

Unit 7 Measures

Five daily lessons

Year 5
Spring term

Unit Objectives Year 5

- **Understand area measured in square centimetres (cm²).**
Understand and use formula in words 'length x breadth' for the area of a rectangle.
- Use, read and write standard metric units (km, m, cm, mm, kg, g, l, ml), including their abbreviations, and relationships between them. Convert larger to smaller units (e.g. km to m, m to cm or mm, kg to g, l to ml).
- Suggest suitable units and measuring equipment to estimate or measure length, mass or capacity.
Record estimates and readings from scales to a suitable degree of accuracy.

Supplement of Examples

Page 97

Page 91

Pages 93, 95

This Unit Plan is designed to guide your teaching.
You will need to adapt it to meet the needs of your class.

Resources needed to teach this unit:

- Activity sheet 7.1
- Activity sheet 7.2
- OHT 7.1
- OHT 7.2
- Counting stick
- Variety of items weighing 1kg, including 1kg weights
- Weighing scales
- Whiteboards
- OHP calculator
- Empty unlabelled litre and 2 litre bottles
- Bottles or jugs holding different amounts of liquid
- Measuring jug in centilitres

Link Objectives

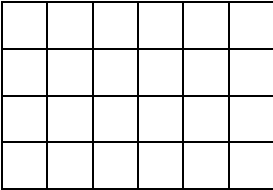
Year 4

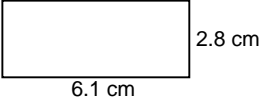
Year 6

- Measure and calculate the perimeter and area of rectangles and other simple shapes, using counting methods and standard units (cm, cm²).
- Use, read and write standard metric units (km, m, cm, mm, kg, g, l, ml), including their abbreviations.
- **Know and use the relationships between familiar units of length, mass and capacity.**
- now the equivalent of $\frac{1}{2}$, $\frac{1}{4}$, $\frac{3}{4}$ and $\frac{1}{10}$ of 1 km, 1 m, 1 kg, 1 litre, in m, cm, g, ml.
- Suggest suitable units and measuring equipment to estimate or measure length, mass or capacity.
Record estimates and readings from scales to a suitable degree of accuracy.

- **Calculate the perimeter and area of simple compound shapes that can be split into rectangles.**
- Use, read and write standard metric units (km, m, cm, mm, kg, g, l, ml, cl), including their abbreviations, and relationships between them.
- Convert smaller to larger units (e.g. m to km, cm or mm to m, g to kg, ml to l) and vice versa.
- Suggest suitable units and measuring equipment to estimate or measure length, mass or capacity.
Record estimates and readings from scales to a suitable degree of accuracy.

(Key objectives in bold)

