

Unit 4

Measures – time, mass and area

Five daily lessons

National
Numeracy Strategy

Year 4
Spring term

Unit Objectives Year 4

- Estimate/check times using seconds, minutes, hours.
- **Know and use the relationships between familiar units of mass.**
- Know the equivalent of a quarter, a half, three-quarters and one-tenth of 1kg in grams.
- Suggest suitable units and measuring equipment to estimate or measure mass.
- Record estimates and readings from scales to suitable degree of accuracy.
- Measure and calculate the perimeter and area of rectangles and other simple shapes, using counting methods and standard units (cm, cm²).

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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:

- Resource sheet 4.1
- Activity sheet 4.1
- Activity sheet 4.2
- OHT 4.1
- OHT 4.2
- OHT 4.3
- OHT 4.4
- OHT 4.5
- OHT 4.6
- Clock with second hand
- 1 minute timers
- Sets of items for weighing
- Weighing scales
- Counting stick
- 1cm² paper
- Arrow card
- Number fans
- Card

Link Objectives

Year 3

Year 5

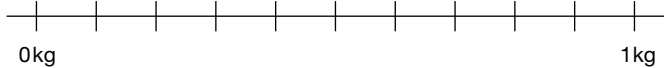
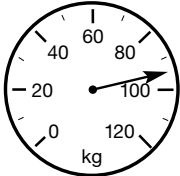
- **Use units of time and know the relationships between them (second, minute, hour, day, week, month, year).**
- Read and begin to write the vocabulary related to mass.
- Know the relationships between kilograms and grams.
- Read scales to the nearest division.
- Record, estimate and measure to the nearest whole or half unit.


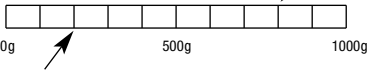
- Use units of time; read the time on a 24-hour digital clock and use 24-hour clock notation, such as 19:53.
- Use, read and write standard metric units (kg, grams) including their abbreviations, and relationships between them.
- Convert larger to smaller units.
- Suggest suitable units and measuring equipment to estimate or measure mass.
- **Understand area measured in square centimetres (cm²). Understand and use the formula in words 'length × breadth' for the area of a rectangle.**

(Key objectives in bold)

department for
education and skills

Planning sheet	Day One	Unit 4 Measures – time, mass and area	Term: Spring	Year Group: 4
Oral and Mental		Main Teaching		Plenary
Objectives and Vocabulary	Teaching Activities	Objectives and Vocabulary	Teaching Activities	Teaching Activities / Focus Questions
Count in steps of five minutes from given starting points and calculate time elapsed. 				

