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# Year 3

## Small Steps Guidance and Examples

### Block 4: Length & Perimeter

**White Rose Maths**

# Year 3 – Yearly Overview

	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8	Week 9	Week 10	Week 11	Week 12
Autumn	Number – Place Value			Number – Addition and Subtraction				Number – Multiplication and Division			Consolidation	
Spring	Number - Multiplication and Division			Measurement: Money	Statistics		Measurement: length and perimeter		Number - Fractions		Consolidation	
Summer	Number – fractions			Measurement: Time			Geometry – Properties of Shapes	Measurement: Mass and Capacity			Consolidation	

# Overview

## Small Steps

- Measure length
- Equivalent lengths – m & cm
- Equivalent lengths – mm & cm
- Compare lengths
- Add lengths
- Subtract lengths
- Measure perimeter
- Calculate perimeter

## NC Objectives

Measure, compare, add and subtract: lengths (m/cm/mm); mass (kg/g); volume/capacity (l/ml).

Measure the perimeter of simple 2D shapes.

## Measure Length

### Notes and Guidance

Children are introduced to millimetres for the first time and build on their understanding of centimetres and metres.

It is important that child have a variety of hands on experiences and opportunities to explore the concept of a millimetre.

### Mathematical Talk

What would be the best equipment to measure X with? (e.g. tape measure, ruler, metre stick)

Look at each side of different measuring equipment – what’s the same, what’s different?

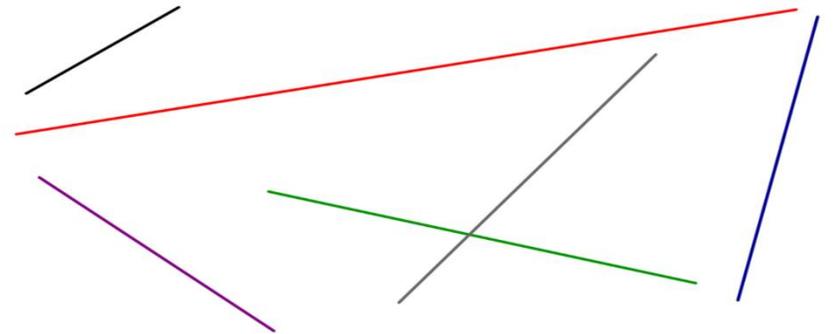
What do we have to remember when using a ruler to measure? Which side are we going to use to measure?

What unit of measure would we use to measure X?

What should you do if it the object does not start from 0?

### Varied Fluency

- 1 Measure these lines to the nearest cm, then to the nearest mm



- 2 Look and think about real life objects. What unit would you use to measure each one?

Possible examples:

Fingernail

Eraser

Pencil

Height of a house

Length of a playground

Length of a table

- 3 What is the length of each pencil?



# Measure Length

## Reasoning and Problem Solving

Abigail's ruler is broken. How could she use it to still measure things?



Possible answer:  
She could start from a different number and count on to measure.

Paige thinks that this chew bar is 4 cm long. Is she correct?



Convince me.

She is not correct because she has not placed the chocolate bar at 0, she has put it at the end of the ruler.

Three children measured the same toy car.

Eva says that the car is 6 cm and 5 mm



Lainey says the car is 5 cm



Macey says the car is 4 cm 5 mm



Who is correct? Who is incorrect?  
Explain why.

Lainey is correct.  
The other two have not lined up the ruler correctly.

## Equivalent Lengths – m & cm

### Notes and Guidance

Children understand that 100 *cm* is equivalent to 1 *m*. Once they are secure with this, they can start to convert between metres and centimetres by partitioning.

### Mathematical Talk

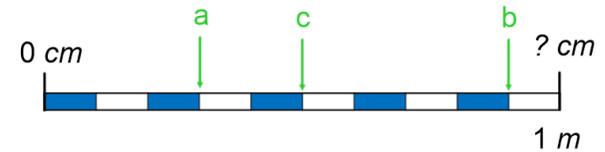
If there are 100 *cm* in 1 metre, how many centimetres would there be in 2 metres? How many centimetres in 3 metres? How many other equivalents can you think of?

