FIRST GREEN
GCSAA BIGGA

CALCULATING AREAS ON A GOLF COURSE

11-14 years 20-30 minutes per station

Introduction

Greenkeepers use maths on the golf course in many ways and area measurement is probably the most important. A greenkeeper should be able to accurately calculate the size of an area. Once the size is calculated, the total amount of seed, fertilizer, or topdressing sand to be used can be calculated.

In this session students are going to calculate the areas and perimeters of different shapes. (Please note that Students in the UK work in metric rather than imperial units.)

Student Learning Objectives

By the end of the session students will be able to

- measure lengths using appropriate equipment and units
- calculate the area of a non-uniform shape
- calculate the total perimeter length of shapes
- calculate the area and perimeter of a circle

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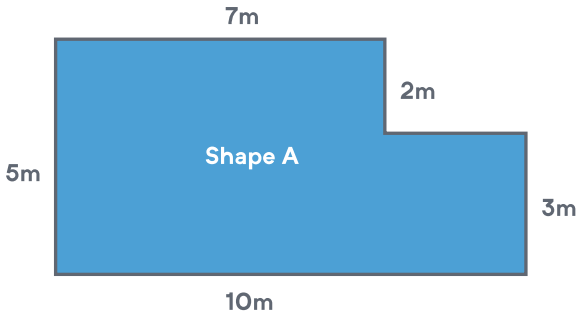
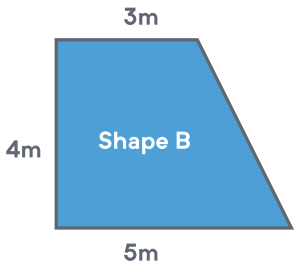
What is needed for the session

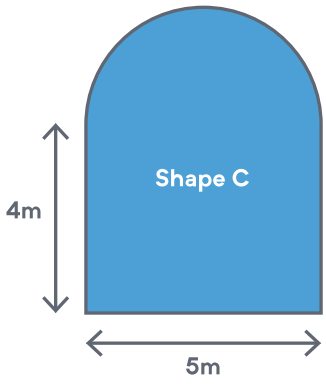
Item	Who will provide it
Measuring tape	Golf course
Trundle wheels	School (if required)
Metre rules	Golf course
Pencil and clipboard for every pupil (not essential)	School
Calculator per pair of pupils	School
Irrigation flags, pegs or spray paint to determine the corners of the area being measured	Golf course
Printed worksheet between 2 students	Golf course
Hi-visibility jackets for all pupils (not essential)	School

What the greenkeeper needs to do

Activity	Equipment	Questions to ask
1. 1. The day before the visit, mark out the shapes below using irrigation flags or an alternative. Leave plenty of room between the shapes. You can change the dimensions to suit your space. Measure the lengths of the sides and calculate the area of the shapes in m^2 so you have the answers ready.	» Irrigation flags or alternative	







2. Tell the students that greenkeepers have to calculate the area of shapes so that they know how much fertilizer to use on an area.		Why would greenkeepers need to calculate the area of a shape?

Activity	Equipment	Questions to ask
3. Take the students to the shapes and ask the students what units we might use to measure the length of the sides of these shapes	» shapes marked out	Why would greenkeepers need to calculate the area of a shape? Which shape do you think has the biggest area? How do you know?
4. Ask students which equipment they could use to measure the length of the sides of these shapes. Check to see that the students know how to measure using a trundle wheel, metre rule and a measuring tape. They will get the opportunity to use each one. Demonstrate how it is done.	» trundle wheels » metre ruler » measuring tape	How do we use a trundle wheel to measure distance?
5. Ask students if they know how to calculate the area of a compound shape. Hopefully Students will know the answer, but if not explain that it can be split into segments.	» as above	How do you calculate the area of a compound shape? What unit do we use for the area of a shape? Square metres (m^2)
6. Give out the worksheets, one between 2, and ask the students to measure the total perimeter of the shape and calculate the area of shape A. Check in on their answers and make sure that all students are confident to calculate the area of a compound shape.	» as above » worksheet	How many times should you check your measurements?
7. Show the students shapes B and C and ask them how they might calculate the total perimeter and area of these shapes. They should know about breaking the shape into two; a rectangle and triangle for area B and a rectangle and half circle for area C. You may have to remind students how to calculate the area of a triangle (½ base x height),the area of a circle (π x radius^2) and the circumference of a circle (π x diameter)	» as above » worksheet	How do you measure the area of a compound shape? How do you measure the area of a triangle? How do you measure the area of a circle? How do you measure the circumference of a circle?
8. Get the students to complete the worksheet	» as above » worksheet	Remind the students to ask you or the teacher questions if they get stuck