Planning sheet	Day Two	Unit 4 Measures – time, mass and area	Term: Spring	Year Group: 4
Oral and Mental		Main Teaching		Plenary
Objectives and Vocabulary	Teaching Activities	Objectives and Vocabulary	Teaching Activities	Teaching Activities / Focus Questions
<p>Suggest suitable units of measurement for time, length, mass.</p>	<ul style="list-style-type: none"> Revise familiar units of measurement for time, length and mass. Introduce ‘mass’ as another word for ‘weight’. Display OHT 4.2. Discuss the units on the display. Give children number fans. Ask children to show the number of the box on the OHT that shows the unit they would use to measure the following. <div> <p>Q Which unit would you use to measure:</p> <ul style="list-style-type: none"> the length of the classroom the length of time usually spent in assembly how heavy a lunch box is the length of the playground the distance to the moon the mass of an elephant the mass of a 1p coin how long it takes to watch a video the thickness of a rubber the mass of six tennis balls how long it would take you to count to 1000 in tens. </div> <p>Discuss children’s responses.</p>	<p>Suggest suitable units and measuring equipment to estimate or measure mass.</p> <p>Record estimates and readings from scales to a suitable degree of accuracy.</p> <p>VOCABULARY mass lightest heaviest kilogram (kg) gram(g) scales</p> <p>RESOURCES Card OHT 4.3 a set of six items for each group to weigh: each set should include one ‘benchmark’, e.g. a kilogram weight or a bag of sugar. Blank out any written measurements on all items apart from the benchmark. a set of weighing scales per group</p>	<ul style="list-style-type: none"> Divide children into small groups. Provide each group with a selection of items. Ask each group to estimate and identify the lightest and heaviest objects, then compare the others, placing all the items in order of weight. Draw on the board: <div>  </div> <p>Explain that it represents a scale for measuring weight from 0kg to 1kg.</p> <div> <p>Q What weight is the middle division? What are the other divisions worth?</p> </div> <p>Write 220g on a post-it:</p> <div> <p>Q Where would 220g go on the scale?</p> </div> <p>Stick the post-it where the children say and help them to place it in the correct position.</p> <p>In groups each child will hold a kg/weight as a benchmark. Ask each group to estimate the mass of one of their items, write their estimate in grams (g) on a card and place on the number line.</p> <div> <p>Q Why have you put your estimate there?</p> <p>Q What helped you make your estimate?</p> </div> <p>Repeat with other items.</p> Working in their groups with a set of scales, pupils take turns to weigh items accurately and record the actual mass on their own number line similar to the one on the board. Discuss results. Compare estimates to some recorded results. <div> <p>Q What was the difference between the estimate and actual mass?</p> </div> <div> <p>Q Did our estimates get better?</p> </div>	<ul style="list-style-type: none"> Display OHT 4.3 showing a range of different scales. <p>Discuss labelled divisions and strategies to read the dials. Ask questions such as:</p> <div> <p>Q What step is the scale going up in?</p> <p>Q How did you work it out?</p> <p>Q What does each division represent?</p> </div> <p>Remind the children of the key points:</p> <ul style="list-style-type: none"> Work out what each division stands for. Use what you know to work out what you don’t know. <p>HOMEWORK – Find three things at home which weigh more than 1kg and three things which weigh less than 1kg.</p> <div> <p>By the end of the lesson the children should be able to:</p> <ul style="list-style-type: none"> Estimate and measure the mass of an object; Read and approximate scales, for example: <div>  </div> <p>(Refer to supplement of examples, section 6, pages 90–94.)</p> </div>

Planning sheet	Day Three	Unit 4 Measures – time, mass and area	Term: Spring	Year Group: 4
Oral and Mental		Main Teaching		Plenary
Objectives and Vocabulary	Teaching Activities	Objectives and Vocabulary	Teaching Activities	Teaching Activities / Focus Questions
<p>Read measuring scales to the nearest division.</p> <p>RESOURCES counting stick</p>	<ul style="list-style-type: none"> Use a counting stick. Label the stick in 100g divisions.  <ul style="list-style-type: none"> Ask the class to count forward and back in hundreds. Remove all labels except 0g, 500g and 1000g. Repeat.  <ul style="list-style-type: none"> Pointing to different divisions, ask: <div>Q What measurement is this? Q How did you work it out?</div> Ask children to estimate points in between divisions. <div>Q What is that to the nearest 100g?</div> 	<p>Know and use the relationship between familiar units of mass.</p> <p>Know the equivalent of $\frac{1}{4}$, $\frac{1}{2}$, $\frac{3}{4}$ and $\frac{1}{10}$ of 1 kg in grams.</p> <p>VOCABULARY equivalent convert mass heavier lighter</p> <p>RESOURCES counting stick OHT 4.4</p>	<p>Refer to previous day's homework.</p> <ul style="list-style-type: none"> Ask children to identify three things they found at home that weighed more than 1 kg and three things less than 1 kg. Continue to use the counting stick. <p>Point to 500g.</p> <div>Q Can you tell me another way of saying 500g? ($\frac{1}{2}$ kg; 0.5 kg)</div> <p>Record on board.</p> <div>Q Where would $\frac{1}{4}$ kg be? Q How do you know? Q How many grams is that? Q What other strategies could you use to find the same answer?</div> <p>Repeat to illustrate $\frac{3}{4}$ kg. Each time, record equivalences on board.</p> <ul style="list-style-type: none"> Remind children that halves give two equal parts and quarters give four equal parts. <div>Q What do we call ten equal parts? Q How many grams are there in $\frac{1}{10}$ kg? Q What other tenths of 1 kg do we know now?</div> <ul style="list-style-type: none"> Display OHT 4.4. With class identify one equivalence e.g. $1\frac{1}{4}$ kg and 1250g. Record on board $1\frac{1}{4}$ kg = 1250g. <p>Children work in pairs to find all equivalent pairs.</p> <p>Collect answers, discuss methods and correct errors and misunderstandings.</p> <p>Ask questions such as.</p> <div>Q Which is heavier, $\frac{3}{4}$ kg or 700g? Q Which is lighter, $\frac{1}{4}$ kg or 400g? Q Why is $1\frac{1}{4}$ kg more than 1000g?</div>	<ul style="list-style-type: none"> On the board write 500g. <div>Q If we add $\frac{1}{4}$ kg to 500g how many grams is this?</div> <p>Give children time to work through answer. Refer to the equivalences they have found to agree that $500\text{g} + \frac{1}{4}\text{kg} = 750\text{g}$. Repeat using other combinations.</p> <div>By the end of the lesson the children should know that:</div> <ul style="list-style-type: none"> 1 kg = 1000g $\frac{1}{4}$ kg = 250g $\frac{1}{2}$ kg = 500g $\frac{3}{4}$ kg = 750g $\frac{1}{10}$ kg = 100g <p>(Refer to supplement of examples, section 6, page 90.)</p>

