

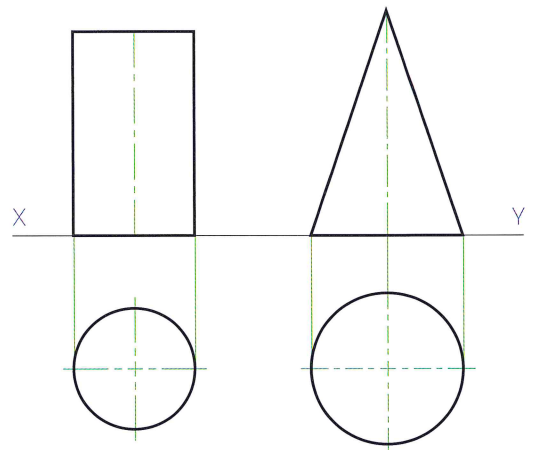
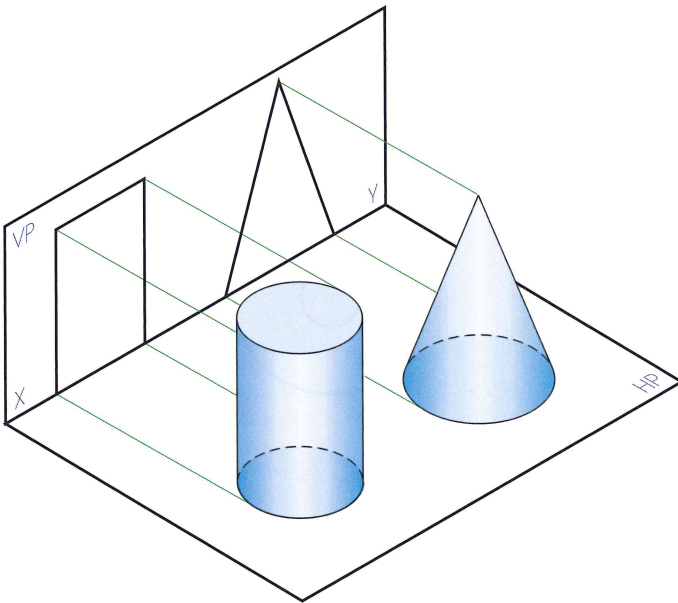
## Chapter 13

# Orthographic Projection 2

We saw in chapter 7 that orthographic projection is a method of representing a three-dimensional object on a plane surface.

The figure below shows a pictorial view of a cylinder and cone in relation to the **principal planes of projection**. The elevation and plan of the solids are also shown.

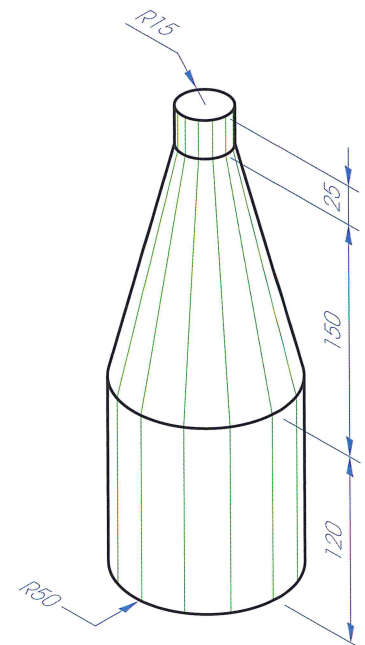
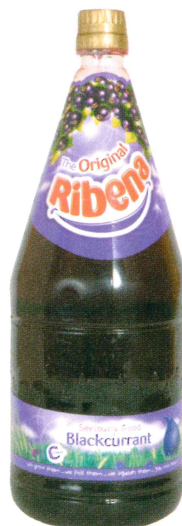
Note that the curved surface of the cylinder appears as a rectangle in elevation, while the curved surface of the cone appears as a triangle.



The horizontal plane (HP) and the vertical plane (VP) are known as the principal planes of projection.

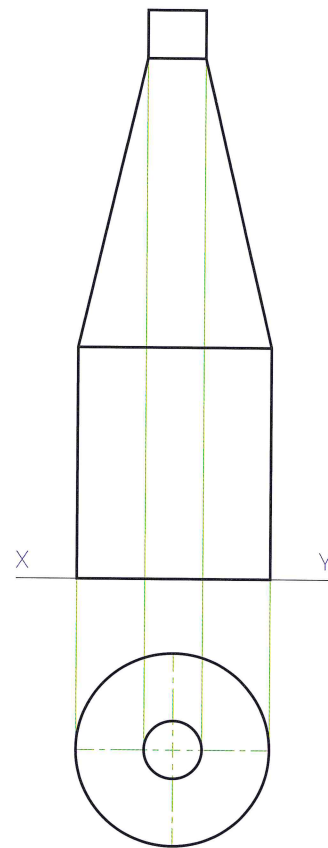
### Example

A pictorial view of a **Ribena Bottle** is shown over. Draw a plan of the bottle and project an elevation.



