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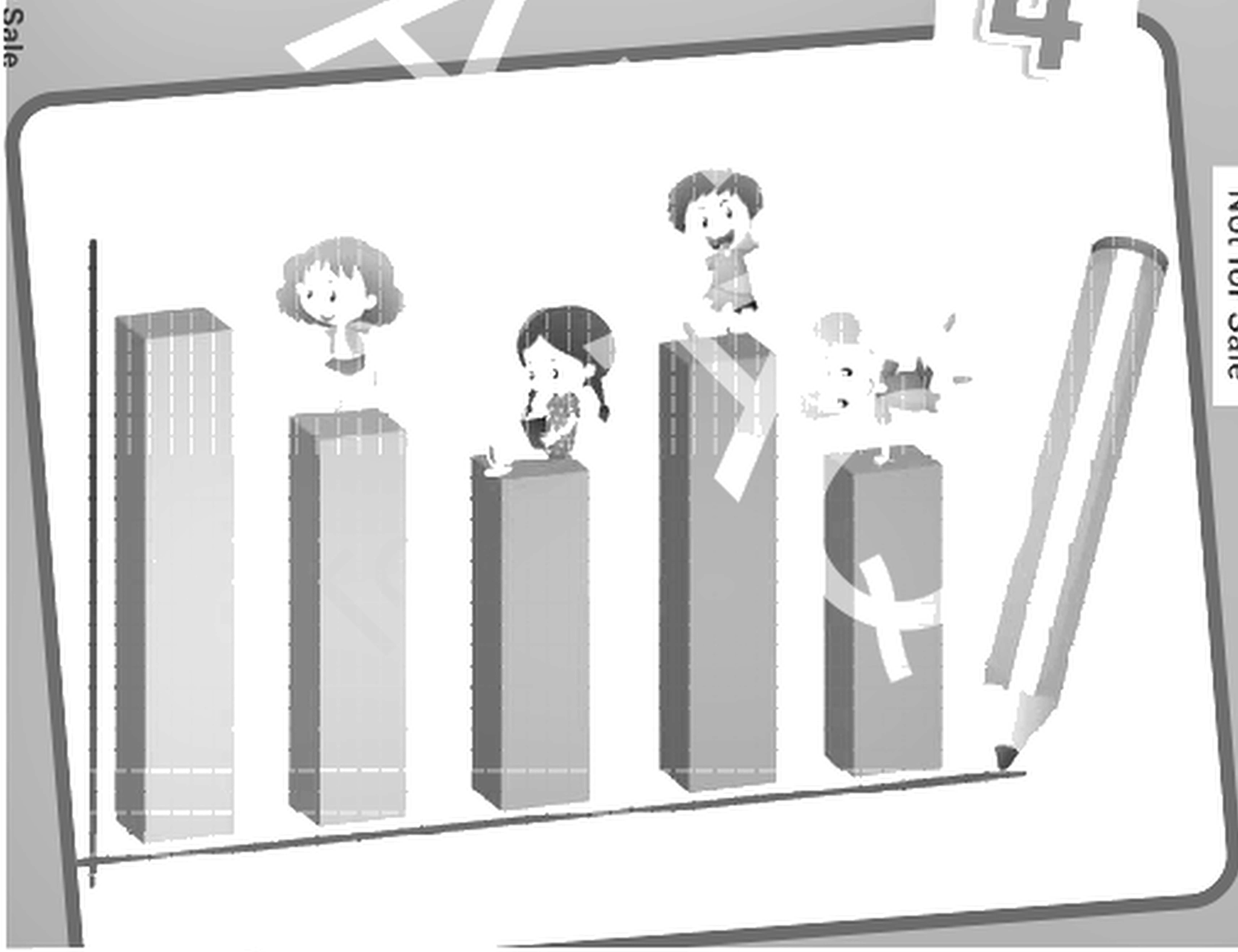
Mathematics

Based on 2017 Curriculum

Not for Sale

4



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National Curriculum Council,

Textbook of

Mathematics

Grade 4

Approved by
Ministry of Federal Education and Professional Training
&
Federal Directorate of Education(FDE) Capital Administration and Development Division Government of Pakistan

Preface

Primary Mathematics (1 – 5) has been developed according to the Curriculum 2017. This series is aimed at efficiently facilitating the process of teaching and learning. It encourages reflective thinking and cultivates problem-solving ability among young learners. These textbooks provide real-life learning situations, which are thought-provoking and exciting for students.

The present series of textbooks has been developed in collaboration between the Ministry of Federal Education and Professional Training and Federal Directorate of Education, Capital Administration and Development Division (CADD). The main aim is to provide quality textbooks as per vision of the government to make Islamabad Capital Territory (ICT) a model education city. It is the result of detailed deliberations between the curriculum developers and the authors who worked in close collaboration to translate the soul of the curriculum into the textbooks.

These books are geared to making students competent and proficient young mathematicians right from their juniour grades.

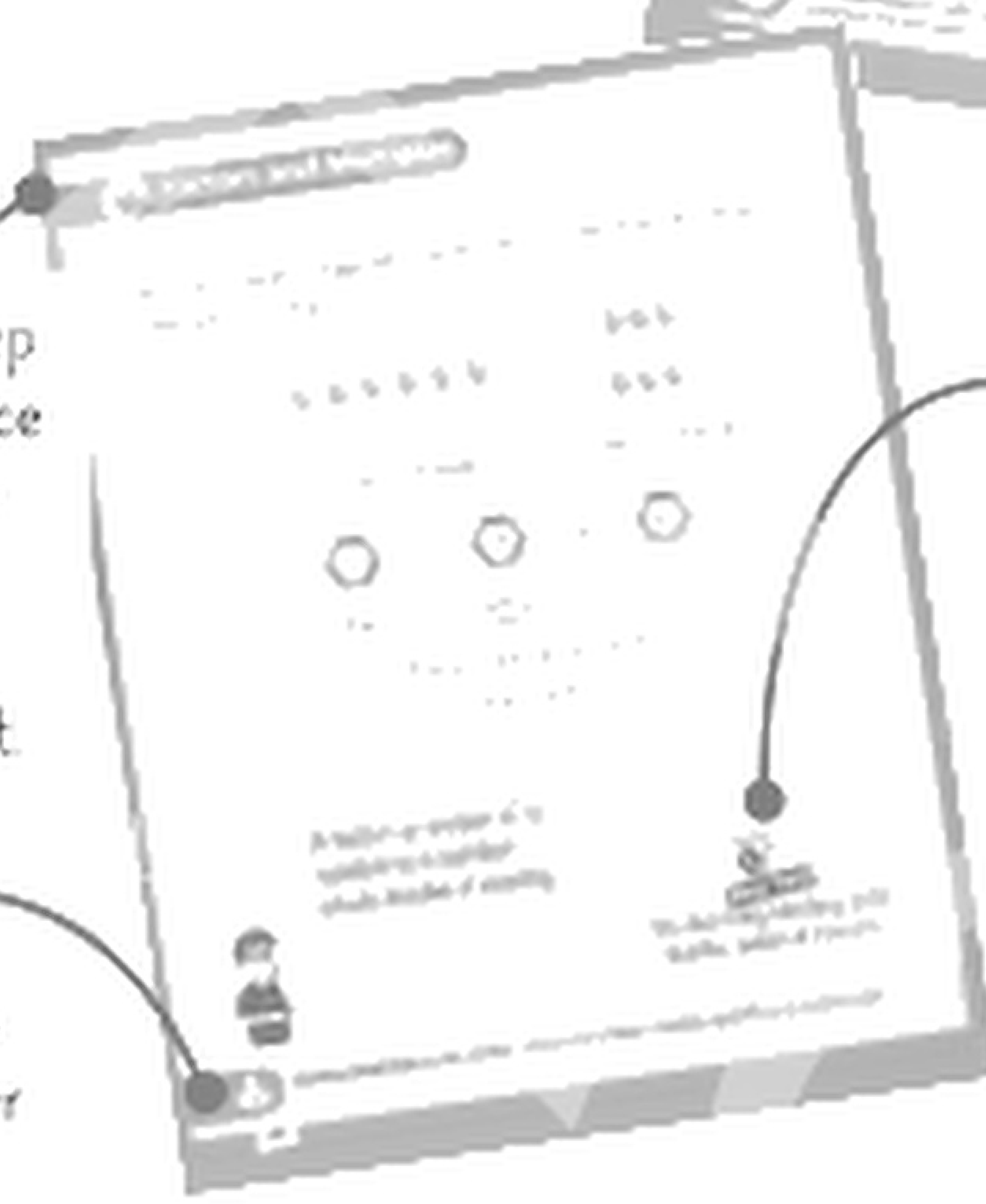
This series focuses on five core areas of Mathematics: numbers and their operations, measurement, geometry, algebraic concepts and data handling. These books include an exciting and pleasant layout, eye-catching graphics and progression-controlled text, which is organised in a logical way.

We will appreciate your valuable feedback and suggestions to make these books more useful for young learners.
May Allah guide and help us (Ameen)!

About the Book

Learning Outcomes: Each unit starts with the target outcomes to be achieved in that specific unit.

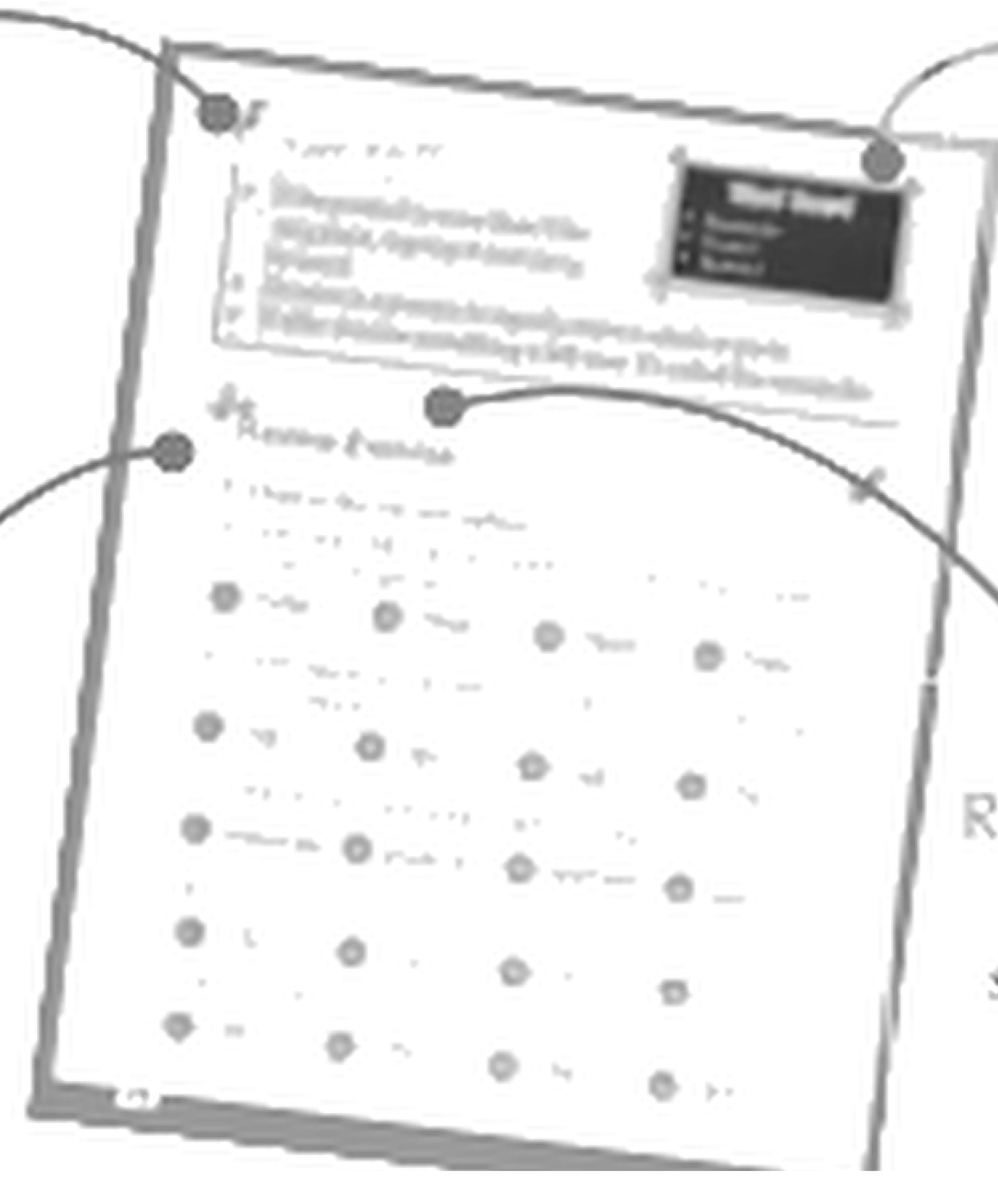
Unit Opener: A full page picture with intriguing question is given at the beginning of a unit to bridge the prior knowledge of the student with the upcoming new concepts.



Concept Building: A step-by-step procedure is provided to introduce each new concept. To facilitate independent working, solved examples and guided practice is added after each new concept.

Chunks: Each unit includes a Key facts, Hints and Check Points to highlight terminologies or facts relevant to the topic.

Teaching Points: Clear instructions have been given to the teacher about how to deliver each lesson.



I Have Learnt: It sums up the key points learnt in the unit.

Word Board: Vocabulary words consisting of mathematical terms are given at the end of each unit.

A variety of activities have been used for clear understanding.

Review exercise: It comprises questions that prompt students to recap the whole lesson.

بِسۡمِ اللّٰہِ الرَّحۡمٰنِ الرَّحِیۡمِ

شروع اللہ کے نام سے جو بڑا مہربان نہایت رحم والا ہے۔

Contents

Whole Numbers

Unit 1

Learning Outcomes

- Identify place values of digits up to a hundred million.
- Read numbers up to one hundred million.
- Write numbers up to one hundred million.
- Recognise numbers in words up to one hundred million.
- Compare and order numbers up to 8 digits.

Teaching Point: For effective teaching and learning, feel free to use 'Urdu' as a medium of instruction to explain the concepts.

Numbers up to 100 million

The population of Abbottabad is 105999. Do you know how we put commas in this number?

We put commas after every three digits from the right. So, we write it as 105,999.

100,000 is the smallest 6-digit number. 999,999 is the greatest 6-digit number. If we add 1 to it, then it becomes 1 million or 1,000,000. We can show these numbers in a place value chart as following.

Millions	Hundred thousands	Ten thousands	Thousands	Hundreds	Tens	Ones
	9	9	9	9	9	9
1	0	0	0	0	0	0

How many thousands are there in 1 million?

Show the number 2635974 in a place value chart:

Millions	Hundred thousands	Ten thousands	Thousands	Hundreds	Tens	Ones
2	6	3	5	9	7	4

We write it as 2,635,974 and read it as "two million six hundred and thirty-five thousand, nine hundred and seventy-four."

The digit 4 is in the ones place. Its value is 4.
The digit 7 is in the tens place. Its value is 70.
The digit 9 is in the hundreds place. Its value is 900.
The digit 5 is in the thousands place. Its value is 5000.

