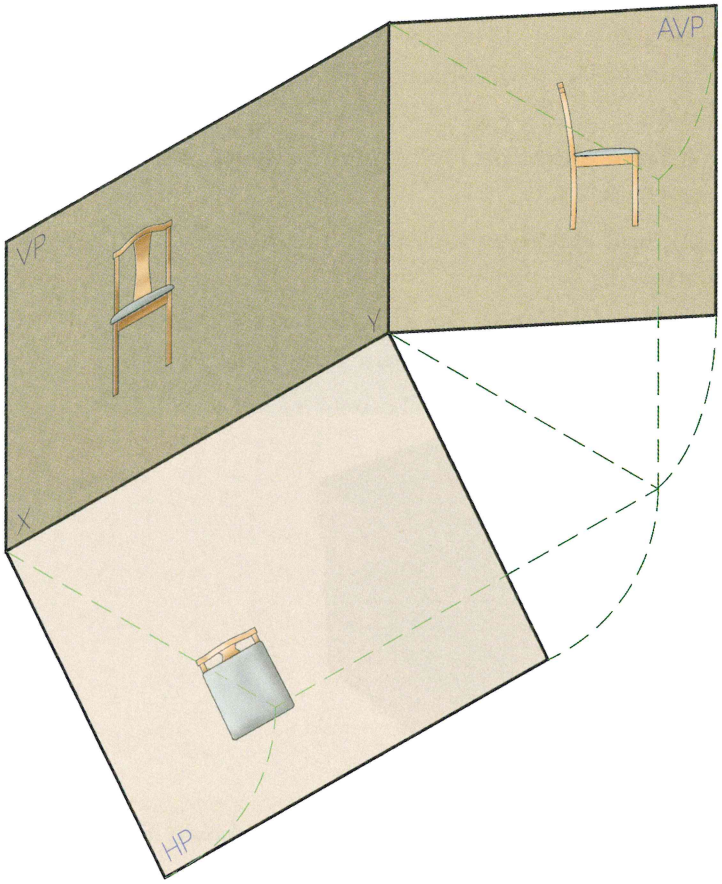
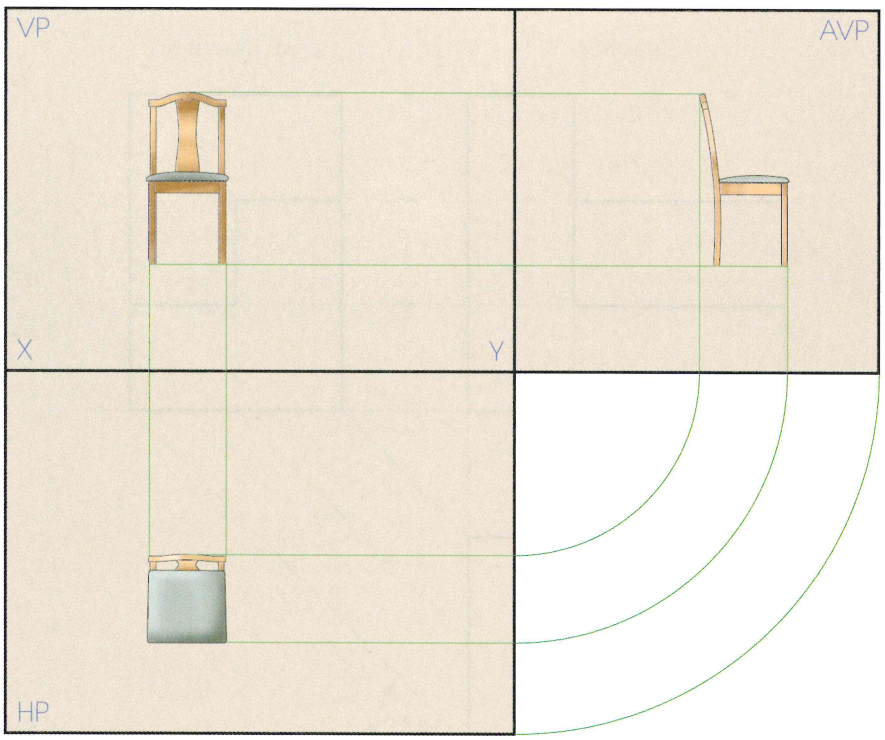
The planes of projection are then rotated into one plane, as shown over and below, allowing the three views to be transferred to a sheet of paper.




The end elevation looking from the left lies directly to the right of the front elevation.
The plan lies directly below the front elevation.
In this arrangement, the three views are said to be in projection.

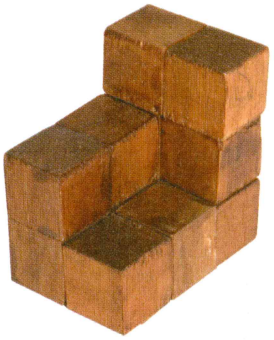
**Example**

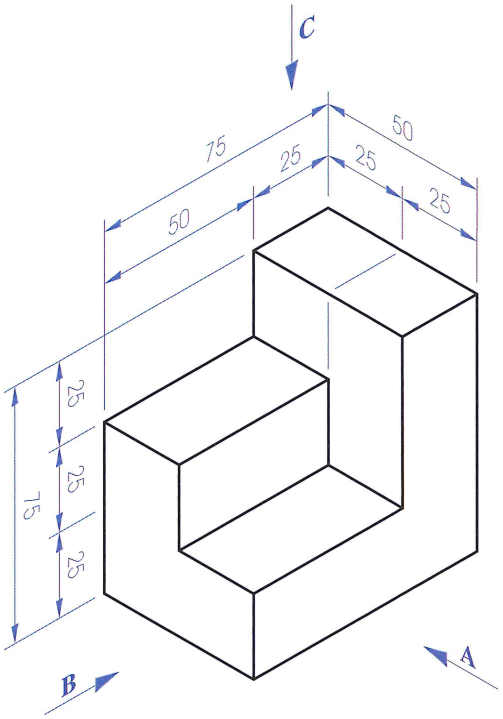
A pictorial view of an object is shown over. Draw full-size:

(a) A **front elevation** looking in the direction of arrow **A**.

