EDEXCEL FUNCTIONAL SKILLS PILOT

TEACHER'S NOTES

Maths Level 1

Chapter 4

Working with measures

SECTION G

Maths Level 1

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Chapter 4: Working with measures

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
Solve problems requiring calculation, with common measures including money, time, length, weight, capacity and temperature	• Use addition, subtraction, multiplication and division in context	**G1** Calculating with money **G2** Time **G3** Calculating with time **G4** Temperature **G5** Length, weight and capacity **G6** Mileage charts
		G7 Remember what you have learned
Convert units of measure in the same system	• Convert between metric measures (length, weight, capacity) • Convert between hours, minutes and seconds	**G5** Length, weight and capacity **G3** Calculating with time

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**.

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4 Working with measures

(pages 65–85 in the learner materials)

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 ■ Identify and obtain necessary information to tackle the problem ■ Select mathematics in an organised way to find solutions to practical problems for different purposes ■ Apply mathematics in an organised way to find solutions to practical problems for different purposes ■ Use appropriate checking procedures at each stage ■ Interpret and communicate solutions to practical problems, drawing simple conclusions and giving explanations	■ solve problems requiring calculation, with common measures including money, time, length, weight, capacity and temperature ■ convert units of measure in the same system	**G1** Calculating with money **G2** Time and timetables **G3** Calculating with time **G4** Temperature **G5** Length, weight and capacity **G6** Mileage chart **G7** Remember what you have learned

Approaches to teaching

This section covers the skills necessary for students to be able to work efficiently with money, time, length, weight, capacity, temperature and mileage charts. The unit focuses on the delivery of working with measures and the questions set allow the learner to practice the full range of skills being taught. The table identifies the coverage and range from the functional skills standards: mathematics level 1 which are covered in this section.

G1 *Calculating with money*

The main idea is to enable students to build confidence in calculating with money. First, ensure students can add and subtract whole numbers using methods they feel happy with. Remind them that the decimal point does not move when you add or subtract amounts of money. Encourage them to explore subtraction methods such as counting up as well as traditional methods.

Show them how to multiply amounts of money written as pounds by single digit whole amounts first. Clarify where the decimal point should be placed in the answer. Demonstrate how to divide amounts of money by whole numbers, ensuring they understand the role of zero as a place filler. Teach them strategies for multiplying or dividing amounts of money by 10 or 100.

Activities

Give students example problems involving adding, subtracting, multiplying and dividing with money. Ask them to work them out individually on mini whiteboards. Ask first what they expect the answer to be close to, using estimation techniques. Canvass the actual methods used, exploring different techniques and emphasing the value of using methods that individual students feel comfortable with.

Misconceptions

Students are often confused about where to place the decimal point when calculating with money. Encourage students to use estimation in questions.

For example, in question 4 on page 66, students could first estimate the answer as follows: round off £112.32 to £100 and 6 to 5 as it is easier to divide 100 by 5. This would give an answer of 20 so students would know the actual answer should be close to £20 per person.

G2 *Time and timetables and G3* Calculating with time

The main idea is to enable students to understand times expressed in the 24-hour system and to calculate the duration of events. Review conversion between times in the 24-hour and 12-hour systems.

Use train and bus timetables to ask students questions about how long various journeys would take and what train or bus they would need to catch in order to arrive at a destination by a certain time. Advise students about different techniques for working out time differences, for example, counting up from one time to another or subtracting one time from another.

Ensure students understand why it is necessary to multiply by 60 when converting times given in hours into minutes and to divide by 60 when converting from minutes into hours.

Activities

Prepare sequential problem and answer cards involving time, for example, *I have an interview at 16:10 and my journey to the interview will take 1½ hours. What time do I need to leave?* Mix up the problems so that students have to work out departure, journey or arrival times. One card is identified as the 'start card'; it shows a question involving time. The answer is on the front of another card, which has a new question on the back. The answer to the final question is on the 'start' card. Ask the student with the 'start card' to ask the class their question. The student with the answer on their card responds and then asks their question, and so on.

Misconceptions

Students often make mistakes when subtracting one time from another, especially if there are insufficient minutes from which to subtract. For example, in question 4 on page 74 in the Skills Book, it is necessary to subtract 2330 from 0215. Some students may wrongly calculate this to be 3 hours 45 minutes instead of 2 hours 45 minutes because they 'borrow' 60 minutes to give 75 – 30, but neglect to adjust the hours accordingly.

When converting from hours to minutes, students often state that 0.4 hours is the same as 40 minutes, instead of 24 minutes; they make this error because they assume 0.4 can be treated as £0.40 which is equal to 40p.