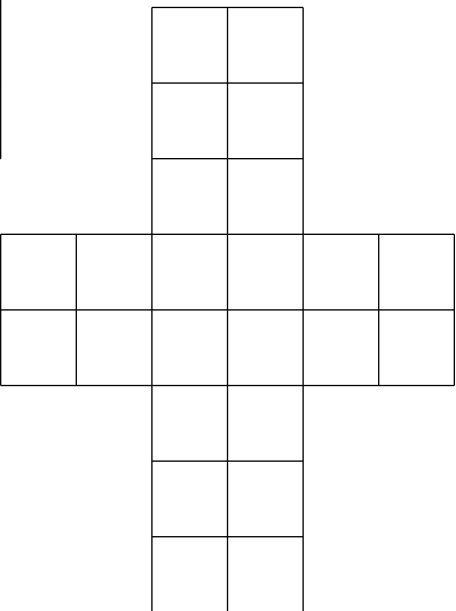
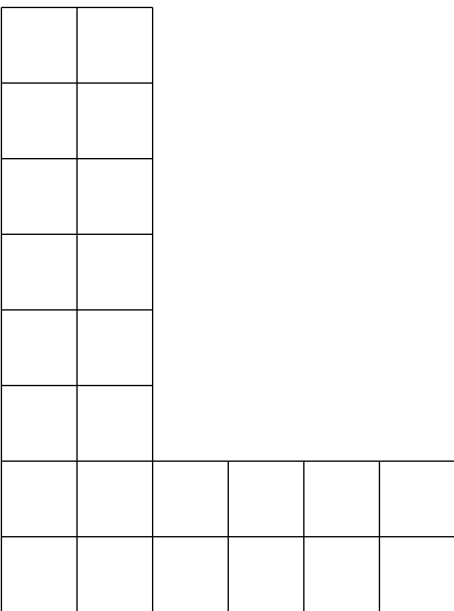
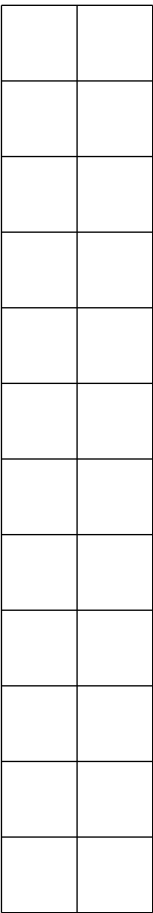
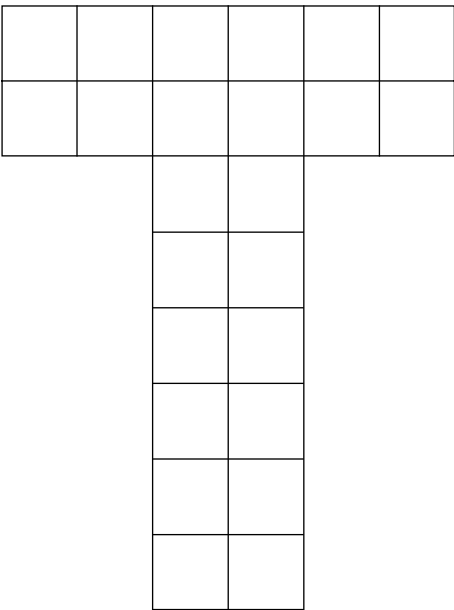
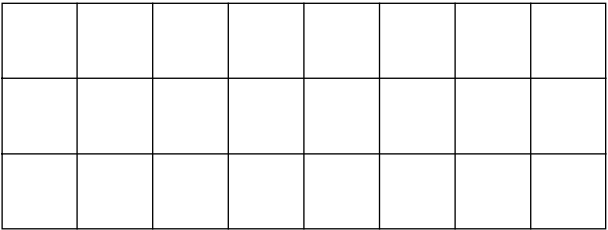
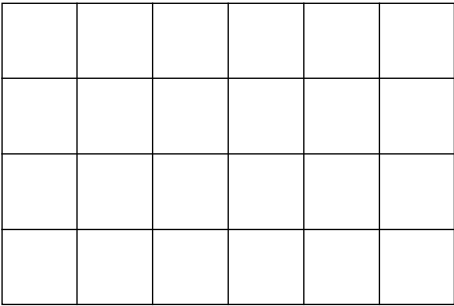
Planning sheet	Day Four	Unit 4 Measures – time, mass and area	Term: Spring	Year Group: 4
Oral and Mental		Main Teaching		Plenary
Objectives and Vocabulary	Teaching Activities	Objectives and Vocabulary	Teaching Activities	Teaching Activities / Focus Questions
<p>Recall multiplication facts in 2, 3, 4, 5, 10 times tables and derive division facts.</p> <p>VOCABULARY inverse</p> <p>RESOURCES Resource sheet 4.1</p>	<ul style="list-style-type: none"> Using the cards from Resource sheet 4.1 play the 'follow-me' activity and record the time it takes to complete. Revise mental strategies where appropriate, to support children in their recall of multiplication facts, including using the inverse operation to derive division facts. Play a second time trying to beat the time taken in the first activity. 	<p>Measure and calculate the area of rectangles and other simple shapes, using counting methods and standard units (cm²).</p> <p>VOCABULARY area rectangle square square centimetre (cm²)</p> <p>RESOURCES OHT 4.5 OHT 4.6 centimetre squared paper</p>	<ul style="list-style-type: none"> Show class OHT 4.5. Explain that the grid is a centimetre grid, use a perspex ruler to confirm this. Point to shape A. <p>Q How many squares make up this shape?</p> <p>Establish that shape A is a rectangle and is made up of 8 centimetre squares. Say that we call this the area of the shape.</p> <p>Q Is shape B bigger or smaller than A?</p> <p>Establish that this rectangle is also made up of 8 centimetre squares. Point to rectangles C and D so they both have an area of 18 square centimetres.</p> <p>Q Which rectangle is bigger?</p> <p>Establish that they are the same area as they are each made up of 18 centimetre squares.</p> <p>Show Question 1 on OHT 4.6. Ask:</p> <p>Q If these were made of chocolate, which one would you rather have?