

# Civil Engineering Drawing

## Part 4 · Isometric Drawings

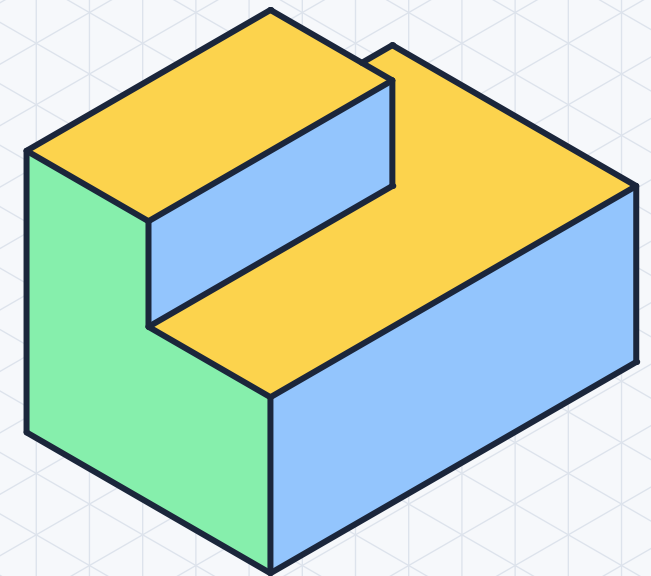
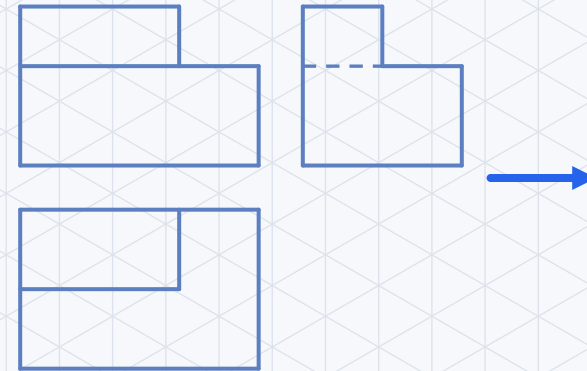
From the views back to the object:  
2D → 3D, step by step.

- The isometric view
- The box method
- Inclined edges
- Circles in isometric
- From views to isometric: practice

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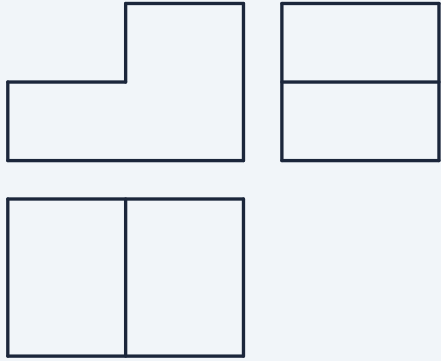
Asst. Prof. Dr. Abdulhadi PALA

Gaziantep University · Faculty of Engineering · Civil Engineering Department · Fall 2026–2027



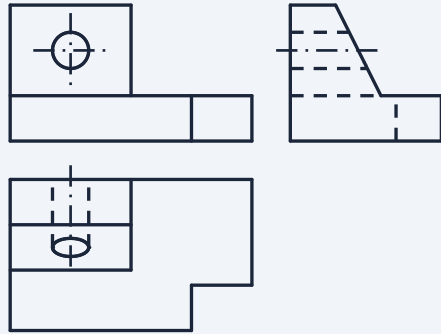
ORTHOGRAPHIC VIEWS → ISOMETRIC DRAWING

# Part 3 in one slide



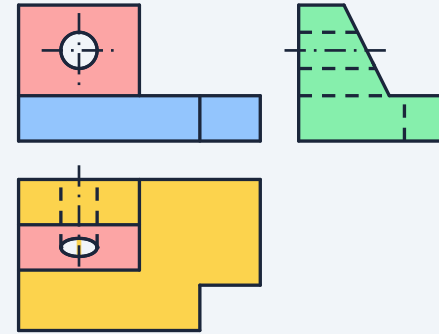
## Sketch the views

FRONT arrow first; top view below, side view right.



