EDEXCEL FUNCTIONAL SKILLS PILOT

# Maths Level 1

## Chapter 1

## Working with whole numbers

# Maths Level 1

Carol Roberts

## Chapter 1: Working with whole numbers

**Use these free pilot resources to help build your learners' skill base**
We are delighted to continue to make available our free pilot learner resources and teacher notes, to help teach the skills learners need to pass Edexcel FS Mathematics, Level 1.

**But use the accredited exam material and other resources to prepare them for the real assessment**
We developed these materials for the pilot assessment and standards and have now matched them to the final specification in the table below. They'll be a useful interim measure to get you started but the assessment guidance should no longer be used and you should make sure you use the accredited assessments to prepare your learners for the actual assessment.

**New resources available for further support**
We're also making available new learner and teacher resources that are completely matched to the final specification and assessment – and also providing access to banks of the actual live papers as these become available. We recommend that you switch to using these as they become available.

**Coverage of accredited specification and standards**
The table below shows the match of the accredited specification to the unit of pilot resources. This table supersedes the pilot table within the teacher notes.

| Coverage and Range | Exemplification | Learner Unit |
|---|---|---|
| Understand and use whole numbers | • Understand place value<br>• Write a number in words and figures<br>• Put whole numbers in order<br>• Use of the terms odd, even, multiple, factor | **A1** Reading and writing whole numbers<br>**A2** Ordering and comparing whole numbers<br>**A3** Rounding<br>**A7** Squares and multiples<br>Use of the terms odd, even, multiple and factor are covered specifically in our new publishing (see below) |
| Understand negative numbers in practical contexts | • Recognise but not calculate, e.g. identify the warmest and coldest from a set of temperatures<br>• Use temperatures | **A13** Negative numbers |
| Add, subtract, multiply and divide whole numbers using a range of strategies | • Add, subtract, multiply and divide positive and negative whole numbers | **A4** Adding whole numbers<br>**A5** Subtracting whole numbers<br>**A6** Multiplying whole numbers<br>**A7** Squares and multiples<br>**A8** Multiplying larger numbers<br>**A9** Dividing whole numbers<br>**A10** Dividing with larger numbers<br>**A11** Solving word problems<br>**A12** Checking answers to calculations<br>**A13** Negative numbers |
| | | **A14** Remember what you have learned |

**Where to find the final specification, assessment and resource material**
Visit our website **www.edexcel.com/fs** then:
- **for the specification and assessments:** under **Subjects**, click on **Mathematics (Levels 1–2)**
- **for information about resources:** under **Support**, click on **Published resources**.

Published by Pearson Education, Edinburgh Gate, Harlow CM20 2JE. First published 2008.  Typeset by Oxford Designers and Illustrators, Oxford

# 1 Working with whole numbers

(pages 2–27 in the Skills Book)

| Performance | Coverage and Range | Unit Objectives |
|---|---|---|
| **Learners can:** | **Learners can:** | |
| ■ understand practical problems in familiar and unfamiliar contexts and situations, some of which are non-routine<br>■ identify and obtain necessary information to tackle the problem<br>■ select mathematics in an organised way to find solutions to practical problems for different purposes<br>■ apply mathematics in an organised way to find solutions to practical problems for different purposes<br>■ use appropriate checking procedures at each stage<br>■ interpret and communicate solutions to practical problems, drawing simple conclusions and giving explanations | ■ understand and use whole numbers and recognise negative numbers in practical contexts<br>■ add, subtract, multiply and divide whole numbers using a range of mental methods<br>■ multiply and divide whole numbers by 10 and 100 using mental arithmetic | **A1** Reading and writing whole numbers<br>**A2** Ordering and comparing whole numbers<br>**A3** Rounding<br>**A4** Adding whole numbers<br>**A5** Subtracting whole numbers<br>**A6** Multiplying whole numbers<br>**A7** Squares and multiples<br>**A8** Multiplying larger numbers<br>**A9** Dividing whole numbers<br>**A10** Dividing with larger numbers<br>**A11** Solving word problems<br>**A12** Checking answers to calculations<br>**A13** Negative numbers |
| | | **A14** Remember what you have learned |

This section covers the skills necessary for learners to be able to work efficiently with numbers. Each unit focuses on the delivery of one particular aspect of numbers. The questions set enable learners to practise the full range of skills being taught. The table identifies the coverage and range from the functional skills standards for maths at Level 2, that are covered in this section.

