

Plans and elevations

Starter

1. A wire in the shape of an equilateral triangle with sides of length 9 cm is placed on a flat piece of paper. A pencil is held in the hole at the centre of a disc of radius 1 cm, and the disc is rolled all the way around the outside of the wire.
- Sketch the loci drawn by the pencil.
 - How long is the line drawn by the pencil as it travels all the way round the equilateral triangle?
 - How would the loci be different if the disc was inside the triangle

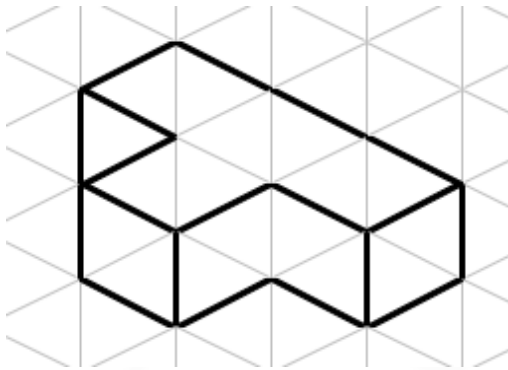
Working:

- On the outside of the wire, the pencil describes an arc of a circle as the disk rolls around each of the corners of the triangle. Along the sides the loci is a straight line parallel to the side.
- Along the 3 sides, the pencil moves 9 cm so 27 cm.
The 3 parts around the corners form a circle of radius 1 cm, whose circumference is $2\pi \times 1 = 2\pi$
Total distance = $27 + 2\pi$
- As the disc rolls around the inside of the wire, the result is another equilateral triangle, 1 cm from the wire.

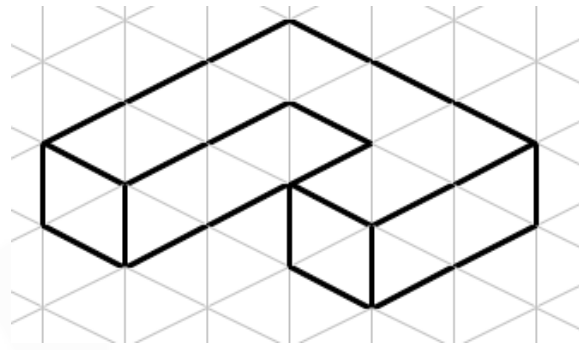


2. Use the multilink cubes on your desk to build these 3-D solids.

(a)



(b)



3. How many 2-dimensional diagrams do we need to define them? Draw all the diagrams that you think you need.

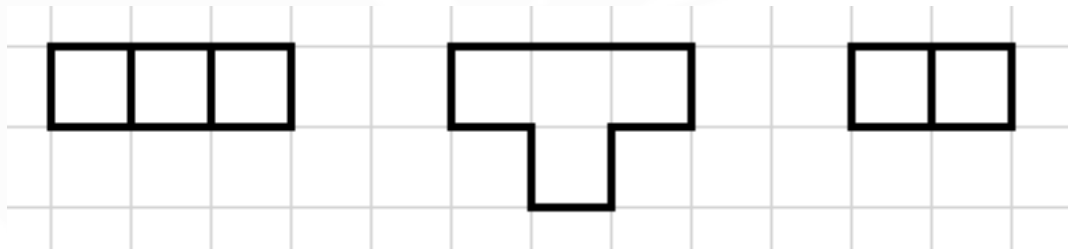
Working: 3 diagrams are needed

(a)

Front elevation

Plan view

Side elevation (right)

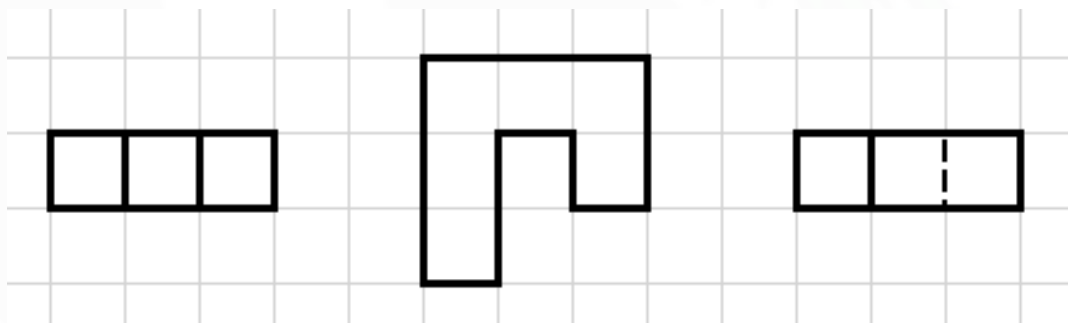


(b)

Front elevation

Plan view

Side elevation (right)



