

Maths Level 1

Chapter 4

Working with measures

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Maths Level 1

Carol Roberts

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	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> 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**.

G Working with measures

You should already know how to:

- ✓ add and subtract decimals
- ✓ read, measure and record time
- ✓ read, measure and compare lengths, weights and capacities, using appropriate metric units
- ✓ read scales to the nearest division.

By the end of this section you will know how to:

- ➡ calculate with money
- ➡ solve problems involving time, including reading timetables
- ➡ measure temperature
- ➡ convert and calculate with metric units of length, weight and capacity
- ➡ use mileage charts.

1 Calculating with money

Learn the skill

Adding and subtracting with money

Example 1: Lekitta buys a bag of crisps costing 57p, a chewy sweet for 5p and a large bar of chocolate for £1.33. How much change does she get from five pounds?

You need to find the total amount she spent first *by adding*.

$$\begin{array}{r} £0.57 \\ £0.05 \\ \underline{£1.33} + \\ £1.93 \end{array} \quad \text{adding using traditional method}$$

Now work out how much change she gets by subtracting this amount from five pounds.

Counting up from £1.93 to £2.00 gives **£0.07**.

Counting up from £2.00 to £5.00 gives **£3.00**.

$$£0.07 + £3.00 = £3.07$$

Answer: £3.07

Tip

Convert the amounts given in pence into pounds first.

Remember

5p is written as £0.05 in pounds, not £0.5 or £0.50.

Remember

This example uses the 'Counting up' method. You can use any method to add or subtract that suits you.

Multiplying with money

Example 2: Alice earns £5.30 an hour. How much does she earn in five hours?

You need to multiply £5.30 by 5.

$$\begin{array}{r} \text{£}5.30 \\ \times 5 \\ \hline \text{£}26.50 \end{array}$$

multiplying using traditional method

Answer: £26.50

Tip

When you multiply an amount of money by a whole number, keep the decimal point in the same position in the answer.

Dividing with money

Example 3: Four friends split the cost of a meal equally. If the bill for the meal comes to £49.52, how much do they each pay?

$$\begin{array}{r} 12.38 \\ 4 \overline{)49.152} \end{array}$$

Answer: £12.38



Try the skill

- Work out the answers to:
 - £32.04 + 79p
 - £20 – £3.40
 - £2.05 × 8
 - £45.06 ÷ 3
- The sign shows today's bargains at a local supermarket. A customer buys one roast chicken and two meat pies.
 - How much does the customer pay?

 - The same customer pays with a ten-pound note. How much change should he receive?

- It costs £3.75 for adults to swim at a local pool. How much will it cost five adults to swim?
- Six friends go out for a meal and the bill comes to £112.32. If they split the bill equally, how much does each one pay?

Today's special offer

Cornish pasties	69p
Meat pies	75p
Roast chickens	£3.75

Multiplying and dividing amounts by multiples of ten

▶ To multiply a decimal amount by 10 or 100, move all the digits one or two places to the left.

▶ To divide a decimal amount by 10 or 100, move all the digits one or two places to the right.

Example 4: Work out **a** $£2.45 \times 10$ **b** $£65.00 \div 100$

a $£2.45 \times 10 =$

T	U	.	t	h
	2	.	4	5
2	4	.	5	0

Answer: £24.50

b $£65.00 \div 100 =$

T	U	.	t	h
6	5	.	2	
	6	.	5	2
	0	.	6	5

Answer: £0.65

Tip

Multiplying a number by 10 or 100 makes it 10 or 100 times bigger. This is why all the digits move to the left: the place value of each digit increases.

You can break a problem into separate calculations to make it easier.

Example 5: Calculate $£12.50 \times 30$.

As $30 = 3 \times 10$, so $£12.50 \times 30$
 $= £12.50 \times 3 \times 10$.

First, multiply $£12.50$ by 3: $£12.50 \times 3 = £37.50$

Then, multiply the result by 10: $£37.50 \times 10 = £375.00$

Answer: £375.00

 **Try the skill**

1. Ring the correct answer.

- a $£1.32 \times 10$ **A** £13.20 **B** £132.00
b $£0.06 \times 100$ **A** £0.60 **B** £6.00
c 100×5.4 pence **A** £5.40 **B** £54.00

2. A farm worker is paid £6.90 an hour. How much is she paid for working ten hours?

3. Electricity costs 12.42 pence per unit. How much does it cost, in pounds, for 100 units of electricity?

4. Ring the correct answer.

- a $£50.20 \div 10$ **A** £5.02 **B** £5.20
b $£0.16 \div 100$ **A** £0.16 **B** £0.016

5. Malachi has ten weeks to save up for a trip costing £159. If he wants to save the same amount each week, how much should he save each week?

