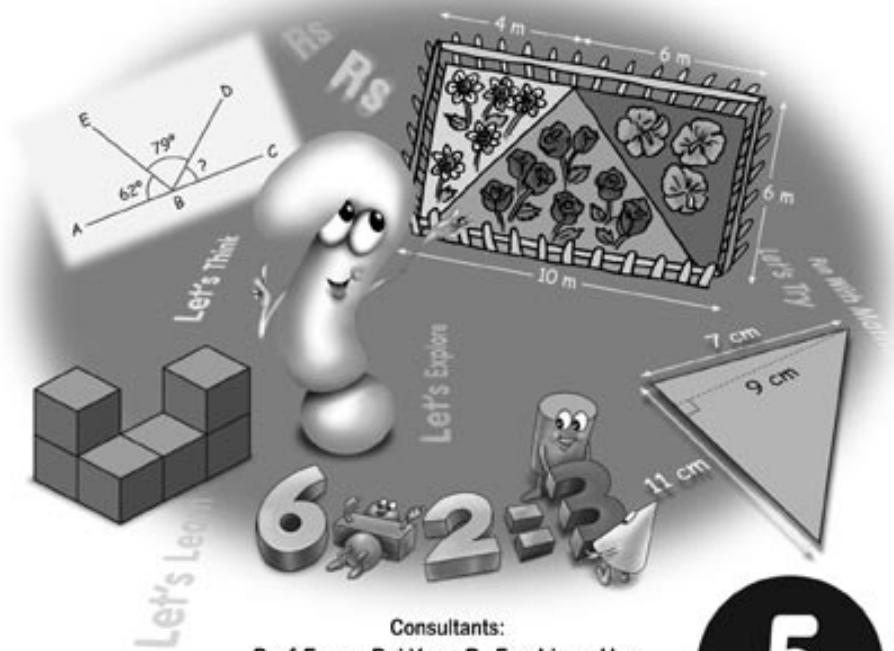


New Syllabus

Primary Mathematics

TEACHING GUIDE



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Preface

The New Syllabus Primary Mathematics (NSPM) series is designed and written based on the latest primary mathematics syllabus. In this series, the concrete to abstract approach has been used to introduce new concepts. The knowledge base is built incrementally as pupils progress up the levels so as to consolidate the linkages between mathematical concepts.

The Teaching Guides have been developed to provide effective support to teachers following the series. The key features of the Teaching Guides are mentioned below.

1. Learning Outcomes

A set of learning outcomes is listed at the beginning of the each topic. At the end of a particular topic, the teacher should be able to evaluate whether or not the outcomes have been achieved. The revision sections in the workbooks will prove very helpful in assessing students' understanding of key concepts.

2. Instructions

Mathematics is often considered difficult and challenging, mainly as a result of the teaching approach used. Teachers should make sure that they are dynamic in their approach to teaching mathematics. Only if teachers are enthusiastic and dynamic will they be able to inspire their pupils to put in their best efforts, work hard, and learn successfully.

Keeping these aspects in mind, step-by-step guidance is provided to help teachers deliver mathematical concepts in a student-friendly manner. Varied activities have been included in the guides to help generate enthusiasm and enjoyment in the classroom, thereby making mathematics interesting. Group work or pair work has been encouraged to enhance learning and understanding of concepts.

An average timing is suggested to cover each topic in class, thereby helping teachers to plan and vary their lessons accordingly. The teachers can adjust this duration as per their requirements. With careful planning, sufficient time can be allocated to the more important concepts of mathematics, while introducing new and interesting ideas will make the class more lively.

Teachers should try to create an atmosphere in the class that is conducive to learning. This can be achieved physically by ensuring that the classroom is colourful, exciting, attractive, and full of interesting objects that help pupils to link mathematics with daily life. For example, a table should be set up in the classroom displaying different items such as shapes, number cards, 3-D figures, etc. that aid teaching. Similarly, on a psychological level, teachers should ensure that the pupils do not feel fearful or intimidated in class. The atmosphere should be peaceful and relaxed to accomplish effective learning.

3. Answers

The guides contain answers to all the questions and activities in the textbook and workbooks.

4. Additional activities

Extra activities have been included in the guides to reinforce and assess the children's understanding of the concepts taught. These can be done individually or in groups depending upon the strength of the class and the resources available.

Unit 1: Whole Numbers

Learning Outcomes

Pupils should be able to:

- read and write numbers beyond 100 000 in numerals and in words
- identify the place values of the digits of numbers beyond 100 000
- compare and order numbers beyond 100 000
- round off numbers to the nearest thousand
- use the approximation symbol (\approx)
- identify prime and composite numbers
- find prime factors of numbers
- visualize and calculate highest common factor
- visualize and calculate least common multiple

NUMBERS BEYOND 100 000

Suggested Duration

2 periods (80 min)

Instructions

Let's Learn...

1. Recall counting in tens up to one hundred (verbal activity)
e.g. ten, twenty, thirty,..., hundred (ascending order)
e.g. hundred, ninety, eighty,..., ten (descending order)
Write down the counting in numerals, i.e.
10, 20, 30, 40,..., 100
2. Prepare number discs in tens by cutting pieces of paper of equal size and write the value of 10 on each piece.
Represent the value of this counting by number discs, e.g.
30, 40, 50 (show below each number, the correct pieces of number discs)
We can also count in hundreds, thousands, ten thousands, hundred thousands, and so on.
Show examples of verbal counting and writing in numerals:
e.g. ten thousands, twenty thousands, thirty thousands,...
10 000, 20 000, 30 000,...
Show samples of these countings by number discs, e.g.

200 000 (show 2 discs of 100 000 each)

3. e.g. This is a 7-digit number 2 542 045

Each digit occupies a place value as shown below:

| millions | hundred thousands | ten thousands | thousands | hundreds | tens | ones |
|----------|----------------------|------------------|-----------|----------|------|------|
| 2 | 5 | 4 | 2 | 0 | 4 | 5 |

Begin from the left,

The digit 2 stands for 2 millions (2 000 000)

The digit 5 stands for 5 hundred thousands (500 000)

The digit 4 stands for 4 ten thousands (40 000)

The digit 2 stands for 2 thousands (2000)

The digit 0 stands for 0 hundreds

The digit 4 stands for 4 tens (40)

The digit 5 stands for 5 ones (5)

So the number is two million, five hundred and forty-two thousand and forty-five.

Although, there are repeated digits, e.g. 2, 4 and 5, the same digit has different value because of the place value it occupies.

Let's Explore (20 min)

Ask the pupils to try the activity on page 7 of the Student's Book.

Let's Try...

Ask the pupils to try the exercises on pages 8–9 of the Student's Book.

Homework

Ask the pupils to do NSPM Workbook 5A—Worksheet 1.

Answers



pages 8–9

- (a) 756 000 (b) 417 938 (c) 2308 543 (c) 6 972 805 (e) 10 000 000
- (a) four hundred and five thousand, four hundred and sixty-one
(b) seven hundred and thirty-one thousand, eight hundred and twenty-nine
(c) nine hundred and nine thousand, nine hundred
(d) three million, sixty-two thousand and forty-five
(e) four million, two hundred and twenty-three thousand, seven hundred and seventy eight
(f) nine million four hundred and eight-thousand

3. (a) 645 328 (b) 700 000 (c) 40 000 (d) 1 000 000

4. 4, 10, 0, 1000, 50 000, 700 000, 3 000 000

WORK **S**heet 1

1. 2, 4, 3, 2, 7, 5, 2, 43 275

two hundred and forty-three thousand, two hundred and seventy-five

2. 2, 4, 3, 3, 2, 6, 5, 2 433 265

two million, four hundred and thirty-three thousand, two hundred and sixty-five

3. (a) 700 000 (b) 60 000 (c) 6000 (d) 2 000 000

(e) 300 000 (f) 70 000 (g) 7 000 000 (h) 600 000

4. (a) 634 000 (b) 504 020 (c) 252 781

(d) 1 063 000 (e) 3 100 970 (f) 8 341 563

5. (a) fifty-four thousand

(b) one hundred and seven thousand

(c) one hundred and sixty-three thousand

(d) two hundred and forty thousand

(e) one million and eighty thousand

(f) five million, seven hundred and ninety-two thousand

6. (a) three hundred and fifteen thousand, six hundred and twenty-four

(b) six hundred and four thousand, one hundred and forty seven

(c) eight million, two hundred and twenty-five thousand, five hundred and thirty-three

(d) one million, one hundred and fifty-six thousand, seven hundred and thirty-two

(e) six million, seven hundred and eight thousand, eight hundred and forty-five

(f) nine million seven hundred and sixty-five thousand, four hundred and thirty-two

7. (a) 3 000 000, hundred thousand, 8000, 6, 500, ones

(b) 400 000 (c) 600 (d) 8 000 000

8. (a) 0, 60, 700, 2000, 10 000, 500 000, 4 000 000

(b) 3, 0, 400, 1000, 50 000, 700 000, 3 000 000

COMPARING NUMBERS

Suggested Duration

2 periods (80 min)

Instructions

Let's Learn...

Use simple examples to draw the students attention to basic features for comparing numbers.

(a) Numbers with different number of digits:

e.g. 132 and 79 The number with more digits is the greater number.

(b) Number with the same number of digits:

e.g. 840 and 576

Look at the digit in the highest place value, i.e. hundreds.

8 is greater than 5, i.e. 8 hundreds is greater than 5 hundreds.

So, 840 is greater than 576.

e.g. 2105 and 2304

Start with the digits in the highest place value, i.e. the thousands, the digits are the same.

Then, look at the digits in the next place value on the right, i.e. the hundreds, 1 is smaller than 3.

So, 2105 is smaller than 2304.

From these simple examples, extend the procedures to larger numbers.

Comparing numbers having different number of digits is an obvious matter,

e.g. a 5-digit number is greater than a 4-digit number.

When comparing numbers with the same number of digits, then there is a procedure to follow:

- Begin with the largest place value, compare the digits. The biggest digit forms the biggest number.
- If the digits are the same, go from left to right of the place value until the digit is not the same.

The same procedure is used for comparing more than 2 numbers.

Let's Try...

1. Ask the pupils to try the exercises on page 11 of the Student's Book.
2. Circle the smaller number, ask the students to indicate the digits (by arrows) that determine the size.
3. Indicate the digits used to compare the size of the number by arrows.

To make the comparison easier, the numbers are written one below the other, e.g.

1 374 255

1 372 688

1 505 377

A common error made by the students involving comparisons is to look at the size of the first digit without noting the number of digits in each number.

Homework

Ask pupils to do NSPM Workbook 5A—Worksheet 2.

Answers



page 11

- (a) $>$ (b) $<$ (c) $>$ (d) $<$
- (a) 635 425 (b) 1 505 377 (c) 576 325

WORK **Sheet** 2

- (a) 3 092 563 is smaller than 4 873 405
(b) 6 347 305 is greater than 6 086 643
- (a) $>$ (b) $>$ (c) $<$ (d) $<$ (e) $<$
(f) $<$ (g) $>$ (h) $>$ (i) $<$ (j) $<$
- (a) 895 304 (b) 703 386 (c) 590 310 (d) 3 725 603
- (a) 1 045 378 (b) 345 067 (c) 1 345 875 (d) 4 743 287
- (a) 915 236, 825 037, 705 305
(b) 438 707, 315 078, 302 875
(c) 435 737, 430 023, 297 305
(d) 5 566 340, 4 155 376, 1 735 407
(e) 7 700 350, 7 635 057, 7 603 308

APPROXIMATION

Suggested Duration

2 periods (80 min)

Instructions

Let's Learn...

Review the rule for rounding off a number to the nearest ten and the nearest hundred.

e.g. Round off 1853 to the nearest ten.

1853



look at the digit i.e. place value 'ones'

4 or smaller, round down

5 or above, round up

So 1853 \approx 1850 (rounded to the nearest ten)

e.g. Round off 1853 to the nearest hundred.

1853



look at the digit i.e. place value 'tens'

5 or above, round up

So $1853 \approx 1900$ (rounded to the nearest hundred)

Proceed to rounding off a number to the nearest thousand.

e.g. Round off 1853 to the thousand.

1853



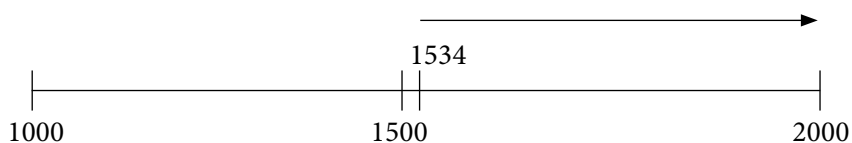
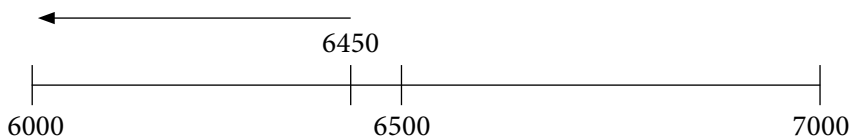
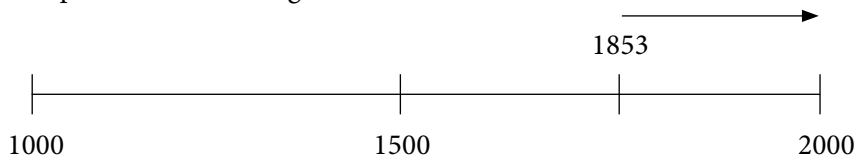
look at the digit i.e. place value 'hundred'

8 is greater than 5, round up

So $1853 \approx 2000$ (rounded to the nearest thousand)

Discuss with the students, with these 3 examples of rounding off, which approximation is closest to 1853 and which approximation is furthest from 1853.

The process of rounding off can be illustrated on a number line as shown.



Let's Think (20 min)

Ask the students these questions:

- What is the smallest 3-digit number that can be rounded to the nearest thousand to become 1000? (answer: 500)
- What is the largest 3-digit number that can be rounded to the nearest thousand to become 1000? (answer: 999)

- (c) What is the largest 4-digit number when rounded to the nearest thousand becomes 1000? (answer: 1499)
- (d) What is the smallest 4-digit number when rounded to the nearest thousand becomes 4000? (answer: 3500)

Let's Try...

Ask the pupils to try the exercises on page 16 of the Student's Book.

Homework

Ask pupils to do NSPM Workbook 5A—Worksheet 3.

Answers



page 16

1. (a) 42 000 (b) 273 000 (c) 1 807 000
2. Rs 658 000 3. 52 000

WORK **Sheet** 3

1. (a) 1000 (b) 5000 (c) 9000 (d) 14 000
2. (a) 1000 (b) 3000 (c) 6000 (d) 115 000 (e) 733 000
- (f) 990 000 (g) 3 158 000 (h) 4 235 000 (i) 3 433 000
3. Rs 3000 4. 40 000 km 5. 384 000 km 6. 6 277 000

PRIME NUMBERS

Suggested Duration:

3 periods (120 min)

Instructions

Let's Learn

Identifying Prime and Composite Numbers

Things needed: checked sheets of paper with squares of 1 cm by 1 cm for each student

- Write the number 6 on the board.
- Ask the students to draw rectangles using 6 squares on the paper.
- Explore different ways of making the rectangle. Repeat for 10, 12, 14, 15, etc...
- Now ask them to make a rectangle using 7 squares. Repeat for 3, 5, 11, etc...
- Point out the difference in the first case and the second case. Explain that there is only one way to make a rectangle using 3, 5, 7 or 11 blocks. Such numbers are known as prime

numbers. Explain that the numbers that can be arranged in different ways are called composite numbers.

6. Point out to the pupils that 1 is neither a prime number nor a composite number.

Identifying Prime Numbers between 1 to 100

1. Draw a grid of 10 by 10 numbered 1–100 on the board.
2. Ask the children to circle the number 2 and cross out all the multiples of 2.
3. Similarly circle the numbers 3, 5 and 7 and cross out their multiples.
4. Circle the remaining numbers.
5. Point out that these numbers are not the multiples of any numbers except 1 and themselves. These are called prime numbers and the crossed out ones are composite numbers since they are multiples of more than two numbers.
6. Discuss why the number 1 was not circled nor crossed out.
7. Discuss the following questions:
 - a. Are all odd numbers prime numbers?
 - b. Are all even numbers composite numbers?
8. Explain that this method of separating the prime numbers is called the *sieve of Eratosthenes*.

Special notes to teachers:

While crossing out the multiples draw the attention of the students at the patterns formed. E.g. when crossing out the multiples of 2, the column with numbers that have even numbers in the units are being crossed out. Similarly for 5 and 10.

Factors and Prime Factors

Things you need: six cards of 6 x 4 dimensions (1 purple, 2 red, 1 blue, 1 orange and 1 yellow)

1. Hold up a purple card and ask which primary colours are used to make purple?
2. Hold up red and blue cards. Tape them on the board $P = R + B$.
3. Similarly, hold up the orange card and ask for its primary colours.
4. Show them the red and yellow cards. Tape them on the board $O = R + Y$.
5. By showing the colours in the primary state will help us compare the two colours purple and orange.
6. Discuss which colour is common.
7. Discuss how many colours have been used.
8. Define factors as things that contribute in making of a substance.
9. Write 6 on the board and ask which prime number is it made of? $6 = 2 \times 3$, similarly, give the e.g. $15 = 3 \times 5$, $14 = 2 \times 7$, $21 = 3 \times 7$, $22 = 2 \times 11$ and so on.
10. Ask the students to compare the prime factors of two or more numbers. Which are common? How many prime factors are used and so on.