Teaching Point: Use place value cards with place values written in words and figures. Write any number on the board and ask students to tell the value of any specific digit.

The digit 3 is in the ten thousands place. Its value is 30,000.

The digit 6 is in the hundred thousands place. Its value is 600,000.

The digit 2 is in the millions place. Its value is 2,000,000.

How can we write a number in expanded form?

We can write a number in expanded form as a sum of all place values.

2,635,974 = 2,000,000 + 600,000 + 30,000 + 5000 + 900 + 70 + 4

9,999,999 is the greatest 7-digit number. If we add 1 to it, then it becomes 10 million or 10,000,000.

We can show these numbers in a place value chart as following.

Ten millions	Millions	Hundred thousands	Ten thousands	Thousands	Hundreds	Tens	Ones
	9	9	9	9	9	9	9
1	0	0	0	0	0	0	0

Show the number 46,705,329 in a place value chart:

Ten millions	Millions	Hundred thousands	Ten thousands	Thousands	Hundreds	Tens	Ones
4	6	7	0	5	3	2	9

We write it as 46,705,329 and read it as "forty-six million, seven hundred and five thousand, three hundred and twenty-nine."

The digit 9 is in the ones place. Its value is 9.

The digit 2 is in the tens place. Its value is 20.

The digit 3 is in the hundreds place. Its value is 300.

The digit 5 is in the thousands place. Its value is 5000.

The digit 0 is in the ten thousands place. Its value is 00,000.
The digit 7 is in the hundred thousands place. Its value is 700,000.
The digit 6 is in the millions place. Its value is 6,000,000.
The digit 4 is in the ten millions place. Its value is 40,000,000.

Write it in expanded form.

46,705,329 = 40,000,000+6,000,000+700,000+00,000+5000+300+20+9

99,999,999 is the greatest 8-digit number. If we add 1 to it, then it becomes 100 million or 100,000,000.

How would you read 63,567,223?

We can show these numbers in a place value chart as following.

Hundred millions	Ten millions	Millions	[illegible]	Ten thousands	Thousands	Hundreds	Tens	Ones
	9	9	9	9	9	9	9	9
1	0	0	0	0	0	0	0	0

We write it as 100,000,000 and read it as one hundred million.

100,000,000 is the smallest 9-digit number.

Exercise 1

1. Write the following numbers in expanded form.

a) 6527892 b) 3268900 c) 10098245

d) 24681001 e) 1342561 f) 56374238

Teaching Point: Explain to the students how to handle zero according to the place values of numbers.

2. **Write the place value of each coloured digit in the following numbers.**

a) 72,526,823 b) 8,924,002 c) 12,223,888
d) 2,986,272 e) 72,123,456 f) 10,000,001

3. **Read the following numbers and write them in words.**

a) 7,824,028 b) 65,267,928 c) 12,923,278
d) 14,987,421 e) 98,456,111 f) 56,234,987

4. **Write the following numbers in figures.**

a) four million, seven hundred and fifty-two thousand, one hundred and nine
b) eighty-one million, four thousand, one hundred and nine
c) four million, seven hundred and fifty-five thousand, three hundred and two
d) seventy-seven million, four hundred and eighty-three thousand, nine hundred and three
e) nine million, two hundred and twenty-five thousand, six hundred and fifty

Comparing and Ordering Numbers

Comparing Numbers

The price of a car is Rs 2,567,831 and the price of a house is Rs 7,982,233. How can we compare these prices?

If we understand the place values of digits, we can easily compare and order numbers.

Millions	Hundred thousands	Ten thousands	Thousands	Hundreds	Tens	Ones
2	5	6	7	8	3	1
7	9	8	2	2	3	3

First compare the digits in the millions place.
7 is greater than 2 i.e 7 > 2

So, 7,982,233 > 2, 567,831.

Compare the corresponding digits of both numbers from left to right.

Compare 43,534,556 and 3,954,267?

Ten Millions	Millions	Hundred Thousands	Ten Thousands	Thousands	Hundreds	Tens	Ones
4	3	5	3	4	5	5	6
	3	9	5	4	2	6	7

As first number has 8-digits and the second number has 7-digits.

So, 43,534,556 > 3,954,267.

Ordering Numbers

Compare and then order from the smallest to the greatest.

Ten millions	Millions	Hundred thousands	Ten thousands	Thousands	Hundreds	Tens	Ones
6	0	3	6	7	5	8	9
6	0	3	5	8	8	3	2
6	0	3	5	4	2	6	7

Teaching Point: Use place value cards to compare numbers. Ask them to compare from the greatest place value.

Here, the digits in the ten millions, millions and hundred thousands place are the same. So, we compare the digits in the ten thousands place.

6 > 5. So, 60,367,589 is the greatest number.

Compare the digits in the thousands place in 60,358,832 and 60,354,267.

8 > 4. So, 60,358,832 is greater than 60,354,267.

To arrange the numbers in ascending order, we write them from smallest to greatest.

60,354,267 60,358,832 60,367,589

To arrange the numbers in descending order, we write them from greatest to smallest.

60,367,589 60,358,832 60,354,267

Exercise 2

1. Compare the following numbers and tell which one is greater and which one is smaller.

a) 2,456,989 16,788,112
b) 56,245,655 56,234,988
c) 2,458,966 72,451,985
d) 87,245,234 87,245,233
e) 90,344,188 99,100,001

Hint

Compare the digits in the greatest place value first.

2. Arrange the following numbers in ascending order.

a) 98,234,222 98,133,254 8,234,244
b) 67,229,099 67,009,009 67,122,099
c) 234,888 67,245,900 67,288,244
d) 73,869,521 71,222,556 73,567,234

3. **Arrange the following numbers in descending order.**

a)	2,193,015	2,143,014	193,008
b)	37,216,647	7,233,156	37,210,600
c)	60,000,501	60,010,301	60,001,101
d)	10,911,032	10,913,033	10,911,070

I have learnt

- Commas are placed after every three digits from the right.
- 100,000 is the smallest 6-digit number.
- 999,999 is the greatest 6-digit number.
- 1,000,000 is the smallest 7-digit number.
- 9,999,999 is the greatest 7-digit number.
- Numbers are written in expanded form as a sum of all place values.
- Always compare numbers from left to right.

Word Board

- Million
- Ten million
- Hundred million
- Expanded form

Review Exercise

1. **Choose the correct option.**

a) In 2,783,567, the digit in the hundred thousands place is:

i) 2 ii) 5 iii) 8 iv) 7

b) The greatest 8-digit number is:

i) 11,111,111 ii) 90,000,000

iii) 99,999,999 iv) 98,999,999

c) If we add 1 to the greatest 7-digit number, we get:

i) 9,999,999 ii) 10,000,000

iii) 11,111,111 iv) 1,111,111

d) When comparing numbers, compare from:

i) left to right ii) right to left

iii) ones iv) tens

e) 2,567,879 is smaller than:

i) 2,567,789 ii) 2,566,979

iii) 2,507,979 iv) 2,567,979

f) In 34,762,981, the value of 4 is:

i) 400 ii) 40,000

iii) 40,000,000 iv) 4,000,000

2. Write the following numbers in expanded form.

a) 8734562 b) 12658734

c) 98425781 d) 23981567

3. Write the place value of each coloured digit in these numbers.

a) 65,546,822 c) 4,966,043

b) 22,209,245 d) 29,053,004

4. Read these numbers and write them in words.

a) 2,934,178 b) 42,375,755

c) 78,237,443 d) 78,420,302

5. Write the following numbers in figures.

a) nine million, four hundred and seventy-two thousand, two hundred and seven

b) forty-two million, three thousand, five hundred and nine

c) eight million, two hundred and twenty-five thousand, six hundred and six

d) seven million, four hundred and three thousand, two hundred and two

e) fifty-one million, nine hundred thousand, one hundred and ten

6. Compare the following numbers and tell which one is greater and which one is smaller.

a)	1,123,989	123,980
b)	52,734,988	2,780,090
c)	70,634,966	7,634,266
d)	12,789,250	12,789,255
e)	38,965,890	38,995,899

7. Arrange the following numbers in ascending order.

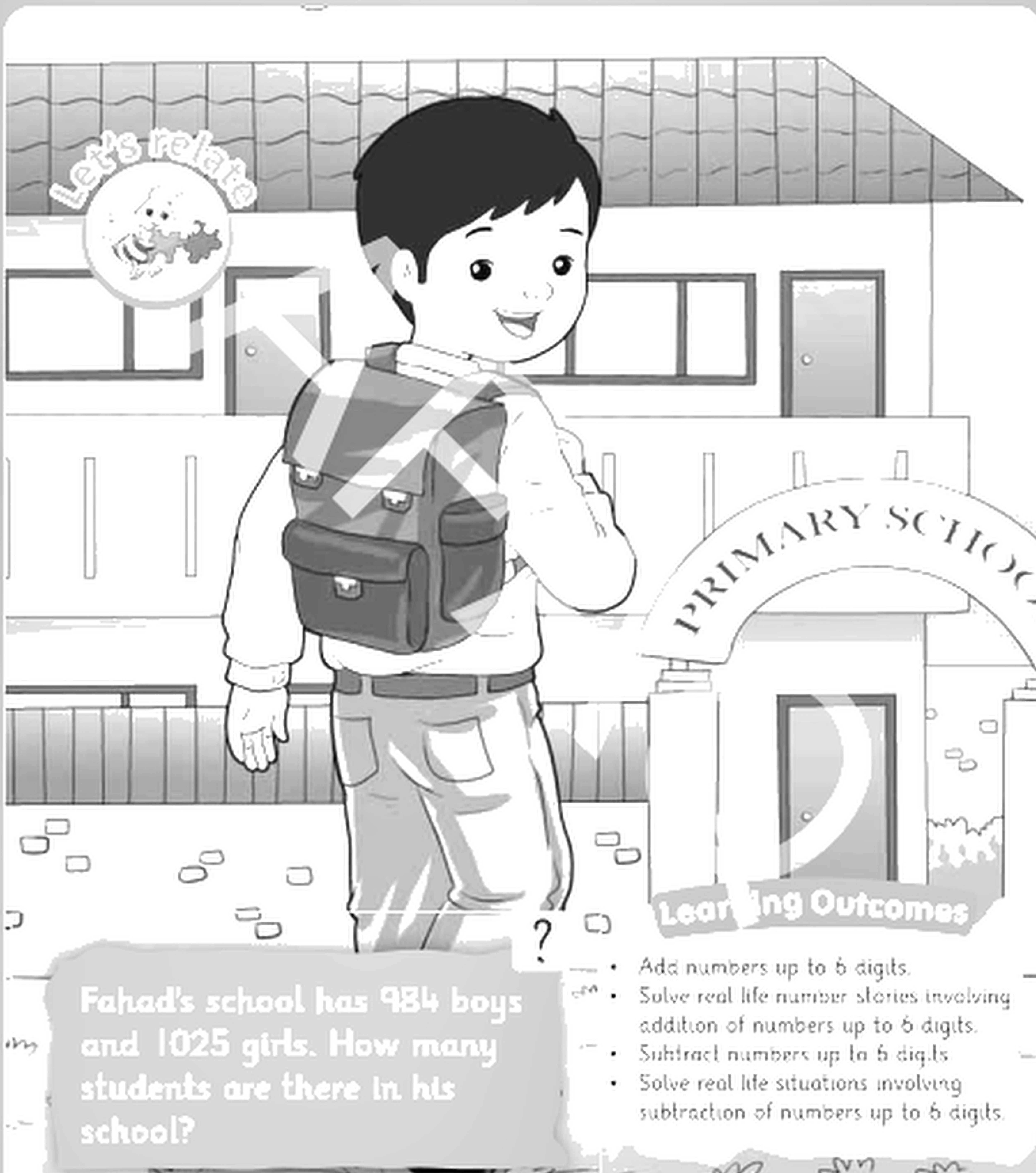
a)	78,900,241	78,999,478	78,909,198
b)	2,567,289	22,562,655	22,566,129
c)	40,268,982	40,268,000	268,007
d)	60,504,030	60,504,130	60,504,031

8. Arrange the following numbers in descending order.

a)	1,877,902	11,809,109	11,877,288
b)	65,234,890	65,204,888	5,333,890
c)	44,444,444	44,444,399	44,444,499
d)	99,897,969	9,897,870	99,897,668

Unit 2

Addition and Subtraction



Fahad's school has 984 boys and 1025 girls. How many students are there in his school?

Learning Outcomes

- Add numbers up to 6 digits.
- Solve real life number stories involving addition of numbers up to 6 digits.
- Subtract numbers up to 6 digits.
- Solve real life situations involving subtraction of numbers up to 6 digits.

Teaching Point: For effective teaching and learning, feel free to use 'Urdu' as a medium of instruction to explain the concepts.

Addition

In a public library, there are 21,100 English books and 18,769 Maths books.

How many English and Maths books are there altogether?

Add to find the answer.

English books in the library	=	21100
Maths books in the library	=	+ 18769
Total number of books	=	39869

There are 39,869 English and Maths books altogether.

- To add two numbers, first line up the numbers.
- First add the ones, then the tens, next the hundreds and thousands and then add the ten thousands and finally the hundred thousands.

The population of Aslam's city is 137,059 and the population of Anwar's city is 322,694. How many people are there in both cities?

Add to find the answer.

		1 1
Population of Aslam's city	=	137059
Population of Anwar's city	=	+ 322694
Total population of both cities	=	459753

There are 459,753 people in both cities

Teaching Point: Help students to add 5- and 6-digit numbers. Use number cards to demonstrate the correct placement of each digit.

Exercise 1

1. Add the following.

a) 39,136 + 53,256

b) 38,548 + 67,234

c) 135,678 + 187,663

d) 20,530 + 420,295

e) 52,027 + 321,708

f) 81,727 + 17,241

2. Add the following.

a)

	H.th	T.th	Th	H	T	O
	3	4	3	1	1	1
+	4	0	6	6	2	2

b)

	H.th	T.th	Th	H	T	O
	4	0	3	0	5	3
+	3	9	6	6	3	6

c)

	H.th	T.th	Th	H	T	O
	3	0	2	4	8	2
+	3	5	0	1	1	4

d)

	H.th	T.th	Th	H	T	O
	2	0	7	8	6	9
+		2	3	2	4	1

e)

	H.th	T.th	Th	H	T	O
	2	5	9	7	9	8
+		5	1	0	6	2

f)

	H.th	T.th	Th	H	T	O
	2	8	9	6	8	5
+		9	4	9	3	6

3. In City A, 283,486 people attended Eid prayer, and in City B, 368,693 people attended Eid prayer. How many people attended the prayer in both cities?

Teaching Point: Help students to understand and solve word problems by presenting real-life scenarios to the class.

4. Mr. Afnan earned Rs 34,609 in January, Rs 29,038 in February, and Rs 40,100 in March. How much did he earn altogether?

5. A factory manufactured 283,685 toy cars in the first week and 146,245 toy cars in the second week. Find the total number of toy cars manufactured.

Subtraction

Mr. Faisal had Rs 76,899 in his bank account. He spent Rs 24,105 to buy a laptop. How much amount is left in his bank account?