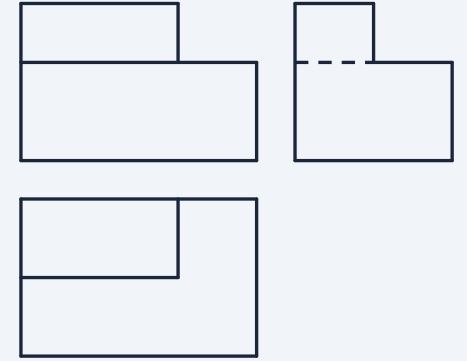
## Read every line

An edge, a surface on edge, or the limit of a curve.



## Read every area

Each closed area is a surface; neighbours differ.



## The third view

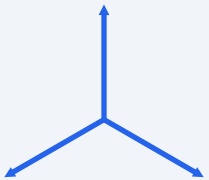
Heights across, depths through the 45° mitre line.

# Today

## 4.1

### The isometric view

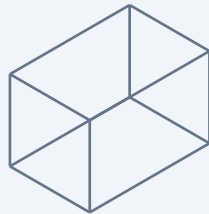
Three axes, 120° apart



## 4.2

### The box method

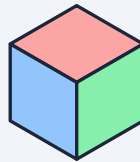
Box first, then cut



## 4.3

### Inclined edges

Find the two ends



## 4.4

### Circles

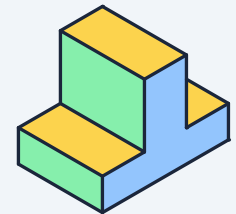
They become ellipses