Special notes to teachers:

At this stage give only the example of those numbers that have different prime factors.
Do not give the e.g. $12 = 2 \times 2 \times 3 \dots$ the factors are repeating.

Let's Try...

Ask the pupils to try the exercises on page 21 of the Student's Book.

Homework

Ask pupils to do NSPM Workbook 5A—Worksheet 4.

Answers



page 21

- 53, 57, 59, 61, 67, 71, 73, 79
- (a) $48 = 2 \times 2 \times 2 \times 2 \times 3$ (b) $52 = 2 \times 2 \times 13$
(c) $36 = 2 \times 2 \times 3 \times 3$ (d) $84 = 2 \times 2 \times 3 \times 7$
(e) $66 = 2 \times 3 \times 11$ (f) $32 = 2 \times 2 \times 2 \times 2 \times 2$
(g) $50 = 2 \times 5 \times 5$ (h) $27 = 3 \times 3 \times 3$

WORK **Sheet** 4

- Prime numbers: 3, 11, 29, 31, 13, 71, 43, 101, 123, 153
Composite numbers: 12, 18, 15, 25, 42, 27, 58, 39, 51, 63, 49, 32, 21, 111, 117, 236, 115, 141, 220, 256, 237, 310, 415, 261, 381, 291
- (a) $2 \times 2 \times 3 \times 3 \times 3 = 108$
(b) $2 \times 2 \times 3 \times 3 \times 3 \times 5 = 540$
(c) $2 \times 3 \times 5 \times 11 = 330$
(d) $2 \times 2 \times 2 \times 3 \times 3 \times 3 \times 3 = 648$

HIGHEST COMMON FACTOR

Suggested duration:

1 period (40 min)

Instructions**Let's Learn**

Things you need: cards with prime numbers written on it (at least three per child)

- Shuffle the cards and distribute them so that each child gets at least three.
- Ask the students to compare the factors they have with their partners.
- How many common ones they have to multiply to find the highest common factor.

- Similarly they can compare their factors with neighbouring students and find the common factors and then multiply them to find the highest common factor.
- Steps 1–4 can be repeated about two to three times.

LEAST COMMON MULTIPLE

Suggested duration

1 period (40 min)

Instructions

Let's Learn

Things you need: cards with prime numbers written on it (at least three per child)

- Shuffle the cards and distribute them so that each child gets at least three.
- Ask the students to compare the factors they have with their partners.
- Write down how many common ones they have? Which ones are not the common and then multiply all of them to get the least common multiple.
- Similarly they can compare their factors with neighbouring students and find the common factors and uncommon ones, then multiply them to find the least common multiple.
- Steps 1–4 can be repeated about two to three times.

Let's Try...

Ask the pupils to try the exercises on page 26 of the Student's Book.

Homework

Ask pupils to do NSPM Workbook 5A—Worksheet 5 and Practice 1.

Answers



page 26

- (a) 12 (b) 48 (c) 8 (d) 6 (e) 15 (f) 11
- (a) 84 (b) 1080 (c) 90 (d) 5250 (e) 2100 (f) 392

WORK **Sheet** 5

- (a) 6 (b) 12 (c) 25 (d) 14 (e) 35 (f) 24
- (a) 144 (b) 180 (c) 4725 (d) 4620 (e) 6804 (f) 8316
- (b) HCF: 21; LCM: 1050
 (c) HCF: 22; LCM: 6930
 (d) HCF: 3; LCM: 1050
 (e) HCF: 105; LCM: 1050

(f) HCF: 21; LCM: 1260

Practice 1

1. (a) 436 381 (b) 6 511 237
2. (a) 503 925 (b) 25 504 (c) 2 631 980
(d) 9 020 576 (e) 4 002 705 (f) 5 250 040
3. (a) 1, 20, 500, 3000, 70 000, 400 000, 6 000 000
(b) 5, 30, 400, 7000, 90 000, 600 000, 3 000 000
4. (a) three hundred and seventy-two thousand, three hundred and sixty-one
(b) four million, one hundred and forty-eight thousand, five hundred and twenty-three
(c) East Timor
(d) Iceland
5. (a) 830 075, 825 607, 732 543
(b) 605 307, 605 239, 436 034
(c) 1 795 201, 1 740 395, 1 603 396
(d) 4 650 258, 4 649 950, 3 925 570
(e) 3 753 466, 893 397, 839 453
6. A: Rs 435 000 B: Rs 374 000
C: Rs 326 000 D: Rs 399 000
E: Rs 425 000 F: Rs 376 000
7. (a) 600 000, 900, 10
(b) 5000, 300 000, 600, 2 000 000
(c) 300, 8, 4 000 000
8. (a) 140 (b) 96
9. (a) 12 (b) 4
10. (a) $3 \times 3 \times 3 \times 7 = 198$
(b) $2 \times 5 \times 7 \times 7 = 490$
11. 41, 67, 2, 11, 19, 17

Fun with Maths

Ask the pupils to try the activity on page 27 of the Student's Book.

Unit 2: Four Operations

Learning Outcomes

Pupils should be able to:

- multiply numbers by tens **without using calculators**
- multiply numbers by hundreds **without using calculators**
- multiply numbers by thousands **without using calculators**
- divide numbers by tens, hundreds and thousands **without using calculators**
- estimate answers in calculations
- check the reasonableness of answers
- solve word problems involving the 4 operations
- manipulate combined operation involving the 4 operations

MULTIPLICATION

Suggested Duration

3 periods (120 min)

Instructions

Let's Learn...

Multiplying a whole number by tens

The process of multiplying a given number by another number can be visualized by using number discs as shown in the example, $52 \times 10 = 520$.

Ask students to find similar problems by induction,

e.g. $73 \times 10 = ?$ $146 \times 10 = ?$ $2085 \times 10 = ?$

By induction, the product of a whole number by 10 is adding a zero as the last digit of the number.

Expand the process to multiply a whole number by multiple of ten as shown in the example.

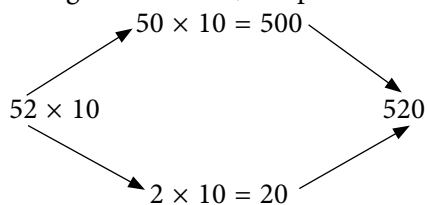
The whole process may be done in a traditional method to get the product directly, i.e.

$$\begin{array}{r} 84 \\ \times 30 \\ \hline 2520 \end{array}$$

Ask the students to complete the following products by induction:

$$\begin{array}{ll}
 1 \times 10 = 10 & 10 \times 10 = 100 \\
 2 \times 10 = ? & 20 \times 10 = ? \\
 3 \times 10 = ? & 30 \times 10 = ? \\
 \dots\dots & \dots\dots \\
 9 \times 10 = ? & 90 \times 10 = ?
 \end{array}$$

Using these results, the product of 52×10 can be done by using number bond:



Multiplying a whole number by hundreds

Showing the process of multiplying 52×100 by number discs (as shown in the Example), ask the students to complete the following products:

$$\begin{array}{ll}
 1 \times 100 = 100 & 10 \times 100 = 1000 \\
 2 \times 100 = ? & 20 \times 100 = ? \\
 3 \times 100 = ? & 30 \times 100 = ? \\
 \dots\dots & \dots\dots \\
 9 \times 100 = ? & 90 \times 100 = ?
 \end{array}$$

Use these results and show the product of 52×100 using the number bond as shown in the earlier example.

Begin with multiplying by 100 and see the product enlarged with 2 zeros as the last digits, i.e. the product is 100 times the original number.

Expand the process to multiply a whole number by multiples of hundred as shown in the example.

Show the traditional method of getting the product directly, i.e.

$$\begin{array}{r}
 67 \\
 \times 500 \\
 \hline
 33\ 500
 \end{array}$$

Multiplying a whole number by thousands

Use the number discs to show the product 52×1000 as shown in the example.

Ask the students complete the following products:

$$1 \times 1000 = 1000 \quad 10 \times 1000 = 10\,000$$

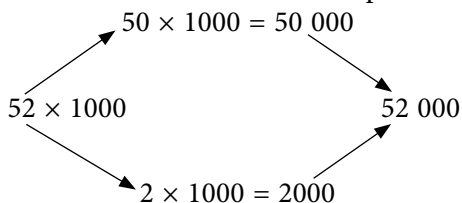
$$2 \times 1000 = ? \quad 20 \times 1000 = ?$$

.....

.....

$$9 \times 1000 = ? \quad 90 \times 1000 = ?$$

Use these results to show the product 52×1000 using number bond:



Begin with multiplying by 1000, the product is enlarged a thousand times, i.e. with 3 zeros as the last digit.

Expand the process to multiply a whole number by multiple of thousand as shown in the example.

Show the traditional method of getting the product directly:

$$\begin{array}{r} 45 \\ \times 3000 \\ \hline 13500 \end{array}$$

Let's Try...

Ask the pupils to try the exercises on page 32 of the Student's Book.

1. The student should be able to write the product directly by determining the number of zeros to be added as last digits.
2. Student can either express the multiplier as a product of a multiple and 10 or 100 or 1000 and perform the multiplication or work out the product directly in the traditional method.

May be it is relevant to remind the students about the commutative property of multiplication.

Example: we can find the product 10×743 directly, because $10 \times 743 = 743 \times 10 = 7430$.

Homework

Ask pupils to do NSPM Workbook 5A—Worksheet 6.

Answers



page 32

1. (a) 7430 (b) 102 000 (c) 100 000
(d) 97 000 (e) 713 000 (f) 315 000
2. (a) 27 000 (b) 28 800 (c) 13 300
(d) 1 996 000 (e) 255 000 (f) 3 297 000

WORK *Sheet* 6

1. (a) 1210 (b) 1730 (c) 403 500 (d) 6500
(e) 20 400 (f) 3 116 000 (g) 37 000 (h) 462 000
2. (a) 720 (b) 47 200 (c) 1 505 700 (d) 7200
(e) 303 000 (f) 516 500 (g) 116 000 (h) 94 200
(i) 8 804 000 (j) 6 057 000 (k) 2 805 000 (l) 7 861 000
3. (a) 100 (b) 10 (c) 100 (d) 1000
(e) 1000 (f) 100 (g) 10

DIVISION

Suggested Duration

3 periods (120 min)

Instructions

Let's Learn...

Dividing a whole number by tens

Use the number discs to show the division of 3200 by 10 as given in the example.

Ask the students to complete the following quotients:

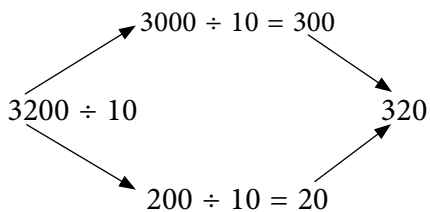
$$10 \div 10 = 1 \quad 100 \div 10 = 10 \quad 1000 \div 10 = 100$$

$$20 \div 10 = ? \quad 200 \div 10 = ? \quad 2000 \div 10 = ?$$

.....

$$90 \div 10 = ? \quad 900 \div 10 = ? \quad 9000 \div 10 = ?$$

Use these results, show the result of $3200 \div 10$ by number bond:



With the use of number discs, the process of division by 10 can be shown place value to place value. The quotient will be one place value less than the given number. However, as the quotient is to be a whole number, the dividend should be a multiple of ten, otherwise, the quotient may end in decimal.

When dividing by multiple of ten, the divisor is transformed into product of the multiple as 10. The process of division will be carried out twice as shown in the example.

The process of division may be carried out directly in vertical form,

e.g.

$$\begin{array}{r} 80 \\ 80 \overline{) 6400} \\ \underline{640} \\ 0 \\ \underline{0} \\ 0 \end{array}$$

Dividing a whole number by hundreds

Begin with using the number discs as shown in the example to show the division of 3200 by 100.

Ask the students to complete the following quotients:

$100 \div 100 = 1 \qquad 1000 \div 100 = 10$

$200 \div 100 = ? \qquad 2000 \div 100 = ?$

.....

$900 \div 100 = ? \qquad 9000 \div 100 = ?$

Use these results to obtain the quotient of $3200 \div 100$ using number bond as shown earlier.

Extend to dividing a number by the multiples of 100 as shown in the given examples.

Dividing a whole number by thousands

Begin with using the number discs to show division by 1000 as shown in the example.

Ask the students to complete the following quotients:

$1000 \div 1000 = 1 \qquad 10\,000 \div 1000 = 10$

$2000 \div 1000 = ? \qquad 20\,000 \div 1000 = ?$

.....

$9000 \div 1000 = ? \qquad 90\,000 \div 1000 = ?$

Use these results to show $32\,000 \div 1000$ by number bond as shown in the earlier example. Extend to dividing a number by the multiples of 1000 as given in the examples.

Let's Try...

1. Ask the pupils to try the exercises on page 36 of the Student's Book.
2. The process of division can be done mentally. Let the students explore some alternative way of finding the quotient, e.g.

$$\begin{array}{r} 2600 \div 100 \\ = \underline{2600} = 26 \\ 100 \end{array}$$

3. Let the students explore some alternative way of finding the quotient, e.g.

$$\begin{aligned} \text{(c)} \quad & 18\,000 \div 6000 \\ & = 18\,000 \div 6000 \\ & = 18 \div 6 = 3 \end{aligned}$$

Homework

Ask pupils to do NSPM Workbook 5A—Worksheet 7.

Answers



page 36

1. (a) 65 (b) 810 (c) 26 (d) 524 (e) 108 (f) 6350
2. (a) 1120 (b) 70 (c) 2 (d) 501 (e) 80 (f) 5000

WORK **Sheet** 7

1. (a) 3 (b) 45 (c) 17 (d) 4
 (e) 63 (f) 81 (g) 8 (h) 37
2. (a) 4 (b) 12 (c) 46 (d) 3 (e) 9 (f) 13
 (g) 8 (h) 6 (i) 24 (j) 80 (k) 240 (l) 130

ESTIMATION

Suggested Duration

3 periods (120 min)

Instructions

Let's Learn...

For estimation, the students can round off a large number to the nearest thousand and a small number to the nearest ten. After rounding off the operation may be performed

mentally. Compare the estimated value with the exact value. If they are close, then the calculated answer is reasonable.

Let's Think

$38\,299 \approx 38\,000$ (round off to the nearest thousand)

But $45\,627 - 7328 \approx 46\,000 - 7000$
 $= 39\,000$

The estimated value is much larger than 38 000.

In the estimated case, the rounding off of the 2 numbers made the difference greater.

Example 6 shows that it is not necessary to round off a large number to the nearest thousand, e.g. we can round off 1732 to 1600. The quotient from the rounded number will be closer to the exact value.

$$1732 \div 42 \approx 41$$

$$2000 \div 42 = 50 \text{ (rounded to the thousand and ten)}$$

$$1600 \div 40 = 40 \text{ (1732 rounded to 1600)}$$

40 is closer to 41.

Let's Try...

1. Ask the pupils to try the exercises on page 43 of the Student's Book.
2. Use the process of rounding off as suggested to estimate the answers.
3. The estimation can be done by rounding off the larger number to the nearest thousand and the smaller number to the nearest ten.

Homework

Ask pupils to do NSPM Workbook 5A—Worksheet 8.

Answers



page 43

1. (a) 6030, 6000 (b) 14 828, 15 000
2. (a) 113 689, 100 000 (b) 297 504, 300 000
3. (a) 287, 300 (b) 314, 300

WORK *Sheet* 8

1. (a) 6876, 7000 (b) 44 350 (c) 42 699 (d) 123 644
2. (a) 5887, 6000 (b) 12 455 (c) 2538 (d) 6729
3. (a) 49 500, 40 000 (b) 49 660 (c) 218 544 (d) 185 652
4. (a) 89, 100 (b) 72 (c) 78 (d) 131

WORD PROBLEMS

Suggested Duration

2 periods (80 min)

Instructions

Let's Learn...

Stress on the importance of drawing a model to represent the problem with the relevant data.

From the model, the type of operation needed to determine the required answers can be rationalized as shown in examples 1–4 .

For a similar problem, like example 5, a trial and error method may be used.

In example 6, determining the proper steps is essential to solve the problem, such as

Step 1: The amount collected from children ticket sales.

Step 2: The amount collected from adult ticket sales.

Step 3: Finding the number of adults at the concert.

Let's Try...

Ask the pupils to try the exercises on page 50 of the Student's Book.

Let the students draw models where applicable and determine the types of operations involved.

Homework

Ask pupils to do NSPM Workbook 5A—Worksheet 9.

Answers



page 50

1. (a) Rs 6591 (b) Rs 5201 (c) Rs 16 700

2. 198

3. Sunday or Monday 4. 405 computers

WORK **Sheet** 9

1. Rs 8280 2. 2030 kg 3. Rs 40 4. 4500

5. Rs 650 6. 250 km 7. 80 h 8. 4

ORDER OF OPERATIONS

Suggested Duration

3 periods (120 min)

Instructions

Let's Learn...

