Autumn Scheme of Learning

Year 5

#MathsEveryoneCan

2019-20
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Autumn - Block 5
Perimeter & Area
## Overview

### Small Steps

- Measure perimeter
- Calculate perimeter
- Area of rectangles
- Area of compound shapes
- Area of irregular shapes

## NC Objectives

- Measure and calculate the perimeter of composite rectilinear shapes in cm and m.
- Calculate and compare the area of rectangles (including squares), and including using standard units, cm², m² estimate the area of irregular shapes.
Measure Perimeter

Notes and Guidance

Children measure the perimeter of rectilinear shapes from diagrams without grids. They will recap measurement skills and recognise that they need to use their ruler accurately in order to get the correct answer. They could consider alternative methods when dealing with rectangles e.g. \( l + w + l + w \) or \((l \times w) \times 2\).

Varied Fluency

- Measure the perimeter of the rectangles.
- Measure the perimeter of the shapes.
- Make this shape double the size using dot paper.
- Measure the perimeter of both shapes.

What do you notice about the perimeter of the larger one? Why?

Mathematical Talk

What is perimeter of a shape?

What's the same/different about these shapes?

Do we need to measure every side?

Once we have measured each side, how do we calculate the perimeter?
<table>
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<tr>
<th>Measure Perimeter</th>
<th>Reasoning and Problem Solving</th>
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<tr>
<td><strong>Each regular hexagon has a side length of 2 cm</strong></td>
<td><strong>Possible answer:</strong></td>
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<tr>
<td>Can you construct a shape with a perimeter of 44 cm?</td>
<td>Discuss how many sides the shape must have with the children. Encourage their reasoning that there must be 22 2 cm sides to make a total perimeter of 44 cm.</td>
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<tr>
<td><img src="image" alt="Hexagon pattern" /></td>
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<td><strong>Activity</strong></td>
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<tr>
<td>Investigate different ways you can make composite rectilinear shapes with a perimeter of 54 cm.</td>
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Calculate Perimeter

Notes and Guidance

Children apply their knowledge of measuring and finding perimeter to find the unknown side lengths.

They find the perimeter of shapes with and without grids.

When calculating perimeter of shapes, encourage children to mark off the sides as they add them up to prevent repetition of counting/omission of sides.

Mathematical Talk

What can you tell me about the sides of a square/rectangle? How does this help you work out this question?

How can you use the labelled sides to find the length of the unknown sides?

What strategies can you use to calculate the total perimeter?

What does regular mean? Why are rectangles irregular?

Varied Fluency

Find the perimeter of the following shapes.

- Each square has an area of 4 square cm.

- What is the length of each square?

- What is the perimeter of the whole shape?

How many _____ can you draw with a perimeter of ___ cm?

- e.g. rectangles, other rectilinear shapes.

- How many regular shapes can you make with a perimeter of ___ cm?
Calculate Perimeter

Reasoning and Problem Solving

Here is a square inside another square.

Small square = 16 cm
Large square = 64 cm
Length of one of the outer sides is 8 cm, because 64 is a square number.

The perimeter of the inner square is 16 cm
The outer square’s perimeter is four times the size of the inner square.
What is the length of one side of the outer square?
How do you know? What do you notice?

The value of c is 14 m.
What is the total perimeter of the shape?

Total perimeter = 38 cm
38 − (4.8 + 4.8) = 28.4
So 28.4 divided by 2 = 14.2 cm

4c + 4c + c + c = 10c
10 × 14 = 140 m
Area of Rectangles

Notes and Guidance

Children build on previous knowledge in Year 4 by counting squares to find the area. They then move on to using a formula to find the area of rectangles.

Is a square a rectangle? This would be a good discussion point when the children are finding different rectangles with a given area. For example, a rectangle with an area of 36 cm² could have four equal sides of 6 cm.

Mathematical Talk

What properties of these shapes do you need to know to help you work this out?

What can you tell me about the sides of a square/rectangle? How does this help you work out this question?

Will the formula ‘Area = length × width’ work for any shape, or only squares and rectangles?