## 4.5

### Practice

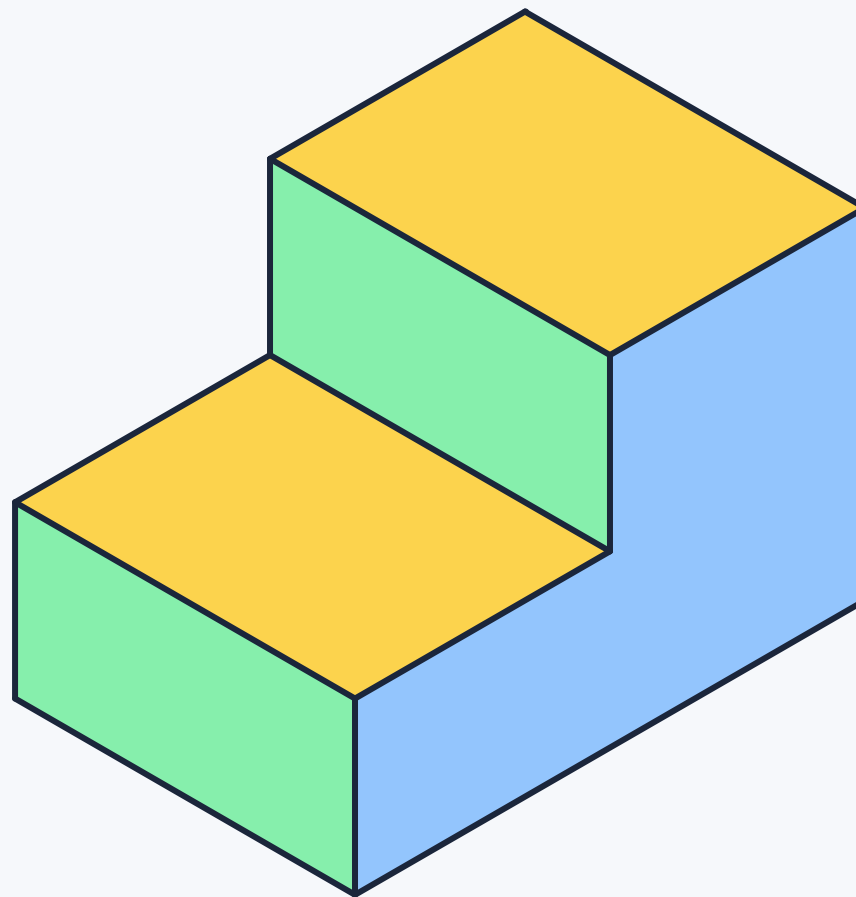
From views to isometric



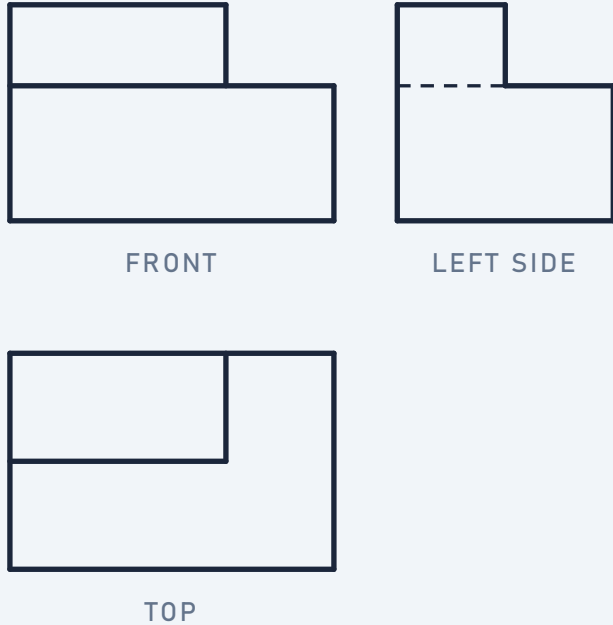
# 4.1

## The isometric view

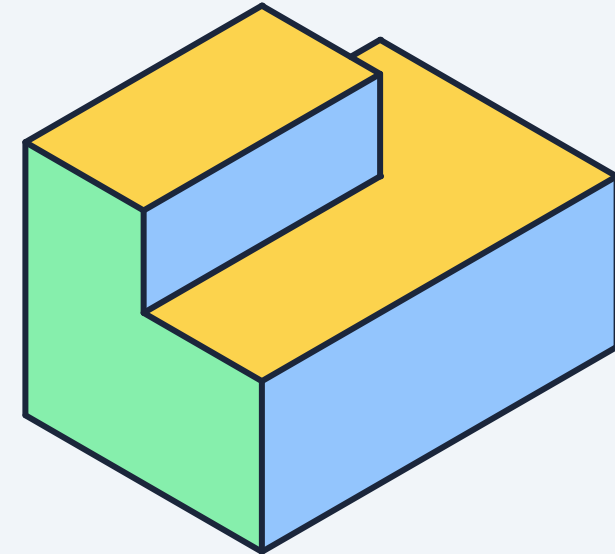
Three axes, equal scale:  
the object in one picture.



# Why an isometric drawing?



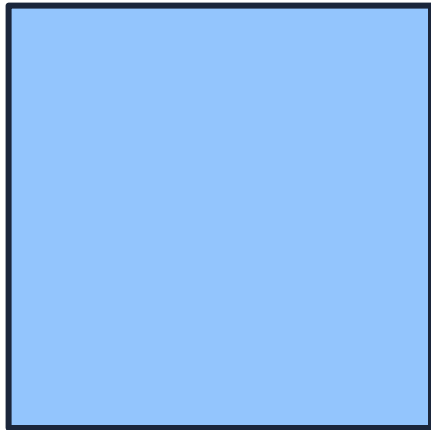
Orthographic views: exact, but you must imagine the object.



Isometric drawing: the object at a glance, three faces at once.

**“Iso-metric” = equal measure: the three main directions are drawn at the same scale.**

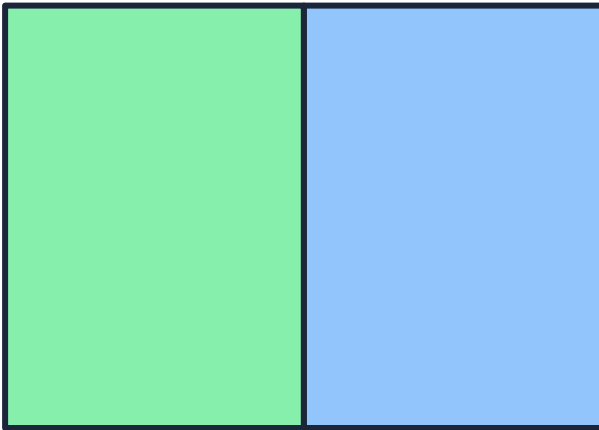
# How a cube becomes isometric



## 1 Straight from the front

One face only: this is a front view.