Highlight the rules on order of operation:

- (a) Involving only addition and subtraction
- (b) Involving only multiplication and division
- (c) Involving the 4 operations
- (d) Involving the 4 operations with brackets

Let's Explore

Guide the students to spot the errors and give a reason in each case.

Let's Try...

Ask the pupils to try the exercises on page 57 of the Student's Book. 1 and 2. Follow the rule from left to right.

Q3. Multiplication and division before + and -

Q4. Do the operation in the brackets first, then the other rules follow.

Homework

Ask pupils to do NSPM Workbook 5A—Worksheet 10 and Practice 2.

Answers



page 57

- 1. (a) 32 (b) 7 (c) 77 (d) 41 (e) 247 (f) 484
- 2. (a) 105 (b) 3 (c) 16 (d) 77 (e) 108 (f) 42
- 3. (a) 26 (b) 19 (c) 33 (d) 77 (e) 63 (f) 134
- 4. (a) 15 (b) 8 (c) 88 (d) 1 (e) 231 (f) 11

WORK **Sheet** 10

- 1. (a) 53 (b) 20 (c) 138 (d) 53 (e) 172 (f) 88
 (g) 168 (h) 3 (i) 36 (j) 80 (k) 108 (l) 60
- 2. (a) 29 (b) 55 (c) 58 (d) 67 (e) 17 (f) 65
 (g) 150 (h) 17 (i) 7 (j) 24 (k) 21 (l) 86
 (m) 108 (n) 6480 (o) 120 (p) 15

Practice 2

- (a) 550 (b) 16 700 (c) 31 000 (d) 690 (e) 9000 (f) 52 000
- (a) 73 (b) 86 (c) 87 (d) 9 (e) 7 (f) 8
- (a) $46\,525 \approx 47\,000$ (b) $16\,429 \approx 16\,000$
 (c) $146\,510 \approx 147\,000$ (d) $77\,315 \approx 77\,000$
 (e) $1806 \approx 2000$ (f) $1933 \approx 2000$
-

| Number | Are the last three digits zero or a multiple of 8? | Is the number divisible by 8? |
|---------|--|-------------------------------|
| 113 92 | 992 | yes |
| 544 000 | 000 | yes |
| 312 316 | no | no |
| 452 115 | no | no |
| 987 664 | 664 | yes |
| 231 000 | 000 | yes |
| 921 188 | no | no |
| 721 600 | 600 | yes |
| 500 040 | 40 | yes |
| 413 668 | no | no |

5.

| Divisibility Test for 4 | | |
|-------------------------|--|-------------------------------|
| Number | Are the last two digits zero or a multiple of 4? | Is the number divisible by 4? |
| 52 348 | 48 | yes |
| 36 456 | 56 | yes |
| 79 300 | 00 | yes |
| 55 512 | 12 | yes |
| 90 006 | 6 | no |
| 953 211 | 11 | no |

| Divisibility Test for 25 | | |
|--------------------------|---|--------------------------------|
| Number | Are the last two digits zero or a multiple of 25? | Is the number divisible by 25? |
| 67 750 | 50 | yes |
| 21 980 | 80 | no |

| | | |
|--------|----|-----|
| 67 000 | 00 | yes |
| 53 775 | 75 | yes |
| 96 745 | 45 | no |
| 12 005 | 5 | no |

6. (a) 10 611 (b) 4059 (c) 10 063 (d) 168
7. Rs 400 8. 840
9. Rs 2125 10. 3
11. (a) 108 (b) 45 (c) 864 (d) 4 (e) 35 (f) 86
 (g) 27 (h) 144 (i) 171 (j) 142 (k) 92 (l) 115
 (m) 56 (n) 54 (o) 42 (p) 240

Fun with Maths

Ask the pupils to try the activity on page 58 of the Student's Book.



Revision 1 (Workbook 5A)

1. (a) 281 788 (b) 600 031 (c) 4 400 302 (d) 8 008 018 (e) 5 235 679
2. (a) 200 000 (b) 3 070 083 (c) 100 000, 900
(d) 730 402 (e) 6 000 000 (f) 300 000
3. (a) 1000 (b) 2000 (c) 527 000
(d) 1 000 000 (e) 3 457 000 (f) 4 010 000
4. (a) 8 (b) 4
5. (a) 1440 (b) 200
6. (a) 2800 (b) 201 000 (c) 7200
(d) 51 000 (e) 76 800 (f) 8 515 000
7. (a) 46 (b) 38 (c) 40 (d) 90 (e) 35 (f) 15
8. (a) 18 (b) 177 (c) 27 (d) 216 (e) 55 (f) 198
9. (a) 680 (b) 170 10. Rs 150
11. (a) 62 924 (b) 105 128 (c) 123 232 (d) 50 781
12. (a) 52 364, 52 000 (b) 167 505, 168 000 (c) 234 232, 234 000
(d) 4530, 5000 (e) 1961, 2000 (f) 2130, 2000
13. Rs 165 000
14. (a) Flat B (b) Rs 2700
15. (a) City A (b) 420 155



Revision 2 (Workbook 5A)

1. (a) one hundred seven thousand and one
(b) eight hundred, ninety thousand and twenty-eight
(c) six million, eight hundred and ten thousand, five hundred and forty-three
(d) nine million, nine hundred thousand, nine hundred and ninety
(e) five million, three hundred and sixty-seven thousand, four hundred and eight
2. (a) 7, 30, 200, 5000, 40 000, 100 000, 8 000 000
(b) 9, 600, 4000, 50 000, 300 000, 1 000 000
3. (a) 1000 (b) 65 000 (c) 829 000 (d) 1 000 000
4. (a) thousands (b) hundred thousands (c) 2, 2 000 000 (d) 90 000
5. (a) 168 (b) 378 6. (a) 15 (b) 12
7. (a) 3670 (b) 10 500 (c) 372 300
(d) 1 534 500 (e) 1 359 000 (f) 5 124 000
8. (a) 183 (b) 146 (c) 174 (d) 122
9. (a) 180 (b) 21 (c) 10 (d) 600
10. (a) 161 092 (b) 350 658 (c) 34 136 (d) 480 494
11. (a) 178, 20, 4000, $4000 \div 20$, 200, 178, 200 (b) 210
12. (a) Aral (b) Huron
(c) Victoria, Huron, Michigan, Aral, Tanganyika
13. 7000 km, 7000 km, 6000 km, 6000 km, 6000 km, 6000 km, 5000 km
14. Rs 52 15. Rs 70
16. Saturday or Wednesday
17. (a) 8 (b) 7

Unit 3: Fractions

Learning Outcomes

Pupils should be able to:

- add proper fractions without using calculators
- subtract proper fractions without using calculators
- add mixed numbers without using calculators
- subtract mixed numbers without using calculators
- add mixed numbers
- subtract mixed numbers
- multiply two proper fractions without using calculators
- multiply an improper fraction and a proper/improper fraction
- multiply a mixed number and a whole number
- associate fractions with division
- convert between fractions and decimals
- divide a proper fractions by a whole number without using calculators
- solve word problems involving the four operations

Do you Know?

Determine the operation involved in the story. Highlight that it also involves division of fraction which will be dealt with later in this chapter.

ADDITION AND SUBTRACTION OF PROPER FRACTIONS

Suggested Duration

2 periods (80 min)

Instructions

Let's Learn...

Recall the addition of like fractions. Show some examples. The fractions can be added directly.

Extend to unlike proper fractions where the denominator of one fraction is a multiple of the other denominator, e.g. $\frac{3}{10} + \frac{2}{5}$. Show the process of addition.

Similar examples to be introduced for subtraction, e.g. $\frac{6}{7} - \frac{2}{7}$, $\frac{7}{8} - \frac{1}{4}$.

In adding unlike proper fractions, the given fraction must be expressed as like fraction by using idea of equivalent fractions. The like fraction can then be added directly by adding the numeration as shown in the example.

Similarly, the same process is used in subtracting unlike fractions as shown in the example.

Now that the pupils have studied LCM, encourage them to add and subtract fractions by taking the LCM of the denominators of the fractions, as shown in the examples.

Let's Try...

Ask the pupils to try the exercises on page 64 of the Student's Book.

Let the students convert the unlike fraction into like fraction using idea of equivalent fractions or the LCM method for Question 2.

In Question 1, the answer can be read out directly from the picture.

Homework

Ask pupils to do NSPM Workbook 5A—Worksheet 11.

Answers



page 64

1. (a) $\frac{11}{12}$ (b) $\frac{1}{10}$
2. (a) $1\frac{3}{20}$ (b) $1\frac{3}{10}$ (c) $\frac{1}{12}$ (d) $\frac{4}{15}$

WORK **Sheet** 11

1. (a) $\frac{11}{12}$ (b) $\frac{14}{15}$ (c) $1\frac{7}{12}$ (d) $\frac{7}{15}$ (e) $\frac{13}{18}$ (f) $1\frac{9}{20}$
2. (a) $\frac{1}{10}$ (b) $\frac{7}{12}$ (c) $\frac{11}{21}$ (d) $\frac{1}{24}$ (e) $\frac{9}{20}$ (f) $\frac{17}{36}$

ADDITION AND SUBTRACTION INVOLVING MIXED NUMBERS

Suggested Duration

2 periods (80 min)

Instructions

Let's Learn...

Recall the idea of mixed number, e.g. $1\frac{1}{2}$ with pictures of circle and half circle.

Recall the process of adding and subtracting mixed numbers.

Always ask the question in each case: 'Are the fractions like or unlike fractions?' or 'Do the fractions have the same denominator?'

Let's Try...

Ask the pupils to try the exercises on page 68 of the Student's Book.

Homework

Ask pupils to do NSPM Workbook 5A—Worksheet 12.

Answers



page 68

1. (a) $1\frac{5}{24}$ (b) $1\frac{11}{12}$ (c) $6\frac{18}{35}$ (d) $8\frac{11}{18}$

2. (a) $\frac{3}{20}$ (b) $1\frac{19}{45}$ (c) $5\frac{37}{40}$ (d) $3\frac{1}{21}$

WORK **Sheet** 12

1. (a) $\frac{37}{42}$ (b) $1\frac{27}{40}$ (c) $2\frac{5}{18}$ (d) $2\frac{11}{56}$ (e) $20\frac{1}{2}$

(f) $14\frac{1}{48}$ (g) $9\frac{1}{18}$ (h) $6\frac{3}{14}$ (i) $16\frac{31}{40}$ (j) $12\frac{7}{60}$

2. (a) $\frac{19}{30}$ (b) $\frac{38}{63}$ (c) $2\frac{3}{7}$ (d) $1\frac{7}{9}$ (e) $2\frac{4}{15}$

(f) $5\frac{29}{30}$ (g) $3\frac{6}{7}$ (h) $1\frac{2}{3}$ (i) $2\frac{77}{90}$ (j) $3\frac{9}{70}$

MULTIPLICATION OF PROPER FRACTIONS

Suggested Duration

3 periods (120 min)

Instructions

Let's Learn...

Relate the pictorial result of $\frac{1}{2}$ of $\frac{1}{2}$ to $\frac{1}{2} \times \frac{1}{2}$

When multiplying 2 fractions, we multiply the numerators and also multiply the denominator as shown in

$$\frac{1}{2} \times \frac{1}{2} \text{ and } \frac{1}{2} \times \frac{1}{4}$$

Point out in these 3 examples, the numerator of both fractions are 1, the resulting product will be in the simplest form.

Let's Explore

Let the student determine from the picture, the value of $\frac{1}{3}$ of $\frac{3}{4}$, expressed as a fraction.

Check the answer by multiplication, i.e. $\frac{1}{3} \times \frac{3}{4} = \frac{1 \times 3}{3 \times 4} = \frac{3}{12} = \frac{1}{4}$

When the numerator of the fractions are not 1, the resulting product may need to be reduced to its simplest form, e.g.

$$\frac{2}{3} \times \frac{3}{4} = \frac{2 \times 3}{3 \times 4} = \frac{6}{12} = \frac{1}{2}$$

Let's Try...

Ask the pupils to try the exercises on page 74 of the Student's Book.

Let the students determine the product of 2 proper fractions in a pictorial manner.

Determine the answers by using the rule,

$$\text{product of 2 fraction} = \frac{\text{product of numerator}}{\text{product of denominators}}$$

Remind the students the need to reduce some of the products to their simplest form.

Homework

Ask pupils to do NSPM Workbook 5A—Worksheet 13.

Answers



page 74

1. $\frac{1}{4}$ 2. (a) $\frac{1}{4}$ (b) $\frac{1}{3}$ (c) $\frac{9}{14}$ (d) $\frac{3}{20}$

WORK **Sheet** 13

1. (a) $\frac{1}{18}$ (b) $\frac{1}{70}$ (c) $\frac{1}{24}$ (d) $\frac{1}{77}$ (e) $\frac{7}{10}$ (f) $\frac{5}{8}$
 (g) $\frac{1}{2}$ (h) $\frac{3}{8}$ (i) $\frac{5}{9}$ (j) $\frac{1}{4}$ (k) $\frac{1}{3}$ (l) $\frac{3}{22}$

MULTIPLICATION OF IMPROPER FRACTIONS

Suggested Duration

2 periods (80 min)

Instructions

Let's Learn...

Show examples of improper fractions, i. e. a fraction whose numerator is greater than the denominators, i.e a fraction whose value is greater than 1, which also can be written as a mixed number.

Begin with multiplication of a proper fraction and an improper fraction in pictorial form.

Extend the rule of product of 2 proper fraction to include improper fraction, i.e

$$\text{Product of a proper fraction and an improper fraction} = \frac{\text{product of numerator}}{\text{product of denominators}}$$

Let's Try...

Ask the pupils to try the exercises on page 77 of the Student's Book.

Homework

Ask pupils to do NSPM Workbook 5A—Worksheet 14.

Answers



page 77

1. (a) $1\frac{7}{8}$ (b) $1\frac{7}{8}$ (c) $2\frac{14}{15}$ (d) $8\frac{3}{4}$ (e) $2\frac{3}{13}$ (f) $\frac{17}{80}$

WORK **Sheet** 14

1. (a) $\frac{5}{8}$ (b) $1\frac{1}{6}$ (c) $\frac{5}{18}$ (d) $1\frac{1}{5}$
2. (a) $1\frac{1}{2}$ (b) $6\frac{1}{2}$ (c) $\frac{1}{10}$ (d) $2\frac{1}{12}$ (e) $\frac{50}{63}$
(f) $\frac{1}{4}$ (g) $\frac{6}{11}$ (h) $1\frac{11}{21}$

MULTIPLICATION OF A MIXED NUMBER AND A WHOLE NUMBER

Suggested Duration

3 periods (120 min)

Instructions

Let's Learn...

The product of 5 of $1\frac{2}{3}$ can be found pictorially as shown. By making 3 parts as one, the total will be $8\frac{1}{3}$.

This product can be done by calculation also in 3 steps as explained.

Explain to the students that multiplication by a whole number is equivalent to repeated addition as shown by the pictorial method.

Highlight that when multiplying an improper fraction by a whole number, we multiply the numerator by the whole number.

Let's Try...

Ask the pupils to try the exercises on page 81 of the Student's Book.

Homework

Ask pupils to do NSPM Workbook 5A—Worksheet 15.

Answers



page 81

1. (a) $5\frac{1}{3}$ (b) $8\frac{1}{2}$
2. (a) $23\frac{1}{3}$ (b) $23\frac{1}{2}$ (c) $13\frac{1}{2}$ (d) 47 (e) $154\frac{1}{2}$ (f) 554

WORK **Sheet** 15

1. (a) 5 (b) $3\frac{1}{2}$ (c) 10 (d) $11\frac{1}{4}$
2. (a) $43\frac{1}{2}$ (b) 88 (c) 80 (d) $41\frac{1}{7}$
(e) 154 (f) $120\frac{3}{5}$ (g) $78\frac{2}{5}$ (h) $90\frac{4}{11}$

FRACTION AS DIVISION

Suggested Duration

3 periods (120 min)

Instructions

Let's Learn...

Begin with pictorial example of a whole number divided by another whole number resulting in a fractional quotient.

E.g. $1 \div 2 = \frac{1}{2}$, i.e. $\frac{1}{2} = 1 \div 2 \rightarrow$ a fraction is the same as the numerator divided by the denominator.

E.g. $2 \div 3 = \frac{2}{3}$, i.e. $\frac{3}{3} = 2 \div 3$

E.g. $\frac{3}{4} = 3 \div 4$

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

Since a fraction can be interpreted as the numerator divided by the denominator, any fraction can thus be expressed as a decimal.

A proper fraction will be a decimal less than 1. An improper fraction will be a decimal more than 1.

The number of places of decimal will depend on the divisibility of the numerator by the denominator.

E.g. a proper fraction with denominator 10 will have only 1 decimal place.

On the other hand, any decimal can be expressed as a fraction (proper or improper).

Give examples of decimals (less than 1) with 1 decimal place, 2 decimal place and 3 decimal place.

Show the process of conversion to fractions in the simplest form. Give similar examples of decimal (greater than 1). Show the process of conversion to improper fractions (mixed numbers) in the simple form.

e.g. $6.25 = \frac{625}{100} = \frac{25}{4} = 6\frac{1}{4}$

Let's Try...

Ask the pupils to try the exercises on page 86 of the Student's Book.

Division of whole numbers can be expressed as a fraction in its simplest form.

A fraction can be expressed as a decimal by division.

