

# Reasoning and Problem Solving

## Step 1: Metric Measures

### National Curriculum Objectives:

Mathematics Year 6: (6M5) [Use, read, write and convert between standard units, converting measurements of length, mass, volume and time from a smaller unit of measure to a larger unit, and vice versa, using decimal notation to up to three decimal places](#)

Mathematics Year 6: (6M9) [Solve problems involving the calculation and conversion of units of measure, using decimal notation up to three decimal places where appropriate](#)

### Differentiation:

Questions 1, 4 and 7 (Reasoning)

**Developing** Assign and explain units of metric measurement within a given context. Use of whole numbers.

**Expected** Assign and explain units of metric measurement within a given context. Use of whole numbers and some decimals and fractions.

**Greater Depth** Assign, explain and estimate units of metric measurement within a given context. Use of whole numbers, decimals and fractions.

Questions 2, 5 and 8 (Reasoning)

**Developing** Explain which statement is the best estimation in a given measuring context. Use of whole numbers.

**Expected** Explain which statement is the best estimation in a given measuring context. Use of whole numbers and some decimals and fractions.

**Greater Depth** Explain which statement is the best estimation in a given measuring context. Use of whole numbers, decimals and fractions. Some square and cube numbers included.

Questions 3, 6 and 9 (Problem Solving)

**Developing** Estimate metric measurements by using the information provided. Use of whole numbers.

**Expected** Estimate metric measurements by using the information provided. Use of whole numbers and some decimals and fractions.

**Greater Depth** Estimate metric measurements by the information provided. Use of whole numbers, decimals and fractions.

More [Year 6 Converting Units](#) resources.

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## Metric Measures

## Metric Measures

1a. Millie is measuring the distance that her friends have walked around the playground.

Hafsa	1	<input type="text"/>
Luke	880	<input type="text"/>

She has forgotten to write the unit of measurement.

Which unit of measure could she be using for each distance? Convince me.



R

1b. Joseph is measuring the length of his classmates' pencil cases and recording his results.

Jack	30	<input type="text"/>
Lucy	400	<input type="text"/>

He has forgotten to write the unit of measurement.

Which unit of measure could he be using for each length? Convince me.



R

2a. The children are estimating how much water is needed to fill a paddling pool.



Tracy

I think it will be around 30ml.

I think it will be around 30L.



Jaxon

Who do you agree with and why?



R

2b. The children are estimating how heavy a book is.



Ethan

I think it will be around 20g.

I think it will be around 2kg.



Isobel

Who do you agree with and why?



R

3a. A pencil is approximately 20cm in length. Estimate the lengths for the following:

a table leg	
a pencil case	
a water bottle	
a rubber	



PS

3b. A tennis ball weighs approximately 60g. Estimate the weights for the following:

a football	
a golf ball	
a bouncy ball	
a cricket ball	



PS

## Metric Measures

4a. Terrie is measuring the length of her classmates' arms and recording her results.

Jenny	0.3	<input type="text"/>
Gerry	400	<input type="text"/>
Jonah	38	<input type="text"/>

She has forgotten to write the unit of measurement.

Which unit of measure could she be using for each length? Convince me.



R

## Metric Measures

4b. Max is measuring the volume of his classmates' water bottles and recording his results.

Iqra	500	<input type="text"/>
Will	0.8	<input type="text"/>
Jake	1	<input type="text"/>

He has forgotten to write the unit of measurement.

Which unit of measure could he be using for each volume? Convince me.



R

5a. The children are estimating how much water is needed to fill a bath.



Susie

I think it will be around 115.5ml.

I think it will be around 115.5L.



Jojo

Who do you agree with and why?



R

5b. The children are estimating how heavy their school desk is.



Jaiden

I think it will be around 25kg.

I think it will be around  $25\frac{1}{2}$  g.



Isaac

Who do you agree with and why?



R

6a. An apple weighs approximately 85g. Estimate the weights for the following:

a grape	<input type="text"/>
a pineapple	<input type="text"/>
a watermelon	<input type="text"/>
an orange	<input type="text"/>



PS

6b. A cat is approximately 50cm in length. Estimate the lengths for the following:

a cow	<input type="text"/>
a mouse	<input type="text"/>
a pig	<input type="text"/>
a sheep	<input type="text"/>



PS

## Metric Measures

7a. Robyn is measuring how far her classmates can jump.

