Maths Level 2

Chapter 1
Working with whole numbers

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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 2.

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 positive and negative numbers of any size in practical contexts	• e.g. temperature changes • Put numbers in order • Addition and subtraction • Use the terms odd, even, multiple factor	**A1** Place value and rounding **A2** Negative numbers **A3** Factors and multiples **A5** Tips for calculating
Carry out calculations with numbers of any size in practical contexts, to a given number of decimal places	• Add, subtract, multiply and divide numbers up to two decimal places • Estimate answers to calculations • Includes negative numbers	**A1** Place value and rounding **A2** Negative numbers **A4** Estimating and checking **A5** Tips for calculating **See also Chapter 2: Working with fractions, decimals and percentages:** **C1** Decimal numbers **C2** Calculating with money **C3** Remember what you have learned
		A6 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**.

1 Working with whole numbers

(pages 2–14 in the Skills Book)

Performance	Coverage and Range	Unit Objectives
Learners can:	**Learners can:**	
■ understand routine and non-routine problems in a wide range of familiar and unfamiliar contexts and situations ■ identify the situation or problem and the mathematical methods needed to tackle it ■ select and apply a range of mathematics to find solutions ■ use appropriate checking procedures and evaluate their effectiveness at each stage ■ interpret and communicate solutions to practical problems in familiar and unfamiliar routine contexts and situations ■ draw conclusions and provide mathematical justifications	■ understand and use positive and negative numbers of any size in practical contexts ■ carry out calculations with numbers of any size in practical contexts	**A1** Place value and rounding **A2** Negative numbers **A3** Factors and multiples **A4** Estimating and checking **A5** Levels of accuracy **A6** Tips for calculating
		A7 Remember what you have learned

This section covers the skills necessary for learners to be able to work efficiently with number. Each unit focuses on the delivery of one particular aspect of number. 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.

Place value and rounding

The main idea is to extend the learners' knowledge of comparing numbers to working with numbers of any size. Encourage the learners to use the place-value table to identify the value of individual digits and identify 'the last digit' they need to consider when rounding. Emphasise the use of zero as a place-holder. Discuss why large numbers are often rounded and ask the learners to identify occasions when this may happen, e.g. attendance at music festivals, company profits. Ask what they think would be the appropriate degree of accuracy in each case.

Activities

Prepare cards with large numbers. Ask learners to round to nearest 10, 100, 1000, 10 000, writing their answers on 'show me' boards. Prepare cards with large numbers that have been rounded. Tell learners these

have been rounded to the nearest 10, 100, ... and ask what the maximum or minimum possible value is. Again, they use 'show me' boards for their responses.

Misconceptions

Learners are often confused when questions involve working with numbers in figures and in words. For example, in question 5 on page 5, they will be unsure how many zeros to write for 3.5 million. Try to overcome this by emphasising that the digit representing millions should have six digits following it. In question 4, a common error will be to write 33 900 instead of 33 500 for the smallest possible attendance. Try to overcome this by encouraging the learners to identify the numbers on a number line. For example, here the value is 34 000, the numbers on either side will be 33 000 and 35 000 if it is written to the nearest 1000, so the midpoints on either side are 33 500 and 34 500. This means the answer is 33 500.

Working with negative numbers

The main idea is to work with negative numbers in practical contexts. Encourage learners to refer to the number line when performing calculations that involve negative numbers. Remind them of the rules for finding the difference between two numbers. Emphasise that, for a negative number, as the *number*

gets higher, the *value* gets lower. For example, −10 is smaller than −5. Discuss where negative numbers are used, the use of the minus sign and the associated language: profit, loss, debit etc.

Activities

Tell the learners to suppose they each start off with £200 in their bank accounts at the beginning of a month and give them a list of deposits and withdrawals for the month. Ask them to work out how much they have left in their account at the end of the month. This can be extended to a longer activity, using Excel where relevant formulae are used.

Misconceptions

Learners will often not associate the sign of a number with the language used in the question. For example, in question 3 on page 7 they may not read the loss of £10 million as being negative and will give an answer of £7 million for the difference instead of £13 million. Try to overcome this by emphasising profit is positive and loss is negative.

Encourage them to make use of their calculator to check their calculations.

Factors, multiples and primes

The main idea is to reinforce the technique of finding the factors of numbers so that learners are then able to simplify calculations by cancelling common factors. Encourage learners to make use of the factor pairs so that all the factors are identified. Remind them to include the number itself and 1. Emphasise that prime numbers have only two factors: the number itself and 1. Also:

- 2 is a factor of all even numbers
- 3 is a factor when the digits of a number add up to 3, 6 or 9
- 5 is a factor if the number ends in 5 or 0
- 9 is a factor if the digits add up to 9
- 10 is a factor if the number ends in 0

Discuss how to express a number as a product of its factors using index notation.