</p> <p>Collect responses and reasons given, and draw out significant vocabulary, for example, longer, wider etc.</p> <p>Q How do you know? Q How could we find out?</p> <p>Encourage pupils to suggest ways of measuring. Establish that squares are best for measuring 2-D space. Superimpose the grid on OHT 4.5 on the two rectangles to establish that one is 4 cm by 4 cm, a square and the other is 2 cm by 8 cm. They are each made up of sixteen square centimetres. Repeat with Question 2.</p> <ul style="list-style-type: none"> Introduce the use of square centimetres as a standard unit of measurement, including the notation cm². Return to Questions 1 and 2 and ask: <p>Q What is the area (in cm²) of each shape?</p> <ul style="list-style-type: none"> Give out sheets of centimetre squared paper. Children work independently creating their own shapes on squared paper calculating and recording their area. <p>If appropriate, pupils could begin to use half squares and combine when counting to find area.</p>	<ul style="list-style-type: none"> Discuss the children's shapes. <p>Q What strategies did you use to find the area of your shape? Q How did you estimate and count parts of squares?</p> <p>Use an example to demonstrate how to combine parts of squares. Write the number 24 on the board. Ask children to make a shape of their choice which has an area of 24 cm². <p>Use children's examples to illustrate the variety of shapes produced.</p> <p>Q These shapes are different, but are they all the same area? Q What is meant by the word: area?</p> <ul style="list-style-type: none"> Draw together the key points from the learning objectives: <ul style="list-style-type: none"> we can use cm² to measure the area of a shape; the area of a 2-D shape is the amount of space it takes up. <p>By the end of the lesson the children should be able to:</p> <ul style="list-style-type: none"> Find areas by counting squares; Use and understand cm² notation. <p>(Refer to supplement of examples, section 6, page 96.)</p> </p>