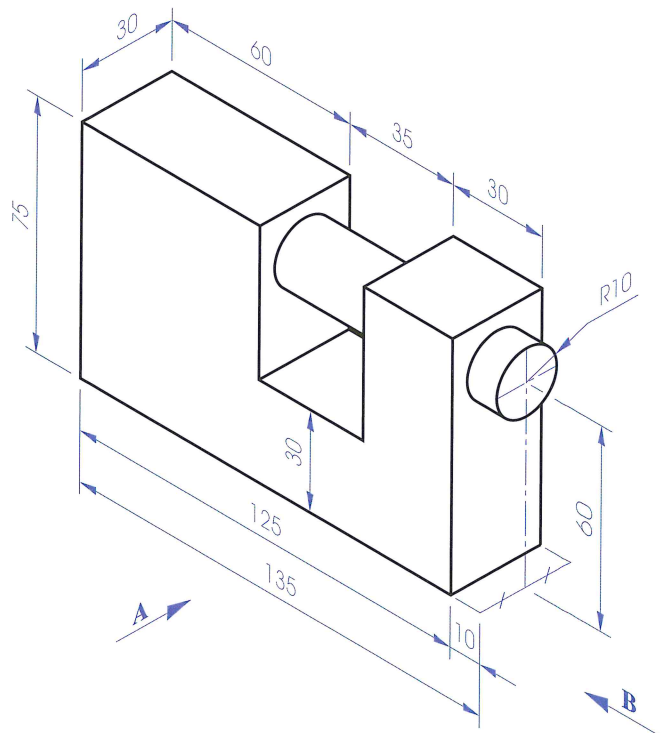
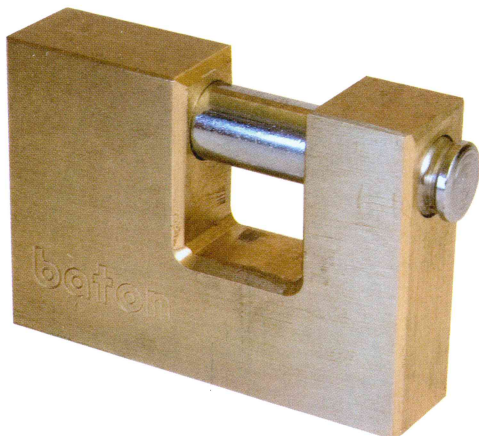
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1. The plan will consist of two concentric circles of radii 15 mm and 50 mm as shown across.
2. The elevation can then be projected by marking off the relevant heights of 120, 150 and 25 mm.
3. Note that the truncated cone appears as a trapezium in elevation.



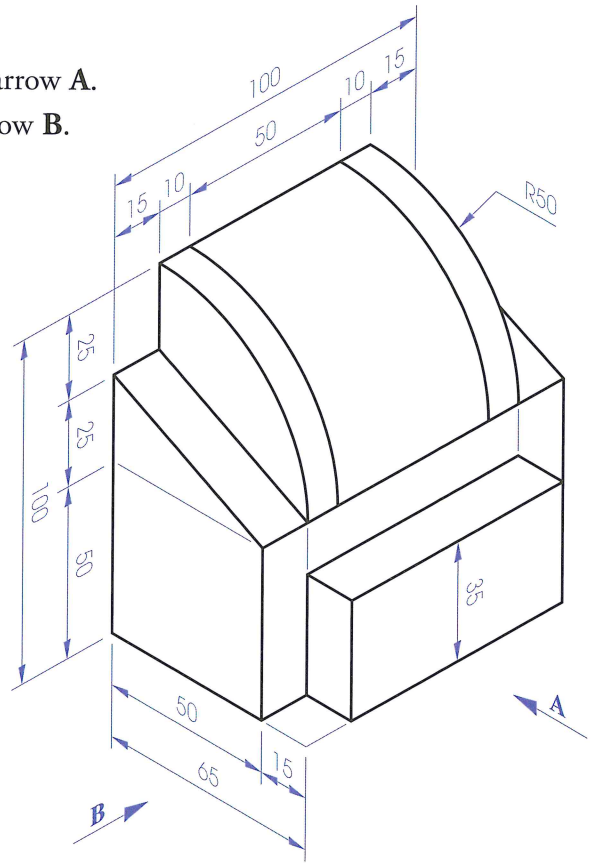
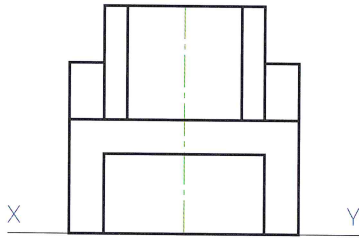
### Exercises

1. A pictorial view of a **blocklock** is shown over. The bolt is 100 mm long.
  - (a) Draw a **front elevation** looking in the direction of arrow **A**.
  - (b) Draw an **end elevation** looking in the direction of arrow **B**.
  - (c) Draw a **plan** projected from (a) above.