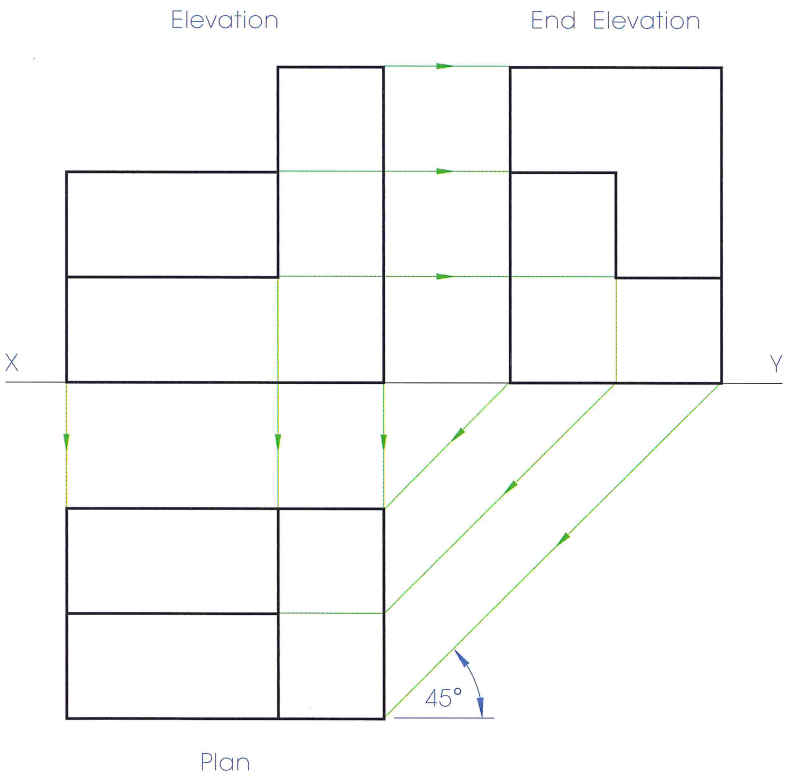
(b) An **end elevation** looking in the direction of arrow **B**.

(c) A **plan** looking in the direction of the arrow **C**, projected from the front elevation.






Build the object from 25 mm cubes as shown above. Use the model to help you visualise the solution.




The end elevation looking from the left lies directly to the right of the front elevation. The plan lies directly below the front elevation.

## Exercises

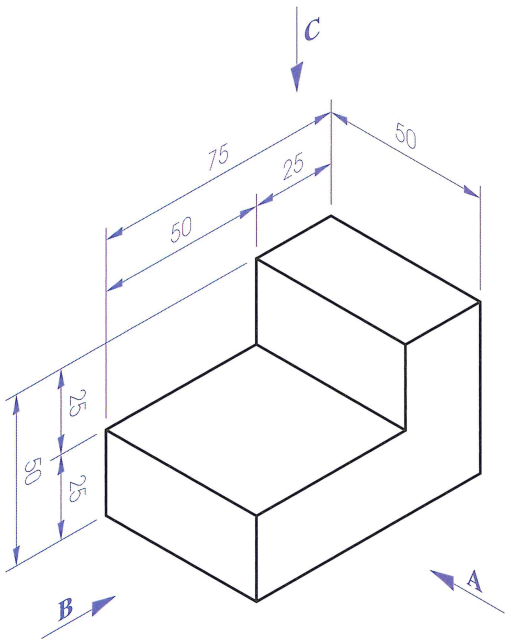
Represent each of the objects shown below using **orthographic projection** by drawing the following views:

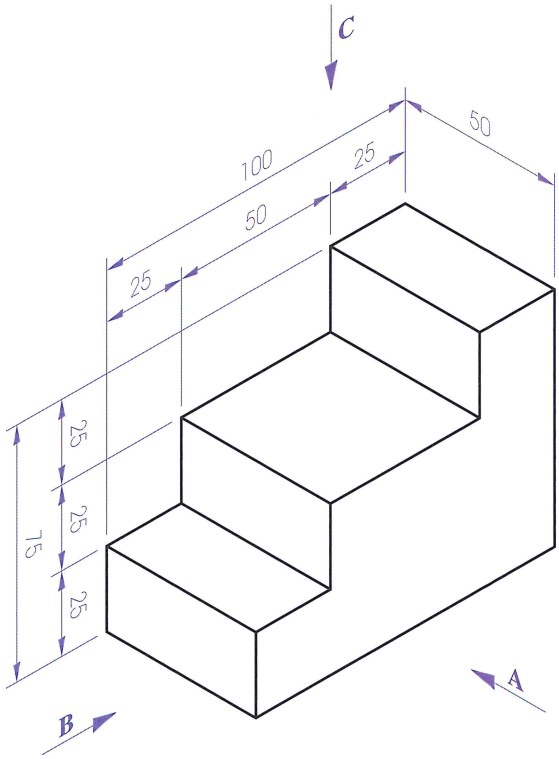
(a) A **front elevation** looking in the direction of arrow **A**.