Here we need to subtract to find the answer.

Amount in bank	=	76899
Amount spent on laptop	= −	24105
Amount left in his bank account	=	52794

So, Rs 52,794 is left.

Subtract the greatest 5-digit number from the greatest 6-digit number.

We always subtract the smaller number from the greater number.

Teaching Point: Help students to subtract numbers using number cards to demonstrate the correct placement of each digit.

First subtract the ones, then the tens, next the hundreds and thousands and finally subtract the ten thousands.

There are 656,392 fruit trees on a farm. If there are 123,678 mango trees, how many other fruit trees are there?

Total trees on the farm	=	6 5 6 3 9 2
Mango trees	= −	1 2 3 6 7 8
Other fruit trees	=	5 3 2 7 1 4

So, there are 532,714 other fruit trees.

Exercise 2

1. Subtract the following.

a) 838,732 – 11,501 ________

b) 346,231 – 295,655 ________

c) 24,962 – 12,648 ________

d) 743,217 – 11,099 ________

e) 84,652 – 2488 ________

f) 798,743 – 465,423 ________

g) 94,607 – 82,888 ________

h) 897,347 – 23,465 ________

2. Solve the following.

a)

	H.th	T.th	Th	H	T	O
	9	4	1	6	7	2
−		8	4	4	0	9

b)

	H.th	T.th	Th	H	T	O
	7	7	3	2	2	4
−	7	4	6	1	7	5

c)

	H.th	T.th	Th	H	T	O
	6	7	5	9	3	4
−	4	3	5	2	0	3

d)

	H.th	T.th	Th	H	T	O
	9	3	6	5	2	1
−	5	3	1	2	0	5

e)

	H.th	T.th	Th	H	T	O
	6	4	3	9	0	0
−		9	6	5	1	8

f)

	H.th	T.th	Th	H	T	O
	5	8	9	3	4	6
−	3	9	8	6	4	3

3. A farmer grew 95,604 carrots in 2009. In 2010, he grew 77,002 carrots. How many fewer carrots did he grow in 2010?

4. There are 21,250 students in one campus and 18,685 students in another campus of a university. How many more students are there in the first campus than the second one?

5. The population of Sialkot is 676,098. The population of Abbottabad is 105,999. What is the difference between the population of Abbotabad and Sialkot?

Teaching Point: Help students to understand and solve word problems by presenting real-life scenarios to the class.

I have learnt

- Addition or subtraction of numbers always starts from right to left.
- Add and subtract ones and ones, tens and tens, hundreds and hundreds, thousands and thousands, ten thousands and ten thousands and hundred thousands and hundred thousands.
- Always subtract the smaller number from the greater number.

Review Exercise

1. **Choose the correct option.**

a) 53,331 + 46,458 =________.

(i) 99,779 (ii) 99,789 (iii) 99,679 (iv) 99,289

b) Train A travels 53,651 km and train B travels 67,731 km. The total number of kilometres they travelled is ________.

(i) 121,382 (ii) 211,382 (iii) 221,382 (iv) 420,382

c) Two necklaces cost Rs 75,460 together. One of the necklaces costs Rs 33,557, the other necklace costs________.

(i) 41,903 (ii) 42,903 (iii) 47,903 (iv) 44,903

d) A television costs Rs 8650. Its price is now reduced by Rs 2000. The new price of the television is Rs________.

(i) 6550 (ii) 8650 (iii) 5650 (iv) 6650

e) A factory manufactured 34,554 toy cars in first week and 12,890 toy cars in second week. The total toy cars are_______.

(i) 47,444 (ii) 47,484 (iii) 47,884 (iv) 47,888

2. Solve the following.

a) 32,454 + 69,437

b) 745,296 – 545,526

c) 521,357 + 815,398

d) 94,321 – 72,845

3. Solve the following.

a)

	H.th	T.th	Th	H	T	O
	3	8	1	5	7	6
+		9	0	7	3	4

b)

	H.th	T.th	Th	H	T	O
	7	4	5	0	7	9
+	1	5	4	6	6	1

c)

	H.th	T.th	Th	H	T	O
	9	8	5	4	1	0
–		2	0	6	7	0

4. The number of visitors to a museum in April was 345,671 and in May was 345,623. Find the total number of visitors in both months.

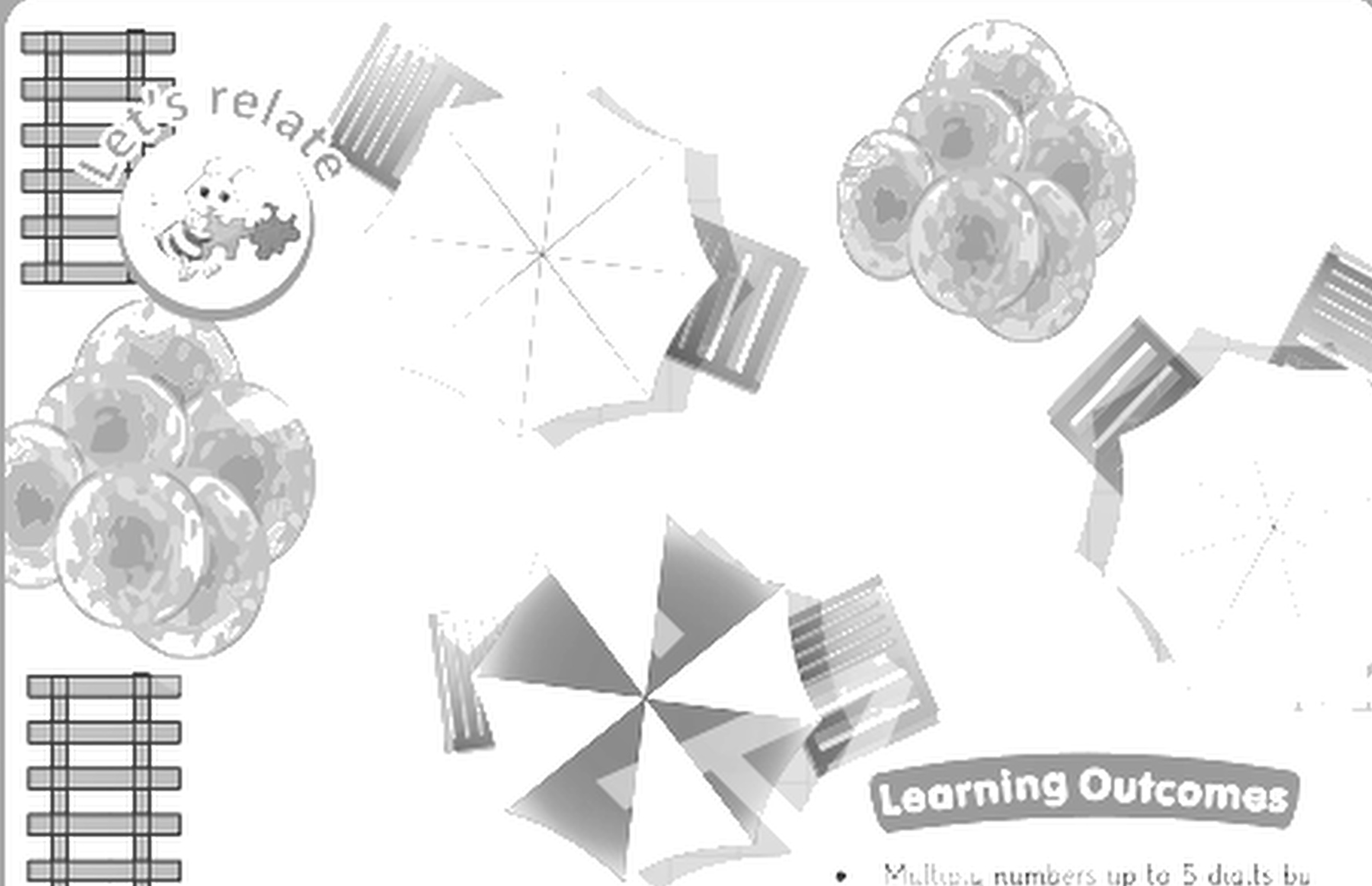
5. From city A, 176,790 passengers travelled by plane and from city B 117, 210 passengers travelled by plane in a year. Find the total number of passengers.

6. In 2016, 116,452 trees were planted in and 245,134 trees were planted in 2017. How many more trees were planted in 2017 than in 2016?

7. The total population of a city is 842,579. If there are 384,014 males, find the number of females in the city.

Unit 3

Multiplication and Division



Learning Outcomes

- Multiply numbers up to 5 digits by numbers up to 3 digits
- Solve real life situations involving multiplication
- Divide numbers up to 4 digits by numbers up to 2 digits
- Solve real life situations involving division
- Use mixed operations of addition, subtraction, multiplication and division.
- Solve real life situations (using Pakistani currency as well) involving addition, subtraction, multiplication and division

In an open-air cafe, there are 2 chairs around a table. If the cafe has 12 tables, how many visitors can sit in the cafe at the same time?

Teaching Point: For effective teaching and learning, feel free to use 'Urdu' as a medium of instruction to explain the concepts.

Multiplication

There are 132 plants in a row. How many plants will be there in 3 such rows.

Multiply 132 by 3.

Multiply each digit in 132 by 3 (one at a time).

	H	T	O
	1	3	2
×			3
			6

Step I: Multiply ones by 3.
2 ones × 3 = 6 ones

	H	T	O
	1	3	2
×			3
		9	6

Step II: Multiply tens by 3.
3 tens × 3 = 9 tens

	H	T	O
	1	3	2
×			3
	3	9	6

Step III: Multiply hundreds by 3.
1 hundred × 3 = 3 hundreds

132 × 3 = 396

So, there are 396 plants in 3 rows.

Teaching Point: Help students to multiply the numbers by explaining the correct steps.

A shopkeeper has 260 boxes of colour pencils each having 32 pencils in it. How many colour pencils are there altogether?

Here we need to multiply because there are equal number of pencils in 260 boxes and we need to find the total.

		Th	H	T	O	
Total boxes	=		2	6	0	
Pencils in each box	=	×		3	2	
			5	2	0	→ Multiply 260 by 2 (2 ones)
		+ 7	8	0	0	→ Multiply 260 by 30 (3 tens)
Total pencils	=	8	3	2	0	→ Add the products

So, there are 8320 pencils in 32 boxes.

Find the product of 48337 and 274.

Multiply the number by the value of each digit of 274 separately and then add all the products.

T.m	M	H.th	T.th	Th	H	T	O	
			4	8	3	3	7	
				×	2	7	4	
		1	9	3	3	4	8	→ Multiply 48337 by 4 (4 ones)
	3	3	8	3	5	9	0	→ Multiply 48337 by 70 (7 tens)
+	9	6	6	7	4	0	0	→ Multiply 48337 by 200 (2 hundreds)
1	3	2	4	4	3	3	8	→ Add the products

Exercise 1

1. Multiply to find the product.

a) 521×8
b) 219×6
c) 620×2

d) 475×68
e) 993×71
f) 866×16

g) 157×82
h) 615×28
i) 951×640

j) 475×640
k) 497×712
l) 356×731

m) 703×328
n) 33504×644
o) 23561×754

p) 33504×644
q) 16339×169
r) 20359×111

2. At a farm, there are 2455 plants in a row. How many plants will there be if there are 340 rows of plants?
3. Mr. Abdullah saves Rs 10,775 every month. How much will he save in 36 months?
4. The cost of a laptop is Rs 52,350. Find the total cost of 525 such laptops.
5. A factory produces 25,555 plastic bags in a month. How many plastic bags will be produced in 12 months?

Teaching Point: Present some situations involving multiplication and ask them to identify why we need to multiply.

Division

There are 72 nails in 6 boxes.
How many nails are there in each box?

We have to distribute nails in 6 boxes therefore we will divide 72 by 6.

Step I: Start with the highest place values in 72. Consider 7 to be divided by 6

Step II: Recall the table of 6. $1 \times 6 = 6$. So, 1 is written in the quotient in the tens place and 6 is written below 7.

Step III: $7 - 6 = 1$

Step IV: Drop down 2. Now, we have 12.

Step V: $2 \times 6 = 12$. So, 2 is written in the quotient in the ones place and 12 is written below 12. Remainder will be 0.

$$
\begin{array}{r l}
 & 12 \rightarrow \text{Quotient} \\
6\,\big) & 72 \\
 & -6\downarrow \\
\hline
 & 12 \\
 & 12 \\
\hline
\text{Remainder} \leftarrow & 0 \\
\hline
\end{array}
$$

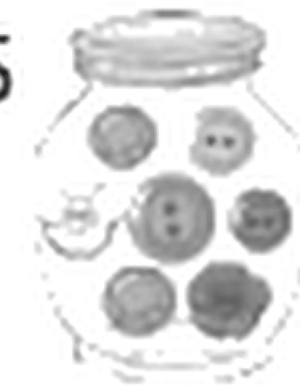
If after division something is left over, it is called the remainder.

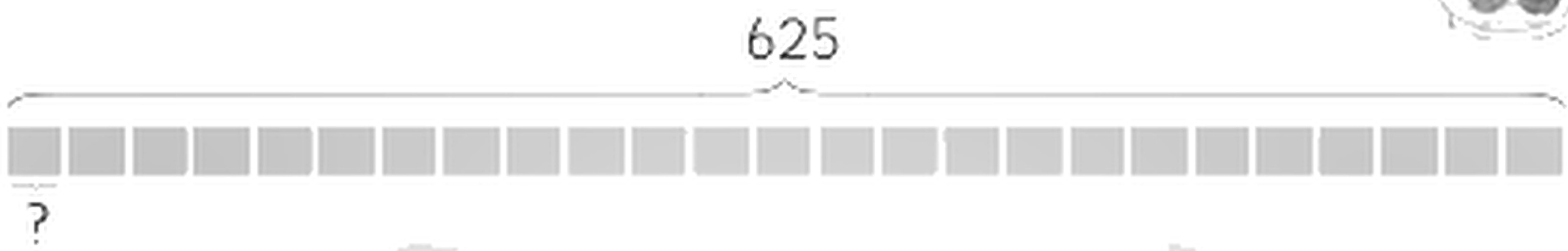
$72 \div 6 = 12$

So, there are 12 nails in each box.

Teaching Point: Help students to understand and solve word problems of division by presenting real-life scenarios to the class.

A tailor has 625 buttons. He wants to put these into 25 jars equally. How many buttons can he put in one jar?





He wants to put 625 buttons into 25 jars equally. Therefore we will divide 625 by 25.

Total buttons = 625

Total jars = 25

Buttons in each jar = 625 ÷ 25

= 25

$$\begin{array}{r} 25 \\ 25\overline{)625} \\ -50\downarrow \\ \hline 125 \\ -125 \\ \hline 0 \\ \hline \end{array}$$

So, he can put 25 buttons in each jar.

Divide 5803 by 14.

$$\begin{array}{r} 414 \\ 14\overline{)5803} \\ -56 \\ \hline 20 \\ -14 \\ \hline 063 \\ -56 \\ \hline 07 \longrightarrow \text{Remainder} \\ \hline \end{array}$$

So, 5803 ÷ 14 = 414 r 7.

Find the quotient and remainder when we divide 2755 by 22.