6. Use any method to work these out, but do not use a calculator.

- a $£5.40 \times 40$ **b** $£2.15 \times 30$

7. An office worker earns £8.70 per hour and works for 40 hours. How much does he earn?

2 Time

Learn the skill

Using times and dates

You need to know the units for time and the connections between them.

seconds	minutes	hours	days
60 seconds = 1 minute	60 minutes = 1 hour	24 hours = 1 day	7 days = 1 week 365 days = 1 year between 28 and 31 days = 1 month <i>it varies!</i>
weeks	months	years	
52 weeks = 1 year 4 and a bit weeks = 1 month <i>it varies!</i>	12 months = 1 year	100 years = 1 century	

Example 1: A man is sentenced to 28 days in prison. How many weeks is this?

You need to divide 28 by 7.
 $28 \div 7 = 4$

Answer: 4 weeks

Example 2: How many weeks are there in six months?

The most common error here is to assume a month is the same as 4 weeks.

There are 12 months in 1 year, so 6 months is the same as $\frac{1}{2}$ a year.

1 year = 52 weeks, so $\frac{1}{2}$ a year = 26 weeks.

Answer: 26 weeks.

Common date formats

There are many ways in which to write the date.

For example, the long way of writing the date of St. Valentines date is **14th February 2008**. A shorter way to write this date could be either of the following:

14/02/2008 or 14/02/08 ie day/month/year

Example 3: A patient sees a doctor on 1st April 2008. She needs a follow-up appointment exactly 3 weeks later. On what date is the follow-up appointment?

Using the calendar, you can see that 01/04/08 is on a Tuesday. Following this column down to cover three weeks gives us a new appointment date of 22/04/08.

Answer: 22nd April 2008.

Remember

A month is not the same as 4 weeks! This rhyme might help you remember.

'30 days in September
April, June and November;
The rest have 31, except
February, which has 28 days
clear
And 29 in each leap year.'

Tip

Americans tend to write the year first, the month second and the day last: e.g.
2008-02-14

Be very careful when the day is a number less than 12!

Mon	Tue	Wed	Thu	Fri	Sat	Sun
	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30				

Try the skill

1. How many weeks is the same as 63 days?
2. How many weeks are there in $2\frac{1}{2}$ years?
3. Write down 25th March 2008 in a shorter date format.
4. Theodore Roosevelt was born in 1858. How many centuries ago is this (taking this year as 2008)?
5. Tim has 60 days to pay his parking fine. How many weeks and days is this?
6. One recycled glass bottle saves enough energy to power a washing machine for 10 minutes. How many recycled glass bottles will it take to power a washing machine for an hour?
7. Here is the calendar for June 2008. A patient has made medical appointments on the first Friday and the last Friday of this month. On what dates are his two appointments? Write your answers using short date format.

Calendar June 2008						
Mon	Tue	Wed	Thu	Fri	Sat	Sun
						1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29
30						

8. Today's date is 05/08/08. You have arranged to meet your friend two weeks on Saturday. What is the date two weeks on Saturday?

Calendar August 2008						
Mon	Tue	Wed	Thu	Fri	Sat	Sun
				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	31

Learn the skill

Working in 12-hour and 24-hour time

These are both ways of showing twenty past three in the afternoon:

3:20pm



This is 12-hour time
or clock time

15:20



This is 24-hour time

To convert from 12-hour time to 24-hour time:

▶ leave morning (am) times the same

▶ add 12 to afternoon (pm) times.

$$3\text{pm} = 3 + 12 = 15:00 \quad 7\text{pm} = 7 + 12 = 19:00$$

Timetables can be used to plan journeys. You can use the timetable to work out what time you need to leave.

Example 1: Here is a timetable for trains travelling between Manchester Piccadilly and London Euston stations.

- a What time does the 10:32 train from Stockport arrive at London Euston, in standard clock time?
- b A man is planning to catch a train from Macclesfield to London Euston. He needs to arrive in London at 2:30pm. He wants to leave Macclesfield as late as possible. Which train should he catch?

Manchester Piccadilly	1023	1123	1223	1323
Stockport \rightarrow	1032	1132	1232	1332
Macclesfield \rightarrow	1052	1152	1252	1352
Stoke-on-Trent	1112	1212	1312	1412
Milton Keynes	1220		1423	
Watford Junction		1340		1539
London Euston	1303	1403	1503	1603

- a First find the 10:32 train from Stockport. Then read down until you find the time that lines up with London Euston: 13:03. Convert this to clock time: 1:03pm.