A decimal can be converted to fraction by process of division.

Homework

Ask pupils to do NSPM Workbook 5A—Worksheet 16.

Answers



page 86

- (a) $\frac{1}{2}$ (b) $\frac{1}{3}$ (c) $\frac{1}{4}$ (d) $\frac{1}{5}$ (e) $\frac{1}{3}$
 (f) $\frac{3}{4}$ (g) $\frac{4}{5}$ (h) $\frac{5}{6}$ (i) $\frac{3}{5}$
- (a) 0.6 (b) 0.625 (c) 1.2 (d) 0.46 (e) 1.625 (f) 1.2
- (a) $\frac{2}{5}$ (b) $\frac{4}{5}$ (c) $1\frac{2}{5}$ (d) $\frac{11}{50}$ (e) $\frac{37}{50}$
 (f) $1\frac{3}{50}$ (g) $5\frac{3}{5}$ (h) $7\frac{9}{10}$ (i) $12\frac{4}{5}$

WORK **Sheet** 16

- (a) $\frac{4}{6} = \frac{2}{3}$ (b) $5 \div 3, \frac{5}{3} = 1\frac{2}{3}$
- (a) $\frac{3}{7}$ (b) $\frac{5}{8}$ (c) $\frac{3}{5}$ (d) $\frac{7}{11}$
 (e) $\frac{4}{9}$ (f) $\frac{5}{6}$ (g) $2\frac{4}{5}$ (h) $1\frac{2}{7}$
- (a) 0.8 (b) 0.75 (c) 0.7 (d) 0.65 (e) 0.94 (f) 0.73
- (a) 1.6 (b) 2.5 (c) 2.75 (d) 3.35 (e) 1.26 (f) 2.37
- (a) $\frac{73}{100}$ (b) $\frac{41}{50}$ (c) $\frac{137}{1000}$ (d) $\frac{87}{200}$ (e) $1\frac{7}{25}$ (f) $1\frac{3}{8}$

DIVISION OF A FRACTION BY A WHOLE NUMBER

Suggested Duration

3 periods (120 min)

Instructions

Let's Learn...

Begin with pictorial interpretation of a fraction divided by a whole number to get the result (quotient in fractional form), e.g.

$\frac{3}{4}$ of a pizza divided equally by 3 is $\frac{1}{4}$ of the original pizza.

This will lead to $\frac{3}{4} \div 3 = \frac{3}{4} \times \frac{1}{3} = \frac{1}{4}$

With other examples, this will lead to division of a fraction by a whole number is same as multiplication of the fraction by the reciprocal of the whole number.

Show how the numerator and denominator can be reduced by a common factor before multiplication as shown in the example. Other examples.

$$\frac{4}{5} \div 10 = \frac{4}{5} \times \frac{1}{10}$$

$$= \frac{2 \times 1}{5 \times 5} = \frac{2}{25}$$

Let's Explore

From this activity, the students can draw conclusion about the relationship of

$$\frac{1}{2} \div 3 \text{ and } \frac{1}{3} \div 2$$

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

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

so $\frac{1}{2} \times \frac{1}{3} = \frac{1}{3} \times \frac{1}{2} = \frac{1}{6}$

The relationship of $\frac{1}{2} \div 3$ and $\frac{1}{3} \div 2$ can also be explained by the commutative property of Multiplication, e.g.

$$\frac{1}{2} \times \frac{1}{3} = \frac{1}{3} \times \frac{1}{2} \text{ (commutative property)}$$

$$\begin{array}{ccc} \downarrow & & \downarrow \\ \frac{1}{2} \div 3 & = & \frac{1}{3} \div 2 \end{array}$$

Let's Try...

Ask the pupils to try the exercises on page 90 of the Student's Book.

Let the students try to divide a fraction by a whole number in pictorial form and by multiplication of the reciprocal of the whole number.

Homework

Ask pupils to do NSPM Workbook 5A—Worksheet 17.

Answers



page 90

1. $\frac{1}{8}$

2. (a) $\frac{3}{25}$ (b) $\frac{5}{66}$ (c) $\frac{7}{240}$ (d) $\frac{1}{12}$ (e) $\frac{1}{35}$ (f) $\frac{1}{108}$

WORK *Sheet* 17

1. (a) $\frac{1}{5} \times \frac{1}{4} = \frac{1}{20}$

(b) $\frac{3}{4} \times \frac{1}{3} = \frac{3}{12} = \frac{1}{4}$

(c) $\frac{2}{3} \times \frac{1}{4} = \frac{2}{12} = \frac{1}{6}$

(d) $\frac{4}{7} \times \frac{1}{8} = \frac{4}{56} = \frac{1}{14}$

2. (a) $\frac{1}{12}$

(b) $\frac{1}{8}$

(c) $\frac{1}{24}$

(d) $\frac{1}{35}$

(e) $\frac{1}{90}$

(f) $\frac{1}{132}$

3. (a) $\frac{2}{15}$

(b) $\frac{3}{28}$

(c) $\frac{2}{15}$

(d) $\frac{5}{48}$

(e) $\frac{7}{90}$

(f) $\frac{5}{96}$

4. (a) $\frac{1}{16}$

(b) $\frac{1}{21}$

(c) $\frac{1}{24}$

(d) $\frac{1}{54}$

(e) $\frac{1}{30}$

(f) $\frac{1}{108}$

WORD PROBLEMS

Suggested Duration

2 periods (80 min)

Instructions

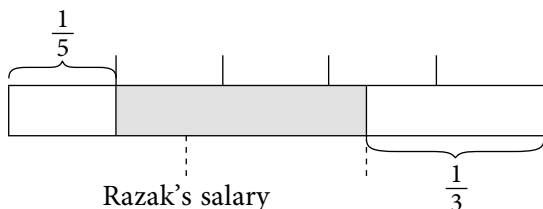
Let's Learn...

It is helpful and relevant to draw a model representing the problem. From the model, the problem can be solved using 2 or 3 steps as shown in the examples.

Let's Try...

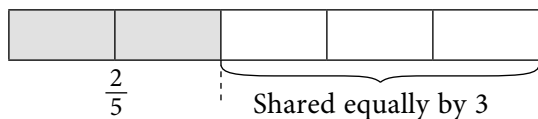
Ask the pupils to try the exercises on page 96 of the Student's Book.

1. A model that can represent this problem.



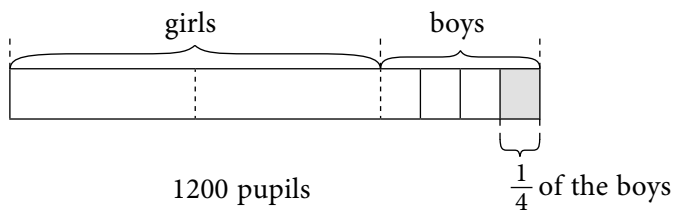
The shaded part is the money left for other expenditures.

2. The model



From the model, the rest of 3 children will share equally included the youngest child.

3. The model



Homework

Ask pupils to do NSPM Workbook 5A—Worksheet 18 and Practice 3.

Answers



page 96

1. Rs 2800 2. Rs 100 3. 100 4. Rs 1700

WORK **Sheet** 18

1. Rs 600
 2. Rs 5000
 3. $9\frac{3}{8}$ kg 4. 16 5. 225 6. 39 7. 120 8. Rs 92 250

P Practice 3

1. (a) $\frac{14}{15}$ (b) $1\frac{13}{35}$ (c) $\frac{19}{24}$ (d) $1\frac{11}{18}$
 (e) $\frac{5}{24}$ (f) $\frac{3}{28}$ (g) $\frac{1}{15}$ (h) $\frac{11}{24}$
2. (a) $1\frac{27}{56}$ (b) $1\frac{17}{24}$ (c) $2\frac{19}{36}$ (d) $4\frac{9}{35}$ (e) $1\frac{17}{42}$ (f) $8\frac{1}{70}$
 (g) $7\frac{29}{55}$ (h) $8\frac{19}{24}$ (i) $\frac{13}{35}$ (j) $\frac{3}{4}$ (k) $3\frac{3}{5}$ (l) $2\frac{11}{30}$
 (m) $\frac{13}{24}$ (n) $6\frac{7}{10}$ (o) $2\frac{4}{9}$ (p) $2\frac{2}{9}$
3. (a) $\frac{4}{15}$ (b) $\frac{1}{8}$ (c) $\frac{2}{11}$ (d) $\frac{1}{8}$ (e) $2\frac{1}{4}$

4. (a) $1\frac{1}{3}$ (b) $1\frac{3}{5}$ (c) $\frac{4}{5}$ (d) $\frac{3}{7}$ (e) $1\frac{3}{7}$ (f) $1\frac{1}{3}$
5. (a) 0.3 (b) 0.6 (c) 0.14 (d) 0.45
6. (a) $\frac{1}{21}$ (b) $\frac{1}{12}$ (c) $\frac{2}{25}$ (d) $\frac{1}{24}$ (e) $\frac{2}{33}$ (f) $\frac{7}{20}$
7. (a) $31\frac{1}{2}$ (b) $39\frac{2}{3}$ (c) 82 (d) $129\frac{1}{4}$
- (e) $1\frac{1}{16}$ (f) $1\frac{2}{5}$ (g) $2\frac{7}{22}$ (h) 9
8. $\frac{3}{10}$ 9. $\frac{2}{15}$ 10. Rs 270 11. 4

Fun with Maths

The pattern of the answers is increasing by $\frac{1}{2}$.

A quicker way of finding the sum is to pair off 2 fractions where sum is 1, e.g.

$$\frac{1}{8} + \frac{2}{8} + \frac{3}{8} + \frac{4}{8} + \frac{5}{8} + \frac{6}{8} + \frac{7}{8} + \frac{8}{8}$$

$$\begin{aligned} \text{The sum} &= 1 + 1 + 1 + \frac{4}{8} + \frac{8}{8} \\ &= 3 + \frac{1}{2} + 1 = 4\frac{1}{2} \end{aligned}$$

Unit 4: Ratio

Learning Outcomes

Pupils should be able to:

- interpret $a : b$ and $a : b : c$ where a , b and c are whole numbers
- write equivalent ratios
- express a ratio in its simplest form
- find the ratio of two or three given quantities
- find the missing term in a pair of equivalent ratios
- find one quantity given the other quantity and their ratio
- solve up to 2-step word problems involving ratio

Do you Know?

Let the students explore ways of comparing the number of two quantities of related objects by using comparatives like ‘how many more’, ‘how many less’, e.g. the number of pears is 6 more than lemons.

RATIO

Suggested Duration

3 periods (120 min)

Instructions

Let's Learn...

Begin with daily use of the language in comparing the quantities of two related objects, e.g. number of lemons and pears.

The use of words like ‘...more’, ‘...less’, ‘...fewer’, ‘...equal’, ‘twice’, ‘half’, etc. give an idea of comparison of 2 quantities.

In mathematics, a more direct method of comparison is using ratio ‘ : ’. From the ratio, you can tell which is more and which is less. However, the ratio may not give the actual number of the objects involved.

From the ratio of 2 sets of objects, lead the students to compare ratio involving 3 sets of objects, like the number of lemons, pears and apples in example 2.

Let's Explore

At this stage, let the students find the ratio by counting and writing down the actual numbers with the ratio notation, e.g.

The number of 50-paise coins to the number of Rs 2 coins is 5 : 11.

In this activity, all the ratios are already in their simplest forms.

Let's Try...

Ask the pupils to try the exercises on page 104 of the Student's Book.

Let the students count the number of objects and write down the ratio.

Special notes to teachers:

At this stage, the ratio is limited to comparing the number of objects. So there is no conversion needed to the units involved, unlike the ratio of lengths of 2 sticks (one in cm and the other in m).

Homework

Ask pupils to do NSPM Workbook 5A—Worksheet 19.

Answers



page 104

1. (a) 4 : 3 (b) 3 : 4
2. (a) 3 : 5 (b) 7 : 5 (c) 7 : 8 (d) 7 : 3 : 5 (e) 1 : 5

WORK *Sheet* 19

1. (a) 4 : 5 (b) 5 : 7 (c) 4 : 7 (d) 9 : 7 (e) 12 : 4 (f) 4 : 5 : 7
2. (a) 3 : 4 (b) 4 : 5 (c) 5 : 1 (d) 3 : 4 : 5 (e) 4 : 5 : 1
3. (a) 5 : 1 (b) 2 : 3 (c) 3 : 5 (d) 5 : 4 (e) 3 : 2 : 1 (f) 5 : 4 : 2

EQUIVALENT RATIOS

Suggested Duration

2 periods (80 min)

Instructions

Let's Learn...

From the example on number of lemons and pears, the comparison can be done by grouping the fruits in twos, threes and sixes. This will lead to the ratios 6 : 12, 3 : 6, 2 : 4, 1 : 2.

This will lead to idea of equivalent ratios.

Equivalent ratios can be obtained by multiplying each number of a given ratio by the same factor.

On the other hand, if both numbers of a given ratio can be divided by a common factor, the result will be an equivalent ratio.

Let's Try...

Using equivalent ratios, a given ratio may be reduced to its simplest form.

Ask the pupils to try the exercises on page 110 of the Student's Book.

Homework

Ask pupils to do NSPM Workbook 5A—Worksheet 20.

Answers



page 110

1. (a) 2 : 5 (b) 7 : 2 (c) 1 : 2 : 3 (d) 4 : 3 : 6
2. (a) 16 (b) 3 (c) 7 (d) 4 (e) 16, 20 (f) 6, 6

WORK **Sheet** 20

1. (a) 1 : 9 (b) 5 : 8 (c) 3 : 7 (d) 6 : 5 (e) 11 : 8 (f) 1 : 2
2. (a) 1 : 3 : 3 (b) 3 : 1 : 4 (c) 2 : 5 : 1 (d) 11 : 9 : 10 (e) 6 : 4 : 3
3. (a) 12 (b) 40 (c) 6 (d) 9 (e) 7 (f) 20
4. (a) 4 (b) 10 (c) 12 (d) 2 (e) 2 (f) 6
5. (a) 3 : 5 (b) 15 : 8 (c) 6 : 15 : 8
6. 9 : 5 7. 10 : 16 : 9 8. 12 : 13 9. 5 : 8

WORD PROBLEMS

Suggested Duration

2 periods (80 min)

Instructions

Let's Learn...

Introduce a problem involving a given ratio, with one given quantity and an unknown quantity as in example 1.

Develop a model from the given ratio. Using the given information together with idea of equivalent ratio, solve the problem.

Let's Try...

Ask the pupils to try the exercises on page 114 of the Student's Book.

Let the students use the idea of equivalent ratio to find the required answer.

Use equivalent ratio to determine the common factor.

(a) found by multiplication to determine the common factor.

(b) found by addition.

Similar process as in Q 2.

Use equivalent ratio to determine the common factor. By multiplication, the number of goats and chickens can be found.

Homework

Ask pupils to do NSPM Workbook 5A—Worksheet 21 and Practice 4.

Answers



page 114

1. 20
2. (a) 10 (b) 25
3. (a) 15 (b) 40
4. goats: 14, chickens: 49

WORK *Sheet* 21

1. 10
2. 7
3. 14
4. 36
5. 3 : 5, Rs 500
6. 24



Practice 4

1. (a) 12 (b) 5 (c) 6, 12 (d) 2, 5
2. (a) 2 : 3 (b) 3 : 5 : 4
3. 4 : 5
4. 19 : 8
5. 12
6. 3 : 13 : 4

Fun with Maths

Ask the pupils to try the activity on page 115 of the Student's Book.

Unit 5: Decimals

Learning Outcomes

Pupils should be able to:

- multiply decimals up to 3 decimal places by tens, hundreds and thousands
- divide decimals up to 3 decimal places by tens, hundreds and thousands
- convert measurements from a smaller unit to a larger unit in decimal form, and vice versa
- multiply and divide decimal numbers
- round off answers to a specified degree of accuracy; to estimate answers in calculations
- solve word problems involving the four operations

Do you Know?

Operations involving decimals are often needed in our daily life, e.g. shopping. This happens because price of goods are often marked in decimals.

MULTIPLICATION

Suggested Duration

3 periods (120 min)

Instructions

Let's Learn...

Show the effect of multiplying a decimal (one decimal place to 3 decimal places) by 10. This will lead to the conclusion that the decimal point will move 1 place to the right. This means that the answer is 10 times the value of the given decimal.

Show the effect of multiplying a decimal up to 3 decimal place by 100. The answer is the same as moving the decimal point 2 places to the right, i.e. the answer is 100 times larger than the given decimals.

Similar effect is obtained by multiplying a decimal by 1000.

Show the multiplication of a decimal by a multiple of 10, 100 or 1000 in 2 steps, as shown in the example.

Step 1 : multiply the decimal by the multiple

Step 2 : multiply the resulting decimal by 10, 100 or 1000.

Special notes to teachers:

When the students are familiar with the result of multiplying a number by tens, hundreds, thousands and their multiples, it is logical to introduce the product in vertical form where the 2 steps are combined, e.g.

$$\begin{array}{r} 4.72 \\ \times 1000 \\ \hline 4720.00 \end{array}$$

Let's Try...

Ask the pupils to try the exercises on page 123 of the Student's Book.

Multiply a decimal by 10, 100 or 1000 can be done directly by moving the decimal point with the correct number of places to the right.