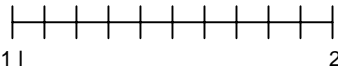
Planning sheet	Day One	Unit 7 Measures	Term: Spring	Year Group: 5
Oral and Mental		Main Teaching		Plenary
Objectives and Vocabulary	Teaching Activities	Objectives and Vocabulary	Teaching Activities	Teaching Activities/Focus Questions
<p>Recall multiplication facts up to 10 x 10.</p> <p>VOCABULARY double</p> <p>RESOURCES Whiteboards</p>	<ul style="list-style-type: none"> Ask random multiplication facts (to 10 x 10) for the class to answer orally together on your signal. Remind children about strategies for quickly working out any facts which they cannot instantly recall, e.g. doubling x3 to find x6; doubling x4 to find x8 (or double and double again x2); subtracting the other factor from x10 to find x9 (e.g. for 6 x 9 subtract 6 from 6 x 10). Ask for the multiplication facts children often find difficult to remember (e.g. 6 x 7, 6 x 8, 7 x 8). Children to show answers using whiteboards. After each answer, ask children to record the fact on paper if they were unable to answer it in the given time. Children should try to learn their recorded facts. 	<p>Understand area measured in square centimetres.</p> <p>Begin to understand the formula in words 'length x breadth' for the area of a rectangle.</p> <p>VOCABULARY area covers surface dimensions length breadth width square centimetre (cm²) perimeter</p> <p>RESOURCES OHT 7.1</p>	<ul style="list-style-type: none"> Remind the class about the meaning of 'area', e.g. ask the children to indicate the area of their table or desktop and establish that it is the top surface. Remind children that the area of a 2-D shape is the amount of space within its perimeter. Draw a 6 by 4 rectangle on the board, i.e.  <p>Q How can we work out the area of this rectangle?</p> <p>Establish that this can be found by counting the squares it contains. Ask children to count the squares. Record the area as 24 squares. Remind them that if the sides are in cm, the area is 24 square centimeters and can be abbreviated to 24 cm².</p> <ul style="list-style-type: none"> Ask the children to draw other rectangles on their paper, find their areas and record in cm². Take feedback, asking children to give the dimensions and the areas of their rectangles. <p>Q Can anyone explain a quick way to work out the area of the rectangles?</p> <p>Discuss and establish that multiplying the number of squares in each row by the number in each column gives the area. Show how these are equivalent to the length and the width or breadth. Establish that the area of a rectangle can be written as 'length x breadth' or 'length x width'.</p> <ul style="list-style-type: none"> Ask children to draw further rectangles and find their areas by multiplying the length by the width, recording the results in cm². Collect results and discuss strategies. Ask: <p>Q If you double the length of a rectangle what would happen to its area?</p> <p>Q What would happen to the area if you doubled the length and the width?</p> <ul style="list-style-type: none"> Return to the 6 by 4 rectangle and say this represents a patio. Say that each paving slab measures 60 cm by 60 cm. <p>Q If we used 30cm by 30cm paving slabs instead would we need twice as many?</p> <ul style="list-style-type: none"> Draw out that four of the smaller slabs would fit onto each larger slab and so we would need four times the number of slabs. When the length and breadth are halved, the area is quartered. 	<ul style="list-style-type: none"> Show the first shape on OHT 7.1. <p>Q How can we find its area?</p> <p>Encourage children to divide the shape into rectangles, and write in the missing dimensions.</p> <p>Establish the area is 40 cm².</p> <ul style="list-style-type: none"> Ask children to draw a similar shape but this time with the dimensions half those of the OHT's shape. <p>Q What's the area of this smaller shape?</p> <p>Collect answers and agree it is 10 cm².</p> <ul style="list-style-type: none"> Show the second shape on OHT 7.1 and repeat the above. <p>By the end of the lesson the children should be able to:</p> <ul style="list-style-type: none"> Express the formula for the area of a rectangle first in words, then in letters; Choose a suitable unit to estimate the area. <p>(Refer to supplement of examples, section 6, page 97.)</p>

