SUB-STRAND 2: Number Operations

CONTENT STANDARD: B7.1.2.1 Apply mental mathematics strategies and number properties used to solve problems.

INDICATOR B7.1.2.1.1 Multiply and divide given numbers by multiples of 10 including decimals and benchmark fractions.
B7.1.2.1.2 Apply mental mathematics strategies and number properties used to do calculation.

5.1 Multiplication facts up to 144

Study the multiplication chart below.

×	1	2	3	4	5	6	7	8	9	10	11	12
1	1	2	3	4	5	6	7	8	9	10	11	12
2	2	4	6	8	10	12	14	16	18	20	22	24
3	3	6	9	12	15	18	21	24	27	30	33	36
4	4	8	12	16	20	24	28	32	36	40	44	48
5	5	10	15	20	25	30	35	40	45	50	55	60
6	6	12	18	24	30	36	42	48	54	60	66	72
7	7	14	21	28	35	42	49	56	63	70	77	84
8	8	16	24	32	40	48	56	64	72	80	88	96
9	9	18	27	36	45	54	63	72	81	90	99	108
10	10	20	30	40	50	60	70	80	90	100	110	120
11	11	22	33	44	55	66	77	88	99	110	121	132
12	12	24	36	48	60	72	84	96	108	120	132	144

Each row in a multiplication chart forms a times table for a particular number. The row gives what the number is when it is multiplied by other numbers.

This row can be used to generate the 7 times table as shown below.

$7 \times 1 = 7$
$7 \times 2 = 14$
$7 \times 3 = 21$
$7 \times 4 = 28$
$7 \times 5 = 35$
$7 \times 6 = 42$
$7 \times 7 = 49$
$7 \times 8 = 56$
$7 \times 9 = 63$
$7 \times 10 = 70$
$7 \times 11 = 77$
$7 \times 12 = 84$

Example 2: Row "8"

It tells you that when 8 is multiplied by 1, you get 8, by 2 you get 16, by 3 you get 24, by 4 you get 32, etc.

This row can be used to generate the 8 Times table as shown below.

$8 \times 1 = 8$
$8 \times 2 = 16$
$8 \times 3 = 24$
$8 \times 4 = 32$
$8 \times 5 = 40$
$8 \times 6 = 48$
$8 \times 7 = 56$

Exercise: 1

Generate the times t
these numbers using
chart.

5

1. $5 \times 1 = 5$

2.

7

3. $7 \times 1 = 7$

4.

Exercise: 2

Complete the following.

1. $3 \times 7 =$
2. $3 \times 12 =$
3. $4 \times 8 =$
4. $4 \times 11 =$
5. $4 \times 12 =$
6. $10 \times 2 =$
7. $2 \times 12 =$
8. $3 \times 6 =$
9. $9 \times 4 =$
10. $8 \times 7 =$
11. $10 \times 7 =$
12. $6 \times 8 =$
13. $11 \times 12 =$
14. $11 \times 9 =$
15. $5 \times 11 =$
16. $10 \times 10 =$
17. $7 \times 9 =$
18. $10 \times 12 =$
19. $12 \times 8 =$
20. $12 \times 12 =$

DIVISION AS INVERSE MULTIPLICATION

Every division sentence has a related multiplication sentence.

We are going to learn to use multiplication as a strategy to solve division problems.

For instance, if we have $24 \div 4 =$ what? Its inverse relation in the form of multiplication will be $4 \times$ what? $= 24$. This means that we have to look for a number that could be multiplied by 4 to give 24.

From the multiplication chart,

$4 \times 6 = 24$.

Therefore, $24 \div 4 = 6$.

Let us use the multiplication chart to solve some division sentences.

Example 1

Solve $56 \div 7 = \square$

Solution

$56 \div 7 = \square \longrightarrow 7 \times \square = 56$

From the multiplication chart,

$7 \times 8 = 56$

Therefore, $56 \div 7 = \boxed{8}$

Example 2

Find the missing numbers.

a. $108 \div 9 = \square$

b. $96 \div 8 = \square \longrightarrow 8 \times \square = 96$

c. $110 \div 11 = \square \longrightarrow \square \times 11 = 110$

Solution

a. $108 \div 9 = \square \longrightarrow 9 \times \square = 108$

Since $9 \times \boxed{12} = 108$

Then $108 \div 9 = \boxed{12}$

b. From the multiplication chart,

$96 \div 8 = \square \longrightarrow 8 \times \square = 96$

$8 \times 12 = 96$

Therefore, $96 \div 8 = \boxed{12}$

c. From the chart,

So, $110 \div 11 = \square \longrightarrow \square \times 11 = 110$

$= \boxed{10} \times 11 = 110$

Exercise: 3

Find the missing numbers.

1. $45 \div 5 = \square \longrightarrow 5 \times \square = 45$
2. $54 \div 9 = \square \longrightarrow 9 \times \square = 54$
3. $56 \div 7 = \square \longrightarrow 7 \times \square = 56$
4. $63 \div 9 = \square \longrightarrow 9 \times \square = 63$
5. $100 \div 10 = \square \longrightarrow \square \times 10 = 100$
6. $88 \div 8 = \square \longrightarrow \square \times 8 = 88$
7. $84 \div 7 = \square \longrightarrow \square \times 7 = 84$
8. $96 \div 8 = \square \longrightarrow \square \times 8 = 96$
9. $121 \div 11 = \square \longrightarrow \square \times 11 = 121$
10. $132 \div 12 = \square \longrightarrow \square \times 12 = 132$

Exercise: 4

Divide the following.