## *Reading, writing, ordering and comparing whole numbers*

The main idea is to enable learners to understand place value so that they know how to write and interpret larger numbers, especially those with zeros. Encourage learners first to use place-value tables to identify the correct number of digits in a number. Once they have identified how many digits they need, they have more chance of using zeros as place fillers appropriately or of interpreting numbers that include zeros.

### Activities

Make 10 digit cards. Divide learners into two teams and ask each team to select five cards, at random. Teams race against each other to use the digit cards to create numbers according to given criteria, for example, Make the nearest number to 350.

### Misconceptions

Learners are often confused when writing and interpreting larger numbers in figures, particularly when the number contains one or more zeros. They may include too many or too few zeros, or put them in the wrong place. Encourage learners to use a place-value table.

## *Rounding numbers to required accuracy*

The main idea is to enable learners to round numbers to the required accuracy or appropriate power of ten. Advise learners to read questions carefully, to identify whether they need to round numbers to the nearest 10, 100 or 1000, and demonstrate how to work out which digit to consider when rounding up or down.

### Activities

Arrange learners in teams and give shopping lists to each team. Ask them to round each price to the nearest £1 or ten pence and shout out the total, as quickly as they can. The first team with the correct answer could win a point each time.

### Misconceptions

Learners have difficulty in rounding numbers correctly to the required level of accuracy. Often, they will

round a number to the nearest 10, without looking carefully at the actual question to check what they are being asked to do. Encourage learners to highlight the digit with the place value to which they are rounding, then look at the digit immediately to its right, and to decide whether to round up or down. Illustrate the use of a number line to help work out visually the number that is 'nearest'.

## *Calculating with whole numbers*

The main idea is to enable learners to sample different methods for adding, subtracting, multiplying and dividing, and to select which methods they prefer. There is an emphasis on mental methods to promote learners developing strategies to work out additions or subtractions in their head. Emphasise that the important thing is to arrive at the correct answer and encourage learners to use their own preferred methods, rather than to believe 'there is one right way to do it'.

Encourage learners also to ask themselves if the answers they have worked out are sensible in terms of the question context.

### Activities

Ask learners to add, subtract, multiply or divide numbers individually on mini whiteboards. Ask them in pairs to then explain to each other different methods used and to unpick any errors made. Feedback methods collected to the whole group: this enables a group to sample and value different methods simultaneously.

### Misconceptions

Learners are used to using particular methods for each operation and are often resistant to trying other methods, mainly because it confuses what they already know. The reason why it is crucial to explore other methods with learners is to give them the confidence to decide for themselves what methods suit them and also to enable them to see connections and patterns in the way numbers work (for example, how $49 \times 35 = 50 \times 35 - 1 \times 35$ relates to the distributive law)

## *Square and multiples*

The main idea is to extend learners' knowledge of different types of numbers. Encourage learners to learn multiples or times tables if they have not already done so, emphasising how useful this will be to them in a wide range of problems. Encourage them also to rote learn square numbers up to 144.

### Activities

Ask learners to shade in different colours e.g. the multiples of 6 or all square numbers above 20 in a $12 \times 12$ number grid.

Make random number cards between 1 and 100, ensuring there are various multiples and square numbers included. Ask learners to sort out the cards into groups; do not specify the type of groups or the number of cards in the groups (this is to give learners the opportunity to make connections for themselves). Snowball feedback to ensure as many multiples relations and squares have been collected. (You can also extend this activity to include factors and primes.)

### Misconceptions

Learners often do not give the first multiple when asked to list multiples; for example, if asked to write down the first four multiples of 5, they will start with 10 instead of 5. Emphasise the need to start with 1× the number.

Learners sometimes confuse squares with square roots: try to overcome this confusion by emphasising the relationship between squares and square roots, i.e. '9 is the square of 3, 3 is a square root of 9'.

## *Working out which operations to use*

The main idea is to enable learners to read questions carefully, identifying which operation/s are needed from the language used. Advise learners to underline or highlight significant phrases and instructions, for example, 'altogether' usually indicates an addition, 'how many more' usually indicates a subtraction. If they are given a total and asked how much 'per month' then they need to divide, whereas if they are given a monthly amount and asked for the total at the end of the year, they need to multiply. Encourage them to draw or sketch the situation in multi-step problems, to help them work out the correct order.