Can you explain how you are partitioning each measurement?

Could you partition it in any other way? Why is it most effective to partition the hundreds and then the tens and ones?

### Varied Fluency

- 1 Use the metre stick to help you fill in the blanks.



$$1 \text{ m} = \underline{\quad} \text{ cm} \quad a = \underline{\quad} \text{ cm}$$

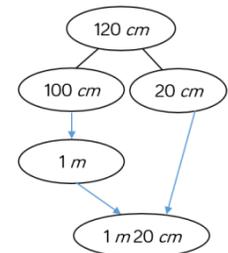
$$b = \underline{\quad} \text{ cm} \quad c = \underline{\quad} \text{ cm}$$

- 2 Can you match up the equivalent measurements?

100 <i>cm</i>	9 <i>m</i>
5 <i>m</i>	200 <i>cm</i>
300 <i>cm</i>	500 <i>cm</i>
2 <i>m</i>	1 metre
900 centimetres	3 <i>m</i>

- 3 Use this method to convert:

- 230 *cm*
- 470 *cm*
- 1 *m* and 60 *cm*
- 178 *cm*
- 569 *cm*



# Equivalent Lengths – m & cm

## Reasoning and Problem Solving

Max and Anna each have a skipping rope.



Anna

I have the longest skipping rope. Mine is  $2\frac{1}{2}$  metres long.



Max

My skipping rope is the longest because it is 220 cm and 220 is a bigger number.

Who is correct? Explain your answer.

Anna is correct because in cm her skipping rope is 250 cm long and this is 30 cm more than 220 cm

Three children are partitioning 754 cm

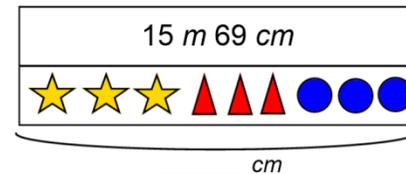
Child A: 75 m and 4 cm

Child B: 7 m 50 cm and 4 cm

Child C: 7 m and 54 cm

Who is correct? Explain why.

Can you work out what each symbol represents?

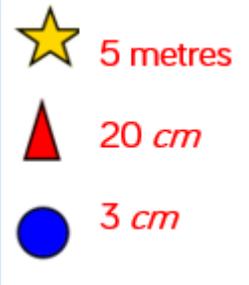


= metres

= a multiple of 10 in centimetres

= a single digit in centimetres

Child B and C are both correct. Child A has incorrectly converted from cm to m when partitioning.



## Equivalent Lengths – mm & cm

### Notes and Guidance

Children understand that 10 mm is equivalent to 1 cm

Once they are secure with this, they can start to convert between centimetres and millimetres by partitioning.

### Mathematical Talk

If there are 10 mm in 1 cm, how many mm would there be in 2 cm?

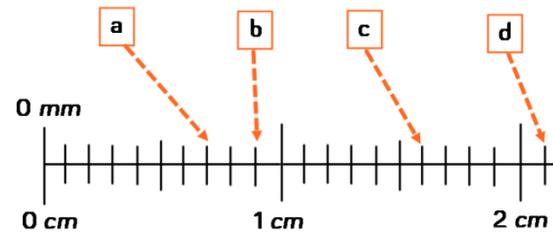
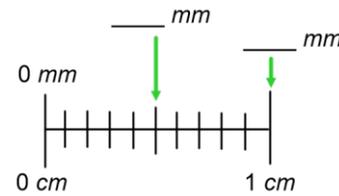
Can you explain how you are partitioning each number?

Can you partition it any other way?

Why is it most effective to partition the hundreds and then the tens and ones?