1. $45 \div 9 =$ ☐
2. $88 \div 11 =$ ☐
3. $72 \div 6 =$ ☐
4. $24 \div 4 =$ ☐
5. $36 \div 3 =$ ☐
6. $27 \div 9 =$ ☐
7. $54 \div 9 =$ ☐
8. $120 \div 12 =$ ☐
9. $15 \div 5 =$ ☐
10. $68 \div 4 =$ ☐

Exercise: 5

Convert each multiplication into two division sentences.

Example: $4 \times 8 = 32 \longrightarrow 32 \div 4 = 8$, $32 \div 8 = 4$

1. $8 \times 6 = 48 \longrightarrow$ _____
2. $6 \times 10 = 60$ _____
3. $9 \times 3 = 27$ _____
4. $8 \times 11 = 88$ _____
5. $12 \times 6 = 72$ _____
6. $12 \times 8 = 96$ _____
7. $9 \times 11 = 99$ _____
8. $12 \times 7 = 84$ _____
9. $10 \times 11 = 110$ _____
10. $12 \times 12 = 144$ _____

5.2 Decimal Names Of Given Benchmark Fractions

a. Converting Common Fractions to Percentages

We understand that decimals are another way of writing fractions and percentages. It is important to be able to interchange between fractions and decimals. We learnt about this conversion in B5 and B6.

However, let us revise them thoroughly

To convert a given fraction to percentage, multiply the numerator by 100 and then divide by the denominator or convert the fraction into decimal and move the decimal point 2 places to the right.

Example 1

Convert the following common fractions to percentages.

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

Solution

a. Changing $\frac{2}{5}$ to percentage.

Multiply the numerator by 100 and then divide by the numerator.

$$\frac{2 \times 100}{5} = \frac{200}{5} = 40$$

Put the percent sign (%) beside it.

So $\frac{2}{5} = 40\%$

OR

To change $\frac{2}{5}$ to decimals, divide the numerator by the denominator. Use long division

Put the n
sign and
$\frac{2}{5}$ =
$\frac{2}{5}$
Sc
b. $\frac{3}{4}$
Mu
an
$\frac{3}{4}$
Char
c.
Mu
div

Put the numerator in the long division sign and the denominator outside.

$\frac{2}{5} = 5\overline{)20}$ (0.4)

-20

0

$\frac{2}{5} = 0.4$

So $\frac{2}{5} = 0.4 = 40\%$

b. $\frac{3}{4}$

Multiply the numerator 3 by 100 and then divide all by 4.

$\frac{3 \times 100}{4} = \frac{300}{4} = 75$

$\frac{3}{4} = 75\%$

OR

Change the fraction to decimal.

$\frac{3}{4} \rightarrow 4\overline{)30}$ (0.75)

28

20

20

0

$\frac{3}{4} = 0.75 = 75\%$

c. $\frac{3}{10}$

Multiply the numerator by 100 and divide

$\frac{3}{10} = \frac{3 \times 100}{10} = \frac{30}{1}$

$\frac{3}{10} = 30\%$

OR

Change the fraction to decimal.

$\frac{3}{10} = 0.3$

$10\overline{)30}$ (0.3)

30

10

$\frac{3}{10} = 0.3 = 30\%$

b. Converting Percentages to Common Fractions

A percent is a special way of expressing a fraction as a number out of 100.

To convert a given percentage to common fraction, write down the percent divided by 100 and then simplify the fraction.

Example

Convert the following percentages into common fractions.

i. 40%

ii. 75%

iii. 80%

Solution

i. Given 40%

Write down the percent divided by 100.

So, $\frac{40}{100}$

Simplify the fraction.

$\frac{40}{100} = \frac{4}{10} = \frac{2}{5}$

$40\% = \frac{2}{5}$

ii. To convert 75% to a common fraction,

write 75 divided by 100.

So, $\frac{75}{100}$

Now, simplify the fraction

$\frac{75}{100} = \frac{3}{4}$

Therefore, 75% $\longrightarrow \frac{3}{4}$

ii 80% to common fraction.

$\frac{80}{100} = \frac{8}{10} = \frac{4}{5}$

$80\% = \frac{4}{5}$

Exercise: 6

Answer these questions.

Convert each of these fractions to percentages and decimal numbers.

1. $\frac{1}{2}$
2. $\frac{3}{5}$
3. $\frac{7}{10}$
4. $\frac{3}{8}$
5. $\frac{6}{25}$
6. $\frac{5}{8}$

Exercise: 7

2. Convert each of the following percentages to common fractions and decimal numbers.

1. 15%
2. 25%
3. 28%
4. 50%
5. 95%
6. 20%

c. Converting Common Fractions to Decimals

To convert a given common fraction to a decimal, follow the steps below.

1. Find a number that you can multiply by the denominator of the fraction to make it 10 or 100, or 1000, etc.
2. Multiply both the numerator and denominator by that number.
3. Write only the numerator and put the decimal point in one space from the right hand side for every zero in the denominator.