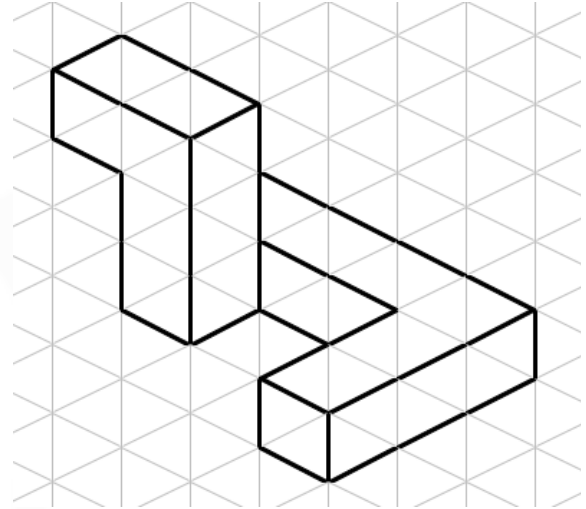
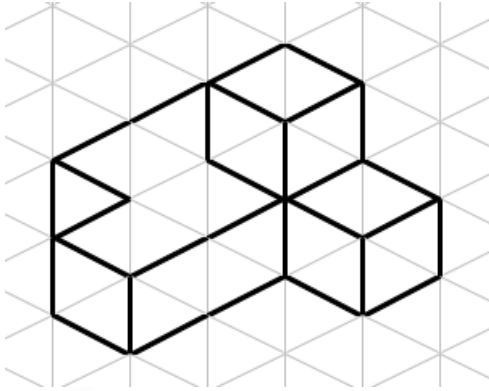
N.B. Dotted lines are again used to indicate hidden edges.

E.g. 1 Draw the three plans and elevations needed to define these 3-D solids.

Hint: Use your multilink cubes to build the solid before attempting to draw the diagrams.

(a)

(b)



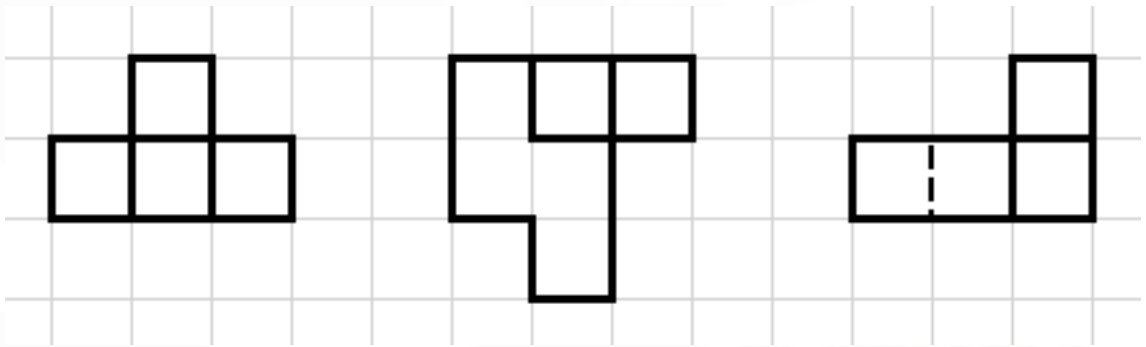
Working:

(a)

Front elevation

Plan view

Side elevation (right)

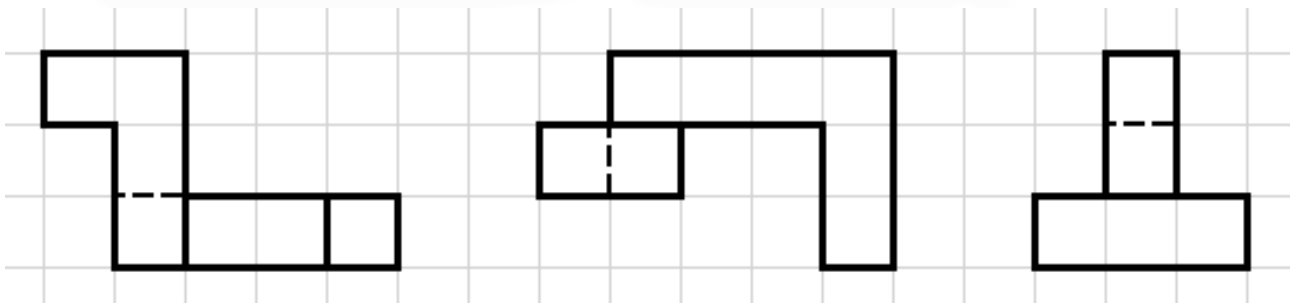


(b)

Front elevation

Plan view

Side elevation (right)



N.B. When drawing on isometric paper, make sure the dots or lines are vertical.

Video: [Plans and elevations](#)

[Solutions to Starter and E.g.s](#)

Exercise

9-1 class textbook:	p566 M18.1 Qu 1-11 (isometric paper needed)
A*-G class textbook:	p527 M18.1 Qu 1-11 (isometric paper needed)
9-1 homework book:	p189 M18.1 Qu 1-6
A*-G homework book:	p144 M18.1 Qu 1-5

Summary

Three 2-dimensional diagrams are used to define a 3-dimensional shape

1. **Front elevation** — the view standing in front of the solid
2. **Plan view** — the view from the above the solid (i.e. the bird's eye view)
3. **Side elevation** — the view from a side. It is a good idea to state whether it is left or right side elevation.

Visible vs. hidden edges

- **Visible edges** (i.e. edges that can be seen) — **solid line**
- **Hidden edges** (i.e. edges that cannot be seen) — **dotted line**

Hint: Always draw the outline of the shape first and then fill in the visible and hidden edges inside the outline last.

[Homework book answers \(only available during a lockdown\)](#)