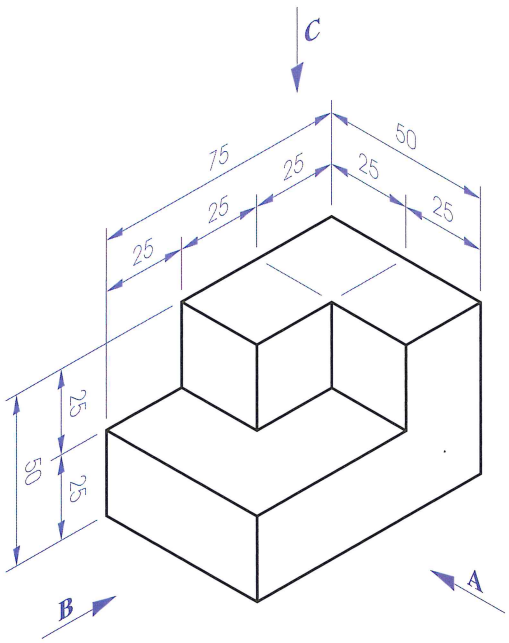
(b) An **end elevation** looking in the direction of arrow **B**.

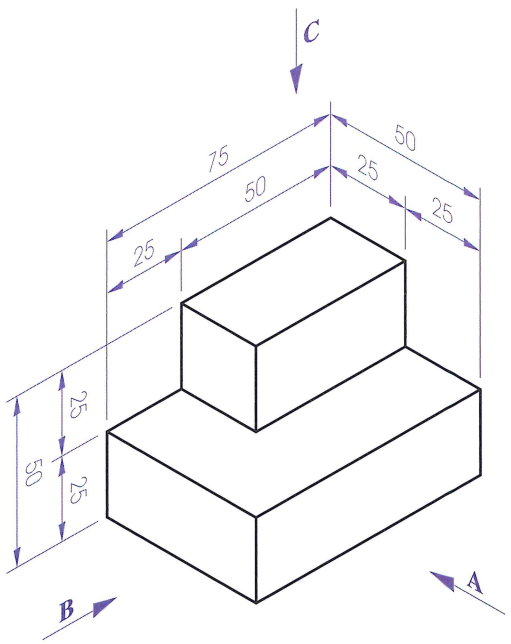
(c) A **plan** looking in the direction of the arrow **C**, projected from the front elevation.

Build each of the objects from 25 mm cubes and use the models to help you visualise the solutions.



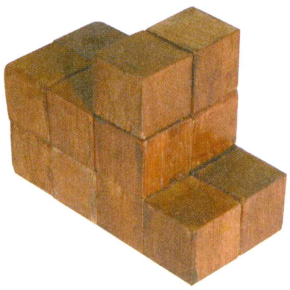
## Example

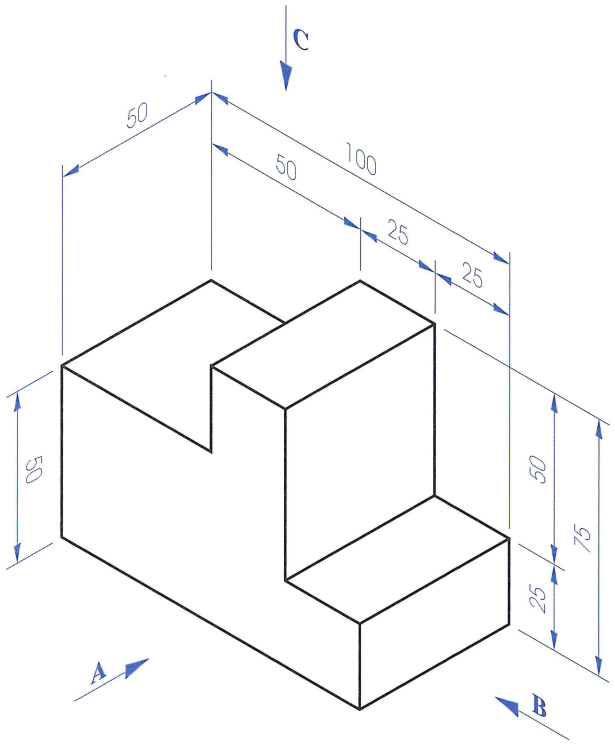
A pictorial view of an object is shown across.
Draw full-size:

(a) A **front elevation** looking in the direction of arrow **A**.

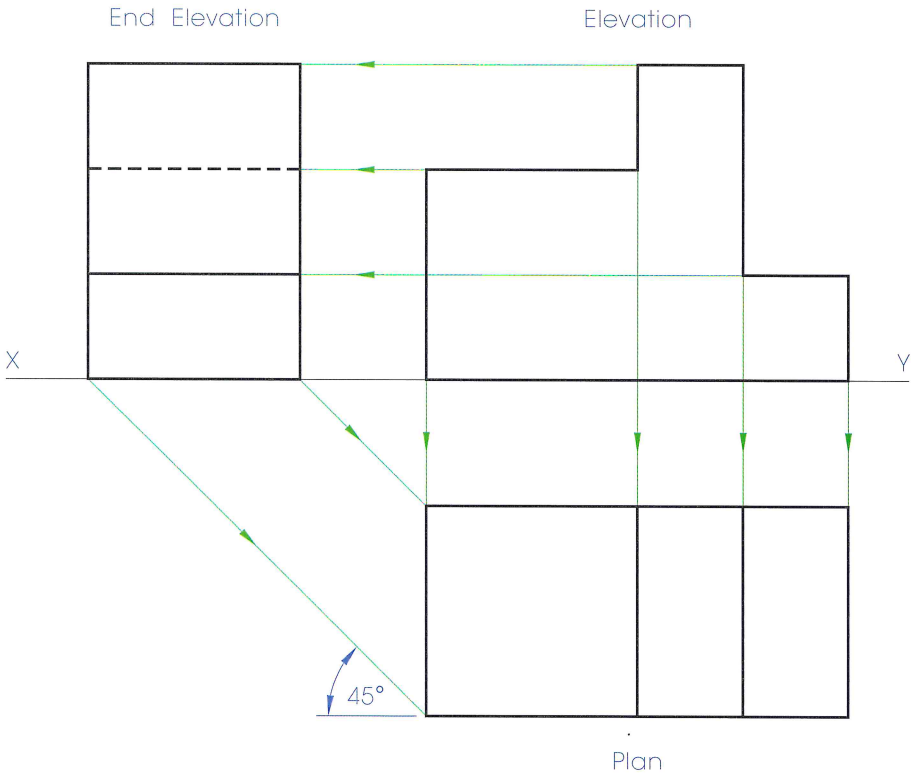
(b) An **end elevation** looking in the direction of arrow **B**.