The long division can be used to convert a given common fraction to decimal.

Example

Convert each of the following common fractions to decimal.

i. $\frac{3}{4}$ ii. $\frac{2}{5}$ iii. $\frac{5}{8}$

Solution

i. Given $\frac{3}{4}$,

Find the number that can multiply by 4 to make 100.

$4 \times ? = 100$

The number $= \frac{100}{4}$

$= 25$

The number that can multiply 4 to give 100 is 25.

Now, multiply both the numerator and denominator by 25.

$\frac{3 \times 25}{4 \times 25} = \frac{75}{100} = 75$

Since there are 2 zeroes in the denominator, write the numerator and put the decimal point 2 places from the right hand side to left.

$75 \longrightarrow 0.75$

$\frac{3}{4} = 0.75$

Use the long division to divide the fraction to change it to decimal numbers.

$$\begin{array}{r|l} & 0.75 \\ 4 & 30 \\ & 28 \\ \hline & 20 \\ & 20 \\ \hline & 0 \end{array}$$

$\frac{3}{4} = 75\% = 0.75$

ii. $\frac{2}{5}$

Find the number that can multiply by 5 to make 10.

$\frac{10}{5} = 2$

The number is 2 so multiply both the numerator and the denominator by 2.

$\frac{2 \times 2}{5 \times 2} = \frac{4}{10}$

Since there is one zero in the denominator, write the numerator and put the decimal point one place from the right hand side to the left.

$4 \longrightarrow 0.4$

$\frac{2}{5} = 0.4$

Using the long division to change the fraction to decimals.

$$\frac{2}{5} \longrightarrow 5\overline{)\begin{array}{r}0.4\\20\\\underline{20}\\0\end{array}}$$

$\frac{2}{5} \longrightarrow 0.4$

iii. $\frac{5}{8}$

Find the number that can multiply by 8 to make 1000.

$125 \times 8 = 1000$

So the number is 125.

Now, multiply both the numerator and the denominator by 125.

$\frac{5 \times 125}{8 \times 125} = \frac{625}{1000}$

Because there are three zeroes in the denominator, write the numerator and put the decimal point 3 places from the right hand side to the left.

$625 \longrightarrow 0.625$

Therefore, $\frac{5}{8} \longrightarrow 0.625$

Using the long division to change $\frac{5}{8}$ to decimal number.

$$\frac{5}{8} \rightarrow 8\overline{)\begin{array}{r}0.625\\50\\\underline{48}\\20\\\underline{16}\\40\\\underline{40}\\0\end{array}}$$

$\frac{5}{8} = 0.625$

d. Converting Decimals to Common Fractions

To convert a given decimal to a common fraction, follow the steps below.

1. Write down the decimal divided by 1.
2. Multiply both top and bottom by 10 for every number after the decimal point.

Thus, if the number of digits after the decimal point is 1, then use 10, if they are 2, use 100, if they are 3, then use 1000, etc.

3. Simplify the fraction.

Example

Convert the following decimals to common fractions.

i. 0.4 ii. 0.75 iii. 0.625

Solution

i. 0.4

Write the decimal divided by 1

$\frac{0.4}{1}$

Since there is only one digit after the decimal point, multiply both the top and bottom by 10.

$\frac{0.4 \times 10}{1 \times 10}$

To multiply 0.4 by 10, move the decimal point one place to the right.

So, $\frac{0.4 \times 10}{1 \times 10} = \frac{4}{10}$

Simplify the fraction.

$\frac{4}{10} = \frac{2}{5}$

$0.4 = \frac{2}{5}$

ii. 0.75

Write the decimal divided by 1.

$\frac{0.75}{1}$

Since there are two digits after the decimal point, multiply both top and bottom by 100.

$\frac{0.75 \times 100}{1 \times 100} = \frac{75}{100} = \frac{3}{4}$

$0.75 = \frac{3}{4}$

iii. 0.625

Now, $\frac{0.625}{1}$

Since there are three digits after the decimal point, multiply both top and bottom by 1000.

$\frac{0.625 \times 1000}{1 \times 1000} = \frac{625}{1000}$

Simplify the fraction.

$\frac{625}{1000} = \frac{25}{40} = \frac{5}{8}$

$0.625 = \frac{5}{8}$

Exercise: 8

Answer all questions.

1. Convert the following comm fractions to decimals.

i. $\frac{1}{4}$ iv. $\frac{6}{25}$

ii. $\frac{3}{5}$ v. $\frac{1}{8}$

iii. $\frac{7}{20}$ vi. $\frac{8}{25}$

2. Convert each of these decima to common fractions.

i.	0.2	iv.	0.12
ii.	0.8	v.	0.05
iii.	0.15	vi.	0.375

5.3 Multiplying Decimals by 10, 100, 1000, $\frac{1}{10}$, $\frac{1}{100}$, etc.

It is easier to work with powers o multiples of 10.

To multiply a decimal by powers of 10 such as 10, 100, 1000, etc; move the decimal point to the right the same number of places as there are zeroes in the power of 10.