Planning sheet		Day Two		Unit 7 Measures	Term: Spring	Year Group: 5
Oral and Mental			Main Teaching			Plenary
Objectives and Vocabulary	Teaching Activities	Objectives and Vocabulary	Teaching Activities			Teaching Activities/Focus Questions
<p>Use doubling to multiply two-digit numbers by 4. Halve any two-digit number.</p> <p>VOCABULARY double halve fraction decimal</p>	<ul style="list-style-type: none"> Write any two-digit number on the board and ask the class to double it, saying the answer together on your signal. Repeat with other two-digit numbers. Give children two-digit numbers to halve. Discuss how halves of odd numbers can be expressed as fractions or decimals. Ask children to halve odd numbers. State whether the answer is to be given as a fraction or a decimal. Write 24 on the board. <p>Q What is a quick way to multiply this number by 4?</p> <p>Discuss and establish doubling twice as a quick mental method. Ask the class to multiply given numbers by 4 saying the answers together as before.</p>	<p>Understand area measured in square centimetres.</p> <p>Understand and use the formula in words 'length x breadth', for the area of a rectangle.</p> <p>VOCABULARY area dimensions square centimetre (cm²) square millimetre (mm²) square metre (m²)</p> <p>RESOURCES Activity sheet 7.1 OHP calculator</p>	<ul style="list-style-type: none"> Remind the class that they used cm² to find the areas of shapes in the previous lesson and write cm² on the board. Sketch a square on the board and write 1 metre on each side. Say this represents a square metre and record 1 m² on the board. <p>Q How many cm² are there in 1 square metre? How did you work it out?</p> <p>Discuss and establish that 1 m² = 10 000 cm². (Length and breadth each 100 cm.)</p> <ul style="list-style-type: none"> Ask the class to visualise a millimetre square. Discuss its size in relation to 1cm² and establish the notation mm². <p>Q How many mm² are there in 1 cm²</p> <p>Establish that 100 mm² = 1 cm². (Length and breadth each 10 mm.)</p> <p>Q Which of the three units (m², cm², mm²) would be best for measuring the area of the classroom floor?</p> <p>Repeat with other familiar areas, including very small surfaces.</p> <ul style="list-style-type: none"> Draw on the board the following rectangle.  <p>Remind children that the area of a rectangle is 'length x breadth' or l x b in shorthand. In this case the area would be 6.1 x 2.8 cm² but you want children to give you an estimate of the area.</p> <p>Q What is the approximate area of this rectangle?</p> <p>Establish that rounding up and down leads to an approximate area of 6 x 3 = 18 cm². Repeat with similar examples.</p> <ul style="list-style-type: none"> Give out Activity sheet 7.1. Ask the children to work in groups to estimate the area of each rectangle. 			<ul style="list-style-type: none"> Discuss results and units used. <p>Identify in which of the rectangles the children think the area has been underestimated. Use an OHP calculator to find the areas of each rectangle. Round the areas to the nearest whole number and compare with their estimates.</p> <p>Q What areas of shapes in the classroom would you measure in mm²? cm²? m²?</p> <p>Collect children's suggestions and discuss whether they are sensible.</p> <p>By the end of the lesson the children should be able to:</p> <ul style="list-style-type: none"> Express the formula for the area of a rectangle first in words, then in letters; Choose a suitable unit to estimate the area. <p>(Refer to supplement of examples, section 6, page 97.)</p>