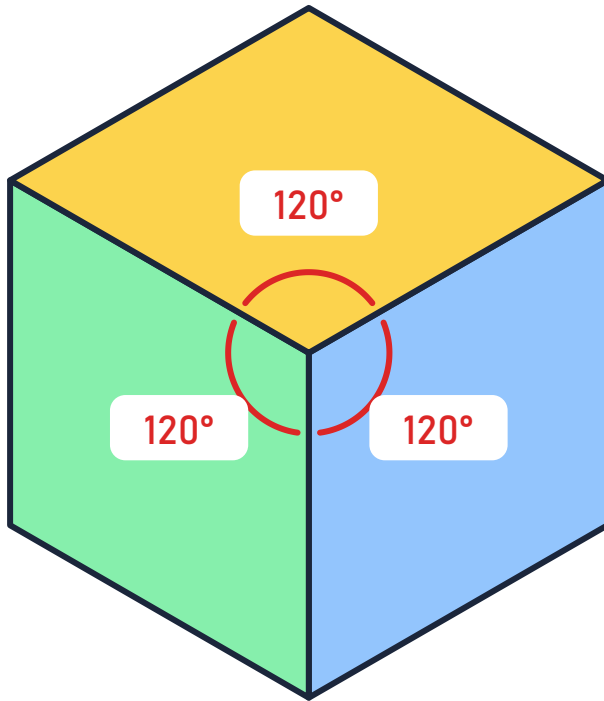
# How a cube becomes isometric



## 2 Turned 45°

Two faces, but still no top.

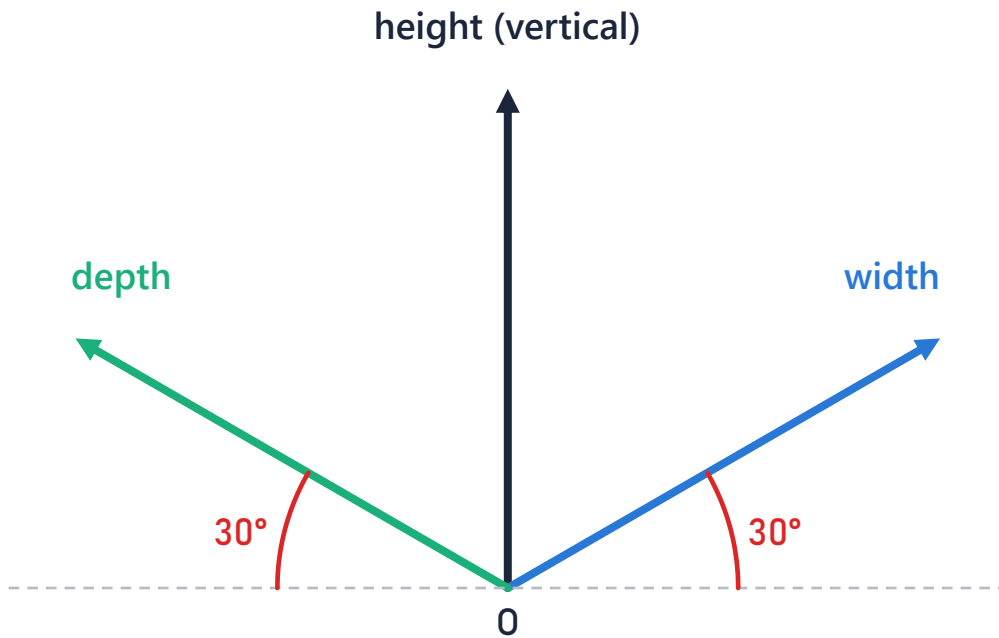
# How a cube becomes isometric



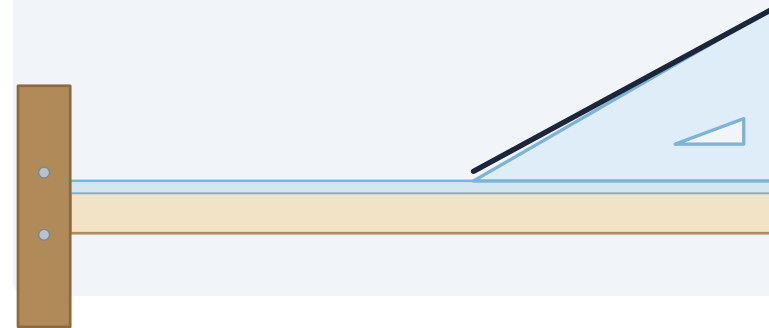
## 3 Tilted forward about 35°

Three faces, all edges equally short: the isometric view.