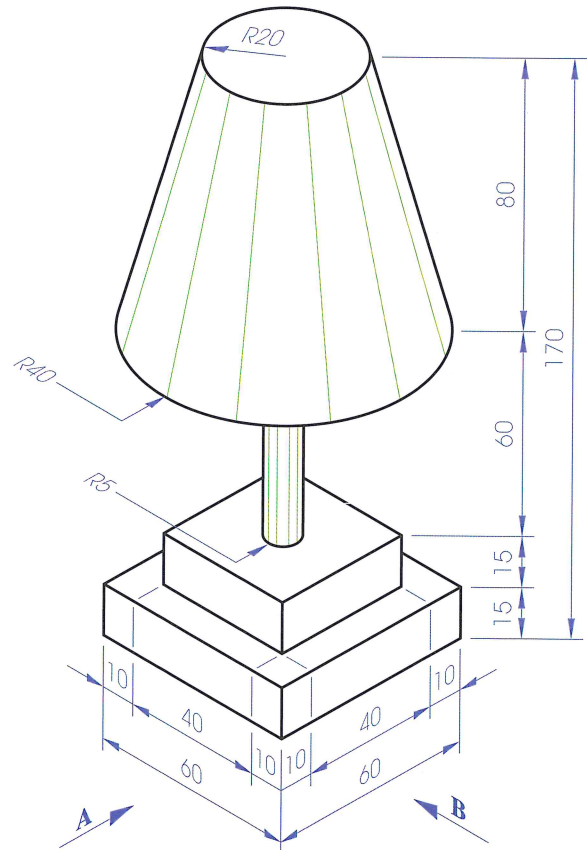
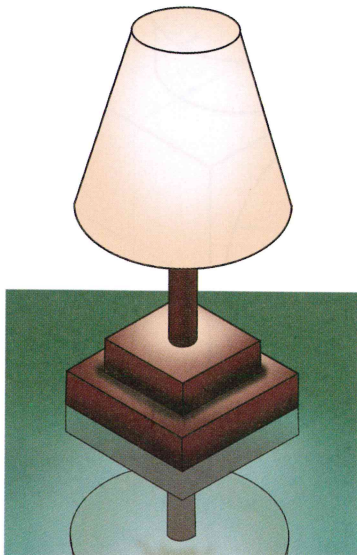
2. The figure over shows a pictorial view of a **school bag**.  
A thumb-sketch of the front elevation is shown below.

- (a) Draw the **front elevation** looking in the direction of arrow **A**.
- (b) Draw an **end elevation** looking in the direction of arrow **B**.
- (c) Draw a **plan** projected from (a) above.



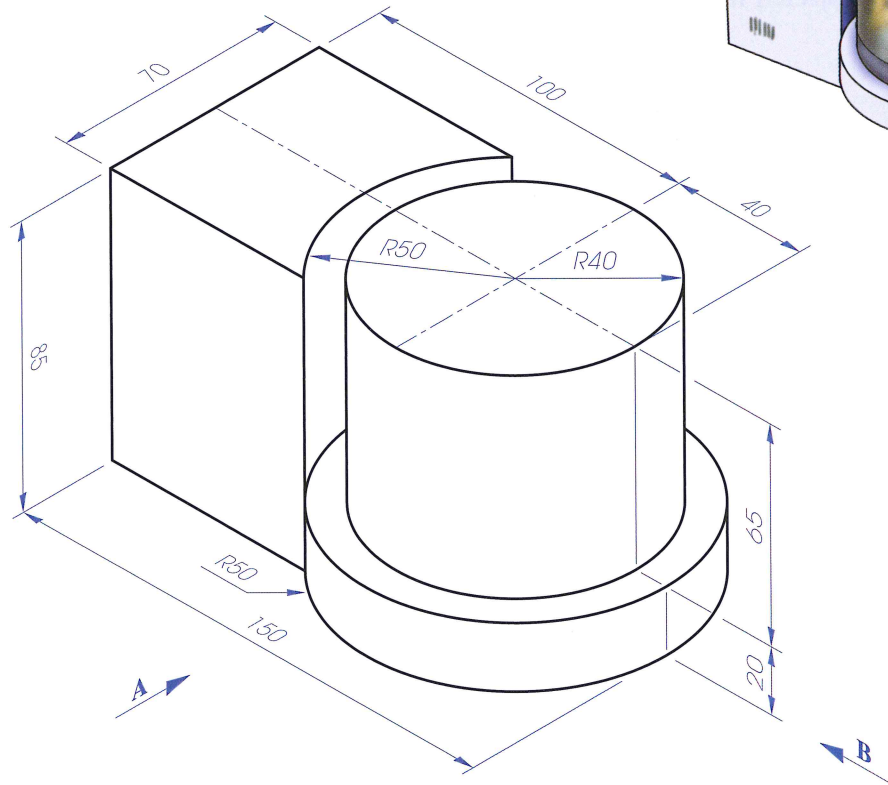
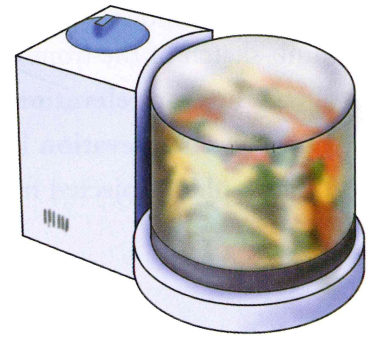
3. The figure over shows a pictorial view of a **lampshade**. Using an A3 sheet portrait:

- (a) Draw an **elevation** looking in the direction of arrow **A**.
- (b) Draw an **end elevation** looking in the direction of arrow **B**.
- (c) Draw a **plan** projected from (a) above.



