

# 1

## Running a nursery

### Coverage

This unit uses a range of number skills in the context of running a nursery. Learners will use and build on previous work with positive and negative numbers in practical situations.

Ratios will be calculated and used in problems of direct proportion.

Algebra will be introduced by the use of letters to represent numbers in expressions and formulae given in words and symbolic form. Learners will substitute values.

Learners' work on fractions will be extended to include evaluating one number as a fraction of another.

Learners will consolidate previous Level-1 work on percentage parts, increase and decrease. Opportunities will be given in the use of the calculator.

Revision and consolidation of Level-1 maths skills also feature in this unit and there are opportunities for learners to use ICT in the form of calculators and computer packages.

### Skills

**N1/L2.1** use positive and negative numbers in practical contexts

**N1/L2.3** calculate ratio and proportion

**N1/L2.4** evaluate expressions and make substitutions to given formulae in words and symbols to produce results

**N2/L2.3** evaluate one number as a fraction of another

**N2/L2.7** order and compare percentages and understand percentage increase and decrease

**N2/L2.8** find percentage parts of quantities and measurements

**N2/L2.10** use a calculator to calculate efficiently using whole numbers, fractions, decimals and percentages

Resources needed for effective teaching of this unit:

Demonstration	Group	Pair	Individual
Demonstration Number lines including temperature scales White/blackboard and/or OHT	Range of measuring apparatus for length	Squared paper Prepared rectangles	Calculators and computers 'Post-it' (self-adhesive) notes Tokens, Deines rods or similar

### Reminder

In the Links, H means Help, E means Extension and M means Mini-project.

### Remember

Throughout the unit, be aware of the reading needs of learners.

You may need to read out parts of the text.

Words **highlighted in bold** will need particular clarification.

An interactive approach to the delivery of this material will consolidate learning and identify any misconceptions.

## Use of calculators

The way in which functions such as % are operated on calculators varies according to the calculator used. You therefore need to decide whether all learners have similar calculators that operate in the same way so that you can teach the use of such functions to the entire group. Similarly, not all learners will have scientific calculators with a fractions function and so this may have to be taught on a one-to-one basis if you consider this appropriate.

It is usually preferable for learners to use their own calculator all the time so that they become familiar with the lay-out and therefore are less likely to make keying errors.

## Context

Discuss the scenario as a group.

There may be other more relevant aspects of finance which learners could use for practice.

## Stimulus questions

- Is there a nursery near where you live?
- Can anybody start a nursery for young children?
- Does anybody you know send their own children to a nursery?
- Why do you think nurseries are inspected in addition to other types of schools?
- How much do you think it costs to send a child to a nursery?
- What maths skills would be important for people working in nurseries?

Keep the discussion general at this stage, so that learners can share knowledge and experience.

## Pages 2 and 3 Don't be negative

### Introduction to activity 1

- Revise earlier work (covered in N1/L1.1 and N1/L1.2) on ordering numbers and negative numbers.
- Draw a vertical number line on the board or OHT and label it like a thermometer.
- Remind learners that 7 has a larger value than 3 but -7 has a smaller value than -3 etc.

- Work through the completed parts of question 3 as a group.

### Activity 1

- Learners complete the questions individually or in pairs.
- Some learners will benefit from writing the numbers in questions 1a and 2a against the thermometer (in another colour) to help put them in order.

### LINKS: H1

## Pages 4–7 Keeping everything in proportion

### Introduction to activity 2

- Start by recalling multiplication facts covered in N1/L1.5 and the earlier work from N1/L1.7.
- Encourage learners to use multiplication facts to work out the answers mentally.
- Discuss why the ratios might vary for different age groups.
- Discuss the answers to the questions in the introduction, particularly the order of the ratio.
- Emphasise that both numbers in the ratio need to be in the same units and are treated in the same way when simplifying.
- Discuss situations where the number of children is not a multiple of the ratio – the need for additional adults.

### Activity 2

- Learners complete the activity individually or in pairs.

### Activity 3

- Work through the example.
- Learners complete the activity individually or in pairs.
- Some learners will benefit from using tokens, Deines rods etc. to complete this activity practically.