# The isometric axes

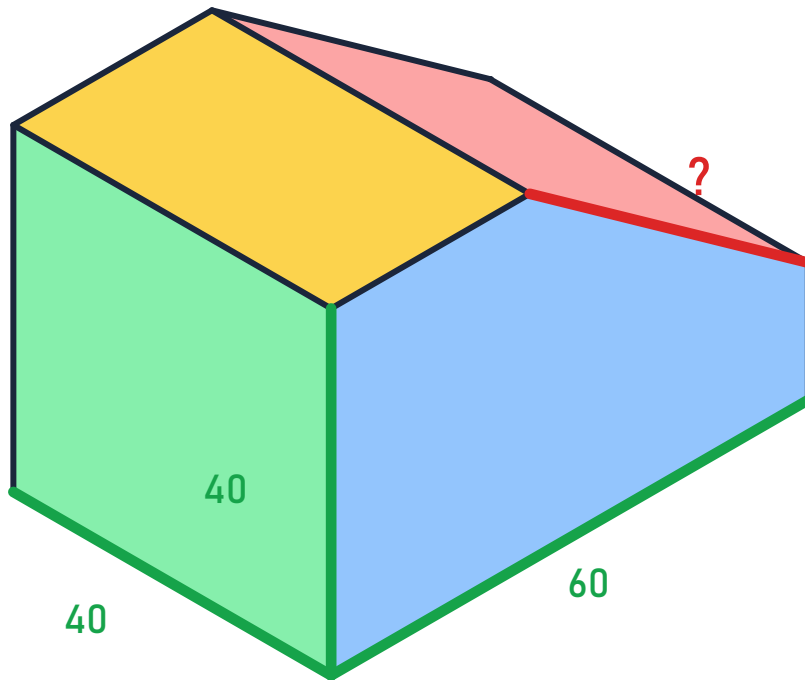


The 30°/60° set square on the T-square



- One vertical axis: heights
- Two axes at 30° to the horizontal: width and depth
- All three are 120° apart

# Measure only along the axes



## Isometric lines

Parallel to an axis: measure the TRUE length with the ruler.

## Non-isometric lines

Sloping lines are NOT true length. Find their two ends, then join them.

We draw every length along the axes at FULL size.

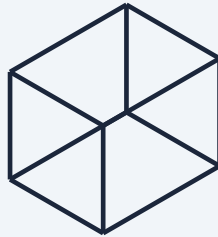
# Four rules of isometric drawing



60 mm → 60 mm

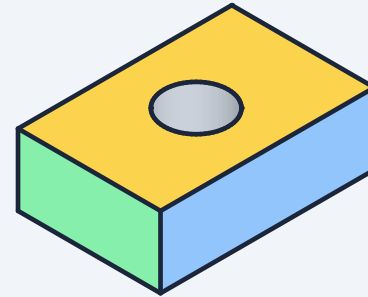
## Full size on the axes

Lengths along the axes are measured true.



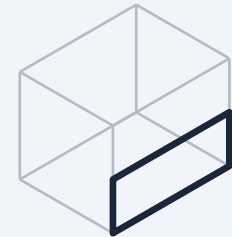
## Parallel stays parallel

Edges parallel on the object are parallel in the drawing.



## No hidden lines

Show what the eye sees; leave hidden edges out.



## Light first, dark last

Build with light lines; darken only the visible edges.

# Key terms



## Isometric drawing

A 3D picture: width, depth and height all drawn full size on three axes.



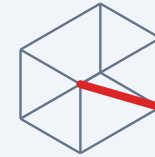
## Isometric axes

One vertical axis and two at 30°; all three 120° apart.



## Isometric line

A line parallel to an axis: it is drawn at its true length.