(c) A **plan** looking in the direction of the arrow **C**, projected from the front elevation.






Build the object from 25 mm cubes as shown above. Use the model to help you visualise the solution.




The end elevation looking from the right lies directly to the left of the front elevation.
The plan lies directly below the front elevation.
Lines that cannot be seen from the viewing direction are represented by dashed lines.

## Exercises

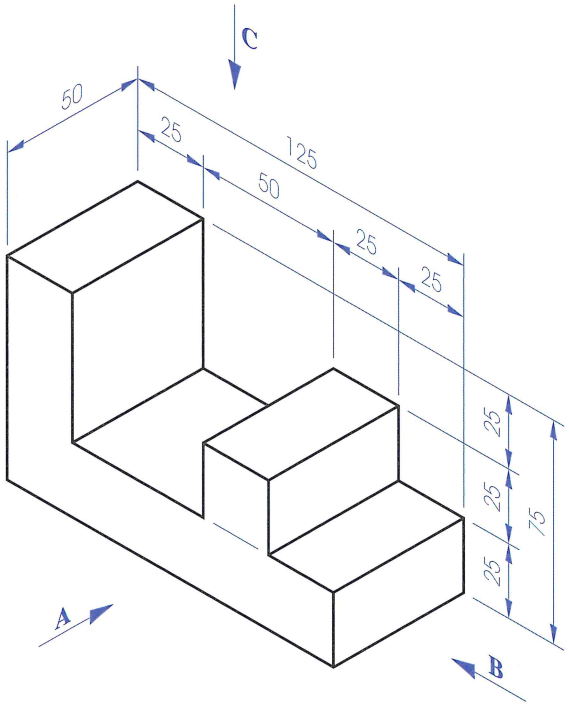
**1.** Represent each of the objects shown below using **orthographic projection** by drawing the following views:

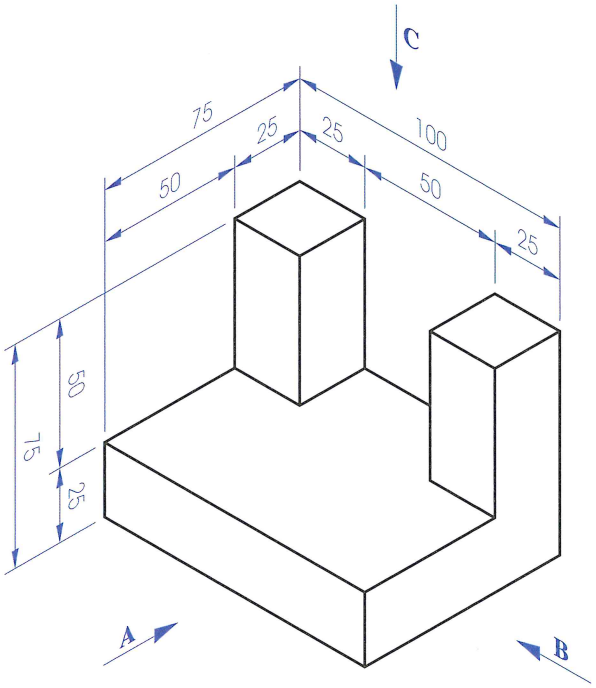
(a) A **front elevation** looking in the direction of arrow **A**.

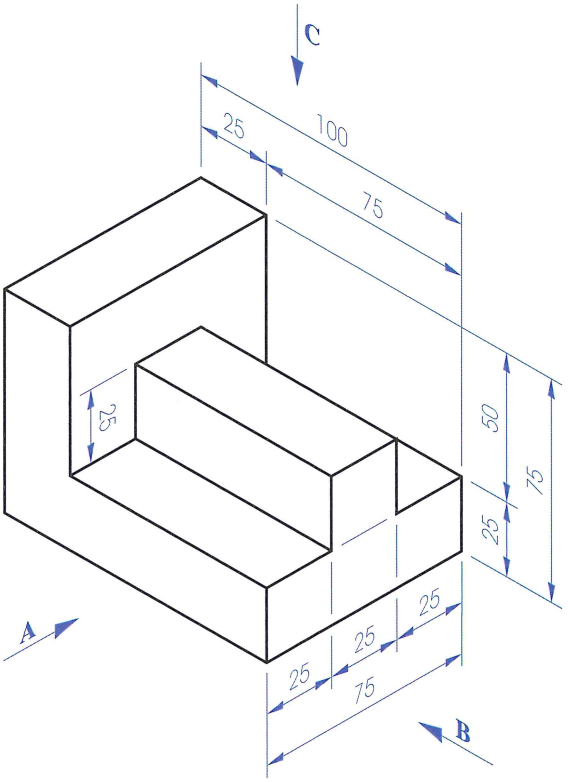
(b) An **end elevation** looking in the direction of arrow **B**.