## Introduction to activity 4

- Discuss direct proportion. Discuss what happens when zero is used.
- The order of the numbers must be kept the same for each ratio.
- For questions 1 and 2, learners use the unitary method to find what one is worth and then multiply by the number they need.

### Activity 4

- Learners work individually or in pairs.

### LINKS: H2, H3, M2, M3

## Pages 8 and 9 Formulae rule OK!

### Introduction to activity 5

- Discuss why it is easier to use a rule or formula when the calculation is the same for different amounts.
- Emphasise that the letters are used for the different numbers of objects not the objects themselves.
- Discuss the introductory activity with the group and the different ways the formula can be written. (The work has been ordered to produce a formula in which the number precedes the letter.)
- Stress that the multiplication sign is not needed when there are just letters, or letters with numbers. Use  $3 \times 2$  and 32 to show that this rule doesn't work when there are numbers only.
- Check that learners have the correct formula for question 2a before they carry on.
- Some learners will need help/support to write the formulae in words but will be able to write it in symbols.

### Activity 5

- Learners complete the activity individually or in pairs.

## Introduction to activity 6

- Remind learners of previous work covered in MSS1/11.9 but here the emphasis is on using a given formula.
- Remind learners that the area of a rectangle is calculated as area (A) = length (l)  $\times$  width (w).
- Emphasise that lw means  $l \times w$ .
- Remind learners that the units of area are  $\text{cm}^2$ .
- Work through the example already completed in the table.

### Activity 6

- Learners work individually or in pairs.
- Decide whether learners may use calculators.

## Introduction to activity 7

- Remind learners of perimeter (covered in MSS1/L1.8) and how to calculate it:  $2 \times (\text{length} + \text{width}) = 2(l + w)$ .
- Discuss items like skirting boards and picture frames as perimeters.
- Remind learners that perimeter is a length, even though it may be bent around corners and angles, and that the units are cm here, but other units of length can be used.
- Remind learners that they must work out the value inside the bracket before multiplying by 2.
- Work through the example already completed in the table.

### Activity 7

- Learners work individually or in pairs.

### LINKS: H4, H5, H6, E1

## Pages 10 and 11 What fraction is it?

### Introduction to activity 8

- This work builds on the work on fractions (covered in N2/E3.1, N2/E3.2, N2/L1.1, N2/L1.2 and N2/L1.3).
- Use mental and oral work with the group to revise common factors.

- Demonstrate that, to find equivalent fractions, the top (numerator) and bottom numbers (denominator) of the fraction are multiplied or divided by the same number.
- Explain that fractions express 'out of': the denominator is the total number and the numerator is 'how many out of'.
- Just as the numerator and denominator of a fraction must be divided by the same factor when cancelling, both parts of a ratio must be divided by the same factor.
- Ratios are always whole numbers, e.g. 2 : 5 cannot be simplified further

### Activity 8

- Learners complete the activity individually or in pairs.

LINKS: H7

## Pages 12 and 13 Percentage amounts

### Introduction to activity 9

- Remind the group that percentages are fractions out of a 100.
- Point out the 'remember' box: 'To find 10%, divide by 10'. (Make sure learners have not generalised this to: 'To find 5%, divide by 5' etc.)
- Encourage learners to use an estimate so that they know if their answer is of the correct order of magnitude.
- Work through the example and method to find the accurate answer, using any type of calculator. This method works on the simplest calculator. You should decide whether to show learners how to use the % function.
- Remind learners about rounding to the nearest penny.
- Units are important. Learners need to be clear that the answers are not percentages but amounts in the units given in the question.

### Activity 9

- Learners complete the activity individually or in pairs.

LINKS: H8

## Pages 14–18 More or less

### Introduction to activity 10

- This activity requires learners to work out the actual increase/decrease from the percentage and add/subtract.
- Work through the calculations already in the table.
- Go through the '10% and halving' method of working out 17.5%.
- Make sure learners give answers to two decimal places (nearest penny).

### Activity 10

- Learners complete the activity individually if possible.