## Non-isometric line

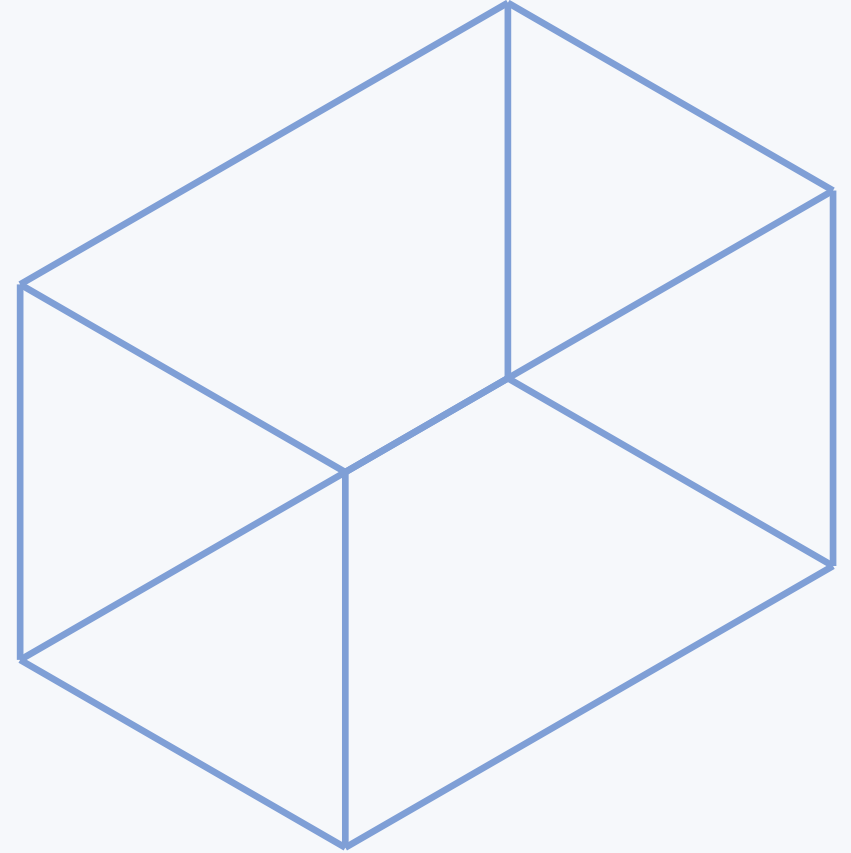
A sloping line: not true length; found from its two ends.

# 4.2

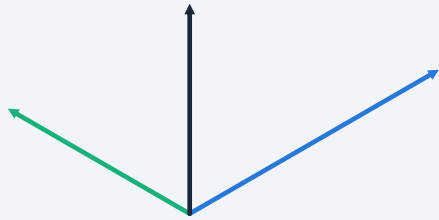
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## The box method

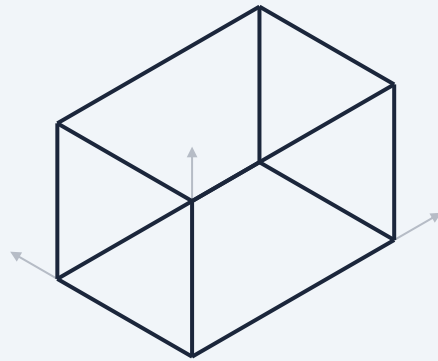
Draw the box first,  
then cut the object out of it.