### Varied Fluency

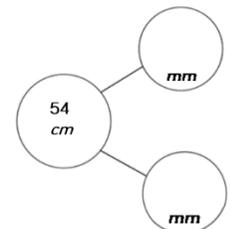
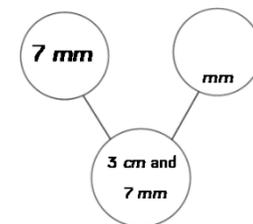
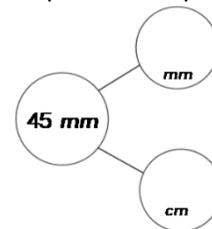
- 1 Fill in the blanks.



a = \_\_\_ cm \_\_\_ mm  
 b = \_\_\_ cm \_\_\_ mm  
 c = \_\_\_ cm \_\_\_ mm  
 d = \_\_\_ cm \_\_\_ mm

- 2 Measure different items around your classroom. Record your answers in a table in cm and mm, and just mm.

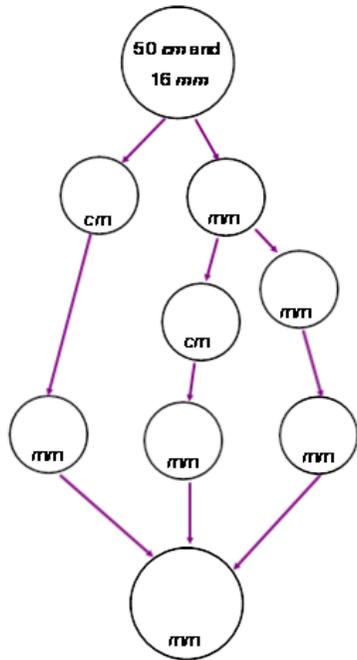
- 3 Complete the part whole models.



# Equivalent Lengths – mm & cm

## Reasoning and Problem Solving

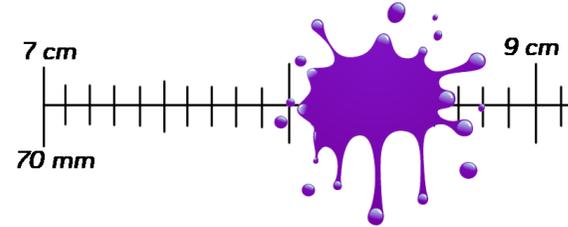
Complete the diagram by converting between mm and cm



Can you make a similar question for your partner?

Possible answer: I think a bar chart would be the most suitable chart because you can use different scales to show the amount. Pictograms would be more difficult to use because you would have to use a lot of symbols because of the size of the numbers.

Louise is thinking of a measurement that has been covered by the splat. Use her clues to work out which measurement she is thinking of.



- In mm, my measurement is a multiple of 2
- It has 8 cm and some mm
- It's less than 85 mm
- In mm, the digit total is 12

Louise is thinking of 84 mm (8 cm and 4 mm)

## Compare Lengths

### Notes and Guidance

Children compare and order lengths based on measurements in mm, cm and m.

They use their knowledge of converting between units of measurement to help them compare and order.

### Mathematical Talk

Can you order the children's' heights from shortest to tallest?

How could you make it easier to compare and order these measurements?

Estimate whose tower you think will be the tallest. Explain why.

## Varied Fluency

- 1 Complete the sentences.

Child	Height
Jasmine	109 cm
Ahmed	1 m 5 cm
Josh	135 cm
Kate	1m 50 mm

Jasmine is \_\_\_\_\_ than Josh.

Josh is \_\_\_\_\_ than Kate.

Ahmed is \_\_\_\_\_ than Jasmine.

Kate is \_\_\_\_\_ than Ahmed.

- 2 Four friends are building towers.  
 Emma's tower is 22 cm and 7 mm  
 Calvin's tower is 0 mm and 22 cm  
 Laura's tower is 205 mm  
 Saif's tower is 16 cm and 100 mm

Order the children's towers in descending order.