In multiplying a decimal by powers of 10 such as $\frac{1}{10}$ or 0.1, $\frac{1}{100}$ or 0.01, $\frac{1}{1000}$ or 0.001, etc; move the decimal point to the left the same number of places as there are decimal places in the power of 10.

Example

Find the product of each of the following.

i. 24.7×100

ii. $24.7 \times \frac{1}{100}$

iii. 105.25×1000

iv 10

Solution

i. 24.7 ×

Since th number point t Therefo

ii.

Note t

So 24.

Since the d left.

24.7 ×

24.7

iii.

Beca whol deci

So, 1

iv.

$\frac{1}{100}$

Sinc the the

105

105

iv $105.25 \times \frac{1}{1000}$

Solution

i. 24.7×100

Since there are two zeroes in the whole number of 100, we move the decimal point two places to the right.

Therefore, $24.7 \times 100 = 2470$

ii. $24.7 \times \frac{1}{100}$

Note that $\frac{1}{100} = 0.01$

So $24.7 \times \frac{1}{100} = 24.7 \times 0.01$

Since there are two zeroes, we move the decimal point two places to the left.

$24.7 \times 0.01 = 0.247$

$24.7 \times \frac{1}{100} = 0.247$

Exercise: 9

Find the product of each of the following.

1. 0.49×10
2. 0.7×10
3. 6.32×100
4. $9.14 \times \frac{1}{10}$
5. $80.46 \times \frac{1}{100}$
6. $2.563 \times \frac{1}{1000}$
7. 0.4502×10000
8. 546.015×1000
9. $304.6 \times \frac{1}{100}$
10. $0.5000 \times \frac{1}{1000}$

5.4 Applying Halving and Doubling to Multiply Two Numbers

d. 25×6

Think of $50 \times 3 = 150$.

Exercise: 10

Apply halving and doubling to solve each of the following.

1. 20×4
2. 32×5
3. 44×5
4. 33×4
5. 39×4
6. 64×5
7. 82×5
8. 142×5
9. 225×4
10. 325×4

5.5 Applying the Distributive Property to Multiply Two Numbers

Let us look at how to use the distributive property to multiply numbers.

Example

Apply the distributive property to multiply the following.

a. 7×15

b. 18×6

c. 35×4

Solution

a. To find 7×15,

think of $7 \times (10 + 5) = (7 \times 10) + (7 \times 5)$

$= 70 + 35$

$= 105$

b. To solve 18×6,

think of $(20 - 2) \times 6 = (20 \times 6) - (2 \times 6)$

$= 120 - 12$

$= 108$

c. To find the product of 35×4,

think of $(30 + 5) \times 4 = (30 \times 4) + (5 \times 4)$

$= 120 + 20$

$= 140$

Exercise: 11

Use the distributive property to s each of the following.

1. 48×4
2. 9×15
3. 7×27
4. 39×6
5. 65×5
6. 8×42
7. 53×6
8. 98×5
9. 7×92
10. 8×87

CHAPTER 6 APPLYING MENTAL STRATEGIES TO SOLVE WORD PROBLEMS

STRAND 1: NUMBER

SUB-STRAND 2: Number Operations

CONTENT STANDARD: B7.1.2.1 Apply mental mathematics strategies and number properties used to solve problems.

INDICATOR B7.1.2.1.2 Apply mental mathematics strategies to solve word problems.

The following are some words relating to the four operations (addition, subtraction, multiplication and division). Note them well.

1. Addition – plus, add, calculate the sum, increase a number by, find the total etc.
2. Subtraction – minus, from a number take, find the difference, what must be added to make, etc.
3. Multiplication – times, multiply, find the product, square, what must be divided by __ to give ___
4. Division – share, divide, how many times does it go into, what must

5kg at ¢2 per kg

$5 \times 2 = 10$

We can apply halving and doubling here.

Double 5 to get 10 and halve 2 to get 1

$5 \times 2 = 10 \times 1 = 10$

Each 5kg of rice costs ¢10.

Since there are three bags, multiply ¢10 by 3. $10 \times 3 = 30$

The three bags cost ¢30.

2. 8×99

Solution: 99 is close to 100 which is a multiple of 10.

$8 \times 99 = (8 \times 100) - (8 \times 1)$

$= (50 \times 10) + (50 \times 4)$

Use annexing and adding zeros.

In 50×10, there are 2 zeros. Multiply 5 by 1 to get 5 and put the 2 zeros after 5.

$5 \times 1 = 5$

$50 \times 10 = 500$

There is 1 zero in 50×4.

$50 \times 4 \longrightarrow 5 \times 4$ and put 1 zero after the product.

$50 \times 4 = 200$

$(50 \times 10) + (50 \times 4)$

$= 500 + 200$

$= 700$

4. How many 21cm pieces can I cut off a string of one metre long?

Solution: The length of each piece should be 21cm.

The whole string is 1metre long.

Convert 1 metre into centimetres.

1metre = 100cm

How many times could we cut 21cm from 100cm?

Subtract 21cm from 100cm until you can no more subtract.

$100 - 21 = 79$

$79 - 21 = 58$

$58 - 21 = 37$

$37 - 21 = 16$

21 was subtracted from 100 four times remainder 16.

4 of 21cm pieces could be cut from 100cm.