Carry out the multiplication in 2 steps as shown in the example.

The pupils can use the vertical form to find the product in Q.2 directly, e.g.

$$\begin{array}{r} 1.287 \\ \times 300 \\ \hline 386.100 \end{array}$$

Homework

Ask pupils to do NSPM Workbook 5A—Worksheet 22.

Answers



page 123

1. (a) 2.47 (b) 183.5 (c) 306 (d) 9.1 (e) 1307 (f) 216
 2. (a) 321.4 (b) 35.52 (c) 386.1 (d) 6595 (e) 92 (f) 22 379

WORK *Sheet* 22

1. (a) 4 (b) 0.7 (c) 3.6 (d) 0.53 (e) 20.81 (f) 783
 2. (a) 4 (b) 2 (c) 48.5 (d) 115.5 (e) 3400 (f) 33 309
 3. (a) 60 (b) 9 (c) 37 (d) 51.9 (e) 933.1 (f) 2630
 4. (a) 500 (b) 30 (c) 82 (d) 198 (e) 7780 (f) 100 400
 5. (a) 240 (b) 10 (c) 59.4 (d) 135.1 (e) 4064.8 (f) 45 180
 6. (a) 1800 (b) 180 (c) 316 (d) 2364 (e) 43 435 (f) 238 400
 7. (a) 10 (b) 100 (c) 1000 (d) 100 (e) 10 (f) 100

DIVISION

Suggested Duration

3 periods (120 min)

Instructions

Let's Learn...

Show the result of dividing a decimal by 10, 100 and 1000 and see how the decimal point is shifted, e.g.

$$0.5 \div 10 = 0.05$$

0,0,5
↑

0.05 is 10 times smaller than 0.5.

$$0.5 \div 100 = 0.005$$

0,0,0,5
↑

0.005 is 100 times smaller than 0.5.

$$0.5 \div 1000 = 0.0005$$

0,0,0,0,5
↑

0.0005 is 1000 times smaller than 0.5.

Show the result of dividing a decimal by multiples of 10, 100 and 1000 in steps as shown in the examples.

Step 1 : divide the decimal by the multiple

Step 2 : divide the resulting quotient by 10, 100 or 1000

Special notes to teachers:

When the students are familiar with the process of dividing a number by ten, hundred and thousand, division by their multiple can be shown in the following manner.

$$\frac{43.4}{700} = \frac{43.4}{7 \times 100}$$

$$= \frac{6.2}{100}$$

$$= 0.062$$

$$\begin{array}{r} 6.2 \\ 7 \overline{) 43.4} \\ \underline{42} \\ 14 \\ \underline{14} \\ 0 \end{array}$$

Let's Explore

The students have to carry out the multiplication or division of a decimal by multiples of 10 and multiples of 100.

Let's Try...

Ask the pupils to try the exercises on page 129 of the Student's Book.

Divide a decimal by 10, 100 or 1000 can be done directly by moving the decimal point to the correct place.

Carry out the division in 2 steps as shown in the example.

The pupils can write the division in the form as shown below, e.g.

$$\begin{aligned}
 (2) \quad \frac{966.3}{600} &= \frac{966.3}{6 \times 100} \\
 &= \frac{161.05}{100} \\
 &= 1.6105
 \end{aligned}$$

$$\begin{array}{r}
 161.05 \\
 7 \overline{) 966.30} \\
 \underline{6} \\
 36 \\
 \underline{36} \\
 6 \\
 \underline{6} \\
 3 \\
 \underline{0} \\
 30 \\
 \underline{30} \\
 0
 \end{array}$$

Homework

Ask pupils to do NSPM Workbook 5A—Worksheet 23.

Answers



page 129

1. (a) 3 (b) 42.96 (c) 0.8023 (d) 0.1 (e) 9.9 (f) 0.007216
2. (a) 0.082 (b) 0.1395 (c) 0.475
- (d) 1.6105 (e) 0.00575 (f) 0.1303

WORK **Sheet** 23

1. (a) 0.4 (b) 6.6 (c) 76.8 (d) 0.05 (e) 0.308 (f) 6.85
2. (a) 0.35 (b) 0.9 (c) 8.3 (d) 0.015 (e) 0.093 (f) 0.643
3. (a) 0.06 (b) 0.93 (c) 3.21 (d) 0.008 (e) 0.093 (f) 0.338
4. (a) 0.002 (b) 0.004 (c) 2.06 (d) 1.53 (e) 0.022 (f) 0.248
5. (a) 0.002 (b) 0.051 (c) 0.083 (d) 0.194 (e) 0.747 (f) 3.628
6. (a) 0.001 (b) 0.009 (c) 0.214 (d) 0.383 (e) 0.132 (f) 0.184

CONVERSION OF MEASUREMENTS INVOLVING DECIMAL

Suggested Duration

2 periods (80 min)

Instructions

Let's Learn...

As the measurements of length, mass and volume are in decimal system, conversion from one unit of measurement to another involves either multiplication or division by 10, 100 or 1000.

As the conversions involve either multiplication or division by 10, 100 or 1000, the answer can be deduced directly by shifting the decimal points.

Let's Try...

Ask the pupils to try the exercises on page 133 of the Student's Book.

The students must know that converting from a bigger to smaller unit of measurement involves multiplication by 10, 100 or 1000. On the other hand, converting a small unit to bigger unit involves division by 10, 100 or 1000.

Homework

Ask pupils to do NSPM Workbook 5A—Worksheet 24.

Answers



page 133

1. (a) 9175 cm (b) 31.50 m (c) 0.3 km (d) 550 m
(e) 915 g (f) 4.95 kg (g) 10.32 l (h) 35 ml

WORK **Sheet** 24

1. (a) 12 350 g (b) 45 150 cm (c) 1500 m
(d) 550 ml (e) 650 g (f) 70 m
2. (a) 0.42 kg (b) 4.975 km (c) 65.05 m
(d) 0.007 kg (e) 0.036 l (f) 75.1 m

MULTIPLICATION AND DIVISION BY A DECIMAL NUMBER

Suggested Duration

3 periods (120 min)

Instructions

Let's Learn...

With the help of the examples, explain the multiplication of decimal numbers.

Ensure that the pupils understand that the number of decimal places in the product is the sum of the decimal places in the numbers being multiplied, as shown in examples 4 and 5.

Explain division of decimals. Emphasize that it is always easier to convert the divisor into a whole number, when dividing decimal numbers.

Let's Try...

Ask the pupils to try the exercises on page 139 of the Student's Book.

Homework

Ask pupils to do NSPM Workbook 5A—Worksheet 25.

Answers



page 139

1. (a) 0.35 (b) 0.48 (c) 0.81 (d) 0.063 (e) 2.835
 (f) 6.156 (g) 8.788 (h) 1.2978 (i) 3.066
2. (a) 2 (b) 4 (c) 2 (d) 6 (e) 3.9 (f) 0.29

WORK *Sheet* 25

1. (a) 0.56 (b) 0.78 (c) 3.51 (d) 6.496
 (e) 11.664 (f) 4.536 (g) 0.6468 (h) 19.593
2. (a) 9 (b) 0.9 (c) 6 (d) 73 (e) 20 (f) 50 (g) 5 (h) 114

FOUR OPERATIONS ON DECIMALS

Suggested Duration

3 periods (120 min)

Instructions

Let's Learn...

Recall the four operations and ask the pupils to implement them on decimals.

Let's Try...

Ask the pupils to try the exercises on page 143 of the Student's Book.

Let the students perform the four operations on decimals. The activities also include rounding off an answer to a specified degree of accuracy, estimating an answer and checking the reasonableness of an answer.

Homework

Ask pupils to do NSPM Workbook 5A—Worksheet 26.

Answers



page 143

- (a) $2.514 \approx 3$ (b) $19.115 \approx 19$ (c) $10.091 \approx 10$ (d) $422.678 \approx 423$
- (a) $8.731 \approx 8.7$ (b) $0.125 \approx 0.13$ (c) $5.235 \approx 5.2$ (d) $244.68 \approx 244.7$
- (a) 42.84, 60 (b) 462.57, 450 (c) 2168.67, 2170 (d) 412.5, 390
- (a) 8.91, 9 (b) 7.2, 7

WORK **Sheet** 26

- (a) 22.33, 22 (b) 70.14, 70 (c) 166.41, 166
(d) 603.9, 604 (e) 118.919, 119 (f) 215.141, 215
- (a) 23.18, 23 (b) 35.57, 36 (c) 338.78, 339
(d) 75.859, 76 (e) 126.88, 127 (f) 6.837, 7
- (a) 31, 15, $31 + 15$, 46, 46.05 (b) 70.462 (c) 19.053 (d) 13.837
- (a) 41.58, 40 (b) 70.07 (c) 760.32 (d) 2885.69
- (a) 280, 280, 7, 6.9 (b) 16.3 (c) 5.78 (d) 3.124

WORD PROBLEMS

Suggested Duration

3 periods (120 min)

Instructions

Let's Learn...

All these word problems involve operations on decimals. After reading and understanding a problem, the students must determine the required operation. A model may be used to determine the kind of operation required. Additional task may be included for checking the reasonableness of the answer by estimation.

Let's Try...

Ask the pupils to try the exercises on page 149 of the Student's Book.

Homework

Ask pupils to do NSPM Workbook 5A—Worksheet 27 and Practice 5.

Answers



page 149

1. 35 cm
2. 15 g
3. (a) Rs 878.85 (b) Rs 423.15
4. 26.8 l

WORK *Sheet* 27

1. 2.375 m
2. 81
3. Rs 4.50
4. Rs 1809.75
5. Rs 97.70, Rs 986
6. Rs 62.90

Practice 5

1. (a) 73.5 (b) 245.6 (c) 328 (d) 3948 (e) 378 (f) 384
2. (a) 17.5 l (b) 3500 g (c) 425 cm (d) 23
(e) 335 ml (f) 9.15 kg (g) 55 m (h) 0.035 km
3. (a) 15.983 (b) 6.412
4. (a) 101.22 (b) $415.242 \approx 415.24$ (c) $1.158 \approx 1.16$ (d) $6.985 \approx 6.99$
5. (a) 3551.6, 68, 50, $68 \times 50 = 3400$ (b) 6022.63
(c) 5.88, 20, 120, 120, $120 \div 20 = 6$ (d) 8.106
6. $40.2 \text{ l} \approx 40 \text{ l}$
7. 8 apples

Fun with Maths

Ask the pupils to try the activity on page 150 of the Student's Book.



Revision 3 (Workbook 5A)

- (a) 0.4 (b) 0.75 (c) 0.68 (d) 0.66 (e) 4.375 (f) 5.75
- (a) $\frac{1}{2}$ (b) $\frac{1}{4}$ (c) $1\frac{1}{13}$ (d) $\frac{7}{90}$ (e) $\frac{7}{50}$ (f) $\frac{1}{8}$
- (a) $\frac{1}{16}$ (b) $\frac{1}{21}$ (c) $\frac{1}{24}$ (d) $\frac{1}{54}$
- (a) 4 : 7 (b) 4 : 3 (c) 7 : 9
(d) 5 : 4 : 8 (e) 9 : 5 : 14 (f) 11 : 13 : 23
- $3\frac{7}{12}$ kg 6. $\frac{2}{9}$ 7. 6 8. 1 : 2 9. 2 : 1 : 3
- (a) 45 (b) 120 11 (a) 24 (b) 39
- 24
- (a) 5.12 (b) 304.9 (c) 10 070 (d) 8
- (a) 0.7 (b) 8.87 (c) 2.35 (d) 1.207
- (a) 2.4 (b) 296 (c) 39 400 (d) 5454
- (a) 0.2 (b) 0.07 (c) 0.24 (d) 0.52
- 1.98 m 18. Rs 42.50
- (a) $10.444 \approx 10$ (b) $477.63 \approx 478$ (c) $329.81 \approx 330$
(d) $2110.5 \approx 2111$ (e) $4.5 \approx 5$ (f) $1.35 \approx 1$



Revision 4 (Workbook 5A)

- (a) $7\frac{1}{4}$ (b) $4\frac{5}{9}$ (c) $8\frac{1}{12}$ (d) $5\frac{7}{10}$ (e) $7\frac{11}{18}$ (f) $9\frac{2}{21}$
- (a) $2\frac{3}{4}$ (b) $2\frac{1}{36}$ (c) $8\frac{4}{9}$ (d) $2\frac{7}{15}$ (e) $5\frac{16}{45}$ (f) $2\frac{5}{28}$
- (a) $78\frac{3}{4}$ (b) $94\frac{1}{5}$ (c) $35\frac{5}{17}$ (d) $189\frac{1}{3}$ (e) $163\frac{2}{9}$ (f) $112\frac{5}{8}$
- (a) $\frac{17}{33}$ (b) $2\frac{11}{12}$ (c) $1\frac{4}{21}$ (d) 11 (e) $5\frac{22}{25}$ (f) $1\frac{5}{7}$
- (a) 20 (b) 20 (c) 2 (d) 9 (e) 9 (f) 20, 10 (g) 5
- 18 cm 7. Rs 60 8. 16 (9. 35
- 44 11. (a) 477 (b) 1113 12. Rs 210 13. 5
- Rs 3225 15. $\frac{11}{30}$ l 16. 245 17. 1760
- (a) 161.7, 8, 20, $8 \times 20 = 160$ (b) 1991.2 (c) 6667.4 (d) 1661.52
- (a) 0.75 (b) 0.963 (c) 0.1476 (d) 0.39
- 0.8 km 21. 535 m 22. 643 g 23. 0.31 m 24. 0.425 kg
- 142 cm 26. 355 ml 27. 0.432 kg
- 0.875 l 29. 0.26 m 30. Rs 13.25

Unit 6: Percentage

Learning Outcomes

Pupils should be able to:

- express a part of a whole as a percentage
- use the percentage symbol (%)
- write fractions and decimals as percentages, and vice versa
- find a percentage part of a whole
- solve word problems up to 2 steps involving percentage

Do you know?

Percentage is a familiar experience. Pupils encounter percentage often in their daily lives. For example, they cannot avoid noticing the points of purchase in shops with discounts marked in percentage.

PERCENTAGE

Suggested Duration

3 periods (120 min)

Instructions

Let's Learn...

Introduce the concept of percentage with 100 unit squares. Refer to examples 1, 2, and 3 from the Student's Book.

The number of marked unit squares will lead to a percentage directly, like $\frac{17}{100} = 17\%$

From the 100 unit squares, ask the students to mark 10%, 25%, 50%, 75% etc.

Special notes to teachers:

Anticipate possible questions from the students, e.g. "can we have more than 100%?"
The answer is yes, but the explanation will come later.

Link the special percentages related to our daily activities, e.g. half – 50%, One-quarter – 25%, three-quarter – 75%, full attendance – 100%

Conversion from fractions to percentage:

Students may use one of the 2 methods to convert a given fraction into percentage. Use examples 4–12.

Method One:

Step 1: change the denominator of the given fraction to 100, e.g. $\frac{3}{4} = \frac{3 \times 25}{4 \times 25}$

Step 2: express the fraction with denominator 100 in the form of percentage, e.g. $\frac{75}{100} = 75\%$

Method Two: multiply the given fraction with 100% and finish the conversion in one step, e.g. $\frac{3}{4} \times 100\% = 75\%$

Special notes to teachers

Include common fractions and the related percentage.

e.g. $\frac{1}{2} = 5\%$, $\frac{2}{5} = 20\%$, $\frac{1}{4} = 25\%$, $\frac{1}{10} = 10\%$, etc.

Conversion from decimal to percentage:

Use examples 13–15.

Method One:

Step 1: change the given decimal into a fraction with denominator 100, e.g. $0.7 = \frac{7}{10} = \frac{70}{100}$

Step 2: express the fraction with denominator 100 in form of percentage, e.g. $\frac{70}{100} = 70\%$

Method Two: multiply the given decimal with 100% and finish the conversion in one step, e.g. $0.7 \times 100\% = 70\%$

Special notes to teachers

Include, at this stage, only decimals less than 1 up to 2 decimal places. For decimals with 1 decimal place, the percentage can be read directly from the fraction with the denominator 10, e.g.

$$0.1 = \frac{1}{10} = 10\%$$

$$0.7 = \frac{7}{10} = 70\% \text{ etc.}$$

Conversion from percentage to fraction

Express percentage as a fraction with denominator 100 first. Then, express the fraction in its simplest form if possible as shown in Examples 16 – 19.

Further examples: $45\% = \frac{45}{100}$ (Convert to fraction with denominator 100)

$$= \frac{9}{20} \quad \text{(Express the fraction in its simplest form)}$$

$12\% = \frac{12}{100}$ (Convert to fraction with denominator 100)

$$= \frac{3}{25} \quad \text{(Express the fraction in its simplest form)}$$

Conversion from percentage to decimal

Conversion from percentage to decimal can be done in 2 steps as shown in Examples 20–23:

Step 1: expressing in fraction with denominator 100

e.g. $45\% = \frac{45}{100}$

$$12\% = \frac{12}{100}$$

Step 2: move the decimal point 2 places to the left:

$$\text{e.g. } 45\% = \frac{45}{100} = 0.45$$

$$12\% = \frac{12}{100} = 0.12$$

Explain the conversion of fractions into percentage in word problem as shown in Examples 24–25.