G4 Temperature

The main idea is to enable students to become familiar with everyday temperatures such as the temperature of water about to freeze and normal body temperature. They should be aware that temperature is usually measured in degrees Celsius but that degrees Fahrenheit can also be used. Remind students that they need to work out the scale on a thermometer to be able to read a temperature.

Activities

Prepare a set of cards, one set with different temperature scales on and the second set with temperature readings. Ensure there is a range of different scales, from divisions representing 1 °C to divisions representing 0.1 °C or 0.2 °C (as with medical thermometers). Ask students to match the temperatures scales with the readings.

Misconceptions

Students can have difficulty with reading temperature scales. For example in question 4 on page 77, students may read the marked temperature as 37.1 °C , taking each division as representing 1 °C instead of 2 °C. Advise students to focus first on finding out what 1 division on the scale represents.

G5 *Length, weight and capacity*

The main idea is to ensure students are familiar with the metric units for length, weight and capacity, and know how to convert between them. Encourage students to learn by rote the relationships connecting, for example, millimetres, centimetres and metres. Advise them to check that all quantities are given in the same units. If necessary, they should convert quantities so they are all in the same units before starting the calculation. Make explicit that in converting between metric units they use the same skills they used earlier in multiplying and dividing by powers of 10.

Demonstrate to students how to measure and read scales accurately. Advise them to note the values given on a scale and to use these to work out the values of unnumbered divisions.

Activities

Prepare cards showing images of objects (e.g. *bag of potatoes, £1 coin, baby, man, bag of crisps, car, feather*). Prepare cards showing the weights of these objects; include incorrect weights as well. Ask students to put the object cards in order of weight and then to match them to the appropriate weight cards. Repeat for lengths and capacities.

Prepare cards displaying terms and symbols such as: length, weight, capacity, arrow up, arrow down, m, cm, mm, kg, g, litres, ml, × 10, ÷ 10, × 100, ÷ 100, × 1000, ÷ 1000. Ask students, in pairs or groups, to discuss how to convert from mm to cm to m etc. and then to arrange the cards showing units and methods in sequence.

Misconceptions

Students often make mistakes when reading scales because they do not evaluate the unnumbered divisions carefully. For example, in question 5 on page 82 of the Skills Book, students may assume that each division is worth 10 g and read the weight of the letter as 115 g. Advise them to note that there are five divisions between 100 g and 200 g, so each division must be worth 100 g ÷ 5 = 20 g, and therefore the letter weighs 130 g.

Students are sometimes confused when adding quantities in mixed units. For example, in practice question number 3 on page 84, they may perceive 1 kg 50 g as being 1 kg 500 g because they do not realise that 1 kg 50 g is written as 1.05 kg, not 1.5 kg. Stress the importance of writing digits in their correct positions, to maintain their place value.

Students may also have problems visualising less familiar units, such as millilitres. In practice question 8 on page 85, some students may select litres as the answer because they do not understand the relative smallness of millilitres. Familiarise students with visual representations of units, for example, by spending time looking at the units given on small bottles of juice and boxes of teabags.

Apply the skills

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 used and identify the information they need for themselves. A suitable activity to practice these number skills would be to investigate the body mass index, BMI, calculation. Measures of height and weight are used to calculate BMI and the task can involve conversion between metric and imperial units. Published graphs and tables can then be used to determine the classification of BMI index. The BMI formula can also be used to determine an optimum weight for a given height. A practice level 1 task is given below:

Body Mass Index

A person's Body Mass Index (BMI) can be calculated as a guide to whether their weight is within a recommended range for their height. Research has shown that people with a BMI within this range are generally healthier and have a longer life expectancy. However, the BMI should only be used as a guide to your overall health. There are other factors such as lifestyle, physical activity, smoking and blood pressure which also play an important role in your general health and well being.

BMI is a reliable indicator of total body fat, which is related to the risk of disease and death. The score is valid for both adult men and women but it does have some limits. The **limits** are:

- It may **overestimate** body fat in athletes and others who have a muscular build.
- It may **underestimate** body fat in older persons and others who have lost muscle mass.

The formula for BMI is:

$$\text{BMI} = \frac{\text{weight in kilograms}}{\text{height in metres} \times \text{height in metres}}$$

Example
Calculate the BMI of a person with a height of 1.7 metres and a weight of 65 kilograms.

$\text{BMI} = \frac{65}{1.7 \times 1.7} = \frac{65}{2.89} = 22.5$ to one decimal place.