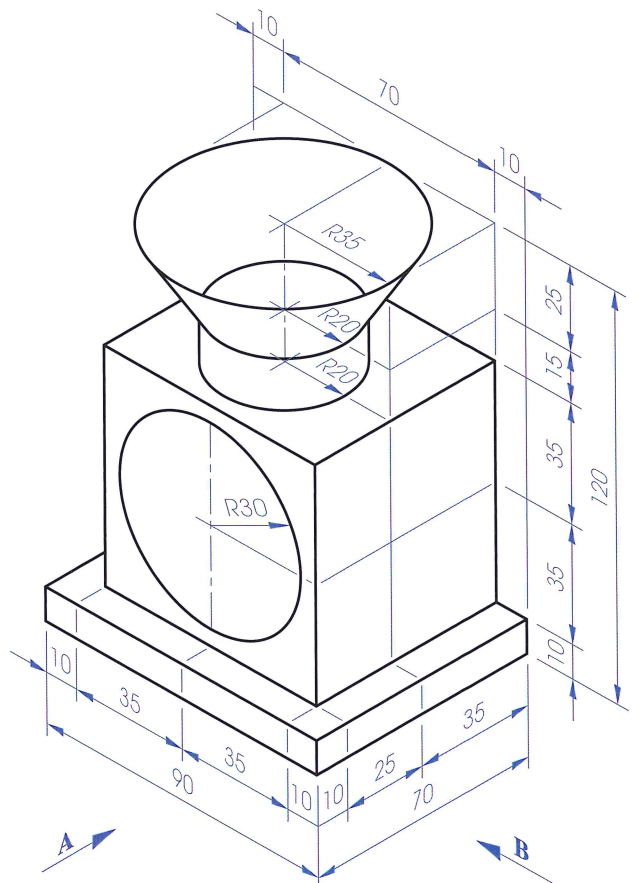
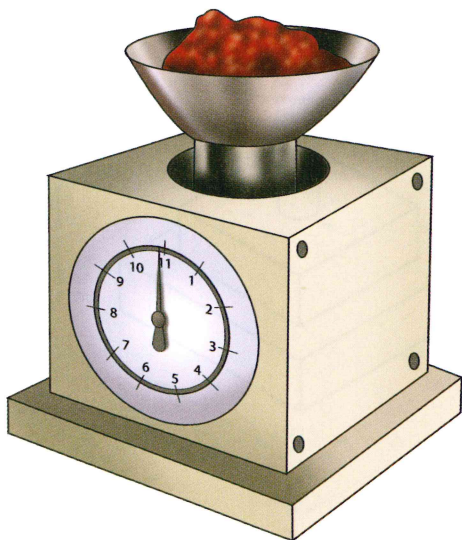
4. The figure below shows a pictorial view of a **food mixer**.

- (a) Draw an **elevation** looking in the direction of arrow **A**.
- (b) Draw an **end view** looking in the direction of arrow **B**.
- (c) Draw a **plan** projected from (a) above.



5. A pictorial view of some **kitchen scales** is shown across.

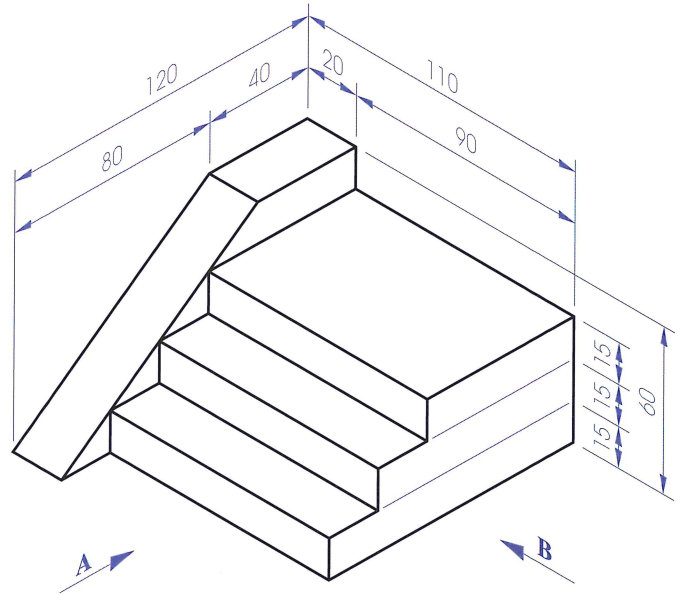
- (a) Draw an **elevation** looking in the direction of arrow **A**.
- (b) Draw an **end view** looking in the direction of arrow **B**.
- (c) Draw a **plan** projected from (a) above.



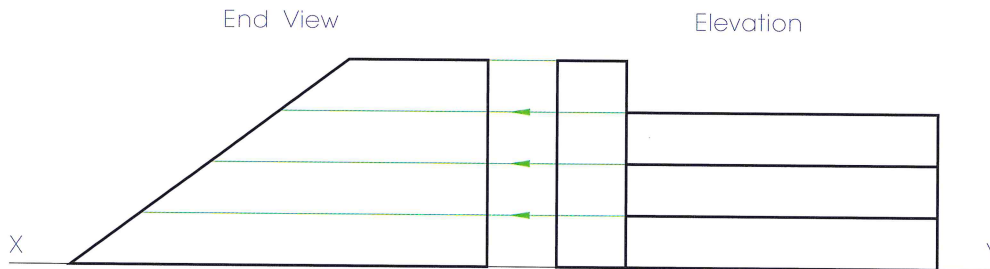
**Example**

The figure over shows a pictorial view of a **flight of steps**.