5. What fraction of a litre is 250ml?

Solution: 1 litre = 1000ml.

$$\frac{250ml}{1000ml} = \frac{1}{4}$$

250ml is $\frac{1}{4}$ of a litre.

6. The area of a square board is 81c
What is perimeter?

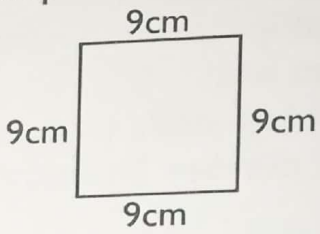
Solution: A square is quadrilateral w
all sides equal in length.

Area of a square = length × length
$l \times l = l^2$

$81cm^2$ If the area is $81cm^2$, then
the length is obtained by finding t
number when multiplied by itself wo
give 81.

$9 \times 9 = 81$

The square measures 9cm each side
Perimeter is the total distance arou
a shape.



Perimeter of a square is obtained b
adding all the 4 sides.

$= 9cm + 9cm + 9cm + 9cm$

$= 4 \times 9$

Add 1 to 9 to get 10.

Because 10 is more friendly to wo
with

$4 \times 9 = (4 \times 10) - 4$

$= 40 - 4$

$= 36cm.$

The perimeter of the square is 36cm

7. Write 60p as a decimal of ¢2.40.

Solution:

¢1 = 100 pesewas

¢2.40 = 2.4×100

Since there are 2 zeros, move the
decimal point by 2 to the right.

= 2.4 0

¢2.④⓪ = 240 pesewas.

$\frac{60}{240} = \frac{1}{4}$

Change $\frac{1}{4}$ to decimal.

$$
\begin{array}{r|l}
 & 0.25 \\
\hline
4 & 1\,0 \\
 & -\,8 \\
\hline
 & 20 \\
\hline
\end{array}
$$

60 pesewas is 0.25 of ¢2.40

Exercise: 2

Apply appropriate mental strategies to solve the following.

1. Two angles of a triangle add up to 98°. What is the size of the third angle?
2. What is the cost of 1 crate of egg at 80 pesewas each?
3. How many groups of 4 make 20?
4. An orange cost ¢1.50. How much do 9 oranges cost?
5. Find the product of 35 and 12.
6. How many 180g could be obtained from 1kg?
7. A square is 36cm^2 in area. What is its perimeter?
8. How many centimetres are in 2.5 metres?
9. What fraction of a metre is 50cm?
10. Find the cost of 5 shirts with a price tag ¢17?

CONTENT STANDARD: B.7.1.2.2 Dem
subtraction, multiplication and division
numbers, to solve problems.

INDICATOR B7.1.2.2.1 Add and subtract up

7.1 Addition of Whole Numbers and Decimals

In this lesson, we shall use partitioning (or expanded form) and place value system to add whole numbers and decimal numbers.

In this strategy, the addends are expanded before they are added according to the place value system. Thus, Thousands are added together, Hundreds are added together, Tens are added together and Ones are added together, tenths are added together etc.

Exercise: 2

Add the following.

1. 3986 + 4288
2. 6975 + 4384
3. 7921 + 35
4. 263 + 1538
5. 141 + 6392
6. 932 + 115
7. 7932 + 4111
8. 9847 + 5192

Example

Add the following decimals using partitioning and place value system.

i. 245.43 and 152.26

ii. 327.60 and 54.13

Solution

Expand and add the numbers.

$$245.43 = 200 + 40 + 5 + \frac{4}{10} + \frac{3}{100}$$

$$+\ 152.26 = 100 + 50 + 2 + \frac{2}{10} + \frac{6}{100}$$

$$397.69 = 300 + 90 + 7 + \frac{6}{10} + \frac{9}{100}$$

5. 3468.3 and 569.7
6. 4021.5 and 3979.4
7. 597.64 and 86.48
8. 609.52 and 78.48
9. 54.65 and 545.35
10. 865.28 and 137.72

Exercise: 4

Find the sum of the following.

1. 4639.84 + 4253.11
2. 673.81 + 34.92
3. 4281 + 3763.35
4. 6095 + 2540.40
5. 863.90 + 27.50
6. 4392.85 + 32.72
7. 2249.85 + 632.45
8. 9399.40 + 279.55
9. 606.61 + 2250.83
10. 4275.40 + 2738.25

7.2 Subtraction of Whole Numbers and Decimals

Solution

a. Expand the numbers and subtract.

$$\begin{array}{rl} 5347 & = 5000 + 300 + 40 + 7 \\ -\ 2134 & = 2000 + 100 + 30 + 4 \\ \hline 3{,}213 & = 3000 + 200 + 10 + 3 \end{array}$$

b. Expand the numbers and subtract.

$$\begin{array}{rl} 6275 & = 6000 + 200 + 70 + 5 \\ -\ 732 & = \quad\ 700 + 30 + 2 \\ \hline 5{,}543 & = 5000 + \ 500 + 40 + 3 \end{array}$$

Exercise: 5

Use the partitioning and place value system to find the difference of each of the following.