The standard categories for the classification of the BMI are given in the following table:

BMI	Weight Status
Below 18.5	Underweight
18.5 – 24.9	Normal
25.0 – 29.9	Overweight
30.0 and above	Obese

Remember

This calculation is a rough guide and you should always be advised on your weight by your doctor.

This person would fall in the 'normal' category for weight status.

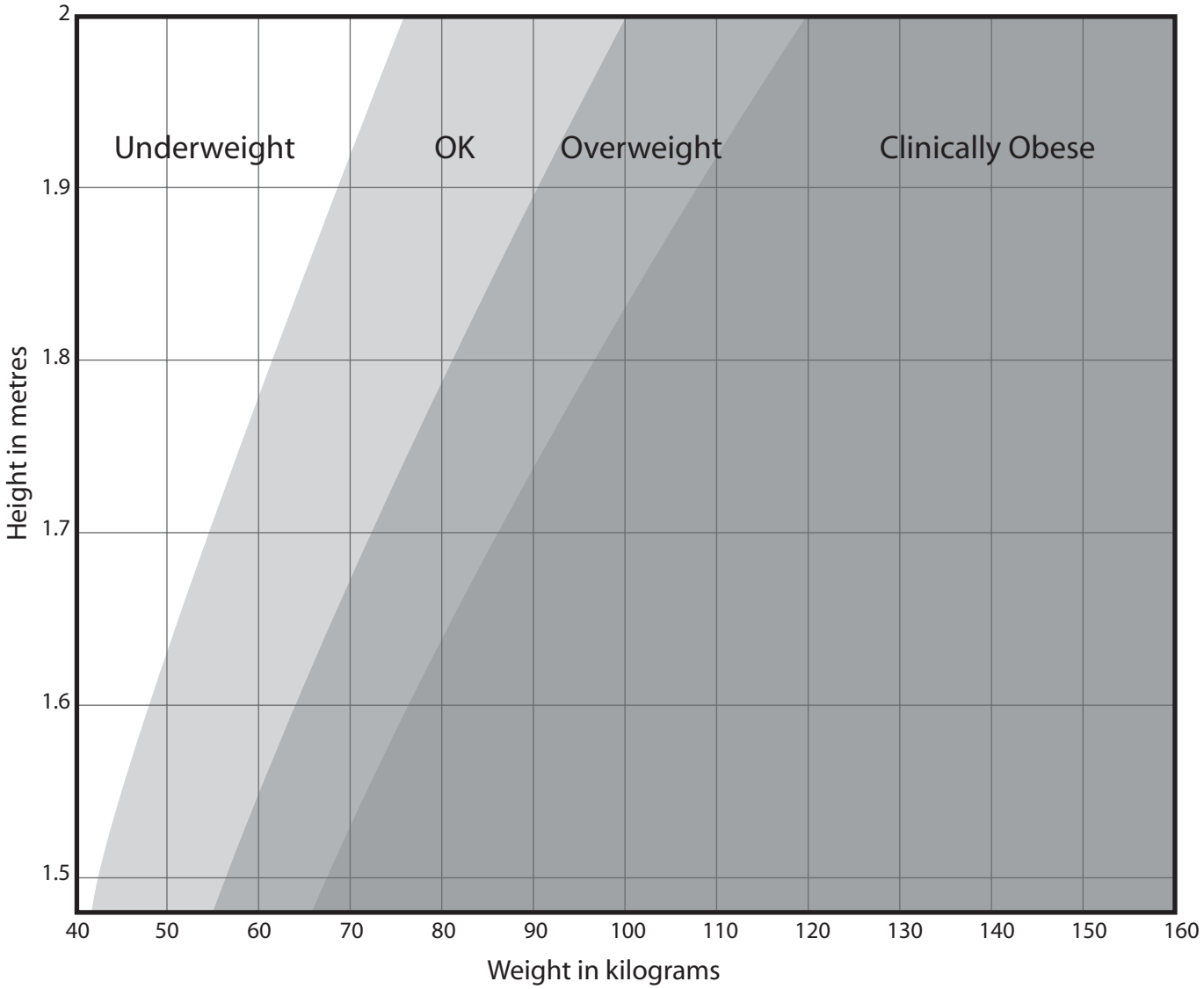
1. Use your height in metres and weight in kilograms to work out your own BMI to one decimal place and use the table to check your weight status.
Note: If asked to give your answer to one decimal place, your working should be to at least two decimal places.