Let's Explore

Ask pupils to try the activity on page 156 of the Student's Book. Allow the pupils to work in pairs.

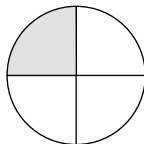
Let's Try...

Ask the pupils to try the exercises on page 157 of the Student's Book.

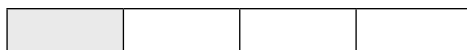
1–4. Let the students convert fractions or decimals to percentage and vice versa.

5 In pictorial representation of percentage, first express the given percentage as fraction in its simplest form. From this fraction, the students can shade the parts required, e.g.

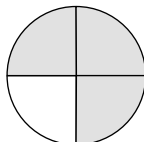
$$25\% = \frac{25}{100} = \frac{1}{4} \text{ (pictorial)}$$



$$20\% = \frac{20}{100} = \frac{1}{5} \text{ (pictorial)}$$



$$75\% = \frac{75}{100} = \frac{3}{4} \text{ (pictorial)}$$



Homework

Ask pupils to do NSPM Workbook 5A—Worksheet 28.

Answers



page 157

- (a) 17% (b) 36% (c) 98% (d) 30% (e) 60% (f) 35%
- (a) $\frac{51}{100}$ (b) $\frac{12}{25}$ (c) $\frac{19}{25}$
- (a) 50% (b) 90% (c) 64%
- (a) 0.48 (b) 0.19 (c) 0.88

WORK *Sheet* 28

2. $\frac{1}{4}$, 25% $\frac{17}{100}$, 17% $\frac{1}{20}$, 5% $\frac{99}{100}$, 99%
3. (a) 13% (b) 55% (c) 60% (d) 8%
4. (a) 75% (b) 40% (c) 40% (d) 85% (e) 4% (f) 66%
5. (a) 29% (b) 4% (c) 18% (d) 14% (e) 7% (f) 88%
6. (a) $\frac{20}{100} = \frac{1}{5}$ (b) $\frac{35}{100} = \frac{7}{20}$ (c) $\frac{48}{100} = \frac{12}{25}$
(d) $\frac{66}{100} = \frac{33}{50}$ (e) $\frac{70}{100} = \frac{7}{10}$ (f) $\frac{90}{100} = \frac{9}{10}$
7. (a) 20% (b) 15% (c) 36% (d) 88% (e) 91% (f) 1%
8. (a) 0.03 (b) 0.07 (c) 0.25 (d) 0.45 (e) 0.59 (f) 0.88

PART AND WHOLE

Suggested Duration

2 periods (80 min)

Instructions

Let's Learn...

There are 2 methods where the students can find the part of a whole given its percentage and the value of the whole.

Method 1: direct multiplication:

$$\text{Percentage of part} \times \text{whole} = \text{value of part}$$

Method 2: unitary method

$$\text{The whole is } 100\%, 1\% = \frac{\text{whole}}{100}$$

The value of the part is value of 1% multiplied by the percentage of the part.

Let's Try...

Ask the pupils to try the exercises on page 160 of the Student's Book.

Let the students use either method to find the value of the part. The unitary method may involve number which looks unrealistic, e.g.

48 marbles \rightarrow 100%

$$1\% = \frac{48}{100} \text{ marbles? (a fractional marble?)}$$

$$\begin{aligned} 25\% \text{ of marbles } &= \frac{48}{100} \times \frac{1}{4} \\ &= 12 \text{ (blue marbles)} \end{aligned}$$

Homework

Ask pupils to do NSPM Workbook 5A—Worksheet 29.

Answers



page 160

1. (a) 30 (b) 31.25 (c) 100 (d) 360 (e) 49 (f) 400
2. 12 3. 180

WORK **Sheet** 29

1. (a) 20 (b) 71 (c) 20 (d) 2 (e) 5 (f) 3
2. (a) 2 (b) 42 (c) 6 (d) 132 (e) 110 (f) 600
3. Rs 258 4. 160 5. 75 kg 6. 35

WORD PROBLEMS

Suggested Duration

2 periods (80 min)

Instructions

Let's Learn...

The word problems on percentage shown here involve discount, GST and interest. Other word problems on percentage can be set, for example, percentage of absentees, percentage increase in weight or height; percentage of adults and children, etc.

Let's Explore

Examples of some word problems:

- Find the total sale of WACK BURGERS for a year.
- Which burger has the least sale for the year?

What is its total sale for the year?

Let's Learn...

Ask the pupils to try the exercises on page 164 of the Student's Book.

Homework

Ask pupils to do NSPM Workbook 5B—Worksheet 30.

Answers



page 164

1. Rs 45 900 2. 10 3. Rs 4275 4. 95% 5. Rs 2780.93

WORK **Sheet** 30

1. 20% 2. Rs 12 750 3. 325 4. 10% 5. Rs 1284
6. Rs 15 096 7. 56% 8. 125

P Practice 6

1. (a) 35% (b) 56% (c) 11% (d) 44%
2. (a) 9% (b) 18% (c) 45% (d) 57%
 (e) 75% (f) 60% (g) 30% (h) 68%
3. (a) $\frac{9}{25}$ (b) $\frac{3}{4}$ (c) $\frac{13}{50}$ (d) $\frac{6}{25}$
4. (a) 0.39 (b) 0.43 (c) 0.57 (d) 0.53
5. 40% 6. 30% 7. 35% 8. 540 ml
9. 108 10. Rs 45 11. 387 12. Rs 51 250

Unit 7: Average

Learning Outcomes

Pupils should be able to:

- interpret average as 'total amount \div number of items'
- calculate average number / quantity
- find the total amount given the average and the number of items
- solve word problems involving average

Do you know?

Let the students think of a score that can represent the results of 4 tests. Ask them to find out the highest and lowest score. A reasonable scores that represents these scores should be lower than the highest but higher than the lowest score.

AVERAGE

Suggested Duration

3 periods (120 min)

Instructions

Let's Learn...

Begin with pictorial or actual objects where the objects can be rearranged so that each stack will have the same amount. The process is to even out the different amounts so that each stack has the same value. In this example, it is the same number of books for each stack.

Mathematically, the even-out process is the total amount, in this case the total number of books, divided by the total number of stacks (items). This leads to the definition of average.

Average = total amount / number of items

If the average and the number of items are known, then

Total amount = average \times number of items.

Special notes to teachers:

Spend about 10 min to introduce the idea of even-out process as shown in Example 1 which leads to the definition of average.

Spend another 10 min with students to work out examples 2–6.

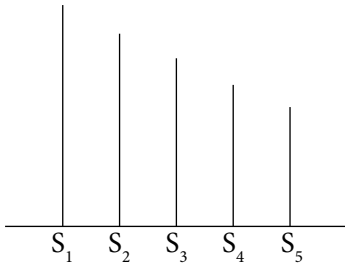
Spend 10 min to introduce the relationship between total amount, the average and the number of items using Examples 7–8.

As a sum-up for this section, show some examples where the average of a set of numbers may not belong to any of these numbers, e.g. average of 1, 5, 6

$$\text{Average} = \frac{1+5+6}{3} = \frac{12}{3} = 4$$

Let's Explore...

Suppose there are 5 members of different heights in the group. Arrange these heights in order as shown:



Average height of all members in this group

$$= \frac{S_1 + S_2 + S_3 + S_4 + S_5}{5}$$

The average height of the tallest and shortest in the group

$$= \frac{S_1 + S_5}{2}$$

Mathematically, the two values are not likely to be the same. But, they may be close.

Let's Try...

Ask the pupils to try the exercises on page 172 of the Student's Book.

Let the students find the average of sets of items, some involving pure numbers and others involving measurements. They will also have to find the total amount given, the average and the number of items.

Homework

Ask pupils to do NSPM Workbook 5B—Worksheet 31.

Answers



page 172

1. (a) 30 (b) 17.6 (c) 3.4 m (d) 40.9 kg (e) Rs 2.525
2. (a) 11.9 l (b) 1800 (c) Rs 51 000
3. 18 4. 75 cm 5. 9

WORK *Sheet* 31

- (a) 7 (b) 4 (c) 40 (d) 27.5 (e) 27 (f) 7.25
- (a) 54 kg (b) 3.5 km (c) Rs 2700 (d) 102.125
- (a) 56 h (b) Rs 9000 (c) 5.52 m
- (a) Food store C (b) Food store B
- Rs 6600 6. Rs 8910 7. 120 8. 42

WORD PROBLEMS

Suggested Duration

2 periods (80 min)

Instructions

Let's Learn...

Take 20 min to go over the steps taken to solve the problems in examples 1–2 and students should realize that given the average score of 2 tests, the total score of the 2 tests can be found; knowing the 1st test score, the 2nd test score can be found.

Let's Think

Peter is not right.

(2 boys)

(4 girls)

average height = 131.6 cm

average height = 128.3 cm

Treating these two values as height of 2 persons.

So, the average of the 2 persons = $\frac{131.6 + 128.3}{2}$

= 129.95 cm (This is the average height of a boy and a girl but not the average height of the 6 children.)

Alternatively, it can be shown that

$\frac{263.2 + 513.2}{6}$ is not equal to $\frac{131.6 + 128.3}{2}$

Average height of the children = $\frac{131.6 \times 2 + 128.3 \times 4}{6}$

However, if the 2 groups have the same number of pupils, then Peter's method is right.

If the number of boys equals the number of girls, e.g. 3

Average height of the children = $\frac{131.6 \times 3 + 128.3 \times 3}{6}$
= $\frac{131.6 + 128.3}{2}$

Give the students 10 minutes to explain why Peter's answer is not correct, followed by the teacher's explanation.

Let's Try...

Ask the pupils to try the exercises on page 176 of the Student's Book.

Q3: The students have to find the sum of heights of the whole class i.e. $1.5 \text{ m} \times 35$

Then find the sum of heights of the girls, i.e.

$$1.45 \times 20$$

With this, they can find the sum of heights of the boys. Knowing the number of boys, the average height of boys can be found.

Special notes to teachers:

Some students may think that the average height of boys is the difference between the average height of the whole class and the average height of the girls. This is incorrect and unrealistic because $1.5 \text{ m} - 1.45 \text{ m} = 0.05 \text{ m}$

Homework

Ask pupils to do NSPM Workbook 5A—Worksheet 32.

Answers



page 176

1. 93 2. Rs 523 3. 0.57 m

WORK **Sheet** 32

1. 1.6 m 2. 30 3. Rs 4.05 4. 96 5. Rs 13 416 6. Rs 54

P Practice 7

1. (a) 33.75 (b) Rs 19 (c) 35.5 l (d) 2.34 m (e) 46.8 kg
2. (a) 85 (b) 17
3. 84 4. 1.35 l 5. 2601 6. Rs 123.30

Fun with Maths

Ask pupils to try the activity on page 177 of the Student's Book.



Revision 1 (Workbook 5B)

- (a) 8% (b) 15% (c) 44% (d) 37.5%
- (a) 35% (b) 7% (c) 0.4% (d) 55.5%
- (a) Rs 2.50 (b) 18 (c) 24
- Rs 153 5. 17
- (a) $\frac{6}{100} = \frac{3}{50}$ (b) $\frac{28}{100} = \frac{7}{25}$ (c) $\frac{75}{100} = \frac{3}{4}$
(d) $\frac{90}{100} = \frac{9}{10}$ (e) $\frac{30}{100} = \frac{3}{10}$ (f) $\frac{8}{100} = \frac{2}{25}$
- Rs 3210 8. Rs 340 9. 34.8 kg 10. 90%



Revision 2 (Workbook 5B)

- (a) 5% (b) 67% (c) 90% (d) 78.5%
- (a) 40% (b) 17% (c) 85% (d) 18%
- (a) 0.35 (b) 0.3 (c) 0.08 (d) 0.855
- 64
- (a) 31.5% (b) 40% (c) $\frac{35}{100} = \frac{7}{20}$
(d) 50% (e) 30.4 (f) 2.05 (g) 1.26
- 16 7. 5 h

Unit 8: Volume

Learning Outcomes

Pupils should be able to:

- build solids with unit cubes
- draw cubes and cuboids on an isometric grid
- measure volume in cubic units
- measure volume in cubic centimetres (cm^3)/cubic metres (m^3)
- use formula to calculate the volume of a cube/cuboid
- find the volume of liquid in a rectangular tank
- convert between l, ml and cm^3
- solve word problems up to 3 steps involving the volume of a cube/cuboid

Do you know?

Water will follow the shape of the tank. Knowing the dimension of the tank will enable you to find the volume of water needed to fill it.

There are 3 dimensions involved. Length and breadth of the tank are given, the height of the water is the missing dimension.

CUBES AND CUBOIDS

Suggested Duration

2 periods (80 min)

Instructions

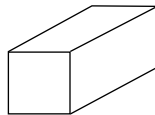
Let's Learn...

Bring a real unit cube to class and show the actual size each edge is 1 cm, each square face has side 1 cm. Use actual unit cubes to build various types of solids. Alternatively, use graphics to show various types of solids formed by unit cubes. Highlight the solids which are cubes and cuboids. Discuss the characteristics of a cube and a cuboid:

---A cube has 6 equal square faces and all its edges are equal in length;

---The opposite faces of cuboids are equal rectangles or squares

Make a cuboid with a pair of opposite sides which are squares, e.g.



Demonstrate how to draw cube/cuboids in isometric form on grid paper.

Special notes to teachers:

10 min to form solids with unit cubes—practical activity.

10 min to discuss the solid formed by unit cubes in graphical form and discuss the features of cube and cuboids.

20 min to distinguish between cubes and cuboids of objects and to draw the shapes of cubes and cuboids in isometric form.

Let's Explore**Special notes to teachers:**

10 min to identify cubes and cuboids around you

10 min to identify identical solids in different positions

20 min to design a structure using cubes

Let's Try...

Ask the pupils to try the exercises on pages 185–186 of the Student's Book.

1. Let the students identify pictures of cubes and cuboids and count the number of unit cubes used to make each solid.
2. Let the students identify identical solids made from unit cubes. Solids are identical when they have identical features but in different positions.

Homework

Ask pupils to do NSPM Workbook 5A—Worksheet 33.

Answers



pages 185–186

1. (a) C (b) F (c) A & C 2. A & F, B & D, C & E

WORK *Sheet* 33

1. (a) x (b) cuboid (c) cuboid (d) x
(e) cuboid (f) x (g) x (h) cube

VOLUME AND CUBIC UNITS

Suggested Duration

2 periods (80 min)

Instructions**Let's Learn...**

Ask the pupils to take examples of solids into the classroom. Each solid is a 3-D object. It

occupies space and has a volume. The volume of a solid is measured in cubic units, e.g. cm^3 . Let the pupils visualize the size of 1 cm^3 .

The volume of an object constructed with unit cubes can be found by counting the number of unit cubes it contains.

The other frequently-used unit of volume is the m^3 . Help pupils to visualize the size of 1 m^3 . Ask the question, 'how many times 1 cm^3 is 1 m^3 ?'

Special notes to teachers:

10 min to find the volume by counting the number of unit cubes

10 min to discuss the size of 1 cubic meter and its link to cm^3 .

Let's Try...

Let the students find the volume of each solid by counting the number of unit cubes that make up the solid on page 191 of the Student's Book.

Special notes to teachers:

Spend about 20 min on the following enrichment: Give the volume of the solid in cm^3 .

Ask the students to draw the possible shapes of the solids with unit cubes.

Homework

Ask pupils to do NSPM Workbook 5B—Worksheet 34.

Answers



page 191

1. (a) 8 cm^3 (b) 14 cm^3 (c) 28 cm^3 (d) 24 cm^3

WORK **Sheet** 34

1. (a) A–12, B–12, C–20 (b) A, B (c) 8
2. (a) $7, 7 \times 1 = 7 \text{ cm}^3$ (b) $12, 12 \times 1 = 12 \text{ cm}^3$ (c) $12, 12 \times 1 = 12 \text{ cm}^3$
(d) $15, 15 \times 1 = 15 \text{ cm}^3$ (e) $10, 10 \times 1 = 10 \text{ cm}^3$ (f) $16, 16 \times 1 = 16 \text{ cm}^3$

VOLUME OF CUBOIDS AND CUBES

Suggested Duration

3 periods (120 min)

Instructions

Let's Learn...

From solids made up of unit cubes, their volume can be found by induction, e.g. volume of cuboids = length \times breadth \times height, and volume of cube = length \times length \times length.

Hence, the volume of cuboids and cube can be found by formula.

Special notes to teachers:

10 min to induce the formula of volume of cuboid and cube

15 min to use the formula to find the volume of a cube or cuboid

Let's Explore

Special notes to teachers:

15 min to calculate the volume of objects, e.g. a book and a pencil box.

Let's Try...

Ask the pupils to try the exercises on page 195 of the Student's Book.

1. The volume of a solid made up of unit cubes can be found by counting the number of unit cubes. The dimension of the solid need not be mentioned.
- 2–3 For cuboids and cubes with given dimensions, their volumes can be found by the formula.

Special notes to teachers:

40 min to count and calculate the volume of the given solids

Homework

Ask pupils to do NSPM Workbook 5B—Worksheet 35.