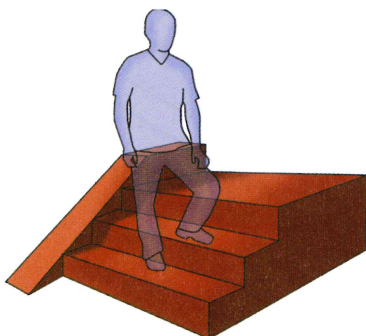
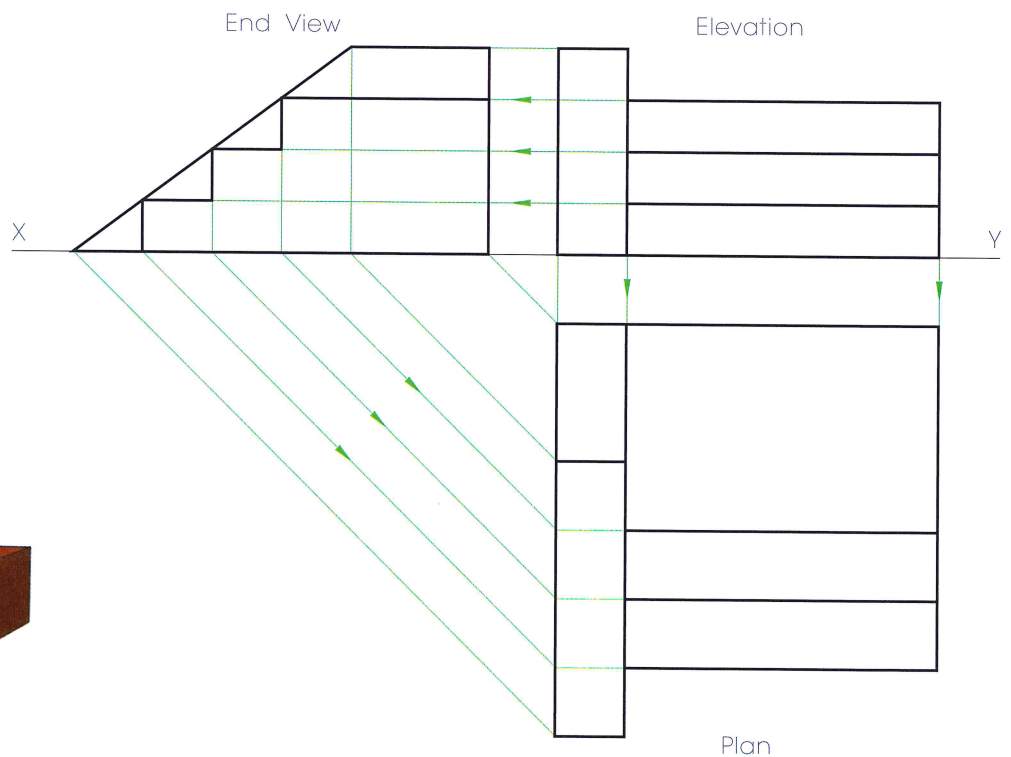
- (a) Draw an **elevation** looking in the direction of arrow **A**.
- (b) Draw an **end view** looking in the direction of arrow **B**.
- (c) Draw a **plan** projected from (a) above.



1. The elevation and outline of the end view are drawn as shown below.
2. The sloped surface appears as an edge (line) in the end view. Therefore the height of each step can be projected to intersect this surface (line) in the end view.
3. Now that the depth of each step has been determined the plan can be projected in the normal manner.

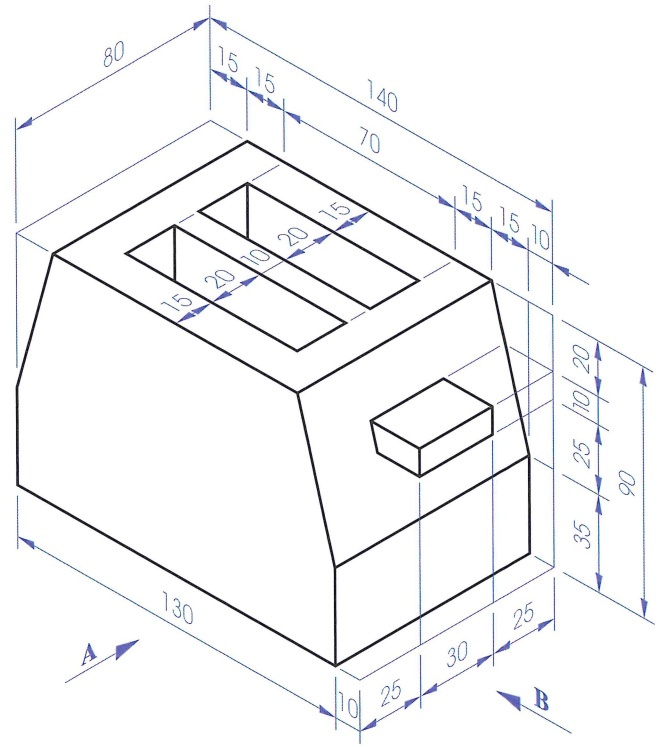
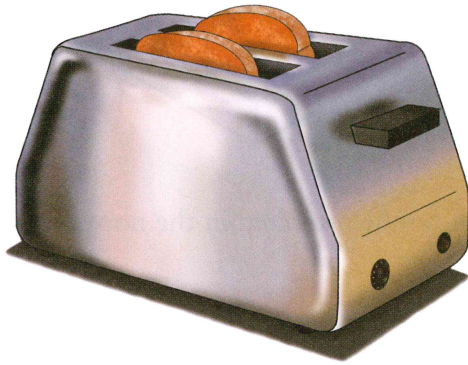