1. 3562 – 2231
2. 3867 – 1534
3. 2945 – 724
4. 1438 – 527
5. 5421 – 910
6. 7340 – 632
7. 8234 – 5226
8. 9113 – 5114
9. 9515 – 426
10. 6341 – 5458

Example

Subtract the following decimals using the partitioning and place value system.

i. 375.68 – 26.52

ii. 93.6 – 7.85

Solution

i. Expand and subtract the figures.

$$\begin{array}{rl} 375.68 & = 300 + 70 + 5 + \frac{6}{10} + \frac{8}{100} \\ -\ 26.52 & = \quad\ 20 + 6 + \frac{5}{10} + \frac{2}{100} \\ \hline 349.16 & = 300 + 40 + 9 + \frac{1}{10} + \frac{6}{100} \end{array}$$

Solution

ii. Expand the figures and subtr

$$\begin{array}{rl} 93.60 & = 90 + 3 + \frac{6}{10} + \frac{0}{100} \\ -\ 7.85 & = \quad\ 7 + \frac{8}{10} + \frac{5}{100} \\ \hline 85.75 & = 80 + 5 + \frac{7}{10} + \frac{5}{100} \end{array}$$

Exercise: 6

Subtract the following using t partitioning and place value system.

1. 56.37 – 25.23
2. 67.3 – 54.8
3. 82.5 – 64.67
4. 375.12 – 154. 18
5. 452.37 – 63.49
6. 485.7 – 278.74
7. 494.25 – 85.35
8. 500.47 – 99.59
9. 8435.3 – 5679.8
10. 8536.4 – 775.52

CHAPTER 8

MULTIPLICATION AND DIVISION OF MULTI-DIGIT NUMBERS BY 1 –AND 2-DIGIT NUMBERS

STRAND 1: NUMBER

SUB-STRAND 2: Number Operations

CONTENT STANDARD: B.7.1.2.2 Demonstrate an understanding of addition, subtraction, multiplication and division of (i) whole numbers, and (ii) decimal numbers, to solve problems.

INDICATOR B71.2.2.2 Multiply or divide multi-digit numbers by 1- and 2- digit numbers.

8.1 Multiplying Using Partitioning/Expanded Method

Exercise: 1

Complete the table by writing the place and place value of the underlined digits.

Number	Place	Place value
1734638		
8546817		
2039778		
9278536		
5983115		
6045468		
4698911		
3988503		
7844324		
2495512		

Exercise: 2

Expand the following.

Example: 3576942 = 3000000 + 500000 + 70000 + 6000 + 900 + 40 + 2

1. 4256374 =
2. 6386435 =
3. 2491656 =
4. 9582721 =
5. 1742838 =
6. 3834694 =
7. 4469211 =
8. 1452362 =
9. 8214359 =
10. 5469355 =

The Partitioning/Expanded Method of Multiplying numbers involves the following.

1. Expand the multiple
2. Multiply the expanded number by the multiplier
3. Add all the resultant products.

Example 1: Solve 743 × 5 using expanded method.

Solution

743 = (700 + 40 + 3)

× 5 = × 5

3,500 + 200 + 15

3,715 = 3,715

Example 2

Multiply 584 by 8 using the portion expanded method.

Solution

584 = (500 + 80 + 4)

× 8 = × 8

4000 + 640 + 32

4,672 = 4,672

Exercise: 3

Multiply each of the following us the partitioning/expanded method.

1. 381 × 6
2. 539 × 5
3. 816 × 4
4. 903 × 7
5. 794 × 9
6. 408 × 5
7. 989 × 3
8. 849 × 8
9. 424 × 5
10. 683 × 6

Exercise: 4

Use the partitioning/expanded meth to multiply the following.

1. 4436 × 3
2. 5408 × 5
3. 7180 × 6
4. 6243 × 4

5. 3824 × 9
6. 5167 × 7
7. 1498 × 6
8. 2899 × 5
9. 3908 × 8
10. 2489 × 9

8.2 The Vertical Place Value Method

Under this method, the numbers to be multiplied are arranged vertically over one another with their least significant digits aligned. The top number is the multiplicand and the down number is the multiplier.

After arranging the numbers correctly, the multiplicand is multiplied by the least significant digit of the multiplier to produce a partial product. The process is continued for the next higher order digit in the multiplier and its partial product is right – aligned with the corresponding digit in the multiplier. The partial products are then summed.

Example 1
Solve 243 × 24 using the place value method.

Solution

$$\begin{array}{r} 243 \\ \times\ 24 \\ \hline 972 \\ +\ 486 \\ \hline 5{,}832 \end{array}$$

Example 2 Multiply 345 by 27.
Solution

345

Exercise: 5

Solve the following using the vertical place value method.

1. 419 × 51
2. 628 × 42
3. 399 × 34
4. 924 × 25
5. 747 × 26
6. 648 × 35
7. 906 × 24
8. 469 × 44
9. 652 × 29
10. 515 × 35

Exercise: 6

Multiply the following numbers using the vertical place value method.