Answers



page 195

1. (a) 24 cm^3 (b) 27 cm^3
2. 125 cm^3 , 112.5 cm^3 , 120 cm^3
3. 192 unit cubes

WORK **Sheet** 35

1.

| Solids | Length (cm) | Breadth (cm) | Height (cm) | Volume (cm^3) |
|--------|-------------|--------------|-------------|--------------------------|
| a | 5 | 1 | 2 | 10 |
| b | 5 | 4 | 3 | 60 |
| c | 5 | 3 | 3 | 45 |
| d | 5 | 2 | 2 | 20 |

2. (a) 18 cm^3 (b) 200 cm^3 (c) 126 cm^3 (d) 192 cm^3
(e) 240 cm^3 (f) 2295 cm^3 (g) 8250 m^3 (h) 7000 m^3

VOLUME OF LIQUID

Suggested Duration

2 periods (80 min)

Instructions

Let's Learn...

As liquid takes the shape of its container, its volume need not appear as a cube or cuboid. Moreover, the units used to measure the volume of liquids are different, e.g. millilitre (ml) and litre (ℓ). However, these units are derived from cm^3 , i.e. $1 \text{ cm}^3 = \text{ml}$ and $1 \text{ l} = 1000 \text{ cm}^3$. Show examples of converting cm^3 into ml or l and vice versa. Generally, the capacity of a tank can be expressed in cm^3 or m^3 but the liquid in it is usually measured in ml or l.

Special notes to teachers:

10 min to discuss and demonstrate the volume of 1 cm^3 and 1 ml of liquid

10 min—examples of conversion of cm^3 to ml and vice versa

20 min—to find the volume of liquid in a container in ml, cm^3 , l and m^3

Let's Try...

Ask the pupils to try the exercises on page 200 of the Student's Book.

1–2 Let the students convert from cm^3 into l or ml and vice versa.

3. Find the capacity of a container in m^3 .

4. Find the volume of liquid in a container in l.

5. To find the difference in volume, the capacity of the carton and the liquid it contains must be of the same unit. In this case 1 l has to be converted to cm^3 .

Homework

Ask pupils to do NSPM Workbook 5B—Worksheet 36.

Answers



page 200

1. (a) 3 l, 3000 ml (b) 5.575 l, 5575 ml (c) 20.025 l, 20 025 ml

2. (a) 750 cm^3 (b) 3070 cm^3 (c) 5120 cm^3

3. (a) 27 m^3 (b) 12 m^3

4. 336 l 5. 250 cm^3

WORK **Sheet** 36

1. (a) 650 cm^3 (b) 2500 cm^3 (c) 1400 ml (d) 3.75 l
(e) 8500 cm^3 (f) 350 cm^3 (g) 7.235 l (h) 320 ml

2. (a) 1.2 l (b) 1.2 l (c) 3.6 l (d) 3.6 l (e) 2.1 l (f) 10 l
 3. $704 \text{ cm}^3 = 704 \text{ ml}$ 4. 288 l

Special notes to teachers:

40 min to find and discuss the answers

WORD PROBLEMS

Suggested Duration

2 periods (80 min)

Instructions

Let's Learn...

Show examples of solving up to 3 step word problems.

Special notes to teachers:

20 min to discuss Examples 1–3

Let's Try...

Ask the pupils to try the exercises on page 204 of the Student's Book.

In Question 3, the students have to work out the total volume of the chocolate bars in ml. They have to determine the nature of operation to find the number of chocolate bars.

Homework

Ask pupils to do NSPM Workbook 5B—Worksheet 37 and Practice 8.

Answers



page 204

1. 3000 m^3 2. (a) 1920 ml (b) 1280 cm^3 3. 30 balls

WORK *Sheet* 37

1. 6 m^3 2. $2500 \text{ cm}^3 = 2.5 \text{ l}$ 3. 600 m^3 4. 1932 cm^3
 5. 1200 cm^3 6. 1800 cm^3 7. 1250 l 8. 18 l



1. 14, 14 cm^3 2. 125 cm^3 4. 324 cm^3 5. 120 l 6. 150 l 7. 1500 cm^3

Fun with Maths

Ask pupils to do the activity on page 205 of the Student's Book.

Unit 9: Angles

Learning Outcomes

Pupils should be able to:

- identify adjacent angles
- state the sum of angles on a straight line as 180°
- find unknown angles on a straight line
- state the sum of angles at a point as 360°
- find unknown angles at a point
- identify vertically opposite angles
- state the relationship between vertically opposite angles as equal
- find unknown angles using the property of vertically opposite angles

Do you Know?

Discuss with the students how angles are formed by straight lines on a plane, e.g. by drawing on the white board, drawing on paper, etc.

ADJACENT ANGLES

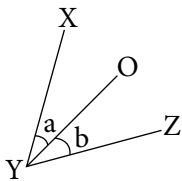
Suggested Duration

1 period (40 min)

Instructions

Let's Learn...

1. Draw two angles as shown below on the board.



2. Emphasize over the fact that angles a and b share a common arm (OY). These angles are termed as adjacent angles as they are next to each other.

Let's Try...

Ask the pupils to try the exercises on page 209 of the Student's Book.

Homework

Ask pupils to do NSPM Workbook 5B—Worksheet 38.

Answers



page 209

1. (a) 45° (b) 41° (c) 94°

WORK *Sheet* 38

1. (a) $30 + 60 = 90^\circ$ (b) $120 - 80 = 40^\circ$ (c) 92° (d) 17°

ANGLES ON A STRAIGHT LINE

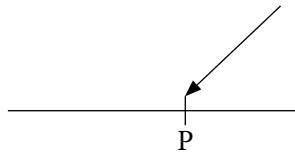
Suggested Duration

2 periods (80 min)

Instructions

Let's Learn...

Show how to create angles on a straight line. First draw a straight line on the board. Mark a point P on the straight line. Place a pencil with one end at P. Show the angle formed. Move the pencil about P to form various angles.



There are numerous angles we can form on both sides on a straight line. On each side, they form angles on a straight line.

Using right angles, it is obvious to see that angles on a straight line will add up to 180° .

By using a protractor, it can be shown that by measuring each angle, the sum of angles on a straight line is 180° .

Use the property 'Sum of angles on a straight line' to find an unknown angle is done by subtracting the known angles from 180° , as shown in examples 1 & 2.

Let the students complete the process of finding the unknown angle given in example 3.

Show angles on straight lines in different positions besides horizontal, e.g. vertical and inclined lines as in (c) and (d) in Let's Try.

Let's Try...

Ask the pupils to try the exercises on page 214 of the Student's Book.

The students use the property of sum of angles on the straight line to find an unknown angle.

Homework

Ask pupils to do NSPM Workbook 5B—Worksheet 39.

Answers



page 214

- (a) 23° (b) 119° (c) 57° (d) $\angle DBE = 100^\circ$, $\angle FBA = 33^\circ$

WORK **Sheet** 39

1. (a) $180^\circ - 137^\circ = 43^\circ$ (b) $180^\circ - 98^\circ = 82^\circ$ (c) $180^\circ - 35^\circ = 145^\circ$
2. (a) $180^\circ - 80^\circ - 55^\circ = 45^\circ$ (b) $180^\circ - 40^\circ - 36^\circ = 104^\circ$
(c) $180^\circ - 63^\circ - 90^\circ = 27^\circ$ (d) $180^\circ - 38^\circ - 90^\circ = 52^\circ$

ANGLES AT A POINT

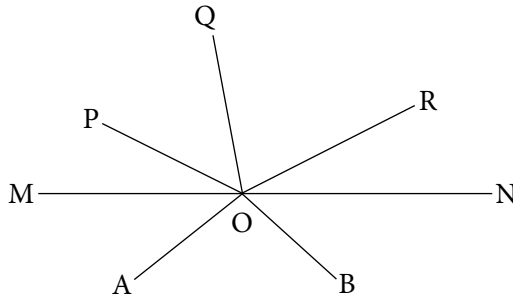
Suggested Duration

2 periods (80 min)

Instructions

Let's Learn...

Inductive way of determining the angles at a point is 360° . Draw a straight line. Make a point O on the straight line. Create a number of angles above and below the line.



Angles on the top of line MN, add up to 180° .

Angles on the bottom of line MN also add up to 180° .

The sum of all these angles is 360° , i.e. angles at a point add up to 360° .

Students can try by measuring each angle at a point by using a protractor. The sum of angles will be 360° (or very close, due to accuracy of measurement).

Include more challenging examples on finding unknown angle at a point, e.g.

- (a) There are only 2 angles at a point. If one angle is 72° , what is the value of the other angle?
(b) There are 5 equal angles at a point. What is the value of each angle?
(c) There are only 3 angles at a point. The 2nd angle is twice the size of the first angle. The 3rd angle is 3 times the size of the first angle. Find the size of each of these angles.

formed (in the second example).

Ask the students to list all the possible pairs of opposite angles which are equal, e.g.

$$\angle AOF = \angle BOE.$$

Let's Try...

Ask the pupils to try the exercises on page 221 of the Student's Book.

Use the properties of angles on a straight line, angles at a point together with vertically opposite angles to find an unknown angle.

Homework

Ask pupils to do NSPM Workbook 5B—Worksheet 41.

Answers



page 221

1. $\angle DBE = 42^\circ$, $\angle ABF = 43^\circ$, $\angle FBC = 137^\circ$
2. $\angle a = 83^\circ$, $\angle b = 79^\circ$, $\angle c = 18^\circ$
3. $\angle a = 59^\circ$, $\angle b = 121^\circ$, $\angle c = 59^\circ$

WORK **Sheet** 41

1. (a) $\angle x = 45^\circ$, $\angle y = 135^\circ$, $\angle z = 45^\circ$
(c) $\angle x = 50^\circ$, $\angle y = 130^\circ$, $\angle z = 50^\circ$
- (b) $\angle x = 150^\circ$, $\angle y = 30^\circ$, $\angle z = 150^\circ$
(d) $\angle x = 110^\circ$, $\angle y = 70^\circ$, $\angle z = 110^\circ$

P Practice 9

1. (a) 36° (b) 92°
2. (a) $\angle x = 50^\circ$, $\angle y = 130^\circ$, $\angle z = 50^\circ$ (b) $\angle x = 115^\circ$, $\angle y = 80^\circ$, $\angle z = 65^\circ$
3. (a) $\angle a = 80^\circ$, $\angle b = 45^\circ$, $\angle c = 45^\circ$, $\angle d = 55^\circ$
(b) $\angle a = 40^\circ$, $\angle b = 70^\circ$, $\angle c = 70^\circ$, $\angle d = 70^\circ$

Unit 10: Triangles

Learning Outcomes

Pupils should be able to:

- use the property that the angles sum of a triangle is 180°
- find unknown angles of a triangle
- identify and name the following types of triangles:
 - right-angled triangle
 - isosceles triangle
 - equilateral triangle
 - scalene triangle
- draw a triangle from given dimensions using ruler, protractor and set squares

Do you know?

Show pupils triangles of different sizes. Make them understand that the size of angles may change but their sums remain the same.

SUM OF ANGLES OF A TRIANGLE

Suggested Duration

2 periods (80 min)

Instructions

Let's Learn...

Allow the pupils to perform the suggested activity and deduce that the sum of angles of a triangle is 180° . The deduction is based on proved angles on a line is 180° . As each pupil draws sum of his/her own triangle, so it can be that the sum of the angles of any triangle is 180° .

Special notes to teachers:

40 min to let pupils deduce the sum of angles of a triangle by practical work as suggested and prove that the sum of the interior angles of a triangle is 180° .

Let's Explore...

Let the pupils draw 3 different triangles and measure the internal angles of each triangle using a protractor. Add up the angles in each case. The sum should be 180° or close 180° because of the accuracy of measurement.

Knowing that the sum of 3 angles in a triangle is 180° , when 2 of the angles are known, the third angle can be found as in Questions 1, 2 and 3.

Let's Try...

Ask the pupils to try the exercises on page 226 of the Student's Book.

Let the pupils find the third angle given the other two angles of a triangle.

Provide extra questions involving special triangles, e.g.

(a) The 2 angles are 75° and 30° , find the 3rd angle.

(b) The 2 angles are 90° and 55° , find the 3rd angle.

(c) The 2 angles are 14° and 76° , find the 3rd angle.

Homework

Ask pupils to do NSPM Workbook 5B—Worksheet 42.

Answers



page 226

(a) 83° (b) 140° (c) 20°

WORK **Sheet** 42

1. (a) $44^\circ, 92^\circ, 44^\circ$ (b) 75° (c) 33° (d) 20° (e) 85° (f) 45°

SPECIAL TRIANGLES

Suggested Duration

2 periods (80 min)

Instructions

Let's Learn...

Right-angled triangles (10 min)

Can a triangle have 2 right angles?

When one angle of a triangle is 90° , the triangle is a right-angled triangle. In a right-angled triangle, one angle is 90° , the sum of the other two angles must also be 90° . It is, therefore, impossible for a triangle to have two right angles.

Let's Explore...

By cutting and folding a right angled triangle as suggested, it can be shown that the sum of the two non-right angles in the triangle equals to 90° .

Let the pupils find the third unknown angle of a given right-angled triangles.

Special notes to teachers:

10 min to find the 3rd unknown angle in a right-angled triangle

Equilateral Triangles

Define an equilateral triangle, i.e. with 3 equal sides. It can be visualized that all 3 angles in an equilateral triangle are equal in size. This will lead to the conclusion that each angle is 60° .

Let the pupils produce examples of equilateral triangles formed by 3 sticks of equal length.

Special notes to teachers:

Topics for discussion:

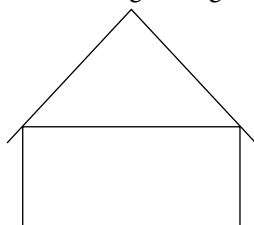
---when 2 angles of a triangle are known to be 60° each, is the triangle equilateral?

---when 2 sides of a triangle are equal, is the triangle equilateral?

Conclusion: when each angle of a triangle is 60° , the triangle must be equilateral.

Isosceles Triangle

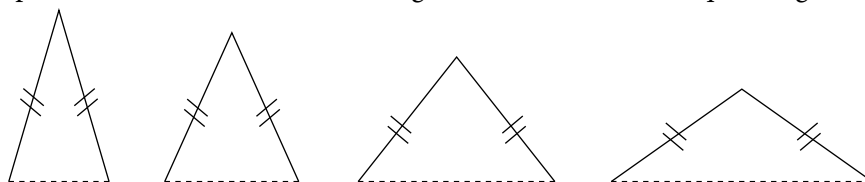
Show examples of objects with isosceles triangles, e.g. the edges of a roof:



This will lead to defining an isosceles triangle, i.e. a triangle with 2 equal sides. By cutting and folding as isosceles triangle, this will lead to the conclusion—the base angles are equal.

Let the pupils find the remaining angles, given one angle in an isosceles triangle.

Let the pupils form different isosceles triangles with two sticks of equal length, e.g.



Scalene triangle

Explain that in a scalene triangle all the sides are of different measures. Similarly all the angles are also different.

Let's Try...

Ask the pupils to try the exercises on page 234 of the Student's Book.

Homework

Ask pupils to do NSPM Workbook 5B—Worksheet 43.

Answers



page 234

- (a) 60° (b) 25° (c) 113° (d) 61° (e) 58° (f) 50°

WORK **Sheet** 43

- equilateral, equal, right-angled, 90° , isosceles, equal, scalene, sides, angles
-

| Type of Triangle | Name of Triangle |
|-----------------------|------------------|
| equilateral triangle | DEF, PQR |
| right-angled triangle | MNO, ABC |
| isosceles triangle | GHI, MNO |
| scalene triangle | XYZ |

- (a) 45° (b) 54° (c) 67° (d) 32° (e) 73° (f) 52°
- (a) 50° (b) 20° (c) 25° (d) 76°
- (a) 60° (b) 60° (c) 60° (d) 60°
- (a) 60° (b) 65° (c) 46° (d) 32°
- (a) $\angle x = 30^\circ$, $\angle y = 45^\circ$
(b) $\angle x = 50^\circ$, $\angle y = 20^\circ$
(c) $\angle x = 130^\circ$, $\angle y = 35^\circ$

CONSTRUCTING TRIANGLES

Suggested Duration

3 periods (120 min)

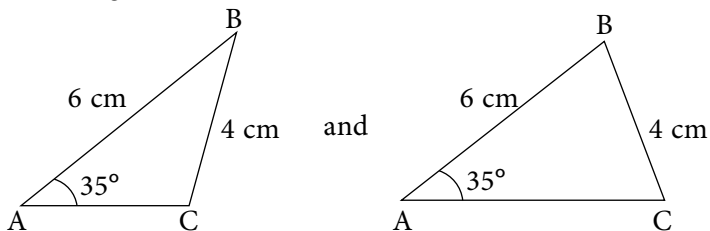
Instructions

Let's Learn...

Using a ruler, protractor and set squares, the pupils can draw any triangle given sufficient information. In any construction of triangle, the length of at least one side must be given to fix the triangle. If only 3 angles of the triangle are given, the size of the triangle is not constant.

Enrichment:

Draw a triangle ABC, in which $AB = 6$ cm, $BC = 4$ cm and $\angle BAC = 35^\circ$. In this case, there are 2 possible triangles ABC.



Let's Try...

Ask the pupils to try the exercises on page 237 of the Student's Book.