<  <  <

- 3 Using a ruler, measure the width of 5 different books to the nearest mm. Record your results in a table, then compare and order them.

# Compare Lengths

## Reasoning and Problem Solving

### Agree or Disagree?

mm lengths are smaller than cm lengths.

Possible answer:  
I disagree because 100 mm is bigger than 7 cm. It could be true though because 1 mm is less than 1 cm

Faye has ordered the lengths from longest to shortest.

1 m 65 cm

1 m and 11 cm

167 cm

500 mm

Longest

Shortest

Find an explain any mistakes.

167 cm is longer than 1 m and 11 cm because 1 m and 11 cm is 111 cm, which is shorter than 167 cm

## Add Lengths

### Notes and Guidance

Children add lengths including examples where there are mixed units and they need to convert.

Children to be encouraged to look for the most efficient way to calculate and develop their mental addition strategies.

### Mathematical Talk

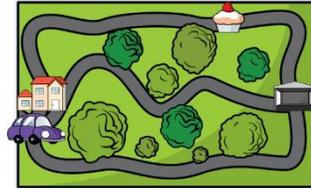
How did you add the distances travelled by Olivia? Can you think of a different way? Which way do you think is the most efficient?

How did you find the total of their heights? Was there a more efficient way of doing this?

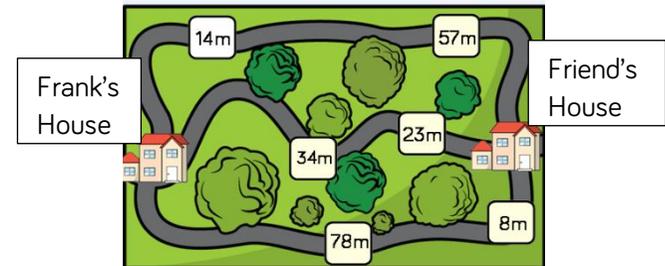
Explain how you added the lengths.

### Varied Fluency

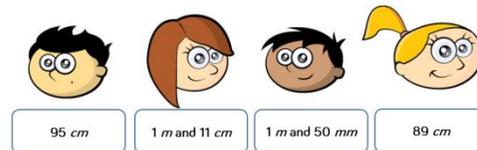
- 1 Olivia travelled 250 m to the bakery, then went to a concert 75 m away and finally travelled back home the exact same way that she came. What was the total distance she travelled?



- 2 Frank needs to travel to his friend's house. He wants to take the shortest possible route. Which way should Frank go?



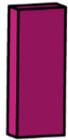
- 3 Miss Nicholson measured the height of four children in her class. What is their total height?



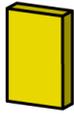
# Add Lengths

## Reasoning and Problem Solving

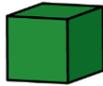
Millie is building a tower using these blocks.



100 mm



80 mm



50 mm

How many different ways can she build a tower measuring 56 cm?

Can you write your calculations in mm and cm?

Possible answer:  
Four 100 mm  
blocks and two 80  
mm blocks.

There are other  
solutions.

Jenny and her brother Alex measured the height of their family.



1m and  
10cm

1m and  
80cm

2m and  
60cm

1m and  
34cm

Jenny thinks their total height is 5 m and 50 cm

Alex thinks their total height is 6 m and 84 cm

Who is correct? Prove it.

Alex is correct.  
Jenny has not  
included her own  
height.

## Subtract Lengths

### Notes and Guidance

Children subtract lengths including examples where there are mixed units and they need to convert.

Children should be encouraged to look for the most efficient way to calculate and develop their mental subtraction strategies.

### Mathematical Talk

What is the difference between the length of the two objects? How would you work it out?