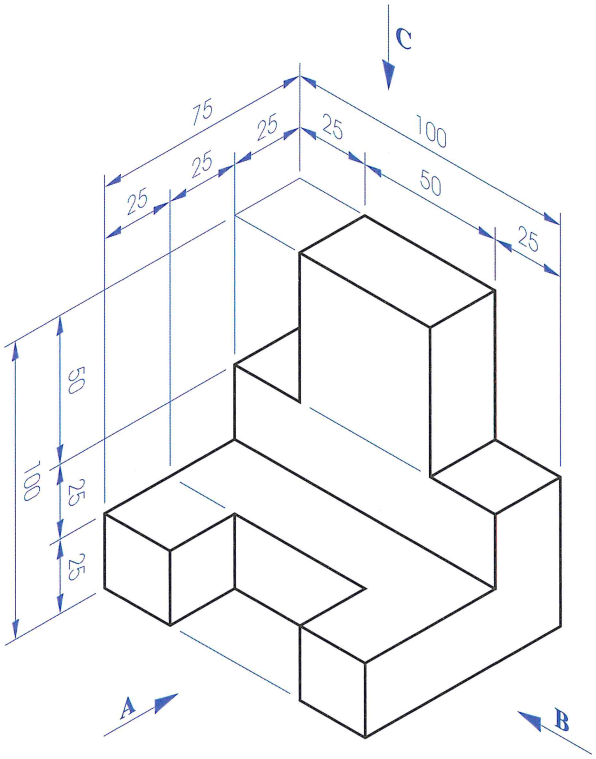
(c) A **plan** looking in the direction of the arrow **C**, projected from the front elevation.

Build each of the objects from 25 mm cubes and use the models to help you visualise the solutions.



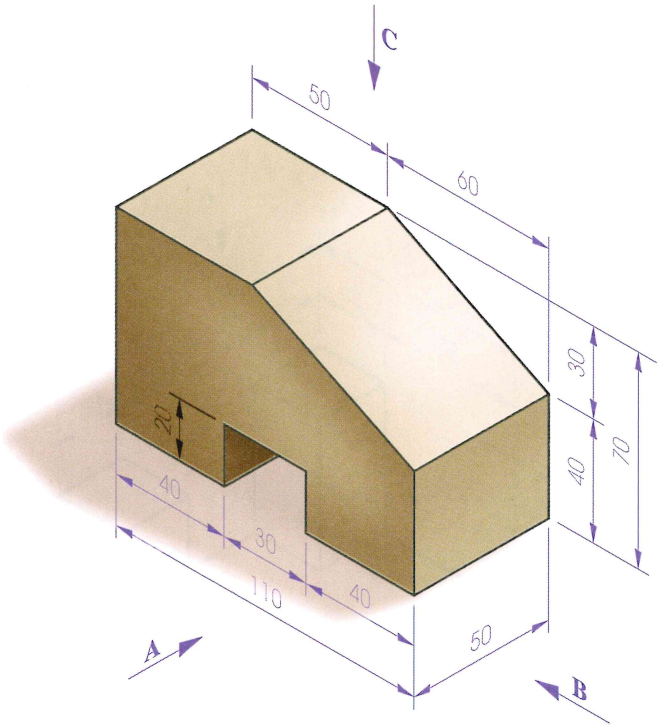



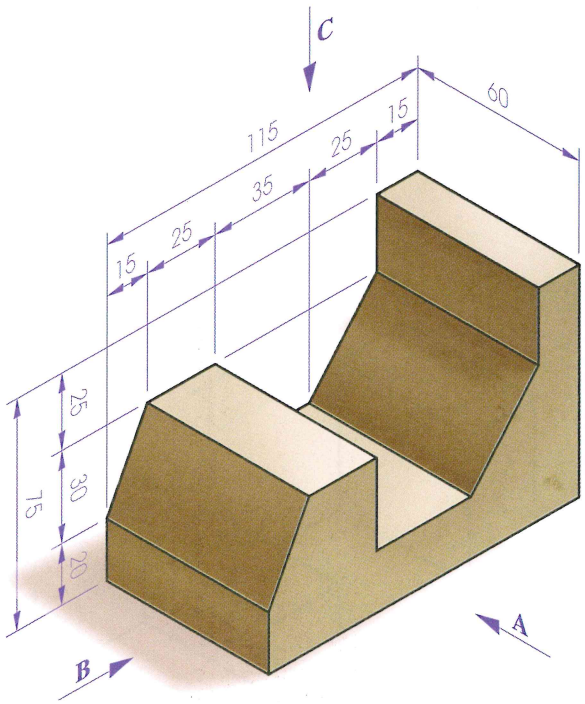
**2.** Represent each of the objects shown below using **orthographic projection** by drawing the following views:

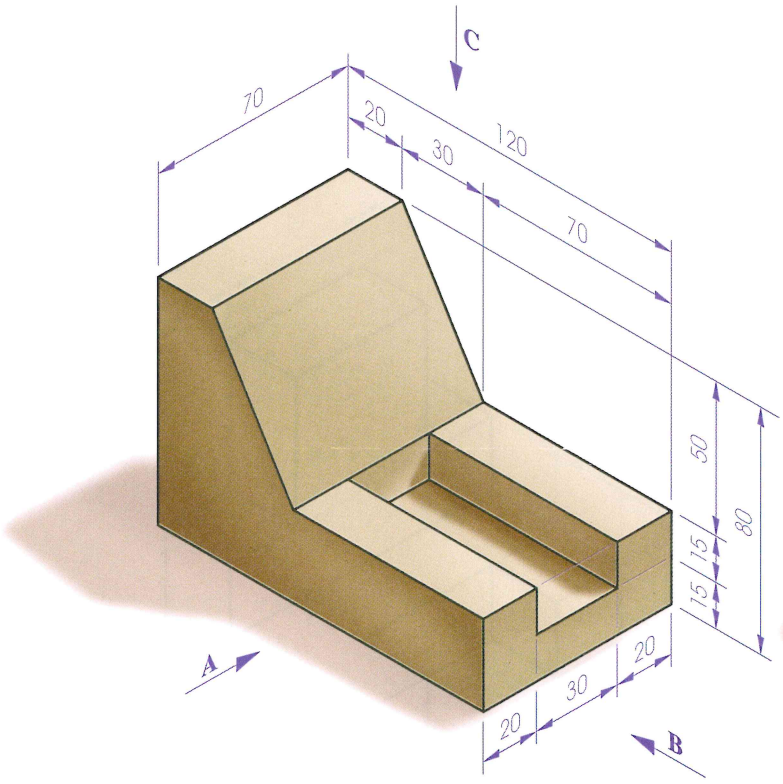
(a) A **front elevation** looking in the direction of arrow **A**.