Planning sheet	Day Five	Unit 4 Measures – time, mass and area	Term: Spring	Year Group: 4
Oral and Mental		Main Teaching		Plenary
Objectives and Vocabulary	Teaching Activities	Objectives and Vocabulary	Teaching Activities	Teaching Activities / Focus Questions
<p>Add and subtract a pair of two-digit numbers (crossing 10 but not 100 boundary).</p> <p>VOCABULARY partition rounding adjusting</p>	<ul style="list-style-type: none"> Write 24 + 37 on the board. Children work in pairs to calculate mentally. Ask children to explain how they worked it out. Model their strategies by recording on the board. Discuss the efficiency, appropriateness and reliability of their methods. <div>Q What subtraction facts can we write using this addition fact?</div> <p>Establish that 61 – 24 = 37 and 61 – 37 = 24</p> <ul style="list-style-type: none"> Repeat with 83 – 37 and establish related addition facts. Write the following on the board: 28 + 39 = 72 – 39 = 24 + 28 = 84 – 28 = <p>Ask children to answer the questions on wipeboards/jotters in pairs showing their methods.</p> <ul style="list-style-type: none"> Collect answers and discuss model methods. Establish related addition and subtraction facts. <p>Extend: Relate examples leading to finding perimeters of shapes.</p> <p>e.g. 18 + 18 = 36 12 + 12 = 24 36 + 24 = 60</p> <div> 18 <div>1212</div> 18 </div>	<p>Measure and calculate the perimeter and area of rectangles and other simple shapes, using counting methods and standard units (square centimetres).</p> <p>VOCABULARY perimeter area centimetres (cm) square centimetres (cm²)</p> <p>RESOURCES Activity sheet 4.2 OHT 4.5</p>	<ul style="list-style-type: none"> Show OHT 4.5. Remind children that the space inside these rectangles is called the area. <p>Establish the area of each rectangle.</p> <div>Q What is the name given to the distance around the outside of the shape?</div> <p>Establish it is called the perimeter. When we measure a perimeter we measure length.</p> <div>Q How will we find the perimeters of A and B?</div> <p>Remind children that A and B have the same area: 8cm². Write: Shape A – area 8cm², perimeter 18cm Shape B – area 8cm², perimeter 12cm</p> <ul style="list-style-type: none"> Give out Activity sheet 4.2. Ask children to find the areas of the shapes, giving groups of children different shapes. Establish that the shapes have the same area of 24cm². <div>Q Do shapes with the same area have the same perimeter?</div> <div>Q Can you explain why?</div> <div>Q How can you prove your explanation?</div> <ul style="list-style-type: none"> Ask children to find the perimeters of the shapes in cm. Collect responses and discuss their methods and solutions. Ask children in pairs to find a rectangle with a perimeter of 20cm that has the largest possible area. 	<ul style="list-style-type: none"> Collect answers from children and draw together in a table. <p>Discuss the mental strategies the children used to calculate area.</p> <div> Q What did you notice? Q Are any of the areas the same? Q Which shape has the largest area? Why? </div> <div> <p>By the end of the lesson the children should be able to:</p> <ul style="list-style-type: none"> Respond to questions such as: Draw different rectangles with a perimeter of 24cm. Which has the largest area? <p>(Refer to supplement of examples, section 6, page 96.)</p> </div>