The point of intersection between a line and a plane can be determined in a view in which the plane appears as an edge.



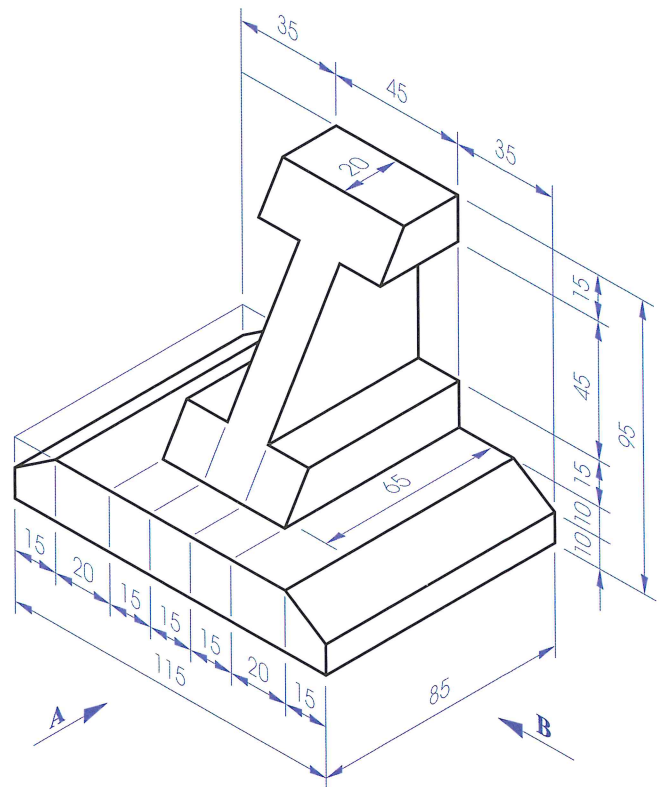
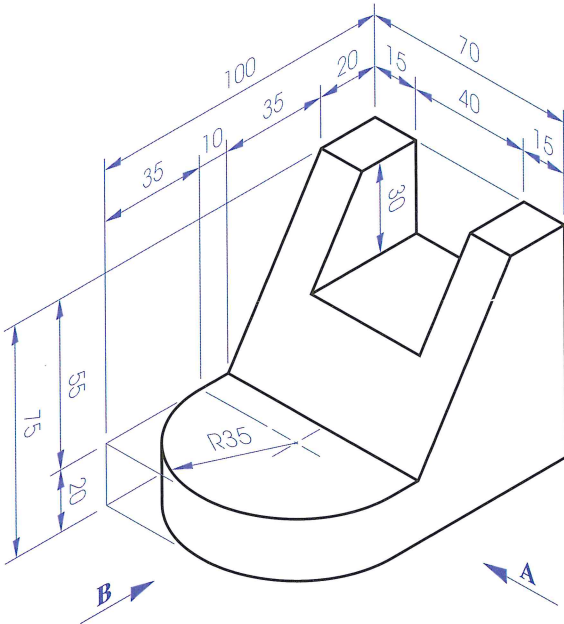
**Exercises**

1. A pictorial view of a **toaster** is shown over. The depth of the holes is 65 mm.
- (a) Draw a **front elevation** looking in the direction of arrow **A**.
  - (b) Draw an **end view** looking in the direction of arrow **B**.
  - (c) Draw a **plan** projected from the front elevation.



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

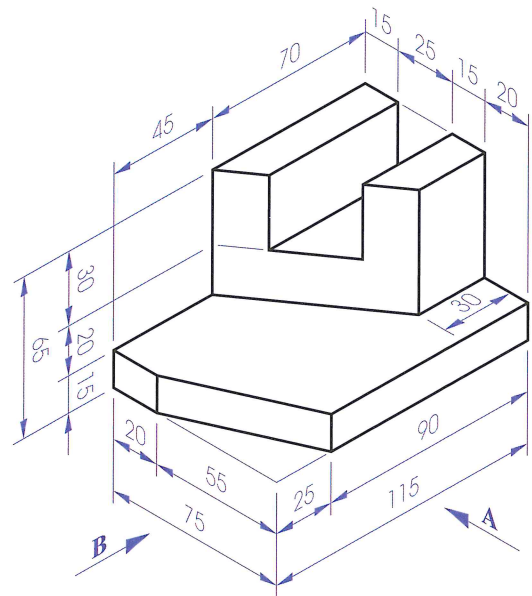
- (a) A **front elevation** looking in the direction of arrow **A**.
- (b) An **end view** looking in the direction of arrow **B**.
- (c) A **plan** projected from (a) above.