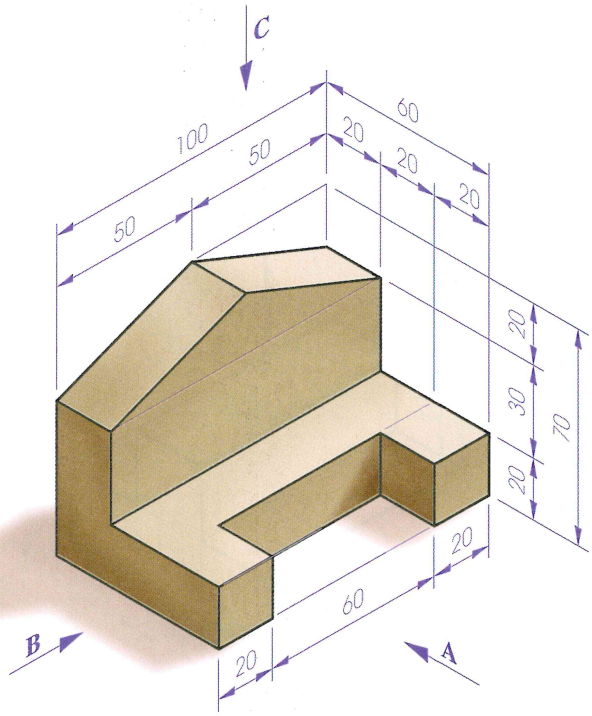
(b) An **end elevation** looking in the direction of arrow **B**.

(c) A **plan** looking in the direction of the arrow **C**, projected from the front elevation.



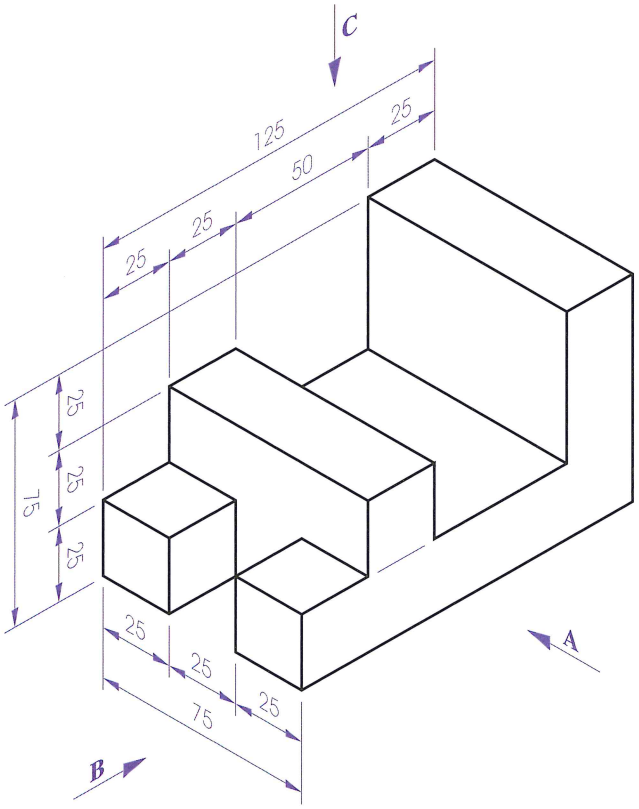
**3.** Represent each of the objects shown below using **orthographic projection** by drawing the following views:

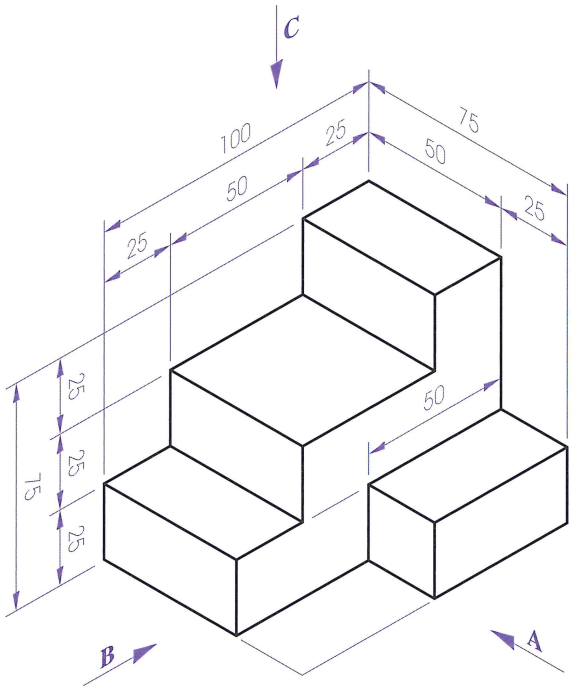
(a) A **front elevation** looking in the direction of arrow **A**.

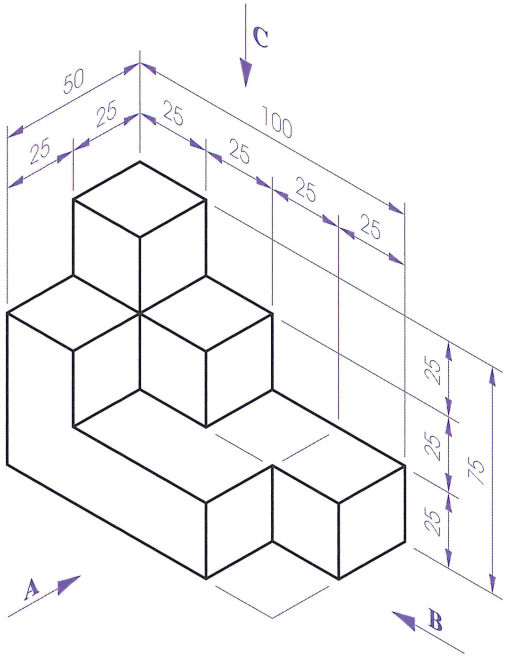
(b) An **end elevation** looking in the direction of arrow **B**.