Just a minute
How much can you do in a minute?

Which number will you reach?	Estimate	Answer
Count in 10s		
Count in 5s		
Count in 5s and write the numbers		
Count in 2s and write the numbers		
Own Activity:		

24 squares



Follow-me cards

I am 100 What is 2×3 ?	I am 6 What is 3×4 ?	I am 12 What is $16 \div 2$?
I am 8 What is 4×4 ?	I am 16 What is 17×0 ?	I am 0 What is $15 \div 3$?
I am 5 What is 7×3 ?	I am 21 What is 5×10 ?	I am 50 What is $4 \div 4$?
I am 1 What is 5×5 ?	I am 25 What is 9×10 ?	I am 90 What is $12 \div 4$?
I am 3 What is $14 \div 2$?	I am 7 What is 5×4 ?	I am 20 What is 9×5 ?
I am 45 What is 3×9 ?	I am 27 What is 7×2 ?	I am 14 What is 9×3 ?

Follow-me cards

I am 45 What is 8×4 ?	I am 32 What is 7×4 ?	I am 28 What is 5×2 ?
I am 10 What is 6×5 ?	I am 30 What is $12 \div 6$?	I am 2 What is $20 \div 5$?
I am 4 What is 6×3 ?	I am 18 What is 1×11 ?	I am 11 What is $18 \div 2$?
I am 9 What is 10×4 ?	I am 40 What is 6×4 ?	I am 24 What is 6×10 ?
I am 60 What is 5×3 ?	I am 15 What is 7×5 ?	I am 35 What is 10×10 ?
I am 100 What is 4×9 ?	I am 36 What is 10×8 ?	I am 80 What is 9×4 ?


Time sheet

How long will it take to complete each activity?

Activity	Estimate	Time taken
Say the 3 times table up to 20×3		
Say the alphabet		
Hop across the classroom		
Bounce a ball 5 times		
Bounce a ball 10 times		
Hold your breath		
Stand on one leg with your eyes closed		
Write your name 20 times		