Planning sheet		Day Three (page 1 of 2)		Unit 7 Measures	Term: Spring	Year Group: 5
Oral and Mental		Main Teaching				Plenary
Objectives and Vocabulary	Teaching Activities	Objectives and Vocabulary	Teaching Activities			Teaching Activities/Focus Questions
Know what each digit represents in a number with up to two decimal places. Round decimals to the nearest whole number. 						

Planning sheet	Day Three (page 2 of 2)	Unit 7 Measures	Term: Spring	Year Group: 5																											
Oral and Mental		Main Teaching		Plenary																											
Objectives and Vocabulary	Teaching Activities	Objectives and Vocabulary	Teaching Activities	Teaching Activities/Focus Questions																											
			<table><tr><td>kg</td><td>kg and g</td><td>g</td></tr><tr><td>1.25 kg</td><td>1 kg 250 g</td><td>1250 g</td></tr><tr><td>1.5 kg</td><td></td><td></td></tr><tr><td></td><td>1 kg 900 g</td><td></td></tr><tr><td>0.7 kg</td><td></td><td></td></tr><tr><td></td><td>1 kg 750 g</td><td></td></tr><tr><td></td><td></td><td>380 g</td></tr><tr><td>0.24 kg</td><td></td><td></td></tr><tr><td></td><td></td><td>2040 g</td></tr></table> <p>Ask children to copy and complete the table in their books.</p>	kg	kg and g	g	1.25 kg	1 kg 250 g	1250 g	1.5 kg				1 kg 900 g		0.7 kg				1 kg 750 g				380 g	0.24 kg					2040 g	<div><p>By the end of the lesson the children should be able to:</p><ul style="list-style-type: none">• Use correctly the abbreviations g and kg;• Understand and use the relationship between g and kg;• Know the equivalent of one-half, one-quarter, three-quarters, one-tenth and one-hundredth of a kilogram in grams.<p>(Refer to supplement of examples, section 6, page 91.)</p></div>
kg	kg and g	g																													
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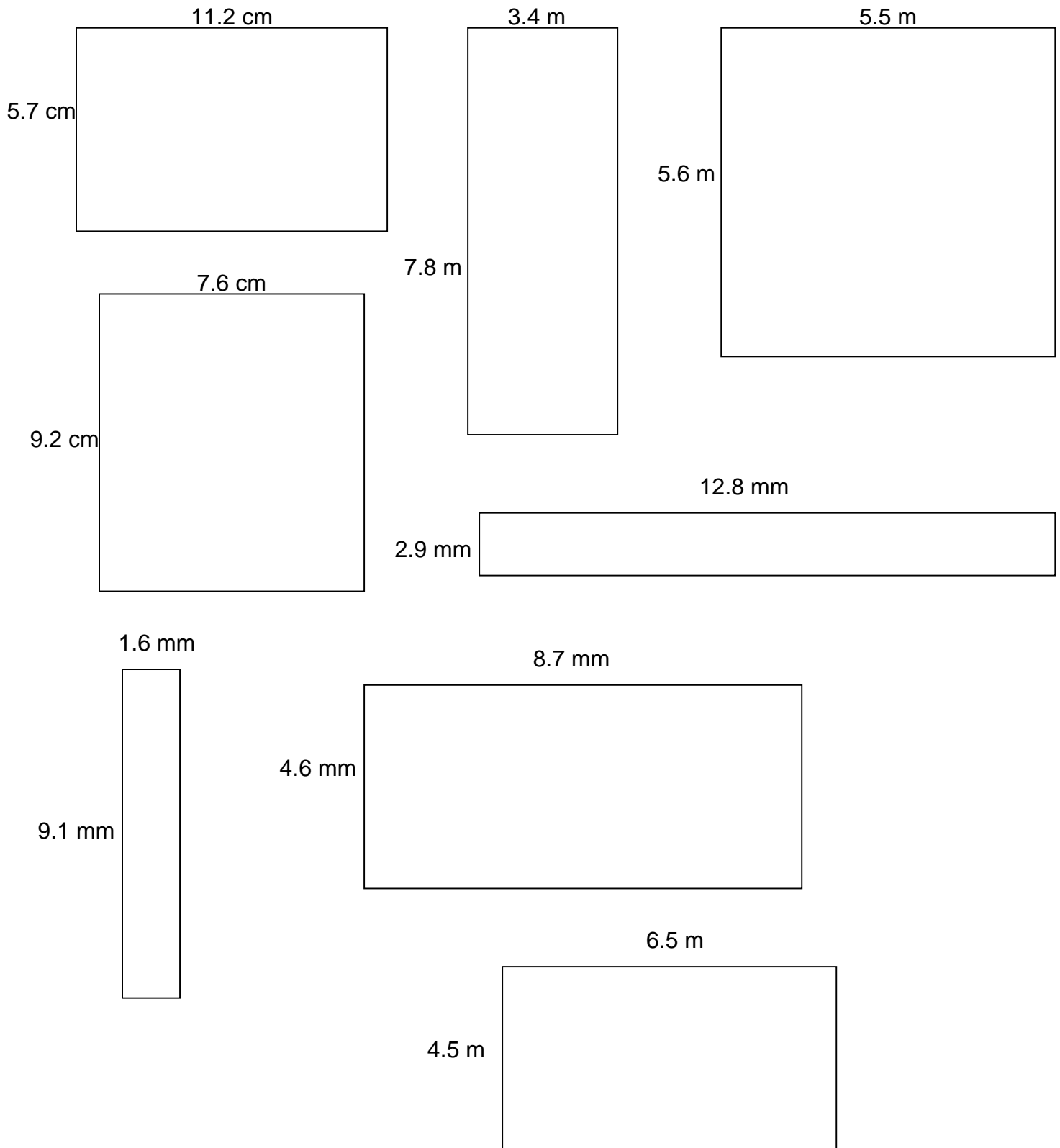
Planning sheet		Day Four		Unit 7 Measures		Term: Spring		Year Group: 5		
Oral and Mental			Main Teaching					Plenary		
Objectives and Vocabulary		Teaching Activities		Objectives and Vocabulary		Teaching Activities			Teaching Activities/Focus Questions	
Convert kg to g. <div>Q How many grams in 1 kg?</div> <div>Record: 1 kg = 1000 g.</div> <ul style="list-style-type: none">Point to the middle of the stick. <div>Q What mass does this point represent?</div> <ul style="list-style-type: none">Draw out that this can be expressed in several ways: 0.5 kg, 1/2 kg, 500 g.Point to intervals on the counting stick, such as 1/4 kg, 3/4 kg, 1/10 kg. <div>Q What mass does this represent, how else can we express this?</div> <div>Repeat using fifths etc and introducing values between intervals on the stick.</div> <div>VOCABULARY equivalent mass</div> <div>RESOURCES Counting stick</div>		<ul style="list-style-type: none">Say that one end of the counting stick represents 0 g and the other 1 kg. <div>Q How many grams in 1 kg?</div> <div>Record: 1 kg = 1000 g.</div> <ul style="list-style-type: none">Point to the middle of the stick. <div>Q What mass does this point represent?