Teaching Point: Recall the clue words for division. Present some situations involving division and ask students to identify why we need to divide.

Exercise 2

1. Solve the following.

a) $3\overline{)585}$ b) $4\overline{)1816}$ c) $42\overline{)6972}$ d) $22\overline{)7546}$

e) $23\overline{)9568}$ f) $31\overline{)9641}$ g) $12\overline{)2868}$ h) $32\overline{)7392}$

2. Solve the following.

a) 166 ÷ 14	b) 8338 ÷ 15	c) 5745 ÷ 34
d) 7048 ÷ 24	e) 3084 ÷ 71	f) 6337 ÷ 28

3. A playschool is taking the kids on a field trip. For the safety of the kids, one teacher is responsible for a group of 15 kids. If there are 270 kids, how many teachers will go with them?

4. There are 3125 markers, which are to be equally packed in 25 boxes. How many markers will there be in each box?

5. Mr. Afaq distributed Rs 9735 equally among 11 orphan children. How much did each child get?

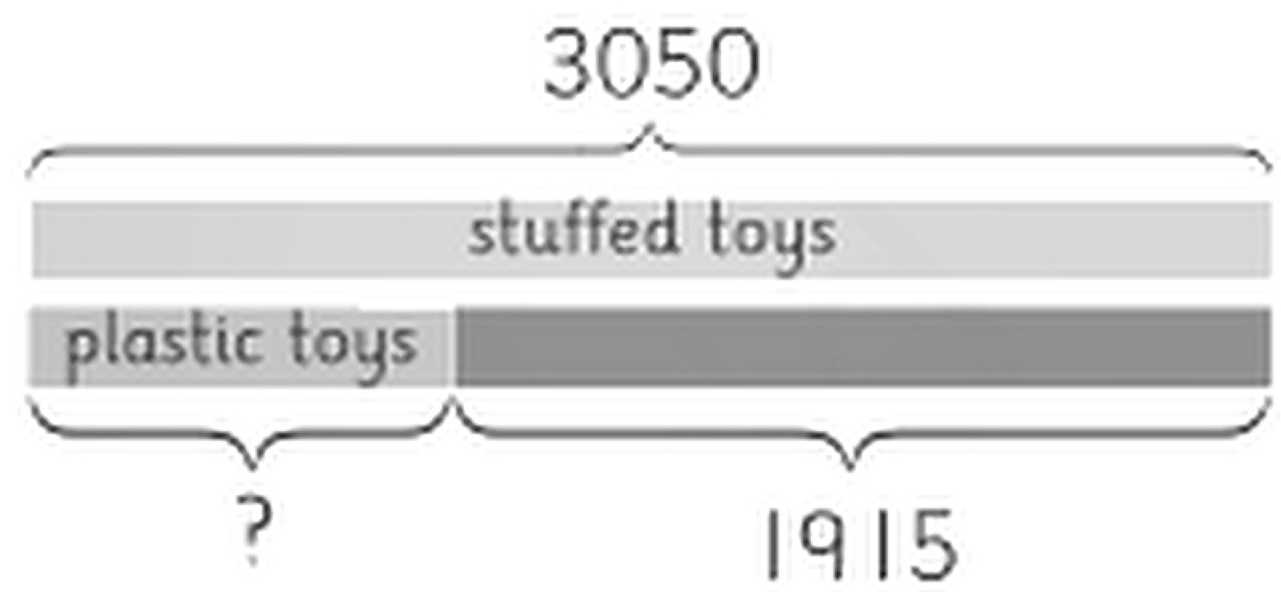
6. The capacity of 32 water tanks is 9120 litres. What is the capacity of each water tank?

Mixed Operations

In a shop, there are 3050 stuffed toys. If there are 1915 fewer plastic toys than stuffed toys, then:

a) How many plastic toys are there?

$$\begin{array}{r} {}^{2}\cancel{3}\ {}^{1}0\ {}^{4}\cancel{5}\ {}^{1}0 \\ -\ 1\quad 9\quad 1\quad 5 \\ \hline 1\quad 1\quad 3\quad 5 \\ \hline \end{array}$$

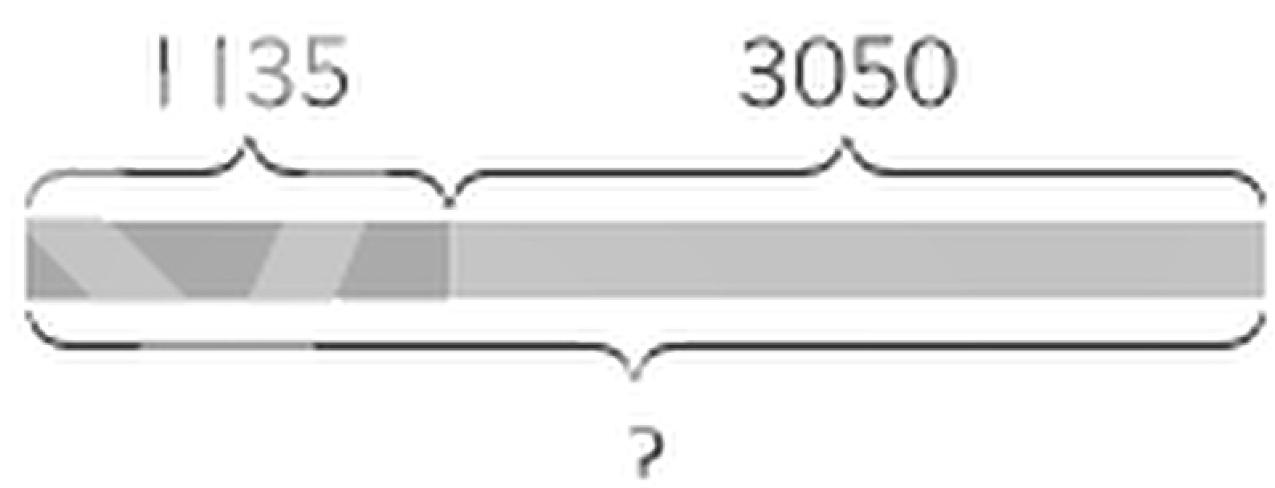


3050 – 1915 = 1135

There are 1135 plastic toys.

b) What is the total number of toys?

$$\begin{array}{r} 3\quad 0\quad 5\quad 0 \\ +\ 1\quad 1\quad 3\quad 5 \\ \hline 4\quad 1\quad 8\quad 5 \\ \hline \end{array}$$



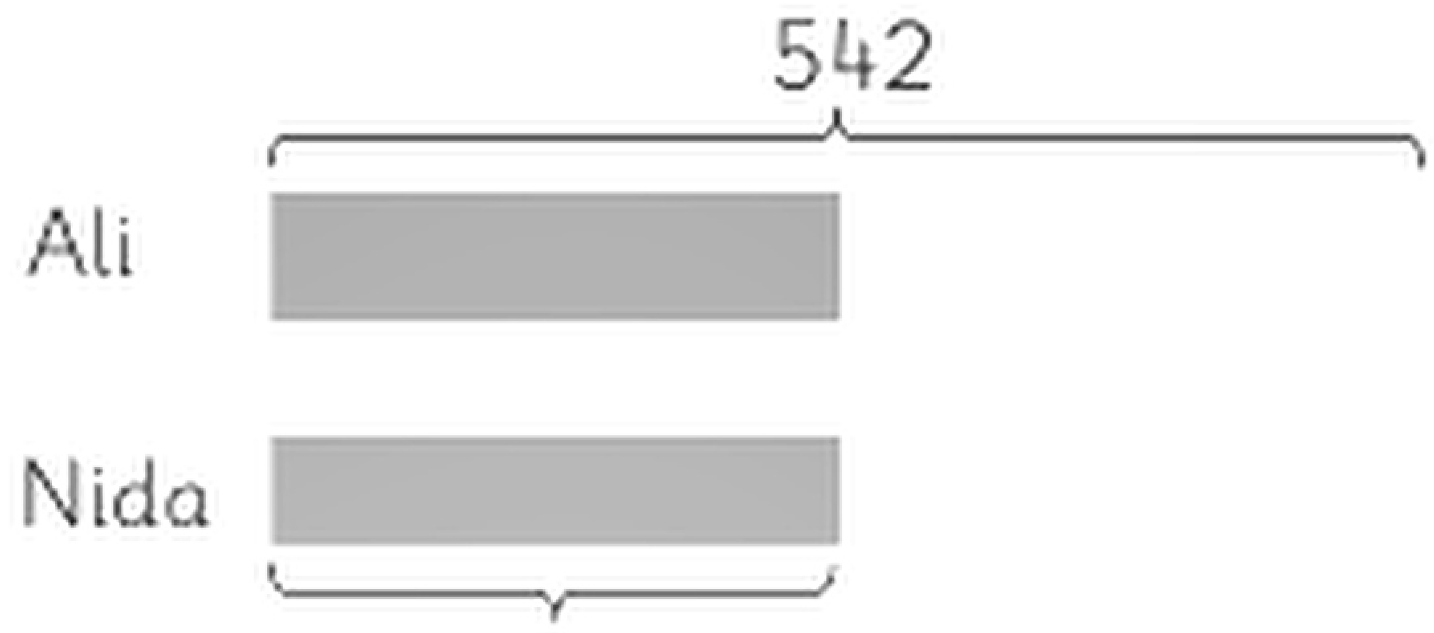
3050 + 1135 = 4185

So, the shop has 4185 toys altogether.

Ali collected 542 seashells. His sister Nida collected half the number of seashells as Ali did.

a) How many seashells did Nida collect?

b) How many seashells did they collect altogether?



a) First, find out the number of seashells Nida collected.

$542 \div 2 = \boxed{271}$

$$\begin{array}{r} 271 \\ 2\overline{)542} \\ -4 \\ \hline 14 \\ -14 \\ \hline 02 \\ -2 \\ \hline 0 \\ \hline \end{array}$$

So, Nida collected 271 seashells.

b) Now, find out the total number of seashells they both collected.

$542 + 271 = \boxed{813}$

$$\begin{array}{r} 542 \\ +\ 271 \\ \hline 813 \\ \hline \end{array}$$

So, they collected 813 seashells altogether.

Exercise 3

1. A farm has 4050 animals and birds altogether. If there are 2555 birds,
   a) How many animals are there?
   b) How many fewer birds are there than animals?
2. A car covered 1230 km in 15 hours.
   a) How many kilometres are covered in one hour?
   b) How many kilometres are covered in 5 hours?
3. 9520 kg of sugar is packed in 85 bags. Find:
   a) How much sugar will each bag contain?
   b) How much sugar will there be in 20 bags?
4. 2876 packets of dates are distributed equally in 20 masjids in Ramadan.
   a) How many packets each masjid will get?
   b) How many packets will be left?

Teaching Point: Recall the clue words for all the four operations. Present some situations involving mixed operations and ask them to identify which operation is needed.

I have learnt

- If the product is more than 9 for any place, regroup it and carry forward.
- Division is a process to equally share a whole in parts.
- If after division something is left over, it's called the remainder.

Word Board

- Remainder
- Product
- Quotient

Review Exercise

1. Choose the correct option.

a) There are 1987 cars in a parking lot. How many wheels are there altogether?

(i) 7498 (ii) 7948 (iii) 7849 (iv) 7984

b) If 444 apples are divided in 3 boxes, each box will have _______ apples.

(i) 158 (ii) 184 (iii) 148 (iv) 156

c) If after division, a number is left over, then it is called_______.

(i) remainder (ii) product (iii) quotient (iv) sum

d) $1720 \div 10 =$ ________

(i) 170 (ii) 172 (iii) 17 (iv) 171

e) $8316 \div 44 =$ ______

(i) 199 (ii) 179 (iii) 198 (iv) 189

2. Multiply to find the product.

a) 4235×5

b) 2187×32

c) 78508×575

d) 9891×42

e) 9038×20

f) 16339×160

3. Multiply the following.

a) 567×53 b) 1098×238 c) 78234×156

4. Divide the following.

a) $5892 \div 7$ b) $4475 \div 5$ c) $7695 \div 14$

d) $3828 \div 22$ e) $8456 \div 56$ f) $3290 \div 70$

g) $2425 \div 96$ h) $5420 \div 50$ i) $1302 \div 4$

j) $2017 \div 12$ k) $3745 \div 35$ l) $306 \div 74$

5. A school ordered 55 boxes of chalks. Each box has 525 chalks in it. How many chalks are there altogether?

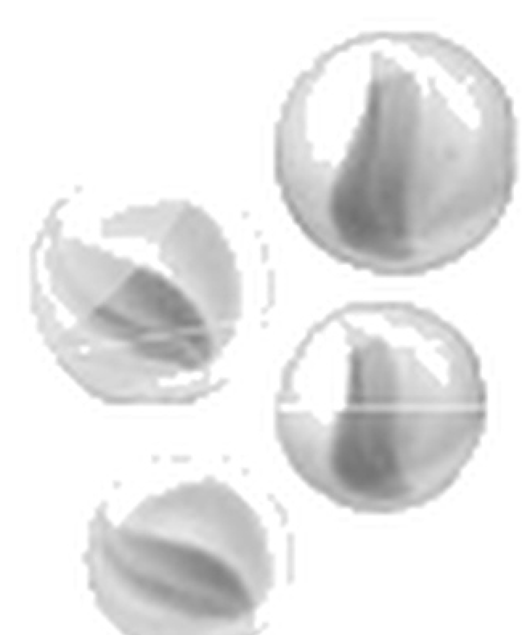
6. A house's rent is Rs 16,750 per month. Find the total rent for one year.

7. There are 4555 cartons of lemons. If each carton contains 185 lemons, how many lemons are there altogether?

8. The price of 98 pairs of socks is Rs 5880. What is the price of each pair?

9. A shopkeeper wants to equally arrange 983 books in 5 shelves.
   a) How many books will be there in each shelf?
   b) How many books will not get a place in the shelf?

10. Usama has collected 1255 marbles. His father gave him 2 more boxes of marbles each having 25 marbles. How many marbles will he have now?



Unit 4

Factors and Multiples

Learning Outcomes

- Identify divisibility rules for 2, 3, 5, and 10.
- Use divisibility tests for 2, 3, 5 and 10 on numbers up to 5 digits.
- Define prime and composite numbers
- Differentiate between prime and composite numbers
- List factors of a number up to 50
- List the first twelve multiples of a 1-digit number
- Differentiate between factors and multiples.
- Factorize a number by using prime factors.
- Determine common factors of two or more 2-digit numbers
- Determine common multiples of two or more 2-digit numbers

?

Nida baked 30 cookies. In how many ways can she put 30 cookies in jars, so that each jar has an equal number of cookies in it?

Teaching Point: For effective teaching and learning, feel free to use 'Urdu' as a medium of instruction to explain the concepts.

Rules of Divisibility

I have 24 crayons. How can I know if I can put them equally in 2 boxes?

A number is said to be divisible by another number if there is no remainder after dividing.

You can use divisibility rules for 2 to check if 24 can be equally divided by 2 or not.

Divisibility Rule for 2

If the digit of a number in its ones place is 0, 2, 4, 6, or 8, then that number will be divisible by 2.
For example, 14, 136, 2458, 67,890 are all divisible by 2.