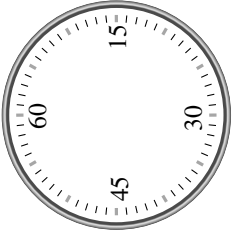
Units of Measure

1




metres

2



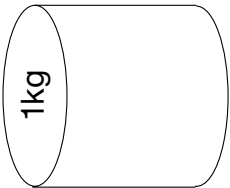
seconds

3



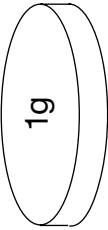
centimetres

4



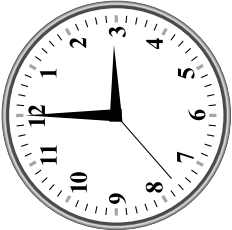
kilograms

5



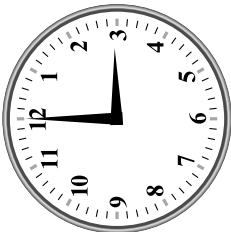
grams

6




minutes

7




hours

8



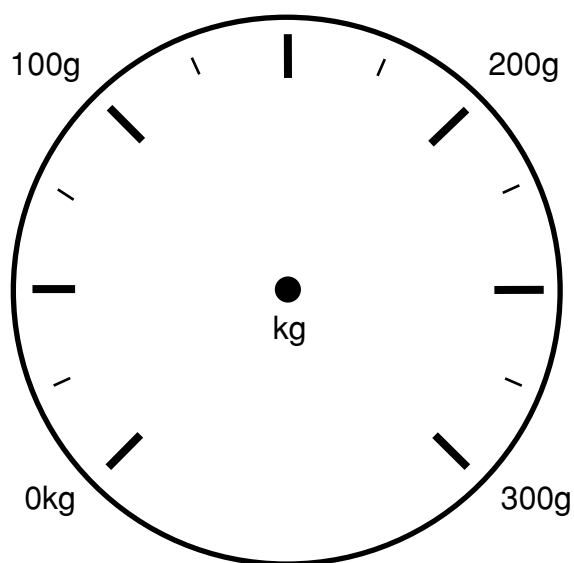
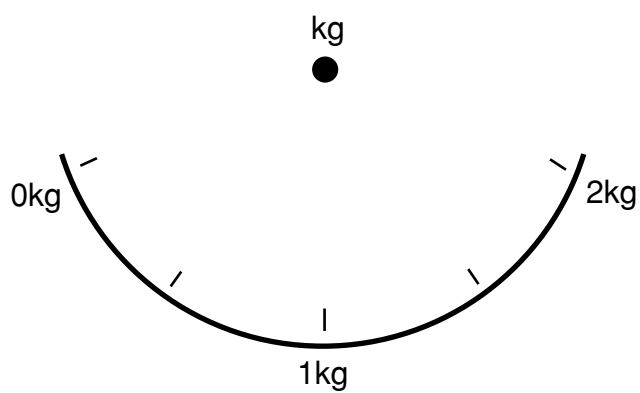
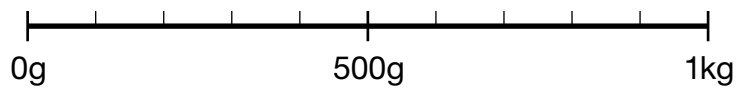
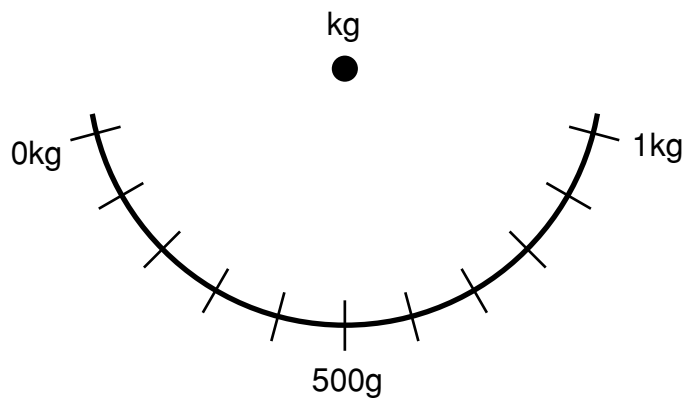
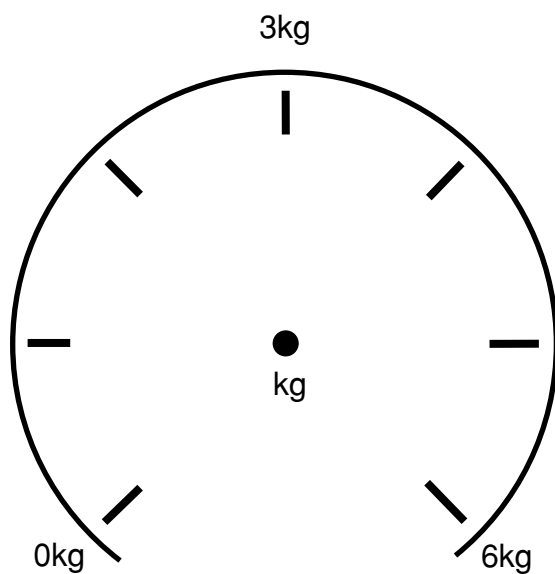
millimetres