</div> <ul style="list-style-type: none">Draw out that this can be expressed in several ways: 0.5 kg, 1/2 kg, 500 g.Point to intervals on the counting stick, such as 1/4 kg, 3/4 kg, 1/10 kg. <div>Q What mass does this represent, how else can we express this?</div> <div>Repeat using fifths etc and introducing values between intervals on the stick.</div> <div>VOCABULARY kilogram gram mass nearest approximately</div> <div>RESOURCES OHT 7.2 Activity sheet 7.2</div>		<ul style="list-style-type: none">Show the first scale on OHT 7.2. Write 100 g in the box on the first scale. <div>Q What is the value of each interval?</div> <div>Establish it is 10 g. Point to an interval and ask what value it represents. Repeat indicating points between the intervals. Replace the 100 g in the box with 200 g.</div> <div>Q How does this change the values of the intervals?</div> <div>Collect answers and agree the intervals are now worth 20 g.</div> <div>Q Where would 60 g appear? What about 130 g?</div> <div>Ask children to show these values on the scale. Repeat changing 200 g to 400 g and 800 g.</div> <ul style="list-style-type: none">Display the second circular scale. <div>Q Where have you seen a scale like this?</div> <div>Discuss the difference between a linear and a circular scale. Write 500 g in the box.</div> <div>Q What is the value of each interval?</div> <div>Establish it is 50 g. Ask children to identify different values on the scale and to show where values such as 100 g, 350 g and 210 g appear on the scale. Change the 500 g to 2 kg and ensure children can read the scale.</div> <ul style="list-style-type: none">Show the third scale. Explain that this is a finer scale. Write 100 g in the box. <div>Q What is the value of each large and each small marker?</div> <div>Establish the large marks are 10 g and the small markers 5 g.</div> <div>Q Where would 40 g, 65 g and 87 g appear?</div> <div>Ask children to identify values on the scale. Change the 100 g to 50 g.</div> <div>Q What are the markers worth now?</div> <div>Collect responses and discuss the change to the scale. Establish that the large markers are worth 5 g and the small 2.5 g.</div> <div>Q Where would 30 g, 12.5 g, 47.5 g appear?</div> <div>Discuss the strategies the children might use to locate the values. With the class count up in 5 g then 2.5 g to help them locate the points.</div> <ul style="list-style-type: none">Give out Activity sheet 7.2 for the children to complete.					<ul style="list-style-type: none">Discuss children's answers and clarify any misconceptions.Write a set of masses on the board such as: 1.1 kg, 375 g, 1.25 kg, 0.3 kg, 650 g, 1040 g, 0.7 kg. Ask children to discuss in pairs which is the lightest and the heaviest mass, then the order of those between. Take feedback and agree the order with the class. <div>By the end of the lesson the children should be able to:</div> <ul style="list-style-type: none">Use the relationships between metric units of mass;Read scales between divisions;Record estimates and readings from scales. <div>(Refer to supplement of examples, section 6, pages 91 and 95.)</div>	