All even numbers are divisible by 2.

Find out if 1456 is divisible by 2 or not.

In 1456, the last digit is 6.

Therefore, 1456 is completely divisible by 2.

Divisibility Rule for 3

If the sum of all digits of a given number is divisible by 3, then that number will be divisible by 3.
For example, 60, 75, 135, 672 are all divisible by 3.

Without dividing, tell whether 89,120 is divisible by 3 or not.

Add the digits.

8 + 9 + 1 + 2 + 0 = 20

The sum of all digits of the number is 20, which is not divisible by 3.

So, 89,120 is not divisible by 3.

Divisibility Rule for 5

If the digit of a number in its ones place is 0 or 5, then that number will be divisible by 5.

For example, 15, 560, 6790, 99,565 are all divisible by 5.

Check whether 23,950 is divisible by 5 or not.

In 23,950 the last digit of the number is 0.

So, it is divisible by 5.

Divisibility Rule for 10

If the digit of a number in its ones place is 0, then that number will be divisible by 10.

For example, 20, 340, 4550, 67780 are all divisible by 10.

Teaching Point: Label 4 baskets with numbers 2,3,5 and 10. Distribute flash cards with random numbers up to 5 digits among students and help them to sort based on divisibility according to the

Check whether 32,679 is divisible by 10 or not.

In 32,679 the last digit is 9.

So, it is not divisible by 10.

Check Point

Is your year of birth divisible by 2, 3, 5 or 10?

Key fact

If a number is divisible by 2 and 5 both, it will be divisible by 10.

Exercise 1

1. Tick (✓) the numbers which are divisible by 2.

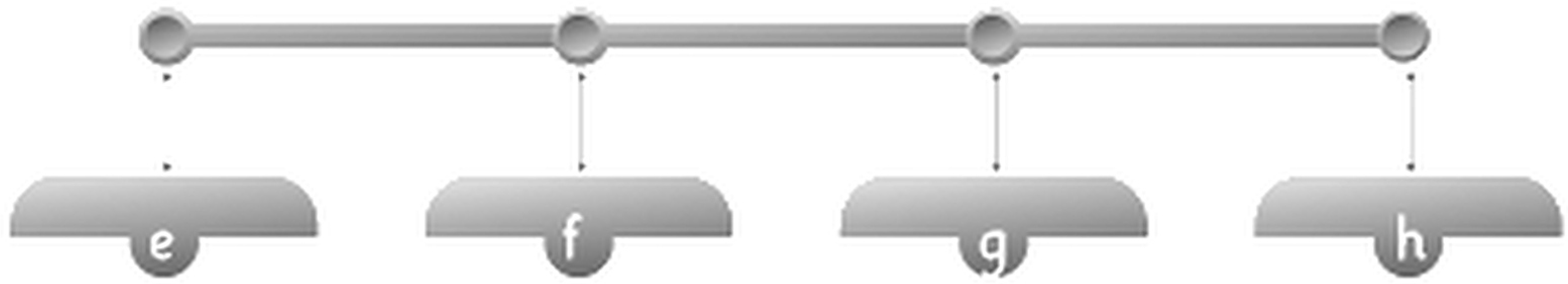
   (a) 4567 (b) 240 (c) 6781 (d) 3789 (e) 8904

2. Tick (✓) the numbers which are divisible by 3.

   (a) 1121 (b) 678 (c) 3210 (d) 2017 (e) 9314

3. Circle the numbers which are divisible by 5 and tick (✓) the numbers which are divisible by 10.

   (a) 45605 (b) 2400 (c) 67815 (d) 11692



77750 91000 8904 5695

4. Write five numbers which are:

a) divisible by 2 and 3 both b) divisible by 2 and 5 both

c) divisible by 3 and 5 both d) divisible by 3 and 10 both

5. Use the divisibility rules to complete the following table.

Numbers	Divisible by 2	Divisible by 3	Divisible by 5	Divisible by 10
144	Yes	Yes	No	No
690				
21044				
45890				

Prime and Composite Numbers

Numbers can be divided into two groups:

a) Prime numbers b) Composite numbers

a) Prime Numbers

A number that is divisible only by 1 and itself is a prime number.

Is 2 a prime number?

As 2 can be divided only by 1 and the number 2 itself. So, it is a prime number. 2 is the only even prime number.

Key fact

1 is neither a prime number nor a composite number.

Is 11 a prime number?

$1 \times 11 = 11$

We can see that 11 has only two divisors, 1 and 11 itself. So, 11 is a prime number.

b) Composite Numbers

A number that has more than two divisors is called a composite number.

Is 6 a composite number?

6 can be divided by 1, 2, 3 and 6. As it has more than two divisors, it is a composite number.

Teaching Point: Encourage students to verbally tell the difference between prime and composite numbers.

Is 9 a prime number or a composite number?

$1 \times 9 = 9$

$3 \times 3 = 9$

9 has more than two divisors 1, 3 and 9.

So, 9 is a composite number.

What is the smallest composite number?

Exercise 2

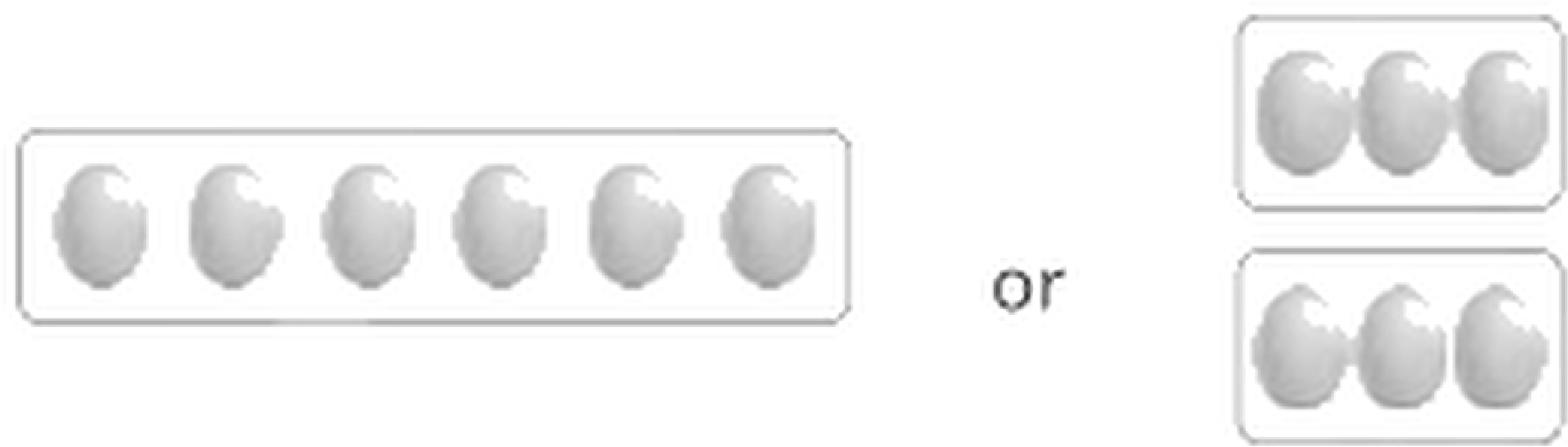
1. Write down all the composite numbers between 50 and 70.
2. Write down all the prime numbers between 1 and 50.
3. Write down the first 10 prime numbers.
4. Write down the first 5 composite numbers.
5. Identify and colour all prime numbers.

1	11	21	31	41	51	61	71	81	91
2	12	22	32	42	52	62	72	82	92
3	13	23	33	43	53	63	73	83	93
4	14	24	34	44	54	64	74	84	94
5	15	25	35	45	55	65	75	85	95
6	16	26	36	46	56	66	76	86	96
7	17	27	37	47	57	67	77	87	97
8	18	28	38	48	58	68	78	88	98
9	19	29	39	49	59	69	79	89	99
10	20	30	40	50	60	70	80	90	100

Factors and Multiples

Factors

We can arrange 6 eggs into equal rows in more than one way.
Here are two ways:



1 row of 6 eggs   or   2 rows of 3 eggs

$$\underbrace{2}_{\text{Factor}} \times \underbrace{3}_{\text{Factor}} = 6$$

2 and 3 are factors of 6.

$$6 = 1 \times 6$$

$$6 = 2 \times 3$$

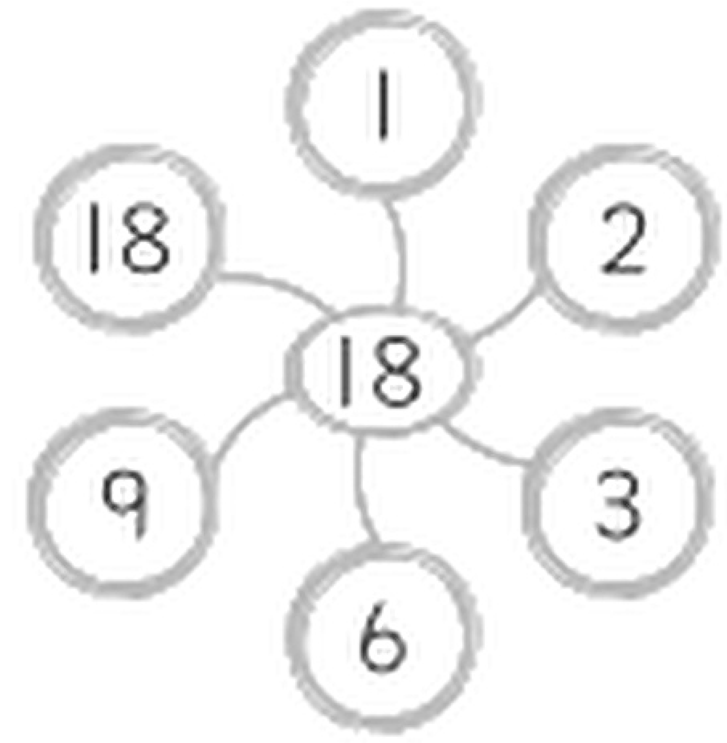
A factor or divisor of a number is a number which divides it exactly.

The divisibility rules help us to find the factors of numbers.

Teaching Point: Help students to find the factors of different numbers up to 50 using number cards.

Observe all the factors of 18.

18	=	1	×	18
18	=	2	×	9
18	=	3	×	6



Therefore, the factors of 18 are 1, 2, 3, 6, 9 and 18.

List all the factors of 9.

9 = 1 × 9

9 = 3 × 3

So, the factors of 9 are 1, 3 and 9.

Every number is a factor of itself.

Multiples

A multiple of a number is the product of that number and any other number.

Which number is a factor of every number?

Every number is a factor of all its multiples.

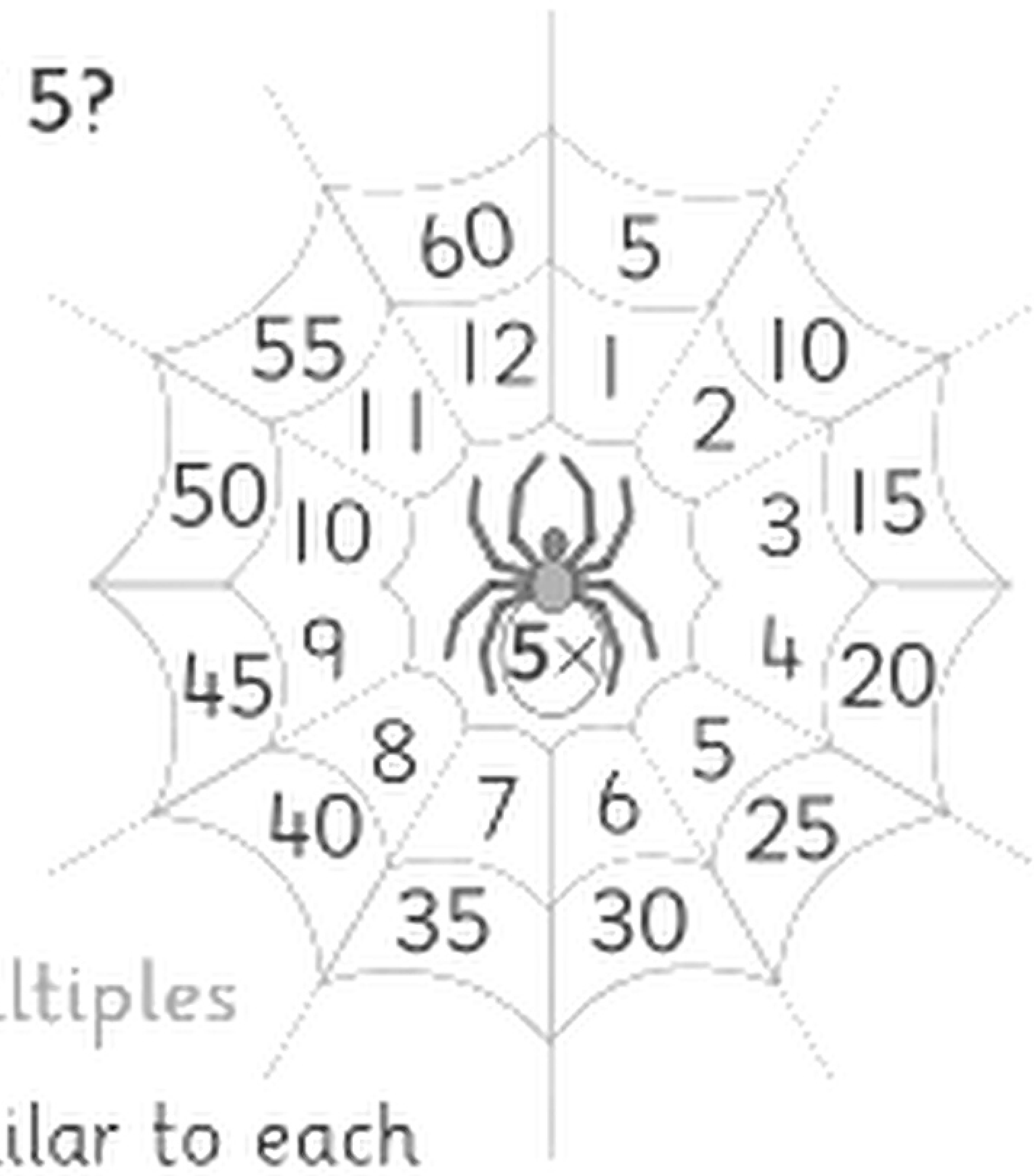
Recall multiplication table of 3.

The first 12 multiples of 3 are 3, 6, 9, 12, 15, 18, 21, 24, 27, 30, 33 and 36.

Teaching Point: Help students to find the factors of different numbers up to 50 using number cards.

What are the first 12 multiples of 5?

To find the multiples of 5, let us recall the multiplication table of 5.



So, the first 12 multiples of 5 are 5, 10, 15, 20, 25, 30, 35, 40, 45, 50, 55 and 60.

Difference Between Factors and Multiples

Factors and multiples look almost similar to each other. But there is a big difference between them.

Factors

- Factors are the numbers we can multiply together to get another number.
- Factors divide the given number without leaving any remainder.
- The smallest factor of any number is 1.
- The biggest factor of a number is the number itself.
- The factors of any number are always countable.