9



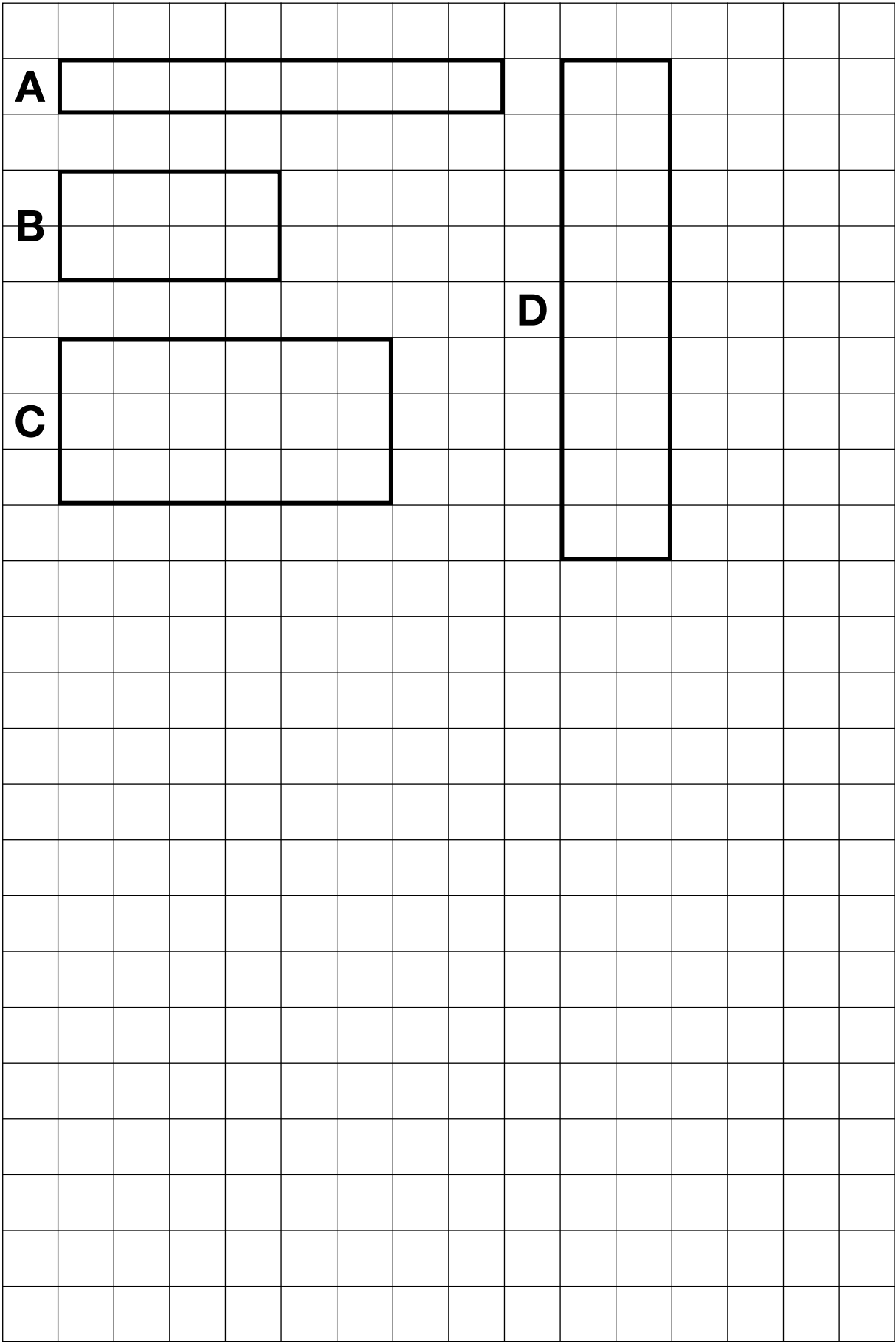
kilometres

Scales



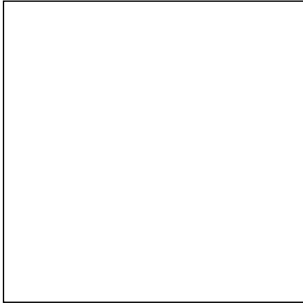
$\frac{1}{2}$ kg	100g	750g	1 kg
$\frac{9}{10}$ kg	250g	$\frac{3}{10}$ kg	$1\frac{1}{4}$ kg
1500g	$\frac{4}{10}$ kg	2 kg	1000g
200g	$\frac{1}{10}$ kg	300g	$1\frac{1}{2}$ kg
1250g	$\frac{1}{4}$ kg	500g	400g
$\frac{3}{4}$ kg	900g	$\frac{2}{10}$ kg	2000g

Centimetre Grid



Area

Question 1



Question 2