Discuss how multiples and factors are connected. For example, 8 is a factor of 16 so 16 is a multiple of 8.

Misconceptions

The main misconceptions are thinking 1 is prime and not identifying 2 as prime. Try to overcome this by emphasising the two key points:

- a prime number has exactly two factors, itself and 1; 1 only has one factor

- 2 is the only even prime number; it has two factors, itself and 1.

Estimating and checking

The main idea is to instil the importance of checking results and identifying the different methods learners can use. Encourage them to think whether their answers make sense. Remind them about inverse operations. Emphasise that the order of operations is important, as is the identification of a starting and finishing point in questions involving calculations and reverse calculations. Discuss the importance of checking bills, invoices, bank accounts etc.

Misconceptions

Learners often have difficulty with questions involving converting from one unit to another. For example, in question 4 on page 11, they can be unsure which of the numbers 8 and 5 should be divided and which should be multiplied. Try to overcome this by getting them to try out a smaller number first, visually matching each 8 km to 5 miles in a diagram to ascertain the correct method. They should be encouraged to check their answers make sense, for example here, as 8 km is equivalent to 5 miles, their answer must be smaller than 162 miles.

Activities

Make up cards with calculations and the corresponding checking calculation. You can use questions 5 to 7 on page 11 as a starting point. Be sure to include some similar but incorrect inverse calculations. Learners, in pairs or small groups, can match the cards.

Levels of accuracy

The main idea is for the student to recognise that the degree of accuracy is important when deciding on an answer for their calculations, particularly when using a calculator. Discussion can be linked to rounding and estimation previously discussed. Emphasise that in questions involving pounds and pence, their answers should be given correct to two decimal places i.e. the nearest penny. Discuss when it is appropriate to round up and when to round down.

Misconceptions

Learners will often have difficulty in deciding whether to round up or round down. For example, in question 4 on page 12, they may give the answer as £15.45 for the amount for each of the friends to pay. Try to overcome this by encouraging them to make sure their answer makes sense, for example here, 11 × £15.45 = £169.95, which is not enough to pay the total bill.

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 2 the learners must decide on the methods used and 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 Place value and rounding – *page 2*

1. 23 000 000 000
2. 250 (billion)
3. £22 600 000
4. 33 500
5. 3 988 000

2 Negative numbers – *page 4*

1. 17 degrees   **2.** –£145
3. £13 million   **4.** 87 degrees
5. £80 billion   **6.** 66 degrees
7. £55

3 Factors and multiples – *page 6*

1. a $2 \times 2 \times 2 \times 2 \times 2 \times 2$
   b $2 \times 2 \times 2 \times 2 \times 3$
   c $2 \times 2 \times 3$
   d $2 \times 3 \times 3 \times 3 \times 3$
2. a A and B
   b B, C, D   3, 5, 9
   c B, D   3, 9
   d none
   e A, B, C, D   2, 3, 5, 9
   f A, B, D   2, 3, 9
   g B, C   3, 5
   h B   3
   i B, C, D   3, 5, 9

4 Estimating and checking – *page 8*

1. £227
2. £2000 (£2392 for 52 weeks)
3. 15 (18.6)
4. 100
5. [£25] → [× 6] → [÷ 5] → [£30]
   [£25] ← [÷ 6] ← [× 5] ← [£30]

Levels of accuracy – *page 9*

1. 13p to nearest penny
2. 333g to nearest g
3. (a) metre (b) centimetre (c) millimetre (d) kilometre
4. £15.46
5. 7 glasses

5 Tips for calculating – *page 11*

1. £4.63 [£13.37 [+ 3p] → £13.40 [+ 60p] → £14.00 [+ £6.00] → £20.00]
2. 3563 [437 [+ 3] → 440 [+ 60] → 500 [+ 500] → 1000 [+ 3000] → 4000]
3. a £134.50 [538 [÷ 2] → 269 [÷ 2] →134.5]
   b 680 km [425 [× 2] → 850 [÷ 10] → 85 [× 2] → 170 [× 2] → 340 [× 2] → 680]
4. £8096
5. 52 [1432 [– 560] → 872 [– 560] → 312 [– 280] → 32 [– 28] → 4]

6 Remember what you have learned – *page 13*

1. D   **2.** B   **3.** D   **4.** A
5. B   **6.** C   **7.** C