Multiples

- The multiple of a number is a number, obtained by multiplying that number by any other number.
- Multiples of any number is the result in the multiplication table of that number.
- The smallest multiple of a number is the number itself.
- The biggest multiple of any number cannot be calculated.
- The multiples of any number are uncountable.

Teaching Point: Ask students to verbally tell the difference between factors and multiples.

Look at the factors and multiples of 6.

Factors of 6

$1 \times 6 = 6$

$2 \times 3 = 6$

Multiples of 6

$6 \times 1 = 6$

$6 \times 2 = 12$

$6 \times 3 = 18$

$6 \times 4 = 24$

So, the factors of 6 are 1, 2, 3 and 6. The multiples of 6 are 6, 12, 18, 24 and so on.

Exercise 3

1. Find all the factors of the following numbers.

   a) 9 b) 14 c) 23

   d) 38 e) 45 f) 50

   g) 40 h) 35 i) 25

Hint

Use the divisibility rules to find the factors of these numbers.

2. Find the first 12 multiples of the following numbers.

   a) 3 b) 7 c) 9

   d) 8 e) 2 f) 6

Prime Factorization

It is a process in which we write a number as the product of its prime factors.

Teaching Point: Explain the method to find the prime factors.

We can factroize a number by
writing it as a product of
its prime factors.

Find all the factors of 12 which are prime.

$12 = 2 \times 2 \times 3$

2	12
2	6
3	3
	1

2, 2 and 3 are the factors of 12, and all factors are prime numbers.

Find the prime factors of 45.

3	45
3	15
5	5
	1

So, $45 = 3 \times 3 \times 5$.

Therefore, the prime factors of 45 are 3, 3 and 5.

Common Factors

When two or more numbers have the same factor,
that factor is called a common factor.

Teaching Point: Explain the methods to find the common multiples of different numbers.

Find the common factors of 4 and 16.

Factors of 4 = 1, 2, 4
Factors of 16 = 1, 2, 4, 8, 16

As 1, 2 and 4 appear in both lists.

So, common factors of 4 and 16 are 1, 2 and 4.

Each common factor (1, 2 and 4) divides the given numbers 4 and 16 exactly.

Find the common factors of 15 and 18.

Factors of 15 = 1, 3, 5, 15
Factors of 18 = 1, 2, 3, 6, 9, 18

What is the common factor of 2 and 15?

The common factors of 15 and 18 are 1 and 3.

Find the common factors of 9, 24 and 27.

List the factors of numbers and circle the common factors of each as shown below:

Factors of 9 = 1, 3, 9
Factors of 24 = 1, 2, 3, 4, 6, 8, 12, 24
Factors of 27 = 1, 3, 9, 27

What are the common factors of two consecutive numbers?

As 1 and 3 appear in all the lists.

Therefore, common factors of 9, 24 and 27 are 1 and 3.

Common Multiples

A number that is a multiple of two or more numbers is called a common multiple.

To find the common multiples of any two numbers, say 2 and 8, write the first few multiples of both numbers and circle the common multiples.

Multiples of 2: 2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24, 26,...

Multiples of 8: 8, 16, 24, 32, 40, 48, 56, 64, 72, 80, 88, 96,...

So, the common multiples of 2 and 8 are 8, 16 and 24

Find the first 3 common multiples of 4 and 6.

Multiples of 4 = 4, 8, 12, 16, 20, 24, 28, 32, 36, 40,...

Multiples of 6 = 6, 12, 18, 24, 30, 36, 42, 48, 54, 60,...

Therefore, the first 3 common multiples of 4 and 6 are 12, 24 and 36.

Teaching Point: Explain the method to find the common multiples of different numbers.

Find the first common multiple of 10, 12 and 15.

Hint

First list down all the multiples.

Multiples of 10 = 10, 20, 30, 40, 50, 60,...

Multiples of 12 = 12, 24, 36, 48, 60, 72,...

Multiples of 15 = 15, 30, 45, 60, 75, 90,...

First common multiple of 10,12 and 15 is 60.

Exercise 4

1. **Find the prime factors of the following numbers.**

   a) 12 b) 34 c) 48 d) 27 e) 45

   f) 18 g) 36 h) 49 i) 22 j) 40

2. **What are the prime factors of 14?**

3. **Find the common factors of the following numbers.**

   a) 20 and 32 b) 28 and 42 c) 12, 14 and 18

   d) 64, 32 and 18 e) 10 and 50 f) 48, 36 and 6

4. **Find the first 2 common multiples of the following numbers.**

   a) 12 and 24 b) 10, 6, 15 c) 2, 5 and 8

   d) 16 and 12 e) 7 and 14 f) 8 and 16

I have learnt

Word Board
- Divisibility Rule
- Prime numbers
- Composite numbers
- Factors
- Multiples
- Factorization

- A number is said to be divisible by another number if there is no remainder after dividing.
- If the digit of a number in its ones place is 0, 2, 4, 6, or 8, the number will be divisible by 2.
- If the sum of all the digits of a given number is divisible by 3, the number will be divisible by 3.
- If the digit of a number in its ones place is 0 or 5, the number will be divisible by 5.
- If the digit of a number in its ones place is 0, the number will be divisible by 10.
- A number that is divisible by 1 and itself is called a prime number.
- A number that has more than two divisors is called a composite number.
- A factor or divisor of a number is a number which divides it exactly.
- A multiple of a number is the product of that number by any other number.
- Prime factorization is a process in which we write a number as the product of its prime factors.
- When two or more numbers have the same factor, that factor is called a common factor.
- A number that is a multiple of two or more numbers is called a common multiple.

Review Exercise

1. Choose the correct option.

a) ______ is divisible by 3.

i) 16 ii) 96 iii) 50 iv) 22

b) A prime number has only______factors.

i) 1 ii) 3 iii) 2 iv) 0

c) Which of the following numbers has both 6 and 8 as common factors?

i) 64 ii) 12 iii) 48 iv) 42

d) Which of the following number is a factor of 24 but not a factor of 36?

i) 2 ii) 3 iii) 4 iv) 8

e) Which of the following numbers has both 2 and 3 as factors?

i) 12 ii) 14 iii) 8 iv) 15

2. Complete the following table. Remember to use the divisibility rules.

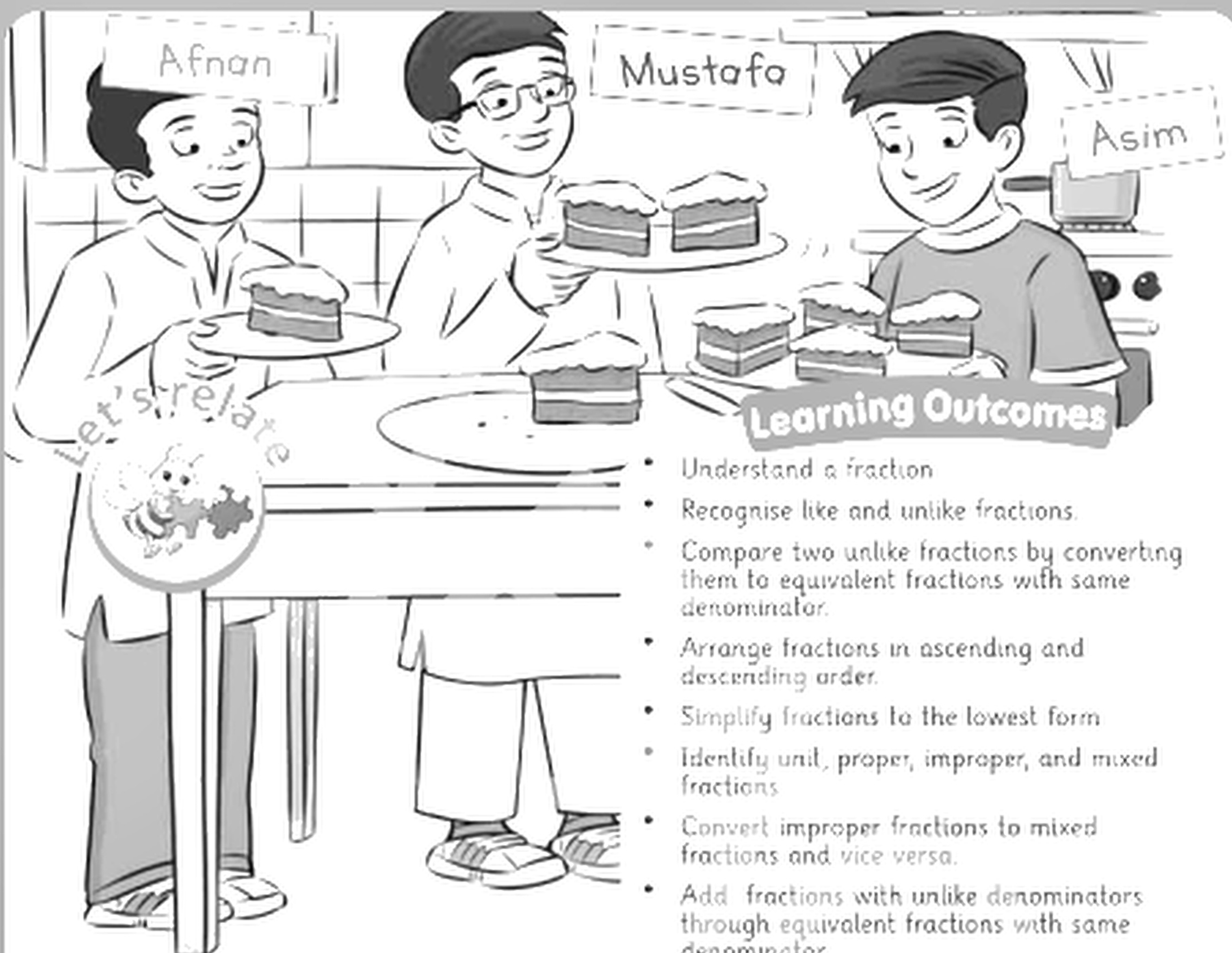
Numbers	Divisible by 2	Divisible by 3	Divisible by 5	Divisible by 10
354	Yes	Yes	No	No
777				
31055				
84500				

3. Write down all the composite numbers between 2 and 100.
4. Write all the prime numbers between 40 and 60.
5. Circle the factors of 36 and underline the multiples of 4.

6. Write all the factors of the following numbers.
   a) 6 b) 10 c) 16
   d) 36 e) 48 f) 11
7. Write down the first 12 multiples of the following numbers.
   a) 2 b) 5 c) 7
   d) 8 e) 9 f) 6
8. Find the common factors of the following numbers.
   a) 18 and 42 b) 25 and 75 c) 12, 18 and 28
   d) 24 , 36 and 50 e) 16 and 72
9. Find the first common multiples of the following numbers.
   a) 2, 6 and 12 b)12 and 18 c) 20 and 35
   d) 7, 14 and 28 e) 18 and 24 f) 14, 56 and 28

Unit 5

Fractions



Learning Outcomes

- Understand a fraction
- Recognise like and unlike fractions.
- Compare two unlike fractions by converting them to equivalent fractions with same denominator.
- Arrange fractions in ascending and descending order.
- Simplify fractions to the lowest form
- Identify unit, proper, improper, and mixed fractions
- Convert improper fractions to mixed fractions and vice versa.
- Add fractions with unlike denominators through equivalent fractions with same denominator.
- Subtract fractions with unlike denominators through equivalent fractions with same denominator.
- Multiply fractions with whole numbers.
- Multiply two or more fractions (proper, improper, mixed)
- Divide a fraction by a whole number
- Divide a whole number by a fraction
- Divide a fraction by another fraction (proper, improper, mixed)
- Analyse real life situations involving fractions by identifying correct arithmetic operations

Who has $\frac{1}{4}$ of the whole cake?

Teaching Point: For effective teaching and learning, feel free to use 'Urdu' as a medium of instruction to explain the concepts.

Fractions

Do you remember what a fraction is?

A fraction shows equal parts of a whole. It is made up of 2 numbers separated by the line.

The number above the line is called numerator. The number below the line is called denominator.

$\frac{3}{5}$ — 3 → numerator, 5 → denominator

Like and Unlike Fractions

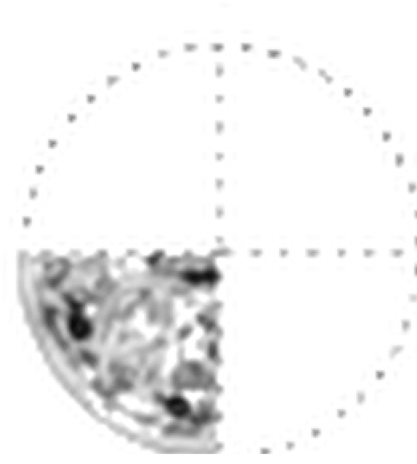
Ali, Sana and Raza have pizzas. They cut their pizza into 4 equal parts.

Ali Sana Raza

Ali ate $\frac{1}{4}$ of his pizza.

Sana ate $\frac{2}{4}$ of her pizza.

Raza ate $\frac{3}{4}$ of his pizza.



In $\frac{1}{4}$, $\frac{2}{4}$ and $\frac{3}{4}$ the denominator is the same.

Two or more fractions with same denominator are called like fractions.

In like fractions: greater the numerator, greater the fraction.

Check if $\frac{1}{10}$, $\frac{4}{10}$, $\frac{7}{10}$ are like fractions or not.

The fractions $\frac{1}{10}$, $\frac{4}{10}$, $\frac{7}{10}$ have the same denominators, i.e. 10, so these are like fractions.

Are $\frac{1}{8}$, $\frac{4}{10}$ and $\frac{6}{7}$ like fractions or unlike fractions?

In fractions $\frac{1}{8}$, $\frac{4}{10}$ and $\frac{6}{7}$, the denominators are different.

So, these are unlike fractions.

Two or more fractions with different denominators are called unlike fractions.

Are $\frac{7}{8}$, $\frac{2}{9}$ and $\frac{3}{5}$ like fractions?

Comparing Unlike Fractions

Zohaib ate $\frac{2}{3}$ of a chocolate bar and his sister Zoobia ate $\frac{1}{6}$ of it. Who ate more of the chocolate bar?

Zohaib ate = $\frac{2}{3}$

Zoobia ate = $\frac{1}{6}$

Teaching Point: Give fractional card to the students and ask the students find out the fractional cards that have same denominators.

Convert these fractions to equivalent fractions having same denominator.

Fractions that have different numerators and denominators, but are equal in value are called equivalent fractions.

$$\frac{2}{3} = \frac{2 \times 2}{3 \times 2} = \frac{4}{6}$$

Now compare $\frac{4}{6}$ and $\frac{1}{6}$.

As 4 is greater than 1 so, $\frac{4}{6} > \frac{1}{6}$ or $\frac{2}{3} > \frac{1}{6}$.

So, we will say Zohaib ate more chocolate than Zoobia.

Ordering Two or More Unlike Fractions

How can we order $\frac{1}{2}$, $\frac{5}{6}$ and $\frac{2}{3}$ from smallest to the greatest?

We can order them by comparing.