Varied Fluency

How many rectangles can you draw with an area of ____ cm²?

What is the area of this shape if:

- each square is 2 cm in length?
- each square is 3.5 cm in length?

Mo buys a house with a small back garden, which has an area of 12 m².

His house lies in a row of terraces, all identical. If there are 15 terraced houses altogether, what is the total area of the garden space?
Area of Rectangles

Investigate how many ways you can make different squares and rectangles with the same area of 84 cm². What strategy did you use?

True or False?
If you cut off a piece from a shape, you reduce its area and perimeter. Draw 2 examples to prove your thinking.

Estimate the area of each shape and then order from largest to smallest.

Each orange square has an area of 24 cm².
Calculate the total orange area.
Calculate the blue area.
Calculate the green area.
What is the total area of the whole shape?

Answer: A = 3cm × 7cm = 21cm²
B = 8cm × 8cm = 64cm²
C = 3cm × 19cm = 57cm²
Order: B, C, A

Answer:
Orange = 48 cm²
Blue = 72 cm²
Green = 24 cm²
Total = 144 cm²
Area of Compound Shapes

Notes and Guidance
Children learn to calculate area of compound shapes. They need to be careful when splitting shapes up to make sure they know which lengths correspond to the whole shape, and which to the smaller shapes they have created. They will discover that the area remains the same no matter how you split up the shapes. Children need to have experience of drawing their own shapes in this step.

Mathematical Talk
What formula do we use to find the area of a rectangle?
Can you see any rectangles within the compound shapes?
How can we split the compound shape?
Is there more than one way?
Do we get a different answer if we split the shape differently?

Varied Fluency
Find the area of the compound shape:
How many ways can we split the compound shape?
Is there more than one way?
Could we multiply $6 \times 6$ and then subtract $2 \times 3$?
Calculate the area.
Calculate the area of these symmetrical shapes.
Area of Compound Shapes

Reasoning and Problem Solving

How many different ways can you split this shape to find the area?

Possible solution:
A = 2 m × 5 m = 10 m²
B = 6 m × 3 m = 18 m²
C = 1 m × 2 m = 2 m²
D = 1 m × 8 m = 8 m²
E = 3 m × 2 m = 6 m²
Total area = 36 m²

Add more values and work out the area.

Jack says this shape has an area of 34 cm².

Possible solution:

Show that Jack is correct.

Find three more possible compound shapes that have an area of 34 cm².
Area of Irregular Shapes

Notes and Guidance

Children use their knowledge of counting squares to estimate the areas of shapes that are not rectilinear. They use their knowledge of fractions to estimate how much of a square is covered and combine different part-covered squares to give an overall approximate area.

Children need to physically annotate to avoid repetition when counting the squares.

Varied Fluency

Estimate the area of the pond.
Each square = 1 m²

Ron's answer is 4 whole squares and 11 parts. Is this an acceptable answer?
What can we do with the parts to find an approximate answer?

If all of the squares are 1 cm in length, which shape has the greatest area?

Is the red shape the greatest because it fills more squares? Why or why not?
What is the same about each image? What is different about the images?

Each square is ____ m²
Work out the approximate area of the shape.

Mathematical Talk

How many whole squares can you see?

How many part squares can you see?

Can you find any part squares that you could be put together to make a full square?

What will we do with the parts?

What does approximate mean?
Area of Irregular Shapes

Reasoning and Problem Solving

Draw a circle on 1 cm² paper. What is the estimated area? Can you draw a circle that has area approximately 20 cm²?

If each square represents 3 m², what is the approximate area of:
- The lake
- The bunkers
- The fairway
- The rough
- Tree/forest area

Can you construct a ‘Pirate Island’ to be used as part of a treasure map for a new game? Each square represents 4 m².

The island must include the following features and be of the given approximate measure:
- Circular Island 180 m²
- Oval Lake 58 m²
- Forests with a total area of 63 m² (can be split over more than one space)
- Beaches with a total area of 92 m² (can be split over more than one space)
- Mountains with a total area of 57 m²
- Rocky coastline with total area of 25 m²