Key words

You may have to explain some of these words as students will not be familiar with them. Check that Students know their meaning before using them too much.

centimetre **metre** **squared** **area**

compound shape **hectare** **circle** **triangle**

radius **circumference** **perimeter**

Lesson extension activities

Get some students to use irrigation flags to mark out their own areas and then challenge other pairs to work out the area of their shape.

For students who finish quicker than others get them to convert the areas of the shapes from m^2 into cm^2. (Multiply the m^2 value by 10,000)

Support activities

Any students that find measuring difficult could pace out the lengths and give their answer in paces.

Information for the teacher

National Curriculum links

England
- Derive and apply formulae to calculate and solve problems involving: perimeter and area of triangles, parallelograms, trapezia,
- Calculate and solve problems involving: perimeters of 2-D shapes (including circles), areas of circles and composite shapes

Wales
- Devise and use formulae for the area of rectangles and triangles
- Find areas of circles

Scotland
- I can find the area of compound 2D shapes
- I can apply my knowledge and understanding of measure to everyday problems and tasks and appreciate the practical importance of accuracy when making calculations.

Northern Ireland
- Perform length and area calculations on a composite shape including those involving the circle;
- Solve complex problems involving perimeter

Additional Resources that could be used to follow up the session

Click on the links below to access
- **Area and perimeter — Access Maths**
- **Area and perimeter - SMILE**
- **Area and perimeter — Learning and skills Improvement Service (for more able students)**

Worksheet: Calculating areas on a golf course

Date ..... Golf Course .....

Student Name .....

Please answer the questions below while participating in the session.

The area of a triangle is determined by ½ base x perpendicular height
If a right angled triangle is 6cm along the base and 5 cm high, what would the area be?

What are the dimensions of the area A? (Include appropriate units)
You can draw a diagram here if needed.

Total area of A ..... Perimeter of A .....

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What are the dimensions of the area B? (Include appropriate units)

You can draw a diagram here if needed.

Total area of B ..... Perimeter of B .....

What are the dimensions of the area C? (Include appropriate units)

You can draw a diagram here if needed.

Total area of C ..... Perimeter of C .....

Extension activity

A football pitch could be 70 metres wide by 100 metres long.

What is the area of one football pitch in m^2?

A hectare is a square 100m x 100m.

What is the area of a hectare in m^2?

A typical 18 hole golf course covers 70 hectares of land

How many football pitches would fit on a golf course?

Answers

There are 10,000 square centimetres in a square metre 100 cm x 100cm = 10,000 square centimetres

A football pitch is 70m x 100m = 7,000m^2

The area of a hectare is 100m x 100m = 10,000 m^2

The area of a golf course in m^2 is 10,000 m^2 x 70 = 700,000 m^2

The number of football pitches that would fit into a golf course is the area of the golf course (700,000 m^2) divided by the area of a football pitch. (7,000m^2) = 100

Risk Assesment:

These are suggested risks, you will probably want to add some of your own.

School Name ..... School Representative .....

Golf Club Name .....

Greenkeeper Name ..... Date of Visit .....

What are the hazards?	Who/what is at risk?	What needs to be done to avoid accidents?	Who is to action?
There will be moving cars in the car park	Students	» Inform students that they must follow instructions when leaving the minibus » All students to wear high visibility jackets whilst on the golf club (if the school requires)	Teacher Greenkeeper
Students might get lost from the rest of the group	Students	» All students to wear high visibility jackets whilst on the golf club (if the school requires) » Teacher to count students in every time they move between areas	Teacher
Being hit by a golf ball	Students Teacher Greenkeeper	» Inform students that there are some areas of the golf course that may be dangerous, therefore they need to avoid » All students to wear high visibility jackets whilst on the golf club (if the school requires)	Teacher Greenkeeper
There will be other adults around the course	Students	» Students to be told to report to the teacher if they have any concerns	Teacher Greenkeeper