If a sketch does not come with the question, advise the pupil to draw a rough sketch of the triangle with the given information. With this sketch, it is easier to construct the required triangle.

Special notes to teachers:

Suggest spending about 90 min on this enrichment activity.

Homework

Ask pupils to do NSPM Workbook 5B—Worksheet 44. and Practice 10.

Answers

Practice 10

- (a) 40° (b) 50° (c) 130°
- (a) 30° (b) 40° (c) 130°
- (a) 65° (b) 40° (c) 75°

Fun with Maths

Ask the pupils to try the activity on page 238 of the Student's Book.

Unit 11: Area of a Triangle

Learning Outcomes

Pupils should be able to:

- identify the base of a triangle and its corresponding height
- use formula to calculate the area of a triangle

Do you Know?

Not all triangles are right-angled. There is a way to find the area of any triangle.

AREA OF A TRIANGLE

Suggested Duration

3 periods (120 min)

Instructions

Let's Learn...

Relate triangle with rectangle. Begin with right-angled triangle, two identical right-angled triangle will form a rectangle.

Form a general triangle in a rectangle whose base is the length of the rectangle and whose height is the breadth of the rectangle.

The area of these triangles

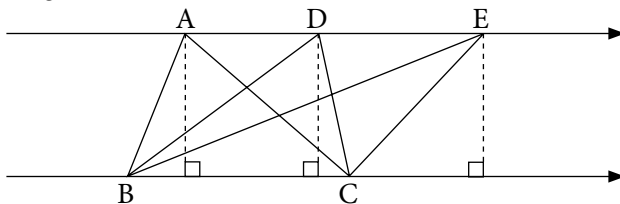
= half of the area of the rectangle

$$= \frac{1}{2} \times \text{length} \times \text{breadth}$$

$$= \frac{1}{2} \times \text{base} \times \text{height}$$

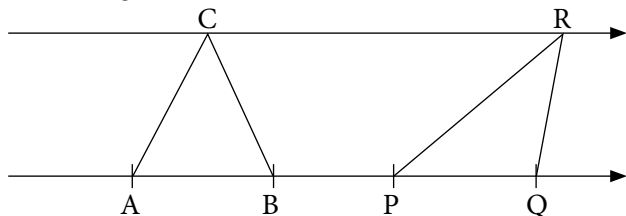
Lead the students to identify the corresponding height of a triangle given the base and use the formula to find the area of a given triangle.

Lead the students to explore areas of different triangles with the same base and the same height as shown below:



Triangles ABC, BCD, and BCE, all have the same base and equal height (distance between parallel line) Their areas are equal.

Similarly, triangles with equal base and equal height will have equal area, e.g. triangle ABC and triangle PQR.



Guide the students to identify the corresponding height of a triangle given its base as shown on pages 243–244.

In a right-angled triangle, the base and the height of a triangle are interchangeable. When the height is the base, the base becomes the height.

Let's Explore

By cut-and-paste, the students can show that the area of the obtuse-angled triangle ABE is $\frac{1}{2}$ of the area of rectangle ABCD, i.e. $\frac{1}{2} \times \text{base} \times \text{height}$. Let the students identify the base and the height of triangle ABE.

Let's Try...

Ask the pupils to try the exercises on pages 247–248 of the Student's Book.

Let the students use the formula to find the area of various kinds of triangles:

- right-angled triangles
- acute-angled triangles
- obtuse-angled triangles

Guide the students to determine the base of a triangle and its corresponding height.

Homework

Ask pupils to do NSPM Workbook 5B—Worksheet 45 and Practice 11.

Answers



page 247–248

- (a) 16 cm^2 (b) 21 cm^2
- (a) 15 m^2 (b) 49.5 cm^2
- (a) 20 cm^2 (b) 31.5 m^2

WORK **Sheet** 45

- (a) BC (b) CD (c) BE (d) AD
- (a) 17.5 cm^2 (b) 30 m^2 (c) 24 cm^2 (d) 30 m^2
- (a) 40 m^2 (b) 36 cm^2 (c) 14 cm^2 (d) 60 m^2
- (a) 22.5 cm^2 (b) 30 m^2 (c) 45.5 m^2 (d) 33 cm^2

Practice 11

- (a) 9 cm^2 (b) 16 m^2 (c) 17.5 cm^2 2. A.

Fun with Maths

Ask the pupils to try the activity on page 249 of the Student's Book.

Unit 12: 4-sided Figures

Learning Outcomes

Pupils should be able to:

- identify and name parallelogram, rhombus and trapezium
- state the properties of parallelogram, rhombus and trapezium
- find unknown angles
- draw a square, rectangle, parallelogram, rhombus and trapezium from given dimensions using a ruler, protractor and set squares

Do you know?

Let the pupils explore and discover that the sum of the angles in each 4-sided figure is 360° . They can reason that a 4-sided figure is made up of 2 triangles. The sum of the internal angles of a triangle = 180° . Thus, the sum of the internal angles of a 4-sided figure = $180^\circ + 180^\circ = 360^\circ$.

IDENTIFYING 4-SIDED FIGURES

Suggested Duration

2 periods (80 min)

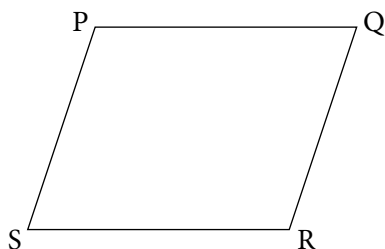
Instructions

Let's Learn...

There are many 4-sided figures. All 4-sided figures belong to the family of quadrilaterals. We are now dealing with some special 4-sided figures.

Parallelogram: show the figure and discuss the properties and definition of a parallelogram.

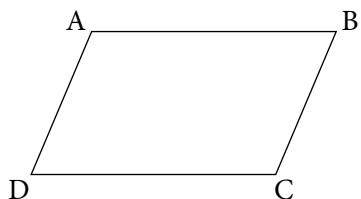
In the figure PQRS shown below, $PQ \parallel SR$ and $PQ = SR$, is PQRS a parallelogram?



From this example, it is sufficient to conclude that PQRS is a parallelogram.

In a 4-sided figure, when a pair of opposite sides are parallel and equal, the figure must be a parallelogram.

An example of 4-sided figure whose opposite sides are parallel is shown below:



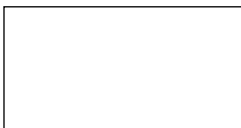
$AB \parallel DC$ and $AD \parallel BC$

ABCD must be a parallelogram.

Some special parallelograms are shown below:



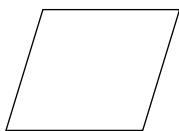
Square



Rectangle

In squares and rectangles, the opposite sides are equal and parallel. They are special parallelograms.

Rhombus



The 4 sides are equal. The opposite sides are parallel.

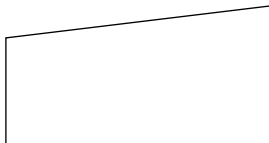
A 4-sided figure with all sides equal, must be a rhombus. When all the sides are equal, the opposite sides must be parallel.

A square is a special rhombus.

A rhombus is a special parallelogram.

Trapezium

A trapezium is a 4-sided figure with only one pair of opposite sides parallel.



What about a 4-sided figure with one pair of opposite sides parallel and the other pair of opposite sides equal as shown below:



It is still a trapezium.

Let's Try...

Ask the pupils to try the exercises on pages 255–256 of the Student's Book.

The pupils will identify equal sides and parallel sides in each figure as well as features based on equal or parallel sides in each figure. At this stage, properties related to angles are excluded.

Homework

Ask pupils to do NSPM Workbook 5B—Worksheet 46.

Answers



page 255–256

- (a) 4 (b) 2 (c) 2 (d) $AD = BC, DC = AB$
- (a) 4 (b) 2 (c) 4 (d) $PM \parallel ON, MN \parallel PO$
- (a) 4 (b) 1 (c) 0
- 4.

| Property | Which figure? | Name of the figures |
|---|---------------|---------------------|
| Opposite sides are parallel and all sides are equal | (d) | rhombus |
| Opposite sides are parallel and equal | (a), (e), (f) | parallelogram |
| Only 1 pair of opposite sides are parallel | (b), (c) | trapezium |

WORK **Sheet** 46

1.

| Properties | Name of figure |
|--------------------------------|--------------------|
| 4 right angles | (a), (e) |
| only 1 pair of parrallel lines | (d) |
| 2 pairs of parrallel lines | (a), (b), (c), (e) |
| no perpendicular lines | (b), (c), (d) |
| all sides are equal | (a), (b) |

2. (a) rhombus (b) square (c) parallelogram (d) trapezium

PROPERTIES OF 4-SIDED FIGURES

Suggested Duration

3 periods (120 min)

Instructions

Let's Learn...

By cutting and matching, it can be shown that the opposite angles of a parallelogram are equal and the sum of angles between 2 parallel sides is 180° .

The pupils can use this property to find out the unknown angle(s) in a parallelogram.

The same property related to angle(s) in parallelograms also applies to rhombus.

By cutting and matching, it can be shown that the sum of angles between 2 parallel lines in a rhombus is 180° . There are only 2 pairs of such angles.

Let's Try...

Ask the pupils to try the exercises on page 263 of the Student's Book.

Using properties related to angles, the pupils can find the unknown angles in a parallelogram, rhombus and trapezium.

Homework

Ask pupils to do NSPM Workbook 5A—Worksheet 47.

Answers



page 263

- (a) 65° (b) 53° (c) 63°
- (a) 96° (b) 52° (c) 94°
- (a) 70° (b) 58° (c) 107°

WORK **Sheet** 47

- (a) 99° (b) 127° (c) 48° (d) 152° (e) 53° (f) 67°
- (a) 106° (b) 78° (c) 66° (d) 18° (e) 150° (f) 50°
- (a) 58° (b) 88° (c) 95° (d) 32° (e) $71^\circ, 21^\circ$ (f) 32°
- (a) 20° (b) 81°
-

| Description | Shapes(s) |
|---|---------------|
| A four-sided figure whose opposite sides are parallel. | parallelogram |
| A four-sided figure whose opposite sides are equal and each angle in the figure is 90° . | rectangle |
| A four-sided figure where only one pair of opposite sides are parallel. | trapezium |
| A four-sided figure whose opposite sides are parallel and all the sides are equal in length. | rhombus |
| A four-sided figure whose sides are equal and each angle is 90° | square |

CONSTRUCTION OF 4-SIDED FIGURES

Suggested Duration

4 periods (160 min)

Instructions

Let's Learn...

For each construction, it is helpful to draw a sketch of the 4-sided figure showing the given information.

From the sketch, the pupils can construct the figure by using a ruler, protractor and set square.

Special notes to teachers:

- Parallelogram:** 20 min to deduce the opposite angles are equal and the sum of angles between 2 parallel lines is 180° by cutting and matching.
20 min to familiarize pupils with these properties by finding the unknown angles in parallelograms.
- Rhombus:** 20 min to ensure understanding that the rhombus is a special parallelogram and that the properties related to angles in parallelogram also apply to rhombus.
Use these properties to find the unknown angles in a rhombus.
- Trapezium:** 20 min to deduce, by cutting and matching, the sum of angles between the parallel sides is 180° .
Use this property to find the unknown angles in a trapezium.

Let's Try...

In construction, the parallel sides can be drawn using the set squares.

Let the pupils construct the 4-sided figures from Questions 1–4 on page 269 of the Student's Book.

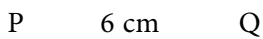
Homework

Ask pupils to do NSPM Workbook 5B—Worksheet 48 and Practice 12.

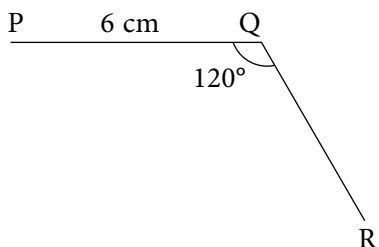
Enrichment

These figures may be done on the board as a review exercise.

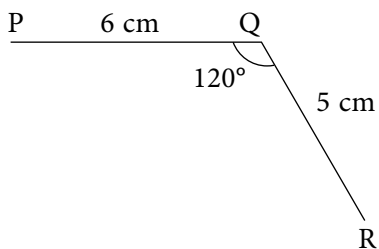
The construction of a trapezium PQRS with $PQ \parallel SR$, $PQ = 6$ cm, $QR = 5$ cm, $RS = 10$ cm and $\angle PQR = 120^\circ$



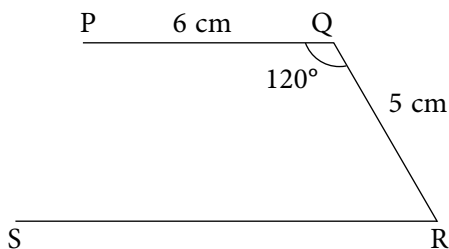
Draw $PQ = 6$ cm



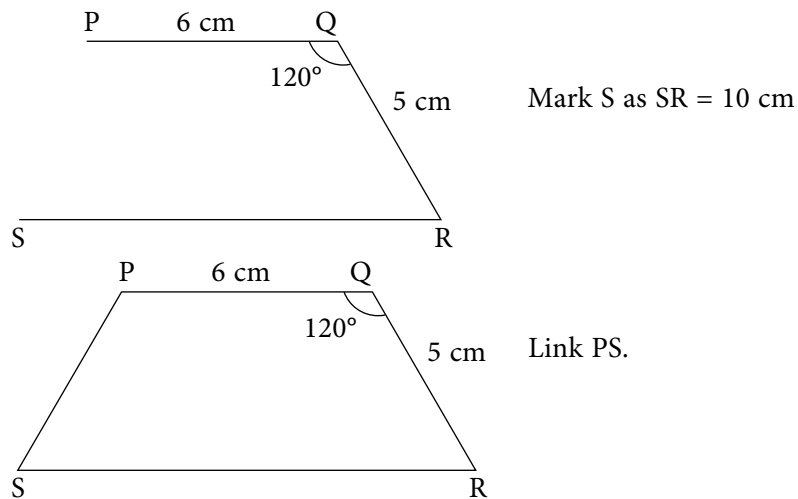
Draw $\angle PQR = 120^\circ$



Mark R as $QR = 5$ cm



Draw a straight line parallel to PQ passing through R



Practice 12

1. trapezium, equilateral triangle, isosceles triangle, trapezium
2. (a) 77° (b) 65° (c) 42°
3. 13°

Fun with Maths

Ask the pupils to try the activity on page 270 of the Student's Book.



Revision 3 (Workbook 5B)

1. (a) 43° (b) 130° (c) $\angle c = 42^\circ$, $\angle d = 138^\circ$, $\angle e = 138^\circ$
2. (a) 30 m^2 (b) 99 m^2 (c) 96 m^2
3. (a) parallelogram (b) trapezium (c) rhombus (d) rhombus
4. (a) 50° (b) 127° (c) 44° (d) 35°
5. (a) 58° (b) 20°
6. (a) 108° (b) 38° (c) 73° (d) 30°
9. (a) 147° (b) 52° (c) 88°
10. (a) 5 cm^3 (b) 8 cm^3 (c) 7 cm^3
(d) 6 cm^3 (e) 9 cm^3 (f) 6 cm^3
11. 1800 12. 280 cm^3 13. 90 l 14. 4096 cm^3
15. (a) 432 ml (b) 256 ml
16. (a) $18\,734 \text{ cm}^3$ (b) $19\,740 \text{ cm}^3$



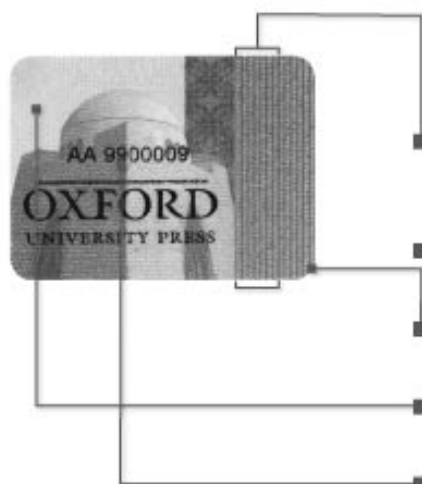
Revision 4 (Workbook 5B)

1. (a) 21° (b) 46° (c) $\angle c = 100^\circ$, $\angle d = 50^\circ$
2. (a) 270 cm^2 (b) 45 cm^2 (c) 8 m^2
3. (a) 34° (b) 25° (c) 26° (d) 119°
4. (a) 25° (b) 64° (c) $62^\circ, 62^\circ$ (d) 35° (e) 35° (f) 40°
5. (a) 78° (b) 68° (c) 54° (d) 44° (e) $\angle e = 110^\circ$, $\angle f = 70^\circ$
(f) $\angle g = 50^\circ$, $\angle h = 50^\circ$ (g) 20° (h) 81° (i) $\angle e = 78^\circ$, $\angle f = 127^\circ$
9. (a) 7.1 l (b) 3050 cm^3 (c) 0.15 l (d) 215 cm^3
(e) 350 ml (f) 50 ml (g) $65\,000 \text{ cm}^3$ (h) 0.125 l
13. (a) 600 cm^3 (b) 3900 cm^3
14. (a) Rs 348 15. $67\,500 \text{ cm}^3$
16. (a) 4500 cm^3 (b) $4 \text{ l } 500 \text{ ml}$

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