1. 2143 × 21
2. 2561 × 24
3. 3484 × 25
4. 1996 × 22
5. 4032 × 34
6. 5114 × 35
7. 6425 × 30
8. 6588 × 27
9. 7829 × 28
10. 4128 × 44

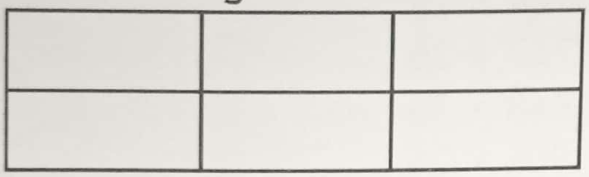
8.3 The Lattice Method

In B.6, we learned how to use the lattice method to multiply multi – digit numbers by 2 – digit numbers. We are going to continue in this lesson.

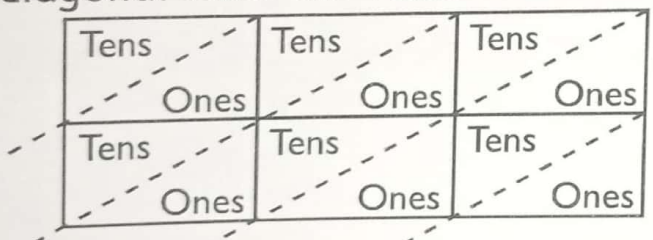
Solution

Draw a 3 × 2 rectangular box. The number of divisions in the rectangular box depends on the number of digits in the numbers being multiplied.

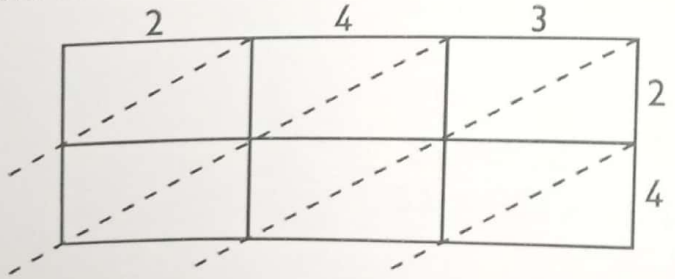
In 243 × 24, the 243 has 3 digits and the 24 has 2 digits hence the 3 × 2 box.



Draw a diagonal across each box, and within each of the boxes, the left upper part of the diagonal takes the value of Tens and the right lower part of the diagonal takes the value of the Ones.

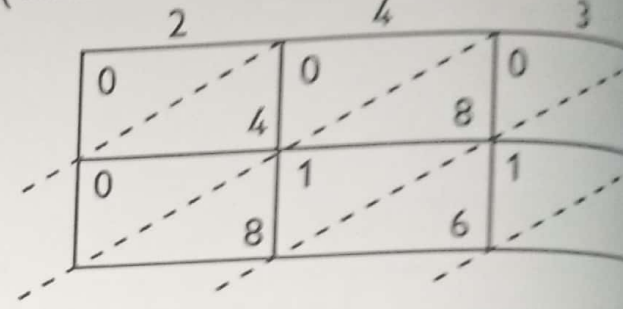


Write the multiplicand, 243 along the top of the box and the multiplier, 24 by the side of the box as shown.

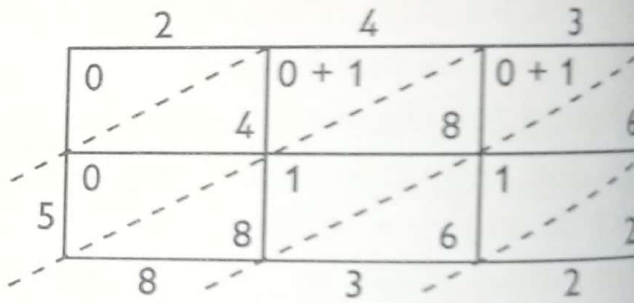


Multiply 2 by 3 and put the product, 6 in the box under the 3. Write the Tens, 0 in the left upper part of the diagonal and the Ones, 6 under the right lower part of the diagonal.

Now, multiply 2 by 4, 2 by 2, 4 4 by 4, 4 by 2 and write the pro (Tens and Ones) as shown.



Start from the extreme right and the numbers in the boxes diagona So 2, then 6 + 1 + 6 = 13. Write 3 carry 1 forward to the next diag We have 1 + 0 + 8 + 1 + 8 = 18. W 8 and carry 1 forward to the diagonal. So, 1 + 0 + 4 + 0 = 5. Ig the 0 since it is beginning a numbe



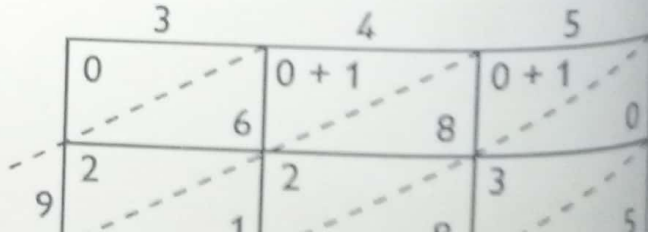
Write the answer as 5832.

Thus, 243 × 24 = 5,832

Example 2

Solve 345 × 27 using the lattice meth

Solution



8.5 8.5 Basic Division Facts

A multiple of a number is the set of all the numbers obtained by multiplying the number by 1, 2, 3, 4, 5, 6,...

For example, the multiple of 3 are obtained as follows:

$3 \times 1 = 3, 3 \times 2 = 6, 3 \times 3 = 9, 3 \times 4 = 12, 3 \times 5 = 15...$

Thus, the multiples of 3 are {3, 6, 9, 12, 15,...}.