Ellie 2.1   
 Martha  cm  
 Jake  m

What unit of measure is missing?

Estimate the missing measurements, and convince me that these are accurate estimates.



R

## Metric Measures

7b. Erin is measuring the weight of her classmates' lunch boxes.

Connor 0.5   
 Bradley  kg  
 Alex  g

What unit of measure is missing?

Estimate the missing measurements, and convince me that these are accurate estimates.



R

8a. The children are estimating the area of a wall.



I think it will be around  $80\text{m}^2$ .

Safeeyah

I think it will take around  $80\text{m}^3$ .



Pippa

Who do you agree with and why?



R

8b. The children are estimating the length of the playground.



I think it will be around a tenth of a kilometre.

Felix

I think it will be around 100m.



Yusuf

Who do you agree with and why?



R

9a. A door is approximately 2m in height. Estimate the heights for the following:

2 pens	
a chair	
a teacher	
2 water bottles	



PS

9b. A bottle of pop has a capacity of approximately 1.5L. Estimate the capacities for the following:

a glass of water	
a cup of tea	
a kettle	
a small carton of juice	



PS

## Reasoning and Problem Solving

### Metric Measures

#### Developing

1a. Various answers, for example: 1km, 880m. Each is around the same distance and both are plausible distances for children to walk.

2a. Various answers, for example: I agree with Jaxon because litres is a greater measure of volume than millilitres. In context, 30ml wouldn't fill a cup, so much more water would be needed to fill a paddling pool.

3a. Various answers, for example: a table leg – 1m, a pencil case – 30cm, a water bottle – 50cm, a rubber – 5cm.

#### Expected

4a. Various answers, for example: 0.3m, 400mm, 38cm. Each is around the same length when converted to the same unit, and children in one class would have similar length arms.

5a. Various answers, for example: I agree with Jojo because a bath requires a large amount of water to fill it, and litres is a greater measure than millilitres. In context 150ml is about half of a small glass of water.

6a. Various answers, for example: a grape – 5g, a pineapple – 1kg, a watermelon – 8kg, an orange – 100g.

#### Greater Depth

7a. Various answers, for example: 2.5m. The missing measurements could be: Martha – 200cm, Jake – 2.2m. These are accurate estimates because each is around the same height, which would be plausible for children in the same class.

8a. Various answers, for example: I agree with Safeeyah because she has used the correct unit of measurement for area; Pippa's use of  $m^3$  refers to volume, not area.

9a. Various answers, for example: 2 pens – 40cm, a chair – 0.5m, a teacher – 1.5m, 2 water bottles – 60cm.

## Reasoning and Problem Solving

### Metric Measures

#### Developing

1b. Various answers, for example: 30cm, 400mm. Each is around the same length and both are plausible lengths for pencil cases.

2b. Various answers, for example: I agree with Isobel because kilograms is a greater measure of weight than grams. In context, 20g is about the weight of a AA battery, so would be too light for the weight of a book.

3b. Various answers, for example: a football – 400g, a golf ball – 50g, a bouncy ball – 10g, a cricket ball – 160g.

#### Expected

4b. Various answers, for example: 500ml, 0.8 litres, 1 litre. Each is around the same volume when converted to the same unit of volume, and children will have similar sized water bottles.

5b. Various answers, for example: I agree with Jaiden because the weight of a table would be measured in kilograms rather than grams. In context, 25g weighs less than a slice of bread.

6b. Various answers, for example: a cow – 2.5m, a mouse – 10cm, a pig – 1.8m, a sheep – 1.5m.

#### Greater Depth

7b. Various answers, for example: 0.5kg. The missing measurements could be: Bradley – 0.8kg, Alex – 750g. These are accurate estimates because each is around the same weight, which would be plausible for children in the same class.

8b. Various answers, for example: I agree with both Felix and Yusuf because 0.1km and 100m are equal distances to one another.

9b. Various answers, for example: a glass of water – 500ml, a cup of tea – 450ml, a kettle – 1L, a carton of juice – 250ml.