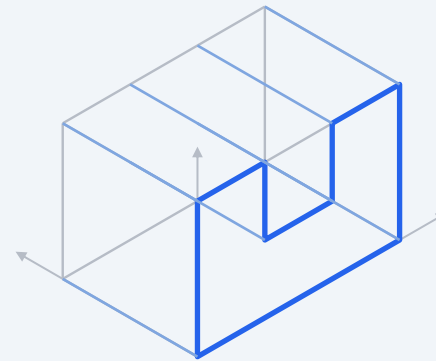
# The box method



1 Axes



2 The box



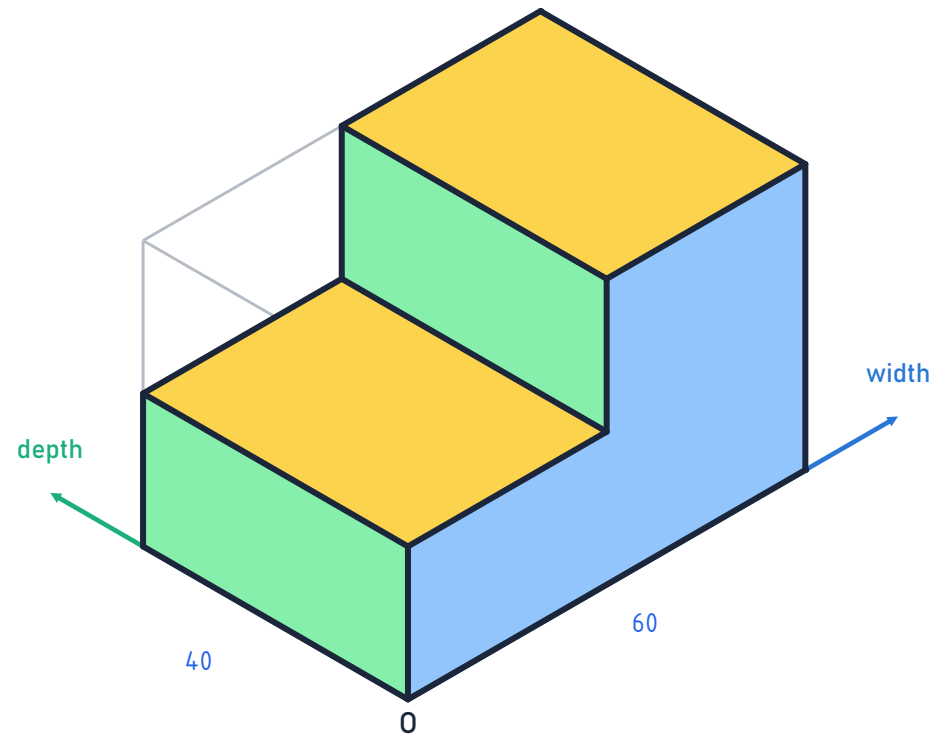
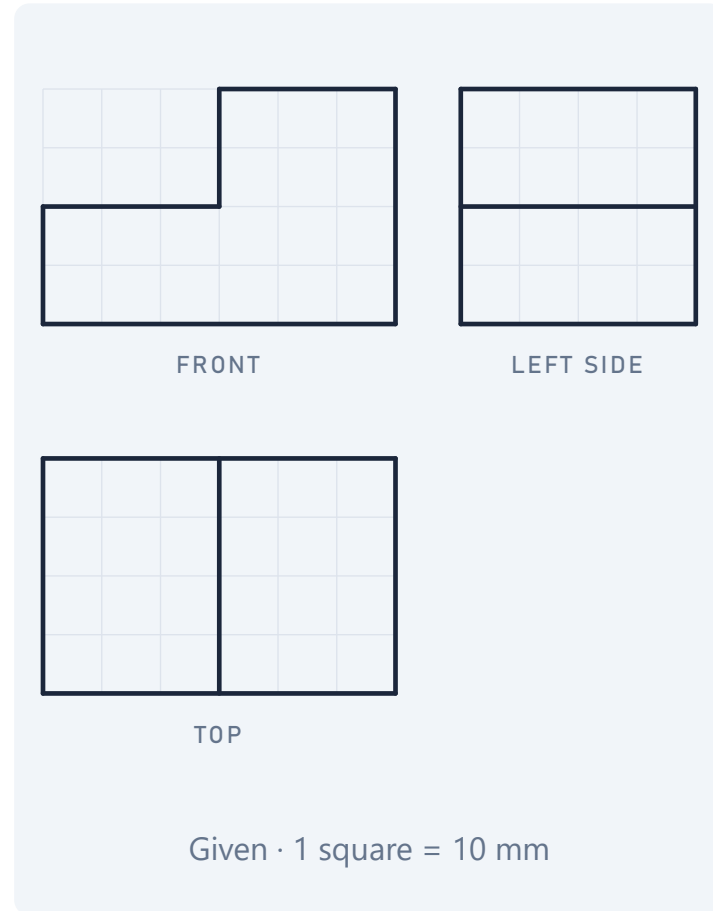
3 Cut the shape