Answer: 1:03pm

- b Convert to 24-hour time: 2:30pm is 14:30. He must arrive on the train that arrives at 14:03. Read up the column to find the time this train leaves Macclesfield: 11:52.

Answer: 11:52

Tip

In the 24-hour clock the day runs from midnight to midnight and is divided into 24 hours, numbered from 0 to 23.
17:25 = 5:25pm ($17 - 12 = 5$)

Tip

To convert from 24-hour clock, subtract 12 from times after 13:00:

$$20:00 - 12 = 8\text{pm}$$

$$17:00 - 12 = 5\text{pm}$$

Note

There are no colons in the timetable. Sometimes 13:23 is written as 1323 to save space. This is acceptable, but 13.23 is definitely incorrect (the decimal point confuses time with decimals).

Tip

Some boxes in the timetable are blank because the train is not scheduled to stop there.

Try the skill

1. The train timetable shows train times for the journey between London Liverpool Street and Silver Street.

a At what time does the 06:52 from Cambridge Heath arrive at Seven Sisters?

b What is the latest train you can catch from Hackney Downs in order to arrive at Silver Street by 8:00am?

c What is the latest train you can catch from London Liverpool Street in order to arrive at Seven Sisters by quarter past seven in the morning?

London Liverpool Street	0615	0628	0641	0654	0707
Cambridge Heath	0626	0639	0652	0705	0718
Hackney Downs	0632	0645	0658	0711	0724
Stoke Newington	0643	0656	0709	0722	0735
Seven Sisters	0657	0710	0723	0736	0749
Silver Street	0719	0732	0745	0758	0811

2. This timetable shows times of trains between Bournemouth and Edinburgh.

a A woman wants to take a train from Bournemouth to Edinburgh. She leaves Bournemouth at ten to eight in the morning. What time will she arrive in Edinburgh?

b A man needs to arrive in Glasgow by three o'clock in the afternoon. What time should he catch a train in Birmingham to do this?

Bournemouth	0550	0620	0750	0915
Birmingham	1018	1112	1218	1343
Glasgow	1443	1513	1643	1818
Edinburgh	1517	1643	1831	1948

3 Calculating with time

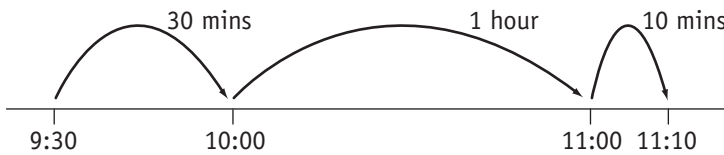
Learn the skill

Adding and subtracting with time

You need to be able to work out how long something takes. A timeline can help.

Example 1: A driver left central London at 9:30am and arrived in Oxford at 11:10am. How long did his journey take?

Sketch a timeline:



Count on from 9:30 to 10:00: 30 minutes

Between 10:00 and 11:00: 1 hour

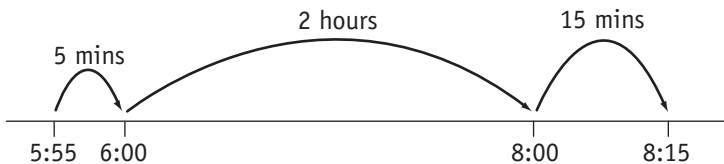
Count on from 11:00 to 11:10: 10 minutes

Add the jumps: 30 minutes + 1 hour + 10 minutes
= 1 hour 40 minutes

Answer: 1 hour 40 minutes

Example 2: A chef knows it will take two hours and twenty minutes to prepare and cook an evening meal. He starts at 5:55pm. When will the meal be ready to serve?

Sketch a timeline:



$5:55 + 2 \text{ hours} = 7:55$

$7:55 + 5 \text{ mins} = 8:00$

$8:00 + 15 \text{ mins} = 8:15$

Answer: 8:15pm

Try the skill

1. Work out how much time has passed between each pair of start and stop times.

	Start	Stop	
a	9:10am	9:30am	
b	8:15pm	10:25pm	
c	5:05am	11:40pm	
d	10:03am	12:00	

2. Three friends went to a concert. They left home at 5:45pm and arrived at the concert venue at 7:25pm. How long did the journey take them?
-

3. A video of a film starts at ten past seven in the evening and finishes later that evening at five to nine. How long does the film last?
-

4. The table gives start and stop times, using the 24-hour clock. Work out how much time has passed in each case.

	Start	Stop	
a	10:05	12:15	
b	11:20	13:45	
c	08:40	14:10	
d	23:30	02:15	

5. A television programme starts at 19:45 and finishes at 22:10. How long is the programme, in hours and minutes?
-

Remember

19:45 is in 24-hour time.
This is the same as 7:45pm.