Find the equivalent fractions with same denominator.

$$\frac{1}{2} = \frac{1 \times 3}{2 \times 3} = \frac{3}{6} \quad \text{and} \quad \frac{2}{3} = \frac{2 \times 2}{3 \times 2} = \frac{4}{6}$$

Now compare the numerators of $\frac{3}{6}$, $\frac{5}{6}$ and $\frac{4}{6}$

$$5 > 4 > 3$$

So, $\frac{5}{6} > \frac{4}{6} > \frac{3}{6}$

Therefore, $\frac{5}{6}$ is the greatest fraction and $\frac{3}{6}$ is the smallest fraction.

Teaching Point: Give different fractional flash cards to the students and help them to arrange the cards of fractions in ascending and descending order.

Arrange the numbers in ascending and descending order:

Ascending order: $\frac{3}{6}, \frac{4}{6}, \frac{5}{6} \Rightarrow \frac{1}{2}, \frac{2}{3}, \frac{5}{6}$

Descending order: $\frac{5}{6}, \frac{4}{6}, \frac{3}{6} \Rightarrow \frac{5}{6}, \frac{2}{3}, \frac{1}{2}$

Simplifying Fractions

I divided a cake in fifteen equal pieces. 12 pieces have been eaten by me and my friends. So, we ate $\frac{12}{15}$ of the cake.

We can write $\frac{12}{15}$ in simple form by dividing numerator and denominator by a common factor 3.

$$\frac{12}{15} = \frac{12 \div 3}{15 \div 3} = \frac{4}{5}$$

Now 4 and 5 do not have common factors.

So, the simplest form of $\frac{12}{15}$ is $\frac{4}{5}$.

Hint

Divide the numerator and denominator with the same number.

Simplify $\frac{18}{24}$.

Divide the numerator and denominator with common factor 6.

Teaching Point: Write the different fractions on the board and put their equivalent fraction flash cards on the table. Ask the students to pick the card which is the simplest form of the fraction written on the board.

$$\frac{18}{24} = \frac{18 \div 6}{24 \div 6} = \frac{3}{4}$$

As 3 and 4 do not have common factors.

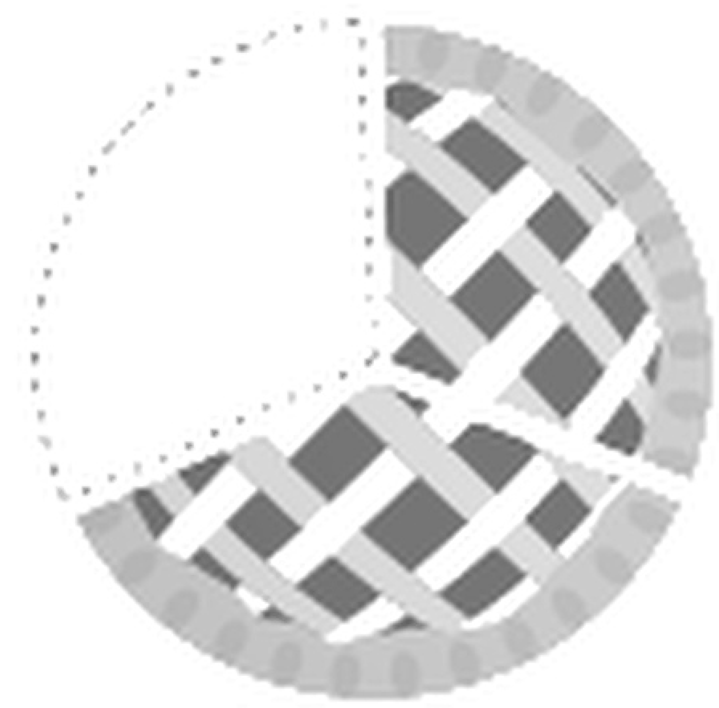
So, the simplest form of $\frac{18}{24}$ is $\frac{3}{4}$.

Can you find the simplest form of $\frac{9}{15}$?

Unit Fraction

The fractions with the numerator 1 are called **unit fractions**.

Look at the apple pie. Its 1 out of 3 pieces has been eaten.



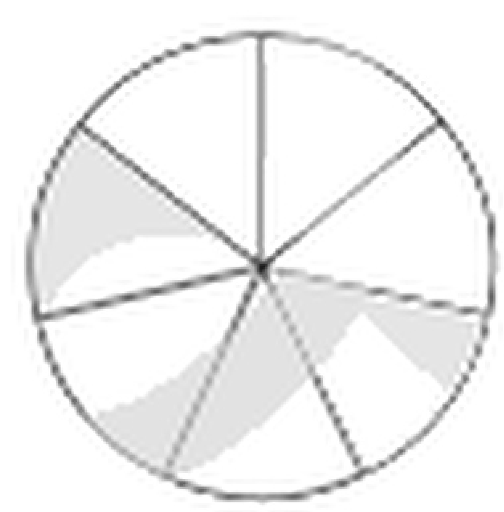
Apple pie

The eaten part can be represented as $\frac{1}{3}$.

As the numerator is 1 so, it is a unit fraction.

Proper and Improper Fractions

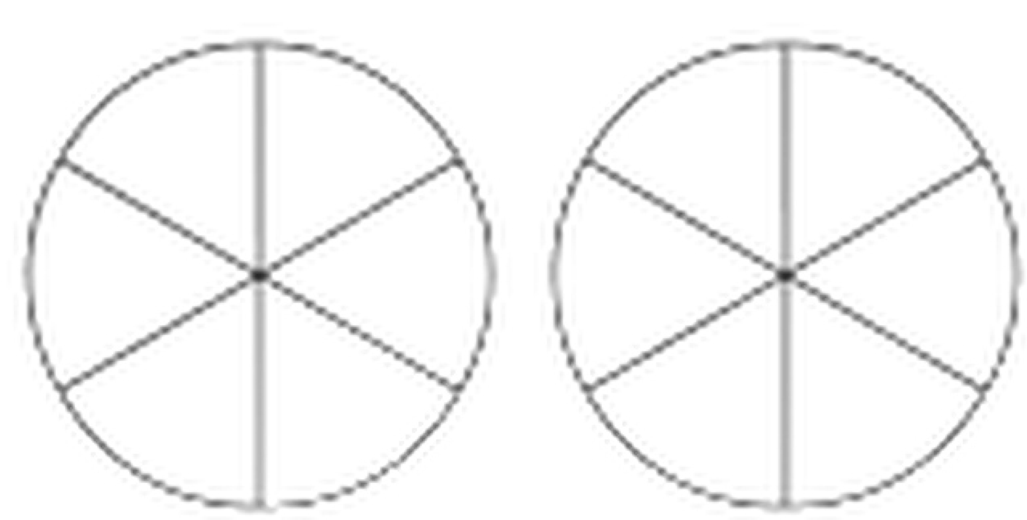
A fraction in which the numerator is smaller than the denominator is called a proper fraction.



$\frac{4}{7}$

A fraction with numerator greater than or equal to the denominator is called an improper fraction.

$\frac{3}{3}$



$\frac{11}{6}$

Mixed Fractions

Mahad and his friends drank 3 whole and a half glass of juice. How can this be shown?

Use fraction discs to model 3 wholes and one half.

3 wholes

1 half or $\frac{1}{2}$

We write this as $3\frac{1}{2}$.

We read it as "three and one-half".

When a fraction is written as a combination of a whole number and a proper fraction, it is called a mixed fraction.

Conversion of Improper to Mixed Fraction

Convert improper fraction $\frac{9}{5}$ into mixed fraction.

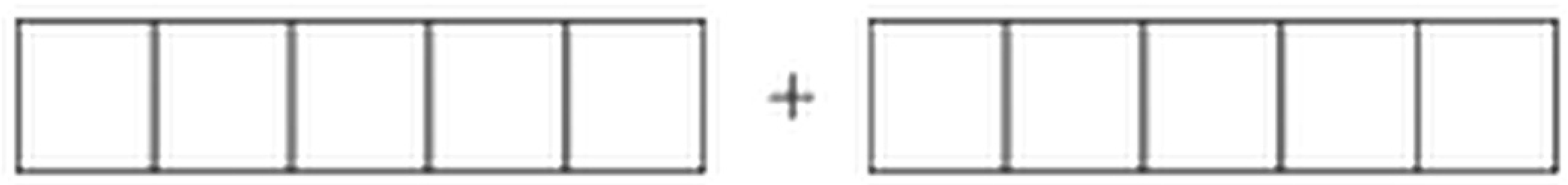
First divide the numerator 9 by the denominator 5 and obtain the quotient and remainder.

$$\begin{array}{rrl} & 1 & \longrightarrow \text{Quotient} \\ \text{Denominator} \longleftarrow 5 \,) & 9 & \longrightarrow \text{Numerator} \\ & -5 & \\ \hline & 4 & \longrightarrow \text{Remainder} \end{array}$$

Teaching Point: Help the students to understand the concept of converting mixed fractions into improper fractions by using fraction strips or discs.

$9 \div 5 = 1$, remainder 4

So, $\frac{9}{5}$ can be written in mixed numbers as $1\frac{4}{5}$.



$$\frac{5}{5} + \frac{4}{5} = \frac{9}{5} = 1\frac{4}{5}$$

Convert $\frac{9}{2}$ into mixed fraction.

To change $\frac{9}{2}$ into mixed fraction, divide 9 by 2.

$$\begin{array}{r|l} & 4 \\ \hline 2 & 9 \\ & -8 \\ \hline & 1 \end{array}$$

$9 \div 2 = 4$, remainder 1

So, $\frac{9}{5}$ can be written in mixed numbers as $4\frac{1}{2}$.

Conversion of Mixed Fraction to Improper Fraction

Convert mixed fraction $4\frac{1}{7}$ into improper fraction.

In fraction $4\frac{1}{7}$, 4 is the whole number and $\frac{1}{7}$ is the proper fraction.

Multiply 4 by the denominator 7 and add the result to the numerator.

$(4 \times 7) + 1 = 28 + 1 = 29$

So, $4\frac{1}{7} = \frac{(4 \times 7) + 1}{7} = \frac{29}{7}$

Keep the denominator unchanged.

Teaching Point: Explain the ways to convert improper fractions to mixed fractions and vise versa.

Convert $3\frac{2}{9}$ into improper fraction.

$$\text{Improper fraction} = \frac{(3 \times 9) + 2}{9}$$

$$= \frac{27 + 2}{9}$$

$$= \frac{29}{9}$$

So, $3\frac{2}{9} = \frac{29}{9}$

Exercise 1

1. Circle the like fractions.

a) $\frac{6}{7}, \frac{5}{7}$ b) $\frac{1}{7}, \frac{1}{5}$ c) $\frac{2}{17}, \frac{6}{17}$

d) $\frac{2}{9}, \frac{2}{11}$ e) $\frac{7}{13}, \frac{3}{5}$ f) $\frac{4}{9}, \frac{5}{9}$

2. Compare the following fractions by using the symbol > or < .

a) $\frac{6}{7} \square \frac{5}{14}$ b) $\frac{1}{10} \square \frac{1}{5}$ c) $\frac{2}{5} \square \frac{7}{15}$

d) $\frac{2}{9} \square \frac{2}{13}$ e) $\frac{2}{3} \square \frac{5}{6}$

f) $\frac{5}{9} \square \frac{1}{3}$ g) $\frac{7}{10} \square \frac{4}{5}$

h) $\frac{8}{9} \square \frac{1}{3}$ i) $\frac{3}{4} \square \frac{1}{8}$

Hint

First change the unlike fraction into like fractions using equivalent fractions.

3. Write the following fractions in ascending and descending order.

a) $\frac{1}{5}, \frac{1}{10}, \frac{1}{4}, \frac{1}{20}$ b) $\frac{5}{9}, \frac{8}{3}, \frac{1}{2}, \frac{7}{18}$

c) $\frac{3}{2}, \frac{5}{8}, \frac{4}{16}, \frac{7}{4}$ d) $\frac{3}{7}, \frac{1}{21}, \frac{5}{3}, \frac{4}{7}$

4. Write the following in their lowest form.

a) $\frac{2}{6}$ b) $\frac{30}{40}$ c) $\frac{24}{30}$ d) $\frac{16}{20}$ e) $\frac{14}{21}$

5. Tick (✓) the proper fractions.

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

6. Convert the following mixed fractions to improper fractions.

a) $1\frac{4}{7}$ b) $5\frac{1}{6}$ c) $4\frac{5}{6}$ d) $6\frac{3}{7}$ e) $8\frac{9}{10}$ f) $2\frac{7}{9}$

7. Convert the following improper fractions to mixed fractions.

a) $\frac{5}{3}$ b) $\frac{7}{4}$ c) $\frac{8}{5}$ d) $\frac{9}{4}$ e) $\frac{5}{2}$ f) $\frac{10}{7}$ g) $\frac{11}{6}$

Addition of Unlike Fractions

Ahmad bought $\frac{4}{5}$ kg of apples and $\frac{3}{4}$ kg of mangoes. What is the total mass of fruits he bought?

Ahmad bought apples = $\frac{4}{5}$ kg

Ahmad bought mangos = $\frac{3}{4}$ kg

Total mass of fruits = ?

Here the clue words are "total" and two quantities are given. So, we need to add.

$$\frac{4}{5} + \frac{3}{4} = \frac{16}{20} + \frac{15}{20} = \frac{31}{20} = 1\frac{11}{20}$$

So, the total mass of the fruits is $1\frac{11}{20}$ kg.

Add $\frac{5}{6}$ and $\frac{3}{5}$.

We can add unlike fractions by converting them into like fractions.

$$\frac{5}{6} = \frac{5 \times 5}{6 \times 5} = \frac{25}{30} \quad \text{and} \quad \frac{3}{5} = \frac{3 \times 6}{5 \times 6} = \frac{18}{30}$$

$$\frac{5}{6} + \frac{3}{5} = \frac{25}{30} + \frac{18}{30} = \frac{43}{30} = 1\frac{13}{30}$$

Add $\frac{1}{7}$ and $\frac{5}{13}$?

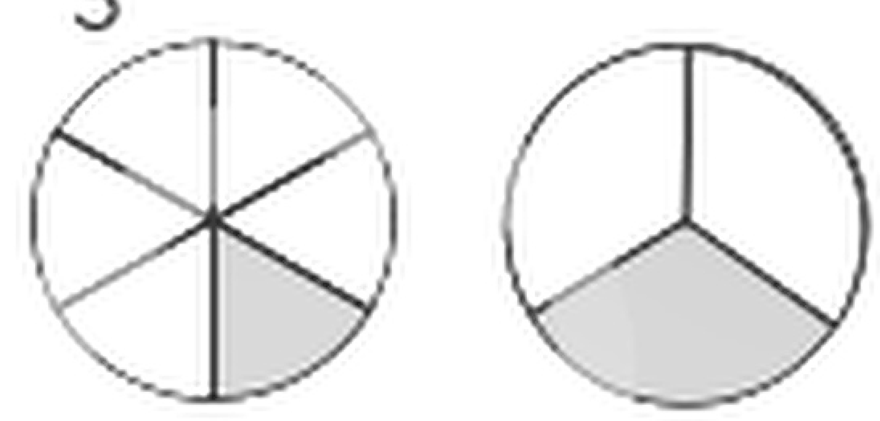
Subtraction of Unlike fractions

Hamza had $\frac{5}{6}$ of an apple pie. He gave $\frac{2}{3}$ of the pie to his friend. How much pie is left?