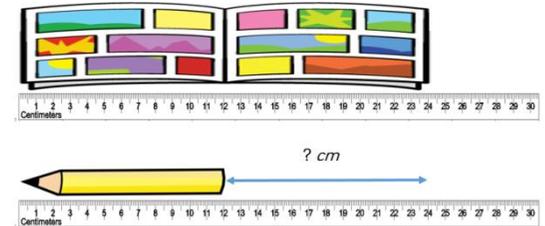
How are Poppy's models different? How are they the same?

Which model do you prefer? Why?

What is the most efficient way to subtract mixed units?

### Varied Fluency

- 1 Work out the difference in length between the book and the pencil.

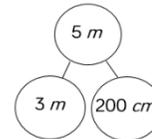


- 2 Poppy had 5 m of rope. She used 1 m and 54 cm of it to make a skipping rope. She worked out how much rope she had left using two different models.

	5m
1m and 54cm	?

$$5 \text{ m} - 1 \text{ m} = 4 \text{ m}$$

$$4 \text{ m} - 54 \text{ cm} = 3 \text{ m } 46 \text{ cm}$$



$$200 \text{ cm} - 154 \text{ cm} = 46 \text{ cm}$$

$$3 \text{ m} + 46 \text{ cm} = 3 \text{ m } 46 \text{ cm}$$

- 3 Use the models to solve:

- Mrs Brook's ball of wool was 10 m long. She used 4 m and 28 cm to knit a scarf. How much does she have left?
- A roll of tape is 3 m long. If I use 68 cm of it wrapping presents, how much will I have left?

# Subtract Lengths

## Reasoning and Problem Solving



A bike race was 160 m long.

Josh cycles 43 m and stopped for a break.

He cycled another 59 m before stopping for another break.

How much further does he need to cycle to complete the race?

Josh has 58 m left to ride in the race.

A train measures 20 m

A car measured 15 m less than the train.

A bike measures 350 cm less than the car.

Work out the length of the car and the bike.



The car is 5 m and the bike is 150 cm or 1 m 50 cm

Megan has a 3 m roll of ribbon.



She is cutting it up into 50 cm lengths.

How many lengths can she cut?  
Convince me.

Megan can cut it in to 6 lengths.

## Measure Perimeter

### Notes and Guidance

Children are introduced to perimeter for the first time.

They explore what perimeter is and what it isn't.

Children measure the perimeter of simple 2D shapes. They may compare different 2D shapes which have the same perimeter.

Children make connections between the properties of 2D shapes and measuring the perimeter.

### Mathematical Talk

What is perimeter? Show me the perimeter of...

Which of the images can we work out the perimeter for? Which ones can we not? Why?

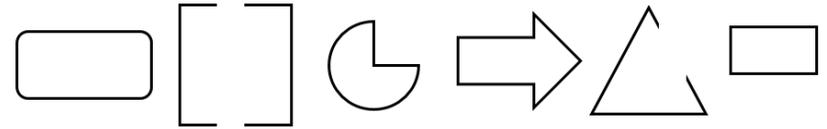
Which shape do you predict will have the longest perimeter? Why?

Does it matter where you start when you measure the length of the perimeter?

What do you notice about the perimeter of the rectangle and the square?

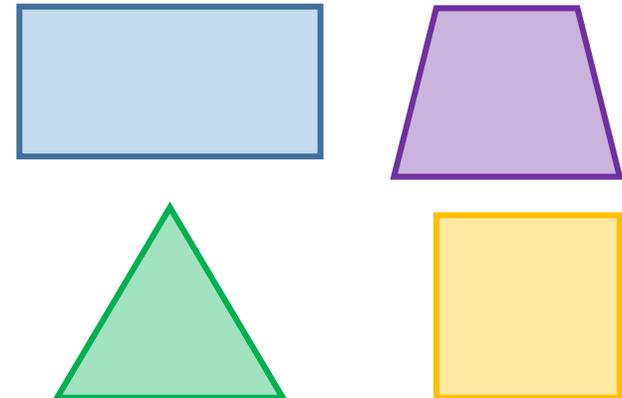
### Varied Fluency

- 1 Using your finger, show me the perimeter of the table, your book, your whiteboard etc.
- 2 Tick the images where you can find the perimeter.