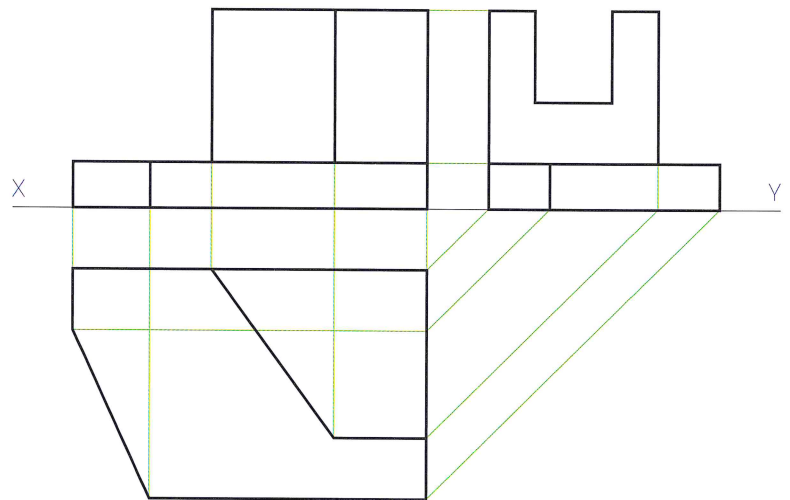
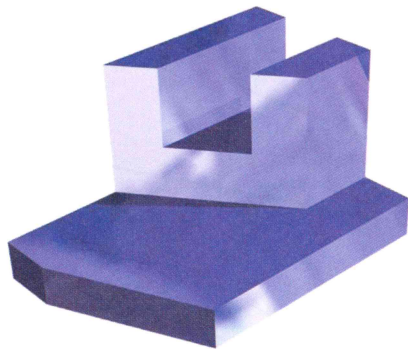
**Example**

A pictorial view of a **solid** is shown over.

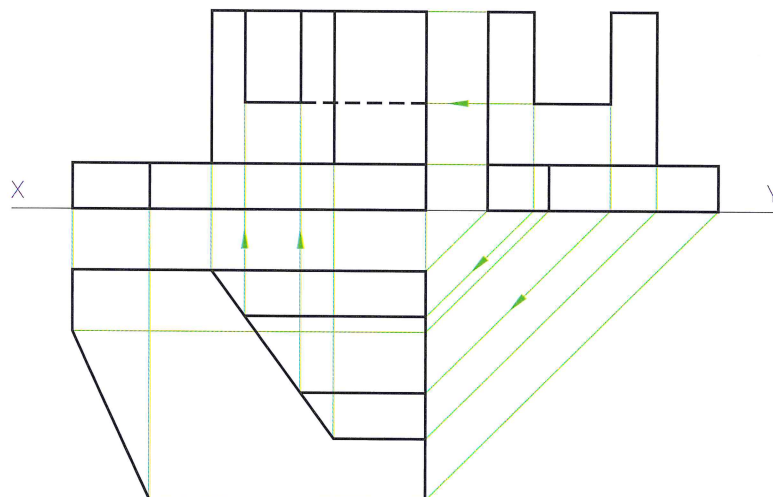
- (a) Draw an **elevation** looking in the direction of arrow **A**.
- (b) Draw an **end view** looking in the direction of arrow **B**.
- (c) Draw a **plan** projected from (a) above.



- 1. The incomplete elevation and the entire end view are drawn as shown below, right.
- 2. The plan is then projected in the normal manner.



- 3. The upper inclined surface appears as an edge in the plan. Accordingly, the remaining lines on the object can be projected from the end view to intersect this surface (line) in the plan.
- 4. Now that the lengths of these lines have been determined, they can be projected to the elevation and the drawing completed as shown below.