### Activities

Ask each student, in turn, to use two numbers and any operation to make the number 24 (e.g. $12 \times 2$, $22 + 2$). Each student must produce a new calculation each time.

### Misconceptions

Learners often have difficulty identifying the correct way to work out a multi-step problem because they are confused about which operations to use, and in which order. Encourage them to 'think through' a problem, breaking it down into smaller parts, perhaps making notes as they do so.

## Checking answers to calculations

The main idea is to enable learners to understand the importance of checking answers and the choices of methods by which they can achieve this.

Advise learners that it is important to check results of calculations, because it is easy to make errors in adding, subtracting, etc. Use simple examples to demonstrate why addition and subtraction are inverse or opposite operations, or why one 'undoes' the other, and why multiplication and division are inverse operations. Extend to multi-step problems with combinations of operations.

Encourage them to ask if their answer is 'sensible'. Also, use checking answers as a means to building confidence in using calculators for basic operations. Emphasise the value of rounding off values first and working out the answer with these values in order to see if their actual answer is 'in the right ball park'. Make the connection with them that estimating values in this way is how adults often function mathematically in everyday life: for example, approximating room length and width to buy carpet, estimating value of shopping trolley contents in supermarket to work out if they have sufficient funds.

### Activities

Prepare another set of cards to use alongside the cards showing multi-step word problems. For each problem, produce cards showing different methods of using inverse operations to check the answer; include some incorrect methods. Learners work in pairs to identify the correct method and explain why the others are incorrect.

Ask learners to mark fictional learners' work where some answers are incorrect. Ask them to decide which answers are correct using different checking methods and to explain in pairs where errors have been made in incorrect answers.

### Misconceptions

Learners often find it confusing to work out the inverse operations necessary to check a calculation. Encourage learners to write the original calculation, then start with the answer and move from right to left performing the opposite operation.

Learners often think they have to round each value off in a problem to a certain degree of accuracy, e.g. to the nearest ten, and miss the point that all they are trying to do is the round the values off to 'something easy to work with mentally'. Emphasise that, for example, rounding 1657 off to 2000 may equally enable them to see what the final answer should roughly be, but that 2000 is far easier to work with than 1660.

## Handling negative numbers

The main idea is to enable learners to understand how to use an abstract concept such as negative numbers in practical contexts such as temperatures dropping below zero and overdrawn bank accounts. Some learners have problems understanding negative numbers because they do not seem 'real'; setting these numbers in familiar and realistic situations should help learners understand how to work with them.

### Activities

Prepare cards showing positive and negative numbers. Lay them out, face down, and ask learners to pick two cards at random and make statements about which is bigger or smaller.

### Misconceptions

Learners are sometimes confused when ordering negative numbers, thinking, for example, that because 5 is more than 2, then –5 must be more than –2. Use a number line to demonstrate that, as numbers go below zero, although the numerical value increases, the actual value of negative number itself decreases. In the context of temperature, negative numbers mean low temperatures.

Another problem is in calculating differences across zero. Encourage learners to use a number line.

## Apply the skill

The learners need to develop their Process Skills, which are:

| Representing | Analysing | Interpreting |
|---|---|---|
| making sense of situations and representing them | processing and using the mathematics | interpreting and communicating the results of the analysis |

At Level 1 the learners may receive some guidance on how to first approach a problem but then must decide on the methods to be used and to identify the information they need for themselves. A suitable activity to practise these number skills would be to plan a holiday for themselves and some friends. This could incorporate:

- Identifying all the costs involved
- Finding the total cost of the holiday
- Rounding to estimate and check the total cost
- Comparing with the cost of another holiday at a different time of year/resort etc

## Answers

# A Working with whole numbers

## 1 Reading and writing whole numbers – *page 2*

**1. a** B **b** A **c** B **d** A
**2.** 23 430 **3.** 566 215 **4.** 2 420 702

## 2 Ordering and comparing whole numbers – *page 4*

**1. a** 4302 4320 43 022
**b** 700 777 707 707 7 070 770
**c** 80 528 82 258 82 288
**2.** Car C
**3.** £249 959

## 3 Rounding – *page 5*

**1. a** 120 **b** 350 **c** 3990
**2.** 66 490 miles
**3.** c
**4.** c
**5. a** 3900 **b** 1900 **c** 12 000
**6.** 14 700
**7.** c
**8.** a
**9. a** 2000 **b** 13 000
**10. a** 3000 **b** 46 000 **c** 21 000
**11.** £23 000
**12.** c
**13.** c