2. Work out the BMI for the celebrities below and classify their weight status:

Name	Height (m)	Weight (kg)
Victoria Beckham	1.68	49.1
Madonna	1.63	54.5
Keira Knightley	1.70	50.0
Johnny Depp	1.78	70.5
Arnold Schwarzenegger	1.88	106.8
David Duchovny	1.83	96.4

3. Check your results on the BMI graph below and discuss your findings.

Calculate your body mass index



Useful websites

National Heart Lung and Blood Institute
http://www.nhlbi.nih.gov/

Answers

G Working with measures

G1 Calculating with money – *page 65*

1. a £32.83 **b** £16.60 **c** £16.40 **d** £15.02

2. a £3.75 + £1.50 = £5.25
b £4.75

3. £18.75

4. £18.72

Multiplying and dividing amounts by multiples of ten

1. a A
b B
c A

2. £69

3. £12.42

4. a A
b B

5. £15.90

6. a 216
b 64.5

7. £348

G2 Time – *page 69*

1. 9 weeks

2. 52 + 52 + 26 = 130

3. 25/03/08

4. $1\frac{1}{2}$ centuries

5. 60 ÷ 7 = 8 and 4 left over, 8 weeks and 4 days

6. 60 ÷ 10 = 6, 6 glass bottles

7. 06/06/08 and 27/06/08

8. 23/08/08

Working in 12-hour and 24-hour time

1. a 07:23
b 07:11
c 06:28

2. a 18:31
b 10:18

G3 Calculating with time – *page 73*

Adding and subtracting with time

1. a 20 minutes
b 2 hours 10 minutes
c 18 hours 35 minutes
d 1 hour 57 minutes

2. 1 hour 40 minutes

3. 1 hour 45 minutes

4. a 2 hours 10 minutes
b 2 hours 25 minutes
c $5\frac{1}{2}$ hours
d $\frac{1}{2}$ an hour

5. 2 hours 25 minutes

6. 5 hours 15 minutes

7. 2 hours 35 minutes

8. 8:45am

Converting units of time

1. a 1.5 hours
b 2.5 hours
c 1.15 hours

2. a 3 hours 30 minutes
b 1 hour 10 minutes
c 1 hour 40 minutes

3. a 30 minutes
b 18 minutes
c 48 minutes

4. a 20 ÷ 50 = 0.4 hours
b 24 minutes

G4 Temperature – *page 76*

1. 14 °C

2. 37.8 °C, 38.4 °C

3. a a little more than 36.8 °C which is normal temperature
b Helena 38.3 °C which is 2.5 °C above normal,
Vikki 39.6 °C which is 2.8 °C above normal

4. 37.2 °C

G5 Length, weight and capacity – *page 78*

Understanding metric units for length, weight and capacity

1. between 10 cm and 20 cm

2. between 2 m and 3 m

3. between 300 ml and 400 ml

4. between 2.5 kg and 5 kg

5. approximately 20 ml per day

Converting and comparing metric units

1. a 540 cm
b 25 cm
c 225 cm

2. a 2.5 m
b 0.65 m
c 0.03 m

3. a 40 mm
b 25 mm
c 2 mm

4. a 5 cm
b 6.3 cm
c 0.3 cm

5. 5.3 + 3.2 + 1.9 cm = 10.4 cm

6. 68 mm, 0.07 m, 71 mm, 7.2 cm

7. a 5000 g
b 4500 g
c 2250 g

8. a 5k g
b 0.6 kg
c 0.35 kg

9. 245.775 kg

10. 9.25 kg

11. a 3000 ml
b 2 600 ml
c 4 750 ml

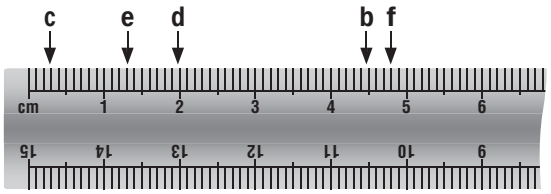
12. a 2 l
b 3.5 l
c 6.75 l

13. 0.075 litres, 0.5 litres, 750 ml

Measuring in metric units

1. **a** millilitres
b kilograms
c metres or centimetres
d grams
e metres
f kilometres

2.



3. **a** **A** 2 kg **B** 3.5 kg **C** 2.75 kg
b **A** 2 kg **B** 3 kg 500 g **C** 2 kg 750 g

4. 130g (each division represents 20 g)

5. 2.6 cm

6. 1750 ml or 1.75 l

G6 Mileage charts – *page 83*

1. 110 miles

2. 50 miles

3. 51 + 144 miles = 195 miles

G7 Remember what you have learned – *page 84*

1. A

2. B

3. C

4. C

5. B

6. B

7. C

8. D

9. C

10. C