Planning sheet		Day Five (page 1 of 2)		Unit 7 Measures	Term: Spring	Year Group: 5
Oral and Mental			Main Teaching			Plenary
Objectives and Vocabulary	Teaching Activities	Objectives and Vocabulary	Teaching Activities	Teaching Activities/Focus Questions		
<p>Multiply and divide any positive integer up to 10 000 by 10 or 100 and understand the effect.</p> <p>VOCABULARY kilogram gram</p> <p>RESOURCES Weighing scales</p>	<ul style="list-style-type: none"> Take a pencil and in front of children weigh the pencil. Record on the board: e.g. 1 pencil 5 g <div>Q What would 10 pencils, 100 pencils weigh?</div> <p>Record on the board: 10 pencils 50 g 100 pencils 500 g</p> <ul style="list-style-type: none"> Ask children to identify an object in the class they think will weigh the same as the 10 pencils. Weigh the object in front of the children and record the weight on the board as before. <div>Q How close to the weight of 10 pencils is the weight of this object?</div> <p>Compare the weights and calculate the differences.</p> <div>Q What would 10 objects, 100 objects weigh?</div> <p>Record these values on the board as before.</p> <ul style="list-style-type: none"> Repeat the process, asking children to identify an object that weighs the same as 10 objects. When a set of data has been collected discuss the effect of multiplying by 10 and 100 on the position of the digits. Use other examples to introduce division e.g. <div>Q If 100 rulers weigh about 1550 kg, what would 10 rulers weigh? One ruler weigh?</div> <p>Weigh a ruler and multiply its weight by 10 and 100 to compare with 1550 g.</p>	<p>Record estimates and readings from scales to a suitable degree of accuracy.</p> <p>Suggest suitable units and measuring equipment to estimate or measure mass.</p> <p>VOCABULARY mass scale kilogram gram</p> <p>RESOURCES Items weighing 1 kg, (e.g. bags of sugar, pasta, potatoes or other vegetables; parcels made up with different materials), each labelled 1 kg. Items as above or classroom items weighing more and less than 1 kg Range of weighing scales with dials Labels</p>	<ul style="list-style-type: none"> Take feedback about the homework set on day 3. Compile a list on the board of items suggested with which all children should be familiar, e.g. tin of beans; sliced loaf; tub of margarine; chocolate bar; packet of crisps etc. Highlight the differences in weight between the items and establish that most of the items are measured in grams. <div>Q What do we call 1000 g?</div> <p>Remind children that kilo means '1000 of' and there are kilometres, kilolitres, kilowatts and other units they might have met in science. Collect any suggestions from the children.</p> <ul style="list-style-type: none"> Ask: <div>Q What do metres and kilometres measure? Q What do litres and kilolitres measure?</div> <p>Establish that m and km measure length or distance and l and kl measure capacity or volume. Discuss the abbreviations and include cm, mm and cl, ml. Remind children in centimetres and centilitres the centi means one hundredth of and in millimetres the milli means one thousandth.</p> <ul style="list-style-type: none"> Show the children an empty litre bottle of squash and an empty 2-litre bottle of lemonade, each with the label removed. Say that when liquid is put into these bottles the volume of liquid or the capacity of the bottle to hold the liquid is measured in litres. <div>Q What quantities of liquid does each of these bottles hold?</div> <p>Collect answers and establish that one holds 1 litre and the other 2 litres.</p> <div>Q Does one look twice the volume of the other?</div> <ul style="list-style-type: none"> Explain that estimating capacity is difficult. <div>Q What would a kilolitre look like?</div> <p>Establish it would be the equivalent of 1000 litre bottles of liquid or 500 of the 2-litre bottles.</p> <div>Q Suppose you drank 5 litres of water each day, how long would it take to drink 1 kl?</div> <p>Collect answers and establish that this is 200 days or $200 \div 7$ gives 28 weeks and 4 days. Remind children there are 28 days in February so it would take about 1 month to drink 1 kl of water.</p>	<ul style="list-style-type: none"> On the board write: 4.75 l, 478 cl, 4.56 l, 4.85 l, 469 cl, 4700 ml. <div>Q Which of these values is the greatest/smallest?</div> <p>Collect answers and ask children to put them in order smallest first. Collect answers and correct any errors or misunderstandings.</p> <ul style="list-style-type: none"> Draw a number line on the board:  <p>Label the ends 1 l and 2 l. Point to markers on the scale for children to read in l and then in cl and ml.</p> <ul style="list-style-type: none"> Re-label the ends 200 cl and 400 cl. <div>Q What are these values in litres?</div> <p>Collect answers and discuss the scale. Ask children to read values on the scale giving their answers in cl, ml and then in l.</p>		