Again, the multiples of 7 are obtained as follows:

$7 \times 1 = 7, 7 \times 2 = 14, 7 \times 3 = 21, 7 \times 4 = 28, 7 \times 5 = 35...$

The multiples of 7 are {7, 14, 21, 28, 35,...}.

Let us go through this activity to find if a number is a multiple of a given number.

Testing for numbers that are divisible by 2, 3, 4, 5, 6, 7, 8, 9, 10, 11 and 12.

For example, if a number is divisible by 7, then the number is a multiple of 7.

Any number which is divisible by a certain number is then a multiple of that number.

a. Test of divisibility by 2

A number is divisible by 2 if the last digit in the Ones place is 0, 2, 4, 6 or 8..

Thus, a number whose last digit is 0, 2, 4, 6 or 8, is a multiple of 2.

Example: 124 is divi...

e. Test of divisibility by 6

A number is divisible by 6 if the last digit is even number and the sum of its digits is divisible by 3.

Thus, a number is divisible by 6 if it is divisible by 2 and 3.

Example: 258 is divisible by 6 since the last digit, 8 is even and the sum of the digits (2 + 5 + 8), 15 is divisible by 3.

Other examples of numbers that are divisible by 6 are 126, 174, 288, 2340, etc.

f. Test of divisibility by 7

To find out if a number is divisible by 7, take the last digit in the number then double it and subtract from the rest of the number. If the result is 0 or a multiple of 7, then the number is divisible by 7.

Example 1: 595 is divisible by 7 since the double of the last digit, 5 is $2 \times 5 = 10$ and when 10 is subtracted from 59, it gives 49 which is a multiple of 7.

Example 2: Given 623,

The double of the last digit $= 2 \times 3$
$= 6$

Subtract the double from the rest of the number.

$62 - 6 = 56$

$56 = 7 \times 8$

Since 56 is a multiple

Example 1: 3120

The last three digits of 3120 is 120 and it is divisible by 8 since 8×15 gives 120.

Therefore, 3120 is divisible by 8.

Example 2: 48,104

The last three digits of 48104 is 104.

$$\frac{104}{8} = 13$$

48,104 is divisible by 8 since its last 3 digits are divisible by 8.

Other examples of numbers that are divisible by 8 are 1200, 2400, 30240, 96184, etc.

h. Test of divisibility by 9

A number is divisible by 9 if the sum of the digits of the number is divisible by 9.

Example: 1089 is divisible by 9 since 1 + 0 + 8 + 9 is 18 which is divisible by 9.

Thus, $9 \times 2 = 18$

Other examples of numbers that are divisible by 9 are 261, 711, 4473, 19611, etc.

i. Test of divisibility by 10

A number is divisible by 10 if its last digit is 0.

Example: 4930 is divisible by 10 since its last digit is 0.

Other examples

Example 2: 1408

The last digit of 1408 is 8.

So $140 - 8 = 132$

132 is divisible by 11 because $11 \times 12 = 132$.

Therefore, 1408 is divisible by 11.

Other examples of numbers that are divisible by 11 are 143, 429, 1331, etc

k. Test of divisibility by 12

A number is divisible by 12 if the number is divisible by 3 and 4.

Example: 432.

The sum of the digits (4 + 3 + 2) is 9 which is divisible by 3. The last two digits of 432 is 32 which is divisible by 4.

Therefore, 432 is divisible by 12 since it is also divisible by 3 and 4.

Other examples of numbers that are divisible by 12 are 132, 276, 540, 1116, 1524, etc.

Exercise: 12

Fill each blank with 3, 4, 5, 7 or 11.

1. 203 is divisible by _____
2. 116 is divisible by _____
3. 319 is divisible by _____
4. 230 is divisible by _____
5. 117 is divisible by _____
6. 928 is divisible by _____
7. 638 is divisible by _____
8. 1,495 is divisible by _____
9. 406 is divisible by _____
10. 1,521 is divisible by

Exercise: 13

Fill in the missing digit of each of following.

Eg. The number 34 is divisible by 2.

1. The number 13 ___ is divisible by
2. The number 43 ___ is divisible by
3. The number 10 ___ is divisible by
4. The number 3 ___ is divisible by
5. The number 709 ___ is divisible by
6. The number 7 ___ is divisible by
7. The number 477 ___ is divisible by
8. The number 21 ___ is divisible by
9. The number 32___ is divisible by
10. The number 16 ___ is divisible by

Exercise: 14

Fill each blank with "True" or "False

1. 4005 is divisible by 10. _____
2. 3,543 is divisible by 2. _____
3. 6,240 is divisible by 5. _____
4. 5,436 is divisible by 4. _____
5. 4,248 is divisible by 3. _____
6. 1,234 is divisible by 9. _____
7. 2,145 is divisible by 11. _____
8. 1,112 is divisible by 8. _____
9. 3,138 is divisible by 6. _____
10. 1,070 is divisible by 7. _____

Exercise: 15

Write Yes or No in each box to answer whether the number to the left of each row is divisible by the number at the top of each column.

	2	3	5	7	8	10	11
1575							
1196							
1110							
6777							
4300							
1917							
1033							
2950							
319							
1245							