

Mathematics for gifted pupils Handout 3.1

Use this sheet to record personal notes and points for action during the session.

Planning for enrichment

Handout 3.2

In these examples the objectives are taken from the yearly teaching programmes of the *Framework for teaching mathematics: Years 7, 8 and 9*. Page numbers refer to the pages in the supplement of examples.

Example 1: opening up questions

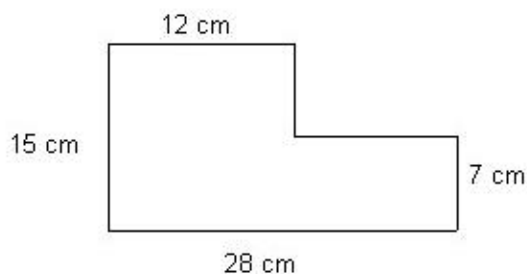
Year 7 objective

Calculate the perimeter and area of shapes made of rectangles (pages 234–235).

Original activity

Pupils work through an exercise of examples like this:

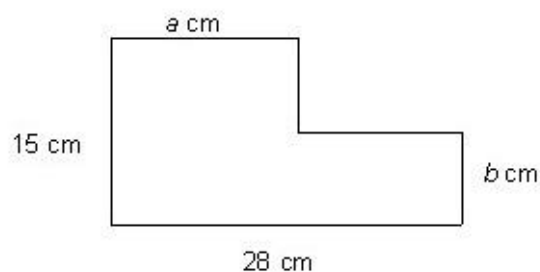
Find the perimeter and area of this shape.



Adapted activity

The teacher has taken one of the questions and 'generalised' it. Pupils are now asked to:

Find the perimeter and area of shapes like this.



Task 1

Work through both questions, comparing your approaches. What different skills are used? What different sorts of thinking are required? What is the difference in the opportunities presented?

Example 2: turning the situation round

Year 8 objective

Use straight edge and compasses to construct the mid-point and perpendicular bisector of a line segment (pages 220–223).

Main activity

Construct triangles from given data. Construct the perpendicular bisector of each side; what do you notice?

Extension activity

You are given three points and told they are the mid-points of the sides of a triangle. Construct the triangle.

Task 2

Quickly tackle both the main and extension activities.

What different skills are used? What different sorts of thinking are required? What is the difference in the opportunities presented?

Example 3: using extension objectives

Year 9 objective

Construct and solve linear equations, selecting an appropriate method (pages 122–131).

Task 3

Look through the Framework supplement of examples for Year 9, pages 123 and 125. Reflect on how you currently teach this topic.

Now look through the supplement of examples for Year 9 extension (*italicised blue print*) on pages 127–131. What opportunities do you currently provide for able pupils to tackle problems at this level in Year 9? Can these be developed further?

Mid-points

The scheme of work for a Year 8 unit identifies the following objectives:

- Interpret solutions in algebraic, geometric or graphical form.
- Begin to distinguish the different roles played by letter symbols.
- Given the coordinates of points A and B, find the mid-point of the line segment AB.

This is an extract from a teacher's plan for the main part of the first lesson with a top set:

Revise conventions for labelling coordinates. Key question: 'Why do we need a rule about the order in which the coordinates are written?'

On an OHT establish and label two points with coordinates [(3, 2) and (9, 8)].

Explain that these are the opposite corners of a square. Ask for ideas about where the other corners could be [(3, 8) and (9, 2)]. Mark and label them. Is this solution unique? How can we be sure?

Ask for observations about patterns in the coordinate pairs.

Now ask pupils to work out mentally the coordinates of the mid-points of the sides of the square. Record these [(3, 5), (6, 8), (9, 5), (6, 2)].

Explain task to pupils. They are to draw other squares with sides parallel to the axes. They should investigate the relationship between the coordinates of the corners and the mid-points of the sides. The aim by the end of the lesson is to be able to answer the following questions.

Work out **without drawing**:

- A square has opposite corners at (35, 12) and (53, 30). What are the coordinates of the mid-points of its sides?
- Explain your rules as succinctly as you can.
- A square has opposite corners at (a, b) and (x, y). What are the coordinates of the mid-points of its sides?

Extension questions for pupils as they finish:

- Does this work if the square is in one of the other quadrants? or if two corners are in different quadrants?

The teacher has a small number of very able pupils in the group. She expects them to be able to complete the task quite quickly by analysis using very little drawing. She intends to sit them together and encourage them to do this. She then plans the following enrichment activity for them:

Enrichment activity

Explore the above for squares whose sides are not parallel to the axes.

Features of effective teaching Handout 3.4

What does good teaching of gifted and talented pupils involve?

- A high degree of subject knowledge
- Understanding of how to plan classwork and homework in order to increase the pace, breadth or depth of the coverage of the subject
- The capacity to envisage and organise unusual projects and approaches which catch pupils' attention and make them want to explore the topic
- The use of tasks which help pupils to develop perseverance and independence in learning through their own research or investigation, while ensuring that they have the necessary knowledge and skills to tackle the work effectively on their own
- The use of demanding resources which help pupils to engage with difficult or complex ideas
- The use of ICT to extend and enhance pupils' work and the opportunity to present the outcomes to others
- The ability to deploy high-level teaching skills in defining *expectations*, creating a positive classroom climate for enquiry, asking probing questions, managing time and resources, and assessing progress through the lesson
- The confidence to try out new ideas, to take risks and to be prepared to respond to leads which look most likely to develop higher levels of thinking by pupils

From *Providing for gifted and talented pupils: an evaluation of Excellence in Cities and other grant-funded programmes* (Ofsted, December 2001)