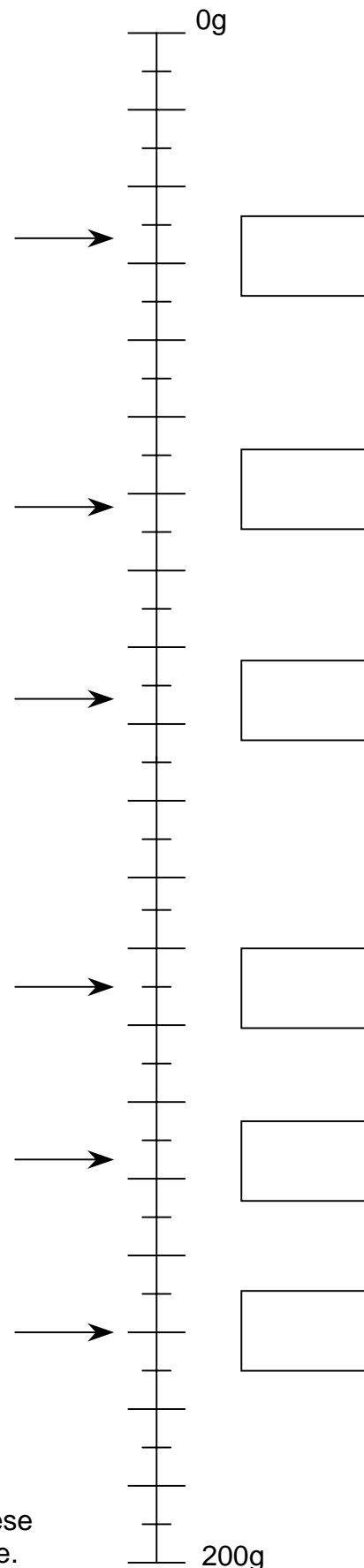
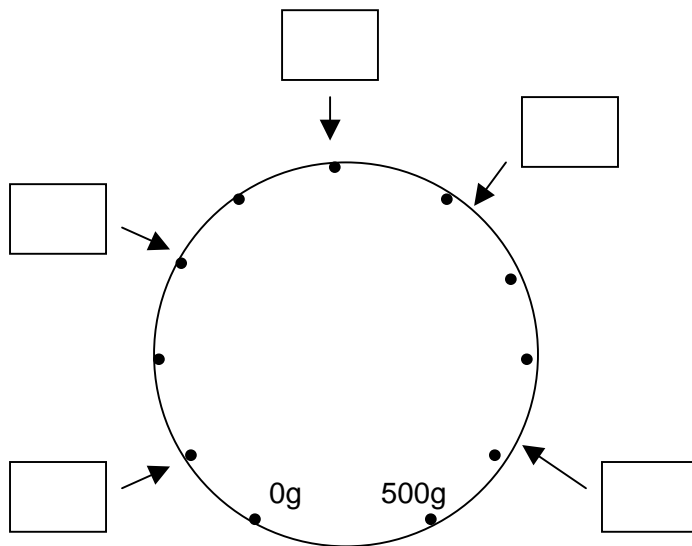
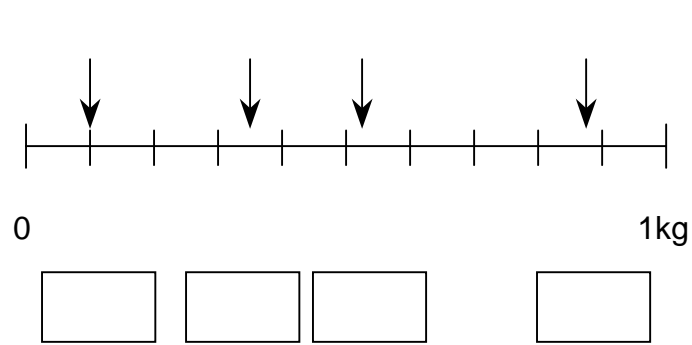
Planning sheet	Day Five (page 2 of 2)	Unit 7 <i>Measures</i>	Term: <i>Spring</i>	Year Group: 5
Oral and Mental		Main Teaching		Plenary
Objectives and Vocabulary	Teaching Activities	Objectives and Vocabulary	Teaching Activities	Teaching Activities/Focus Questions
	<ul style="list-style-type: none"> Repeat asking questions about groups of 100 other objects and dividing by 10 and 100. Discuss the effect of dividing by 10 and 100 on the position of the digits. 		<ul style="list-style-type: none"> Explain that containers smaller than 1 litre are measured in cl or ml. Use a can of cola as an example. <div data-bbox="987 355 1731 379" style="border: 1px solid black; padding: 2px;">Q What is a medicine spoon measured in?</div> <p>Explain that it holds 5 ml, a very small amount.</p> <ul style="list-style-type: none"> Show the class a bottle or jug holding less than 1 litre. <div data-bbox="987 507 1731 531" style="border: 1px solid black; padding: 2px;">Q How much liquid is in this? Is it more or less than 1 l?</div> <p>Collect estimates. Use the 1 l bottle to confirm it is less than 1l then measure the amount of liquid in cl.</p> <p>Repeat using other quantities of liquid each time comparing against the 1 l bottle.</p> <ul style="list-style-type: none"> Show the class a bottle or jug holding between 1 and 2 litres. <div data-bbox="987 758 1731 782" style="border: 1px solid black; padding: 2px;">Q How much liquid is in this?</div> <p>Using the 1 l bottle show there is more than 1 l and the 2 l bottle to show there is less than 2 l. Measure the amount of liquid in l and cl.</p> <div data-bbox="987 882 1731 906" style="border: 1px solid black; padding: 2px;">Q How can we write this?</div> <p>Represent values such as 1l 45 cl as 145 cl and 1.45 l and 1450 ml.</p> <p>Repeat using other quantities of liquid.</p>	<div data-bbox="1762 379 2152 778" style="border: 1px solid black; padding: 10px;"> <p>By the end of the lesson the children should be able to:</p> <ul style="list-style-type: none"> Use correctly the abbreviations: kl, l, cl, ml; Estimate and check using standard metric units; Respond to questions such as do you think there is less or more than 1 litre of water in this jar? <p>(Refer to supplement of examples, section 6, page 91, 93 and 95.)</p> </div>