6. A nurse starts her shift at 18:45 and finishes at 00:00. How long did her shift last?
-

Remember

Midnight is the same as 00:00
and noon or midday is 12:00.

7. A train timetable shows that a train leaving Manchester Piccadilly at 14:40 is due to arrive at London Euston at 17:15. How long will this journey take?
-

8. A family plan to catch a ferry and need to book in at 12:02am. The journey to the ferry port will take 2 hours 45 minutes. What time should they leave home in order to get to the ferry port on time?
-

How to convert from minutes to hours

Divide the number of minutes by **60** because there are 60 minutes in 1 hour.

Example 1: convert 80 minutes into **a)** hours and minutes **b)** hours

a) $80 \div 60 = 1$ with **20 left over**

Answer: 1 hour 20 minutes

b) $80 \div 60 = 1.333\dots$

Answer: 1.333... hours

How to convert from hours to minutes

Multiply the number of hours by **60** because there are 60 minutes in 1 hour.

Example 2: convert 0.6 hours into minutes

$0.6 \times 60 = 36$

Answer: 36 minutes

Try the skill

- Convert the following times into hours
a 90 minutes **b** 150 minutes **c** 75 minutes
- Convert the following times into hours and minutes
a 210 minutes **b** 70 minutes **c** 100 minutes
- Convert the following times into minutes
a 0.5 hours **b** 0.3 hours **c** 0.8 hours

4. Challenge question!

Jonathon drove to a local supermarket at an average speed of 50 kilometres per hour. The supermarket was a distance of 20 kilometres away.

How long did it take him to drive to the supermarket:

- in hours?
- in minutes?

Tip

Time = distance \div speed

4 Temperature

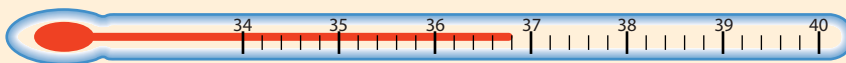
Learn the skill

Temperature is a measure of how hot or cold something is.

It is usually measured in **degrees Celsius**, although **degrees Fahrenheit** are still sometimes used.

▶ To read a temperature scale, first work out what the individual marks on the scale represent.

Example 1:



Betty measures her body temperature. What temperature does the thermometer show?

There are 5 divisions between 36°C and 37°C , so **divide** 1°C by 5.

$1 \div 5 = 0.2$, so each division is worth 0.2°C . The mercury is at 4 divisions above 36°C .

$$36 + 0.2 + 0.2 + 0.2 + 0.2 = 36.8$$

Answer: 36.8°C

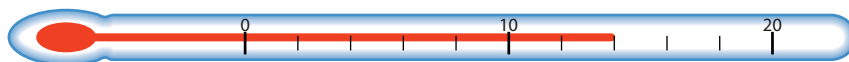
36.8°C is the human body's normal temperature.

0°C is the temperature of water as it is about to freeze.

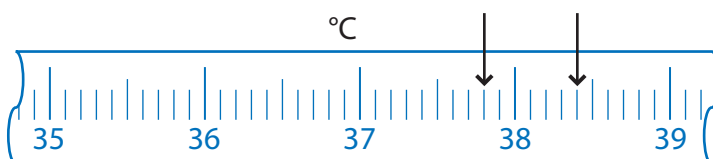
100°C is the temperature of boiling water.

Try the skill

1. What is the temperature marked on this thermometer?



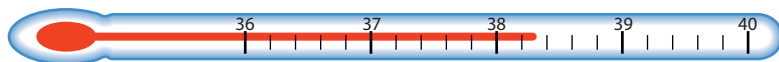
2. What temperatures are the two arrows pointing at?



3. Helena and Vikki are both off work with flu.
 a) If they are feeling hot, estimate what their temperatures might be.

- b) Their actual temperatures are shown on the thermometers.

Helena



Vikki



What are their temperatures? Helena _____
 Vikki _____

How many degrees above normal body temperature are these temperatures?

Remember

Normal body temperature is 36.8 °C

4. What is the temperature marked on this thermometer?