Hamza had $= \frac{5}{6}$

He gave $= \frac{2}{3}$

Apple pie left = ?



$\frac{5}{6} - \frac{2}{3}$

$$\frac{5}{6} - \frac{2}{3} = \frac{5}{6} - \frac{4}{6}$$

$$= \frac{1}{6}$$

We can subtract unlike fractions by converting them into like fractions.

So, Hamza has $\frac{1}{6}$ of the apple pie left.

Teaching Point: Help the students to add and subtract unlike fractions by converting them into like fractions. Have them recall the concept of equivalent fractions to convert unlike fractions to like fractions.

Subtract $\frac{1}{12}$ from $\frac{1}{6}$.

$$\frac{1}{6} - \frac{1}{12} = \frac{2}{12} - \frac{1}{12}$$

$$= \frac{2-1}{12} = \frac{1}{12}$$

Exercise 2

1. Add the following fractions. Write your answer in simplest form.

a) $\frac{3}{4} + \frac{1}{8} = \frac{\square}{\square}$ b) $\frac{1}{2} + \frac{1}{6} = \frac{\square}{\square}$

c) $\frac{2}{5} + \frac{1}{10} = \frac{\square}{\square}$ d) $\frac{2}{3} + \frac{5}{9} = \frac{\square}{\square}$

e) $\frac{1}{2} + \frac{7}{12} = \frac{\square}{\square}$ f) $\frac{5}{6} + \frac{1}{3} = \frac{\square}{\square}$

2. Subtract the following.

a) $\frac{4}{6} - \frac{2}{12} = \frac{\square}{\square}$ b) $\frac{3}{4} - \frac{1}{2} = \frac{\square}{\square}$

c) $\frac{5}{9} - \frac{1}{3} = \frac{\square}{\square}$ d) $\frac{9}{10} - \frac{2}{5} = \frac{\square}{\square}$

3. Saafi bought $3\frac{1}{3}$ litres of mango juice and $2\frac{1}{2}$ litres of orange juice. How much more mango juice did he buy than orange juice?

4. Ahmed spent $\frac{1}{4}$ hours reading newspapers. He spent $\frac{5}{8}$ hours reciting the Holy Quran.
   a) How much time did he spend altogether?
   b) How much more time did he spend reciting the Holy Quran than reading newspapers?

Multiplication of Fractions

Multiplying a fraction by a whole number

$\frac{4}{7}$ of 35 students in a class are boys. How many boys are there in the class? How many girls are there?

Total students = 35

Fraction of boys = $\frac{4}{7}$

Number of girls = ?

$\frac{4}{7}$ of $35 = \frac{4}{7} \times 35$

$= \frac{4 \times 35}{7}$

$= \frac{140}{7} = 20$

So, there are 20 boys.

Number of girls = 35 − 20 = 15

So, there are 15 girls in the class.

Here we will multiply as "of" means to multiply.

Now we need to subtract as we know the total number of students and number of boys.

Multiply $\frac{2}{5}$ by 3.

$$\frac{2}{5} \times 3 = \frac{2}{5} \times \frac{3}{1}$$
$$= \frac{2 \times 3}{5 \times 1}$$
$$= \frac{6}{5} \text{ or } 1\frac{1}{5}$$

First write 3 as $\frac{3}{1}$.
Multiply the numerators and denominators.

We can represent it in diagrams.

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

Find $2\frac{3}{5}$ of 4.

$$2\frac{3}{5} \text{ of } 4 = 2\frac{3}{5} \times 4 = \frac{13}{5} \times \frac{4}{1}$$
$$= \frac{13 \times 4}{5 \times 1}$$
$$= \frac{52}{5} = 10\frac{2}{5}$$

What is $1\frac{3}{7}$ of 2?

Multiplying a fraction by another fraction

Find $\frac{1}{3}$ of $\frac{2}{3}$.

$$\frac{1}{3} \text{ of } \frac{2}{3} = \frac{1}{3} \times \frac{2}{3}$$

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

$$= \frac{2}{9}$$

Find $7\frac{1}{4}$ of $2\frac{4}{5}$.

$$7\frac{1}{4} \text{ of } 2\frac{4}{5} = 7\frac{1}{4} \times 2\frac{4}{5}$$

$$= \frac{29}{4} \times \frac{14}{5}$$

$$= \frac{29 \times \cancel{14}^{7}}{{}_{2}\cancel{4} \times 5}$$

$$= \frac{29 \times 7}{2 \times 5}$$

$$= \frac{203}{10} \text{ or } 20\frac{3}{10}$$

What is $6\frac{1}{2}$ of $\frac{4}{5}$?

$$6\frac{1}{2} \text{ of } \frac{4}{5} = 6\frac{1}{2} \times \frac{4}{5}$$

$$= \frac{13}{2} \times \frac{4}{5}$$

$$= \frac{13 \times \cancel{4}^{2}}{{}_{1}\cancel{2} \times 5}$$

$$= \frac{13 \times 2}{1 \times 5}$$

$$= \frac{26}{5} \text{ or } 5\frac{1}{5}$$

Is the product of any 2 unit fractions, always a unit fraction?

Division of Fractions

Dividing a Fraction by Whole Number

Divide $\frac{1}{2}$ of a pizza among 2 kids. How much pizza will each kid get?

Here we need to find $\frac{1}{2} \div 2$.

Replace the '÷' symbol with the '×' symbol and the whole number by its reciprocal.

Reciprocal of a fraction is obtained by inverting the numerator and denominator of a fraction.
So, reciprocal of $\frac{2}{1}$ is $\frac{1}{2}$.

$\frac{1}{2} \div 2$ is the same as $\frac{1}{2} \times \frac{1}{2}$.

So, $\frac{1}{2} \div 2 = \frac{1}{2} \times \frac{1}{2}$

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

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

So, each kid will get $\frac{1}{4}$ of the whole pizza.

Divide $1\frac{1}{2}$ by 4.

$1\frac{1}{2} \div 4 = \frac{3}{2} \div 4$

$$= \frac{3}{2} \times \frac{1}{4}$$

$$= \frac{3}{8}$$

What is the difference between $\frac{3}{4} \div \frac{1}{4}$ and $\frac{3}{4}$ of $\frac{4}{1}$?

Dividing a Whole Number by a Fraction

A scarf is stitched using $\frac{1}{2}$ metre of cloth. How many scarves can be stitched from 8 metres of cloth?

To divide a whole number by a fraction, steps will remain the same.

Total length of cloth = 8 m

Cloth required for 1 scarf = $\frac{1}{2}$ m

Total number of scarves stitched = $8 \div \frac{1}{2}$

$$8 \div \frac{1}{2} = \frac{8}{1} \div \frac{1}{2}$$
$$= \frac{8}{1} \times \frac{2}{1}$$
$$= \frac{8 \times 2}{1 \times 1}$$
$$= \frac{16}{1} = 16$$

$8 \div \frac{1}{2}$ is the same as $\frac{8}{1}$ of $\frac{2}{1}$ or $\frac{8}{1} \times \frac{2}{1}$

So, 16 scarves can be stitched from 8 m cloth.

Divide 5 by $1\frac{1}{5}$.

$$5 \div 1\frac{1}{5} = \frac{5}{1} \div \frac{6}{5}$$
$$= \frac{5}{1} \times \frac{5}{6}$$
$$= \frac{5 \times 5}{1 \times 6}$$
$$= \frac{25}{6}$$
$$= 4\frac{1}{6}$$

Divide 10 by $\frac{3}{4}$.

Dividing a Fraction by a Fraction

Find $\frac{1}{2} \div \frac{1}{3}$.

$$\frac{1}{2} \div \frac{1}{3} = \frac{1}{2} \times \frac{3}{1}$$

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

Check Point What is $\frac{12}{5} \div \frac{3}{10}$?

Divide $\frac{5}{6}$ by $3\frac{3}{4}$.

$$\frac{5}{6} \div 3\frac{3}{4} = \frac{5}{6} \div \frac{15}{4}$$

$$= \frac{\cancel{5}^{1}}{\cancel{6}_{3}} \times \frac{\cancel{4}^{2}}{\cancel{15}_{3}}$$

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

$$= \frac{2}{9}$$

Exercise 3

1. Solve the following.

a) $4\frac{1}{2} \times 4$ b) $\frac{1}{3}$ of $\frac{4}{5}$ c) $\frac{5}{7} \div 3$

d) $\frac{2}{9} \div 12$ e) $\frac{7}{8}$ of $\frac{9}{11}$ f) $\frac{2}{5} \div 8$

2. Solve the following.

a) $\frac{2}{5} \times 4$ b) $\frac{6}{6} \times \frac{6}{5}$ c) $\frac{10}{7} \times \frac{1}{9} \times \frac{3}{4}$

d) $2\frac{4}{8} \times 1\frac{6}{7} \times 9\frac{1}{8}$ e) $\frac{2}{9} \times 8$ f) $\frac{11}{36} \times 4\frac{1}{36}$

g) $2\frac{6}{5} \times 6\frac{6}{5}$ h) $\frac{27}{45} \times \frac{1}{9} \times 8$

3. Divide the following.

a) $\frac{10}{5}$ by 5 b) $\frac{3}{8}$ by 6 c) $1\frac{8}{9}$ by 24 d) $3\frac{7}{11}$ by 14

e) $\frac{1}{5}$ by 6 f) $\frac{4}{3}$ by 16 g) $5\frac{6}{9}$ by 18 h) $3\frac{5}{4}$ by 17

4. Adeela bought 6 packets of dates for Ramadan. If the mass of one packet is $\frac{1}{2}$ kg, find the total mass of dates she bought.
5. There are 136 trees in a garden. If half of them are palm trees, how many trees are not palm trees?
6. Haadia wants to divide $3\frac{1}{4}$ metres of ribbon equally into 3 pieces. What will be the length of each piece?
7. Mahad ran 3 rounds of a jogging track in the morning and covered a total distance of $4\frac{2}{3}$ km. What is the length of the jogging track?
8. If the mass of 4 bags of rice is $3\frac{1}{3}$ kg, find the mass of each bag.

I have learnt

- A fraction shows equal parts of a whole. It is made up of two numbers separated by the line.
- Two or more fractions with same denominator are called like fractions.
- Two or more fractions with different denominator are called unlike fractions.
- The fractions with the numerator 1 are called unit fractions.

- When a fraction is written as a combination of a whole number and a proper fraction, it is called a mixed fraction or mixed number.
- Fractions are divided by changing the sign of division (÷) into multiplication (×) and taking the reciprocal of divisors (whole numbers or fractions).
- Reciprocal of a fraction is obtained by inverting the numerator and denominator of a fraction.

Review Exercise

1. Choose the correct option.

a) A fraction with numerator _______ is called a unit fraction.

i) 1 ii) 10 iii) 100 iv) 1000

b) Like fractions have same __________.

i) numerator ii) denominator

iii) product iv) sum

c) Reciprocal of 4 is ______________.

i) $\frac{4}{1}$ ii) $4 \div 1$ iii) $\frac{1}{4}$ iv) 4×1

d) Reciprocal of $\frac{3}{5}$ is __________.

i) $\frac{5}{3}$ ii) $\frac{1}{3}$ iii) $\frac{1}{5}$ iv) $\frac{5}{1}$

e) $4\frac{1}{2}$ is a ______________ fraction.

i) proper ii) unit iii) mixed iv) like

2. Tick (✓) the like fractions.

a) $\frac{7}{6}, \frac{3}{6}, \frac{5}{6}$ b) $\frac{1}{3}, \frac{1}{4}, \frac{1}{5}$ c) $\frac{2}{8}, \frac{3}{8}, \frac{7}{8}$

3. Compare the following fractions by using the symbol > or <.

a) $\frac{7}{2} \square \frac{5}{8}$ b) $\frac{4}{9} \square \frac{8}{3}$ c) $\frac{1}{7} \square \frac{11}{21}$ d) $\frac{9}{10} \square \frac{7}{5}$

4. Write the following fractions in ascending and descending order.

a) $\frac{3}{5}, \frac{6}{5}, \frac{7}{10}, \frac{1}{20}$ b) $\frac{1}{6}, \frac{2}{3}, \frac{5}{2}, \frac{7}{12}$

c) $\frac{1}{4}, \frac{3}{8}, \frac{7}{2}, \frac{3}{4}$ d) $\frac{1}{5}, \frac{2}{15}, \frac{5}{3}, \frac{4}{5}$

5. Tick (✓) the unit fractions and circle the mixed fractions.

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

6. Convert the given improper fractions into mixed fractions.

a) $\frac{14}{5}$ b) $\frac{9}{4}$ c) $\frac{22}{10}$ d) $\frac{10}{9}$

7. Convert the given mixed fractions into improper fractions.

a) $4\frac{2}{6}$ b) $5\frac{9}{10}$ c) $6\frac{6}{7}$ d) $3\frac{4}{5}$

8. Reduce the following into their simplest form.

a) $\frac{34}{12}$ b) $\frac{44}{11}$ c) $\frac{28}{14}$ d) $\frac{18}{16}$

9. Add the following.

a) $\frac{2}{4}$ and $\frac{5}{8}$ b) $\frac{2}{9}$ and $\frac{3}{7}$

10. Subtract the following.

a) $\frac{3}{2} - \frac{1}{4}$ b) $\frac{6}{7} - \frac{3}{5}$

11. Find the product of the following fractions and write in simplest form.

a) $\frac{3}{5} \times \frac{1}{5}$ b) $3 \times 4\frac{6}{20} \times \frac{9}{15}$

c) $12 \times \frac{1}{2} \times \frac{1}{15} \times 8$ d) $3 \times \frac{3}{8} \times 1\frac{3}{13}$

12. Solve the following.

a) $\frac{9}{4} \div 3$ b) $\frac{1}{3} \div 12$ c) $\frac{2}{7} \div \frac{1}{7}$ d) $\frac{1}{10} \div \frac{4}{20}$

e) $2\frac{1}{4} \div 1\frac{3}{9}$ f) $5\frac{1}{6} \div 2\frac{4}{5}$ g) $4\frac{6}{24} \div 6$ h) $9\frac{3}{5} \div 10$

13. Rs 1656 is distributed among Saafi, Taaji and Adeela. If Saafi, Taaji and Adeela get $\frac{1}{6}$, $\frac{1}{4}$ and $\frac{7}{12}$ of the total amount respectively, find out how much each child gets.

14. Haadia has 36 m of cloth. If $\frac{1}{6}$ of the cloth is required to stitch a shirt and $\frac{1}{12}$ of the cloth is required to stitch a scarf, find out how much cloth is required to stitch 4 shirts and 3 scarfs.

15. If $\frac{3}{4}$ of the pages of a book are divided into 3 parts equally, find the fraction of pages in each part.

Approved by National Curriculum Council,
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قومی ترانہ

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تُو نِشانِ عزمِ عالی شان ارضِ پاکستان!
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