## 4 Adding whole numbers – *page 7*

**1.** 15 828
**2. a** 32 850 **b** 50 121
**3.** 31 310
**4. a** 36 187 **b** 32 982
**5.** 45 360
**6.** 10 112
**7.** 9913
**8.** 53 710

### Mental strategies for adding – *page 8*

**1.** 30 **2.** 50 **3.** 80 **4.** 120

## 5 Subtracting whole numbers – *page 9*

**1.** 6044
**2. a** 7094 **b** 30 444
**3. a** 8333 **b** 26 625
**4. a** 8768 **b** 838

### Mental strategies for subtracting – *page 10*

**1.** 109 **2.** 11 405 **3.** 17 995 **4.** 585

## 6 Multiplying whole numbers – *page 11*

**1. a** 240 **b** £60.00
**2. a** 230 **b** 8900 **c** 640
**3.** £80
**4. a** 840 **b** 940 **c** 3660
**5.** 3600 pence or £36.00
**6. a** 300 **b** 1500 **c** 2600
**7.** £1500
**8. a** 7000 **b** 16 800 **c** 5600
**9.** £4000
**10. a** 24 000 **b** 60 000 **c** 302 000
**11.** £24 000
**12. a** 26 000 **b** 60 000 **c** 324 000

## 7 Squares and multiples – *page 13*

**1.** 30, 36
**2. a** 5, 10, 15, 20, 25 **b** 10, 20, 30, 40, 50
**c** 7, 14, 21, 28, 35
**3.** 25
**4.** 4, 49, 25, 1, 64, 36, 100

## 8 Multiplying larger numbers – *page 14*

**1. a** 1610 **b** 437 **c** 5628
**2.** £675 **3.** £3750
**4. a** 1728 **b** 2610 **c** 3060
**5.** 14 300 **6.** £1925

## 9 Dividing whole numbers – *page 16*

**1. a** 3 **b** 9 **c** 16 **d** 16
**2. a** 9 **b** 8
**3. a** 5 **b** £9 **c** £12
**4. a** 20 **b** 156 **c** 203
**5. a** 23 **b** 405 **c** 60
**6. a** 13 **b** 246 **c** 305
**7. a** A **b** A
**8. a** 12 **b** 30 **c** 270
**9. a** A **b** B
**10. a** 5 **b** 12 **c** 70
**11. a** A **b** B

## 10 Dividing with larger numbers – *page 18*

**1. a** 18 **b** 47 **c** 23 **d** 17 **e** 27 **f** 35 **g** 37 **h** 63

## 11 Solving word problems – *page 20*

**1.** Subtraction £642
**2.** Addition 53 710 books
**3.** Subtraction 12 222 miles
**4.** Addition £519 Subtraction £230 Subtraction £163
**5.** Multiplication £3060a
**6.** Multiplication £588
**7.** division 17 weeks
**8.** division £35
**9.** division £32
**10.** subtraction £5527
**11.** division £40

## 12 Checking answers to calculations – *page 22*

**1. a** 718 – 462 = 256 correct **b** 124 + 219 = 343 correct
**c** 6300 – 2167 = 4133 correct
**d** 1008 + 1568 = 2576 incorrect
**2. a** 720 ÷ 15 = 48 correct **b** 32 × 21 = 672 correct
**c** 650 ÷ 25 = 26 incorrect **d** 138 × 24 = 3312 correct
**3. a** e.g. 300 × 20 = 6000 which is close to 7590 so this could be correct
**b** e.g. 20 × 3000 = 60 000 which is nowhere near 25 833 so this is incorrect
**c** e.g. 2000 + 1000 + 3500 = 6500 which is close to 6160 so this could be correct
**4.** e.g. £3000 × 10 = £30 000 he is not likely to be correct
**5.** 276 000 ÷ 12 = 23 000 so he is correct
**6.** £479 – £150 + £85 = £414 so he is correct

## 13 Negative numbers – *page 24*

**1. a** Exeter and London **b** Leeds **c** Exeter
**2.** £85 – £160 = –£75
**3.** No **4.** 4>3 2>0 –12<-10 –12<10

## 14 Remember what you have learnt – *page 25*

**1.** A **2.** B **3.** B **4.** C **5.** A **6.** C **7.** C **8.** D
**9.** C **10.** A **11.** D **12.** A **13.** D **14.** B