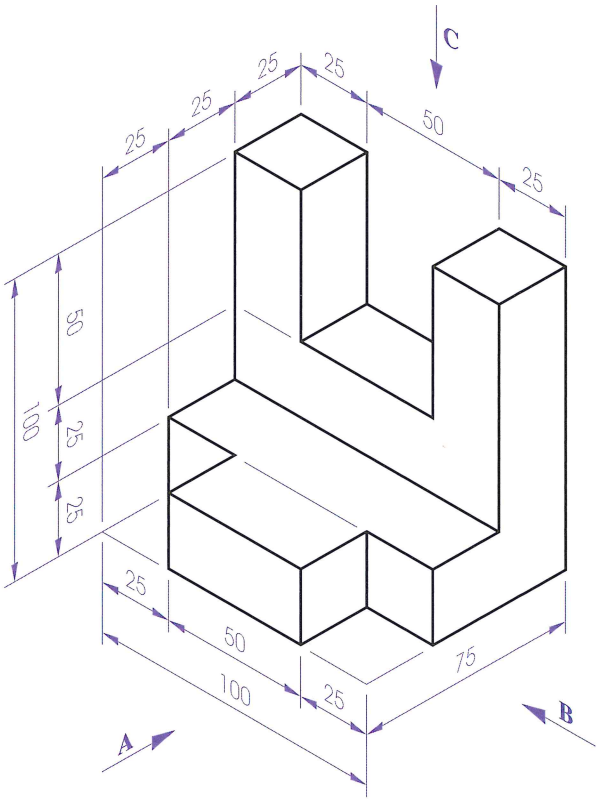
(c) A **plan** looking in the direction of the arrow **C**, projected from the front elevation.

Building the objects from 25 mm cubes will help you visualise the solutions to these questions. It will also develop your ability to visualise more complex objects without the aid of a model.



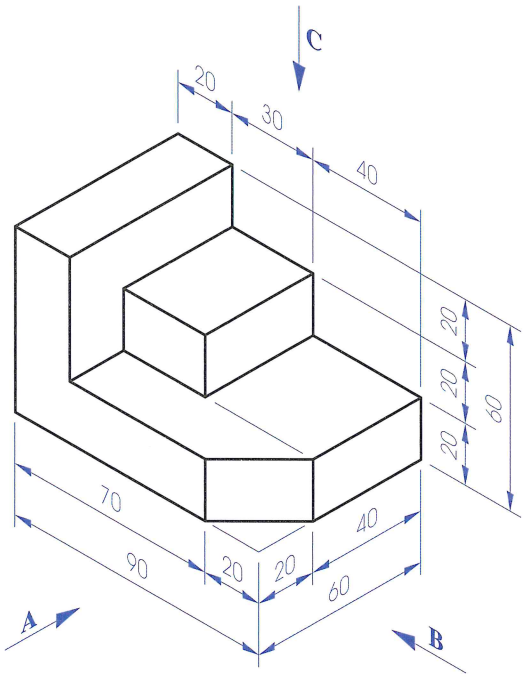

**Answer Worksheets 7A, 7B and 7C**

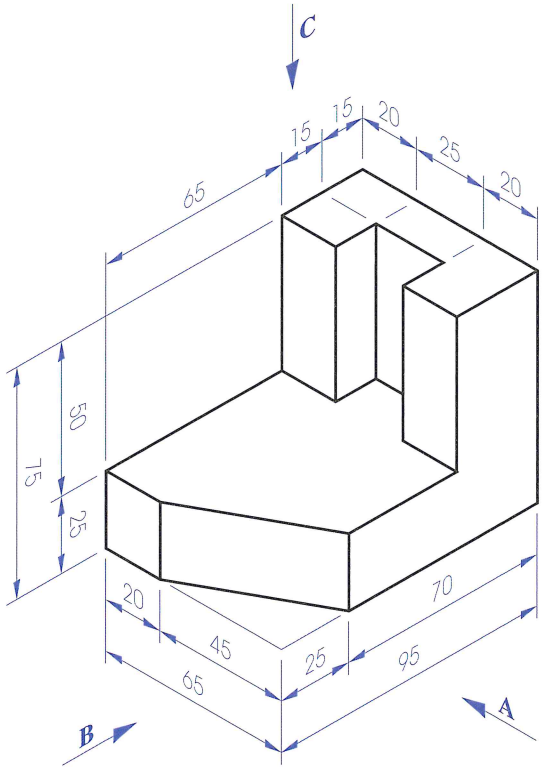
**4.** Represent each of the objects shown below using **orthographic projection** by drawing the following views:

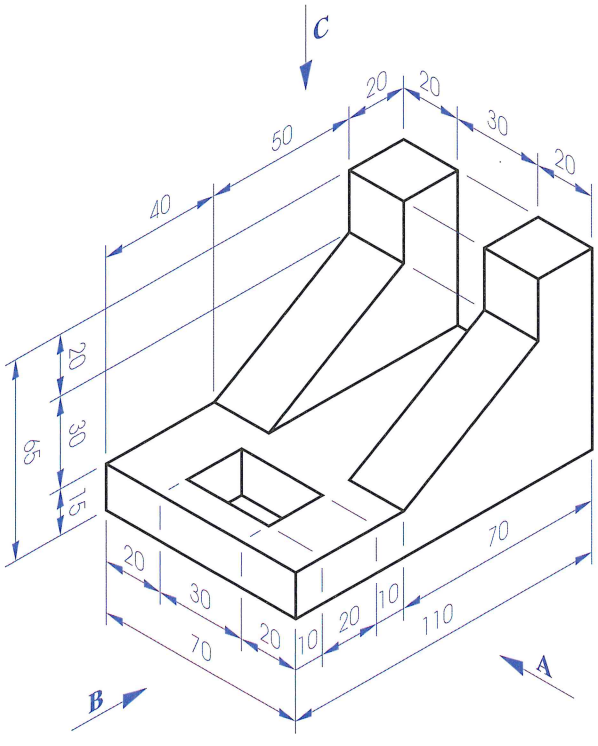
(a) A **front elevation** looking in the direction of arrow **A**.

