into a decimal number.

Solution: $\dfrac{4}{5} = 4 \div 5$ ————— Fraction expressed as a division sum.

```
    0
5 ) 4
  - 0
  ----
    4
```
4 is less than 5. We place a zero in the quotient.

```
    0.
5 ) 4.0
  - 0
  ----
    40
```
Place a decimal next to zero.

Add zero to the remainder.

```
    0.8
5 ) 4.0
  - 0
  ----
    40
  - 40
  ----
     0
```
Continue the division till you get remainder zero.

Example 11: Convert $\frac{37}{8}$ into a decimal number.

Solution:

$$
\begin{array}{r}
4.625 \\
8\overline{)37.000} \\
-32 \\
\hline
50 \\
-48 \\
\hline
20 \\
-16 \\
\hline
40 \\
-40 \\
\hline
0
\end{array}
$$

Continue adding zeroes to the remainder and divide till you get remainder zero.

Worksheet 11

1. Convert the following fractions into a decimal number.

(a) $\frac{3}{4}$

(c) $\frac{1}{20}$

(e) $\frac{18}{90}$

(g) $\frac{11}{20}$

(b) $\frac{7}{8}$

(d) $\frac{8}{25}$

(f) $\frac{12}{15}$

(h) $\frac{31}{50}$

2. Convert the following into a decimal number.

(a) $1\frac{1}{2}$

(c) $16\frac{1}{5}$

(e) $4\frac{1}{4}$

(g) $1\frac{2}{25}$

(b) $5\frac{1}{5}$

(d) $4\frac{1}{20}$

(f) $4\frac{3}{8}$

(h) $1\frac{3}{4}$

PROPERTIES OF DIVISION OF DECIMAL NUMBERS

Division of a decimal number by one.

$4.8 \div 1 = 4.8$

$0.059 \div 1 = 0.059$

A decimal number divided by one is the decimal number itself.

Division of zero by a decimal number.

$$0 \div 4.1 = \frac{0}{4.1} = \frac{0 \times 10}{4.1 \times 10} = \frac{0}{41} = 0$$

$$0 \div 17.82 = \frac{0}{17.82} = \frac{0 \times 100}{17.82 \times 100} = \frac{0}{1782} = 0$$

Zero divided by any decimal number is zero.

Division of a decimal number by the same decimal number.

$$0.3 \div 0.3 = \frac{0.3}{0.3} = \frac{0.3 \times 10}{0.3 \times 10} = \frac{3}{3} = 1$$

$$5.21 \div 5.21 = \frac{5.21}{5.21} = \frac{5.21 \times 100}{5.21 \times 100} = \frac{521}{521} = 1$$

A decimal number divided by itself is one.

Worksheet 12

1. Fill in the boxes.

(a) $9.85 \div 1 = \boxed{}$

(b) $\boxed{} \div 0.3 = 1$

(c) $0.4 \div 0.4 = \boxed{}$

(d) $\boxed{} \div 5.1 = 0$

(e) $0 \div 19.1 = \boxed{}$

(f) $10.506 \div \boxed{} = 1$

(g) $\boxed{} \div 1 = 16.032$

(h) $\boxed{} \div 1.32 = 0$

Let us study the given word problem.

Example 12: Rahul bought 25 balls for ₹ 56.25. Find the cost of one ball

Solution: Cost of 25 balls = ₹ 56.25

Cost of one ball = ₹ 56.25 ÷ 25

$$
\begin{array}{r}
2.25 \\
25\overline{)56.25} \\
-50 \\
\hline
62 \\
-50 \\
\hline
125 \\
-125 \\
\hline
0
\end{array}
$$

One ball costs ₹ 2.25

Worksheet 13

1. Solve the following word problems.

(a) 12 tins can hold 39.624 litres of oil. How much oil can one tin hol

(b) Cost of 23 m of cloth is ₹ 608.35. Find the cost of one metre clot

(c) I have a 7.5 m long ribbon. I want to cut it into 1.5 m long pie many pieces will I get?

(d) 16.5 kg sugar is put in paper bags each containing 0.5 kg of it. bags are there?

(e) I require 2.25 m cloth to stitch a skirt. How many skirts can be stit 20.25 m cloth?

Value Based Question

Manju was excited when she woke up in the morning. It was her birthday! Her parents asked her what gift she would like to have. She told her mother that this time she wanted to distribute sweets to the poor children near the temple. Her parents were very happy with this thought. They bought 25.625 kg sweets and distributed amongst 25 children near the temple. Manju and her parents were happy to see smiles on the children's face.

1. How much sweets did each child get?

2. What quality of Manju is exhibited here?

3. Suggest two different ways in which you can celebrate your birthday as Manju did.

Brain Teasers

1. Tick (✔) the correct answer.

   (a) $456.2 \div \boxed{} = 4.562$

      (i) 10   (ii) 100   (iii) 1000   (iv) 10000

   (b) $2.5 \times 1000 \times .1 = \boxed{}$

      (i) 25000   (ii) 2500   (iii) 250   (iv) 2.500

   (c) The product of 0.2, 0.02, 0.002 is—

      (i) 0.08   (ii) 0.0008   (iii) 0.000008   (iv) 0.00008

(d) The decimal form of $\frac{9}{25}$ is—

(iii) 3.06

(iv) 36

(i) 0.36   (ii) 3.6

2. Find the product of the following:

(a) 8.05×16

(b) 14.89×2.6

(c) 7.8×0.005

3. Find the quotient for the following division questions.

(a) $1.5 \div 12$

(b) $122.455 \div 0.05$

(c) $3622 \div 45.275$

4. Convert into a decimal number.

(a) $\frac{3}{20}$

(b) $5\frac{1}{50}$

(c) $7\frac{3}{8}$

5. If $504 \div 12 = 42$ and $504 \times 12 = 6048$, find the value of:

(a) 5.04×12

(c) 0.504×0.12

(e) $50.4 \div 12$

(b) 50.4×12

(d) $5.04 \div 12$

(f) $0.504 \div 12$

6. Fill in the boxes.

(a) 3.5×10 = ☐

(f) $1.98 \div 100$ = ☐

(b) 1.5×1000 = ☐

(g) $356.4 \div 1000$ = ☐

(c) $7.5 \times$ ☐ = 750

(h) $13.8 \div$ ☐ = 1.38

(d) $95.65 \times$ ☐ = 95.65

(i) ☐ $\div 3.6$ = 0

(e) $53.09 \div 10$ = ☐

(j) $19.85 \times$ ☐ = 19.85

7. Divide 1010.101 by 1.01

8. 3.5 kg toffees are to be distributed among some children. If each child to be given 0.5 kg toffees, how many children get the toffees?

9. Mr Ajay purchases 3 kg tomatoes at ₹15.50 per kilogram and 5.5 kg pota at ₹ 22 per kilogram. Find the total amount spent in all.

10. Which of the following have 15 as quotient?

(a) $0.075 \div 0.5$

(b) $0.075 \div 0.005$

(c) $0.75 \div 5$