Estimate the area of each rectangle. They are not drawn to scale.

Record the area inside each rectangle.



1. Write in the box the mass shown by the arrow on each scale. Be as accurate as you can.



2. Draw a scale which could be used to show each of these masses. Mark the position of each mass on your scale.

2 kg

0.5 kg

3700 g

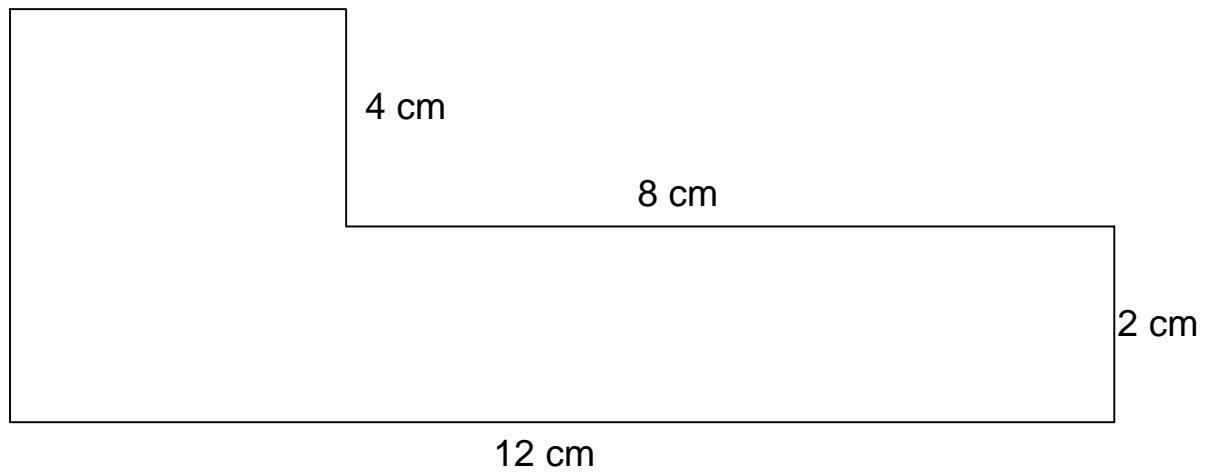
4.25 kg

2.8 kg

1.3 kg

These shapes are not drawn to scale. Calculate their area.

1.



2.