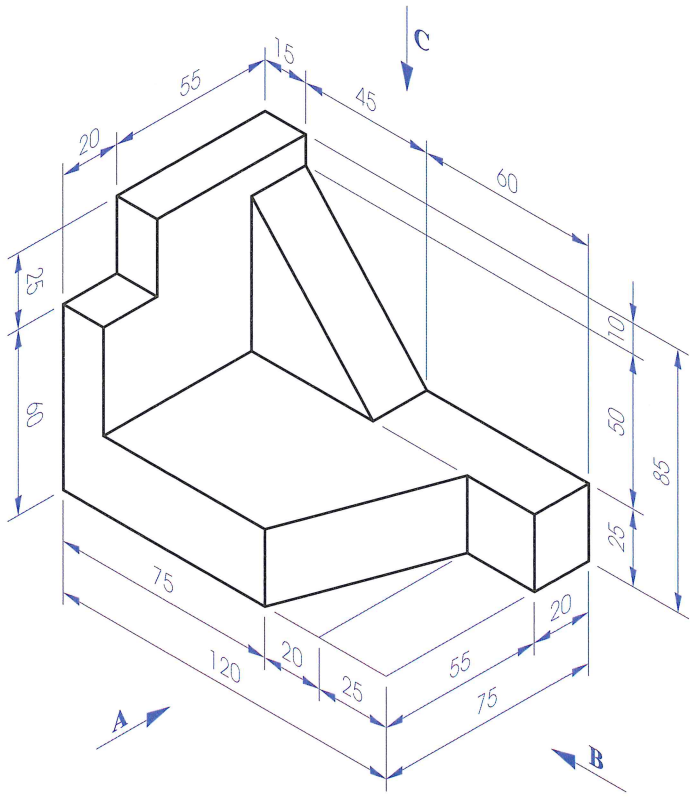
(b) An **end elevation** looking in the direction of arrow **B**.

(c) A **plan** looking in the direction of the arrow **C**, projected from the front elevation.



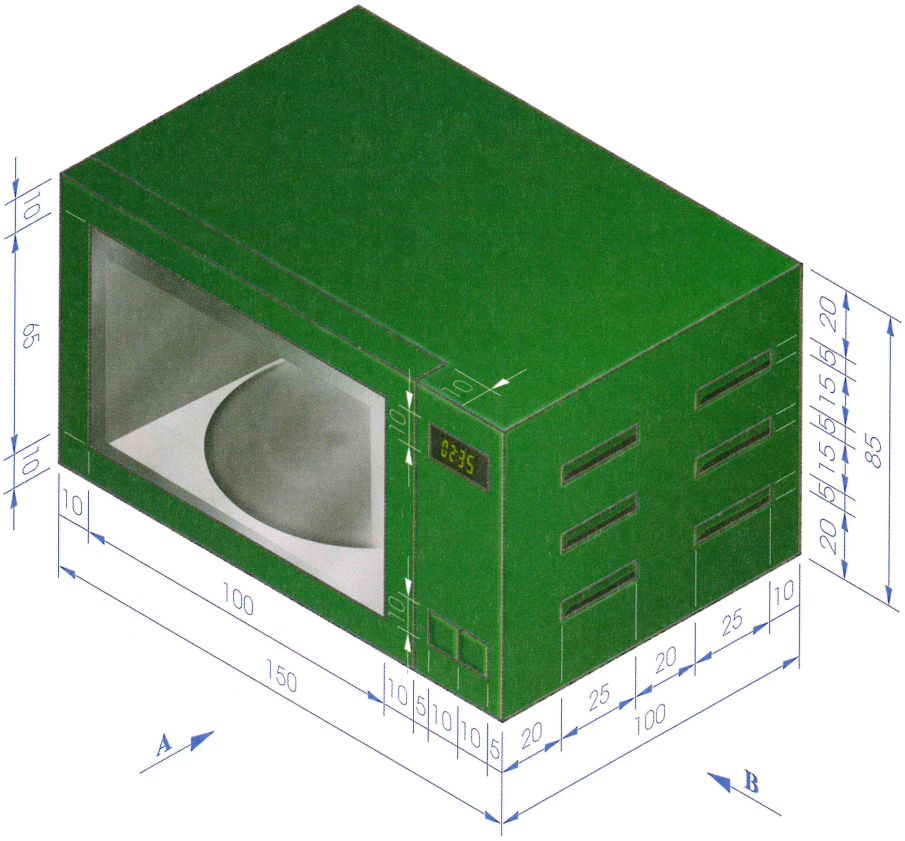



**5.** The figure over shows a pictorial view of a **microwave**. Draw:

(a) A **front elevation** looking in the direction of arrow **A**.

(b) An **end elevation** looking in the direction of arrow **B**.

(c) A **plan** projected from the front elevation.




**6.** A pictorial view of a **cooker** is shown over. The radius of each circle is *ten millimetres*. Draw:

(a) A **front elevation** looking in the direction of arrow **A**.

(b) An **end elevation** looking in the direction of arrow **B**.

(c) A **plan** projected from the front elevation.