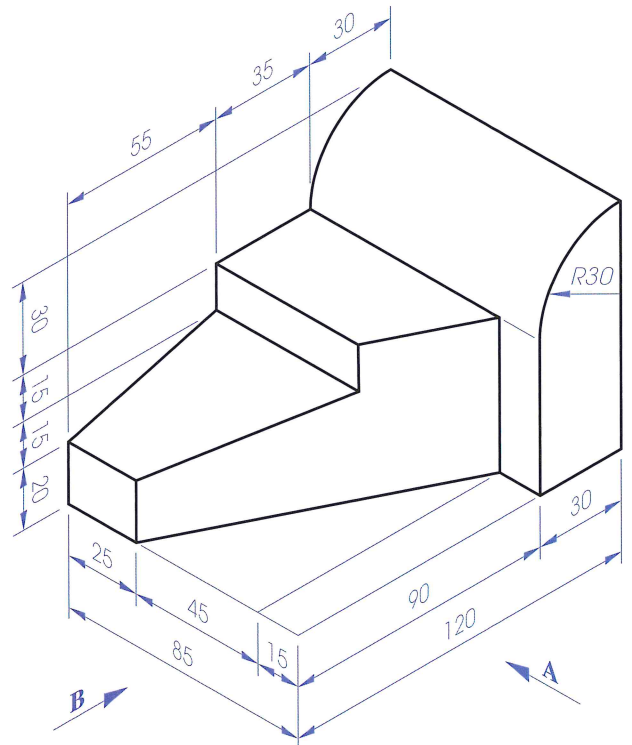
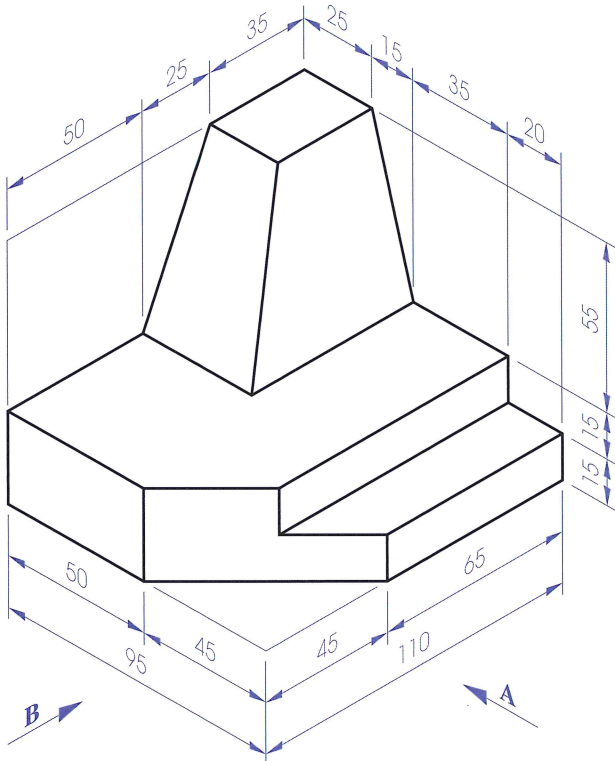


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### Exercises

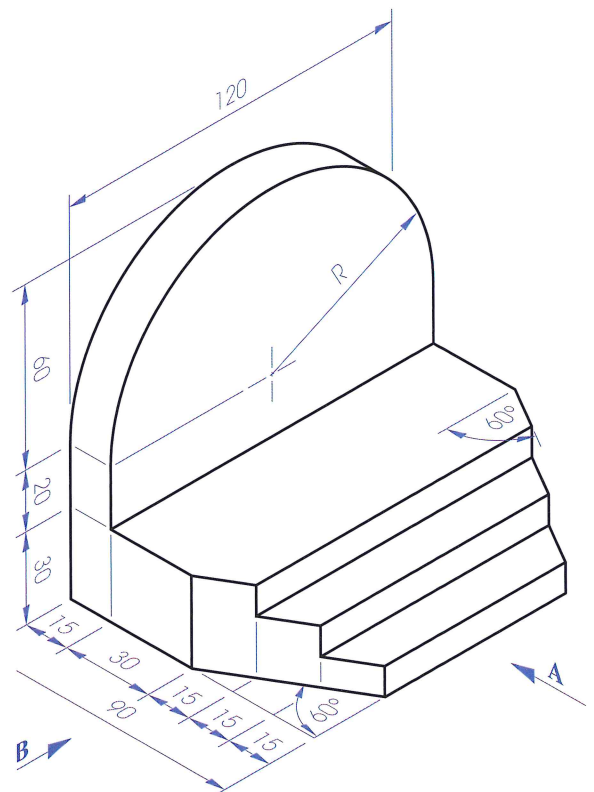
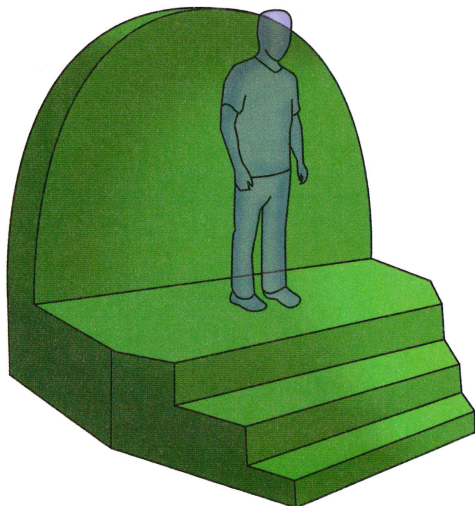
1. A pictorial view of each of two components is shown below. In each case draw full-size:

- An **elevation** looking in the direction of arrow **A**.
- An **end view** looking in the direction of arrow **B**.
- A **plan** projected from (a) above.



2. The figure below shows a pictorial view of a **platform**. Each step is of equal height. Draw full-size:

- An **elevation** looking in the direction of arrow **A**.
- An **end elevation** looking in the direction of arrow **B**.
- A **plan** projected from (a) above.





3. A pictorial view of a **knife block** is shown below. Also shown is an elevation of the knife block looking in the direction of arrow A. Using an A2 size sheet draw full-size:

- (a) The given **elevation** looking in the direction of arrow A.
- (b) An **end view** looking in the direction of arrow B.
- (c) A **plan** projected from (a) above.