### Introduction to activity 11

- Emphasise the difference in the method – instead of working out the actual increase/decrease they are now working out a new percentage by adding/subtracting the percentages (recognising that the original is 100%), and using this to work out a percentage of the required amount.
- Work through the example.
- The activity requires learners to use both methods eventually so it does not matter which method they use first.

### Activity 11

- Learners work individually or in pairs.

### Talk about it

- Discuss what learners have observed using both methods. They should find that the method in activity 9 is preferable if they need to know the actual increase/decrease but if they are only interested in the final figure the method in activity 10 is quicker.
- Learners often feel more confident using the more concrete method in activity 9 but they should know that the other method exists.

### Introduction to activity 12

- Stress that trying to use  $33\frac{1}{3}\%$  leads to difficulties in accuracy;  $\frac{1}{3}$  is more straight forward.
- Remind learners of simple percentage/fraction equivalents, e.g.  $50\% = \frac{1}{2}$ ,  $25\% = \frac{1}{4}$ ,  $10\% = \frac{1}{10}$  = divide by 10.
- Discuss 10% of the total and the offer of 10% off and stress the difference created by the spelling (of/off) in question 6.
- Discuss the importance of knowing the concept behind percentage decrease.
- Work through the example.
- Ensure that learners use their calculators correctly.

### Activity 12

- Learners work individually.
- Discuss learners' answers to this activity, particularly question 6, and ensure that they understand the underlying principles involved in the use of percentages. Some learners may prefer to discuss the answer to 6c.

LINKS: H8, E2, M1

## Pages 19 and 20 Help

### H1

- Learners work individually or in pairs.
- Remind learners to start with the smallest number.
- Revise how to establish the relative size of negative and positive numbers.

- Some learners will benefit from having a drawn thermometer to mark numbers on.

### H2

- Learners work individually or in pairs.
- Remind learners to multiply both numbers of the ratio by the same number.
- Remind learners to keep the numbers of the ratio in the same order.
- Some learners will benefit from using rods or tokens to complete the task practically.

### H3

- Learners work individually or in pairs.
- Remind learners to maintain the order of the ratio.

### H4

- Learners work individually or in pairs.
- Remind learners that  $6n$  means  $6 \times n$  and that the number is written before the letter.
- Remind learners how to substitute values and calculate answers.

### H5

- Learners work individually or in pairs.
- Remind learners that the units of area are squared units, here  $m^2$ .

### H6

- Learners work individually or in pairs.
- Remind learners that perimeter is a length.
- Remind learners to work out the inside of the bracket first.

### H7

- Learners work individually or in pairs.
- Remind learners to put the total number on the bottom of the fraction as the denominator.
- Remind learners that the numerator will be the amount in the category.
- Remind learners that the top and bottom numbers of the fraction must be divided by the same factor when simplifying.

## H8

- Learners work individually or in pairs.
- Remind learners how to calculate  $\frac{1}{3}$  and 30%.
- Encourage learners to explain their reasoning verbally and then in writing.

## Page 21 Extension

### ↑ E1

- Learners work individually.
- Use the example to stress that learners must work out the letter part of the formula first and then add the constant (number term).
- Stress that all parts of the formula must be in the same units and therefore £10 must be written as 1000p.
- Check that learners have produced the correct formula before they use it to calculate amounts.

### ↑ E2

- Learners work individually or in pairs.
- Encourage learners to explain their reasoning.

## Page 22 Mini-projects

- Learners can do these mini-projects individually or in groups in class or at home.
- The mini-projects involve the application of skills covered in this unit.
- Make sure learners understand exactly what they are trying to achieve.

## M1

- Discuss which type of nursery learners will find in the telephone directory and which type will be found in the *Yellow Pages* (local authority, private).

## M2

- Ensure learners telephone to check what information is available (and if possible to arrange a visit).
- Discuss ways of collecting and displaying the data.
- Ensure that learners have access to computers.

## M3

- Ask learners to compile a shopping list in a table.
- Discuss how they might obtain the prices. For example, by visiting the shops or perhaps using the Internet.

## Page 23 Check it

Use these questions to assess how learners have coped with the skills in this unit. Ask learners to indicate the areas in which they would like more help.

### *How am I doing?*

To be completed by learners individually, with teacher support.