Explain why you can't find the perimeter of some of the shapes.

- 3 Predict then measure the perimeter of the shapes.

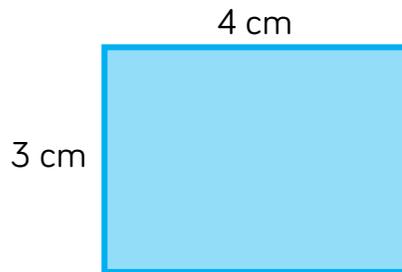


# Measure Perimeter

## Reasoning and Problem Solving

Aaron is measuring the shape below. He says the perimeter is 7 cm

Can you spot his mistake?

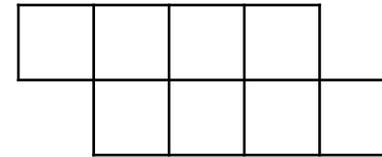


Aaron has only included two of the sides, to find the perimeter he needs all 4 sides. It should be 14 cm

Emily is measuring the perimeter of a square. She says she only needs to measure one side of the square. Do you agree? Explain your answer.

Emily is correct because all four sides of a square are equal in length so if she measures one she can multiply it by 4

Here is a shape made from centimetre squares. Find the perimeter of the shape.



Can you use 8 centimetre squares to make different shapes? Find the perimeter of each one.

The perimeter is 14 cm

There are various different answers depending on the shape made.

## Calculate Perimeter

### Notes and Guidance

Children use their understanding of the properties of shape to calculate the perimeter of simple 2D shapes.

It is important to note they will not explore the formula for a rectangle at this point.

They explore different methods for calculating the perimeter of a shape. For example, they may use repeated addition or they may make connections to multiplication.

### Mathematical Talk

How can we calculate the perimeter of each shape?

Can we calculate the perimeter using a different method?

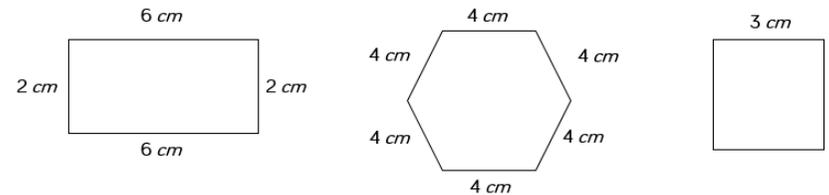
What is the same about the 2 methods?

What is different?

How can we work out the length of the missing side?

### Varied Fluency

- 1 Calculate the perimeter of the shapes.



Can you find more than one way to calculate the perimeter?

- 2 Use two different methods to calculate the perimeter of the squares.



- 3 What is the length of the missing sides?



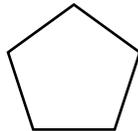
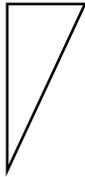
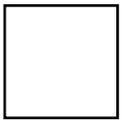
# Calculate Perimeter

## Reasoning and Problem Solving

Tom says,



You only need to know the length of one side of these 2D shapes to work out the perimeter.



Do you agree with Tom? Explain your answer.

You only need to know one side length for the square and the pentagon as all the sides are the same. However, Tom is wrong because for the rectangle you need to know two lengths and the triangle you need to know all of them.



Each side of this shape is of equal length. The perimeter is 60 cm. How long is each side? Explain how you got your answer.

How many different rectangles can you draw with a perimeter of 20 cm?

The shape has 10 sides so the length of each side is 6 cm

There are 5 different ones:  
 1 cm by 9 cm  
 2 cm by 8 cm  
 3 cm by 7 cm  
 4 cm by 6 cm  
 5 cm by 5 cm  
 May discuss the last one is also a square.