4 Darken

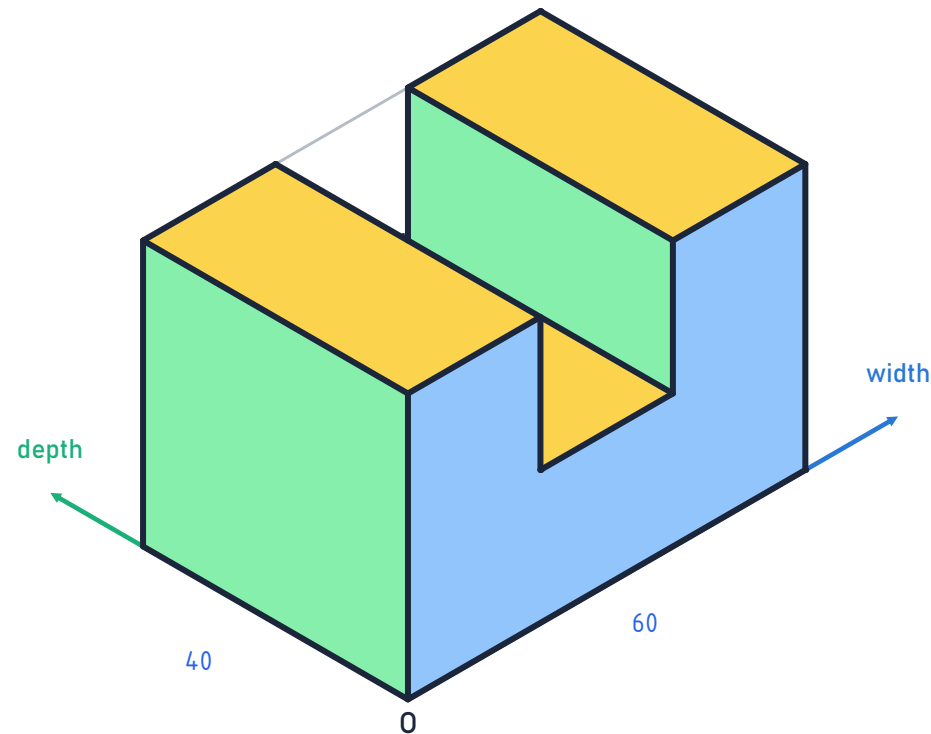
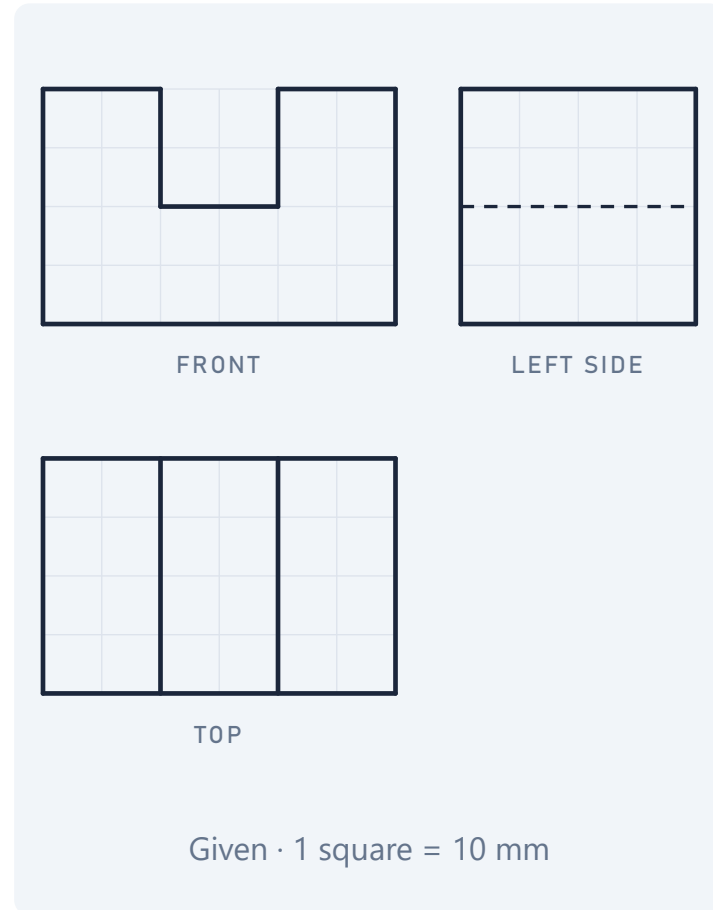
Every object fits in a box. Draw the box, then cut the object out of it.

# Example 1: a stepped block



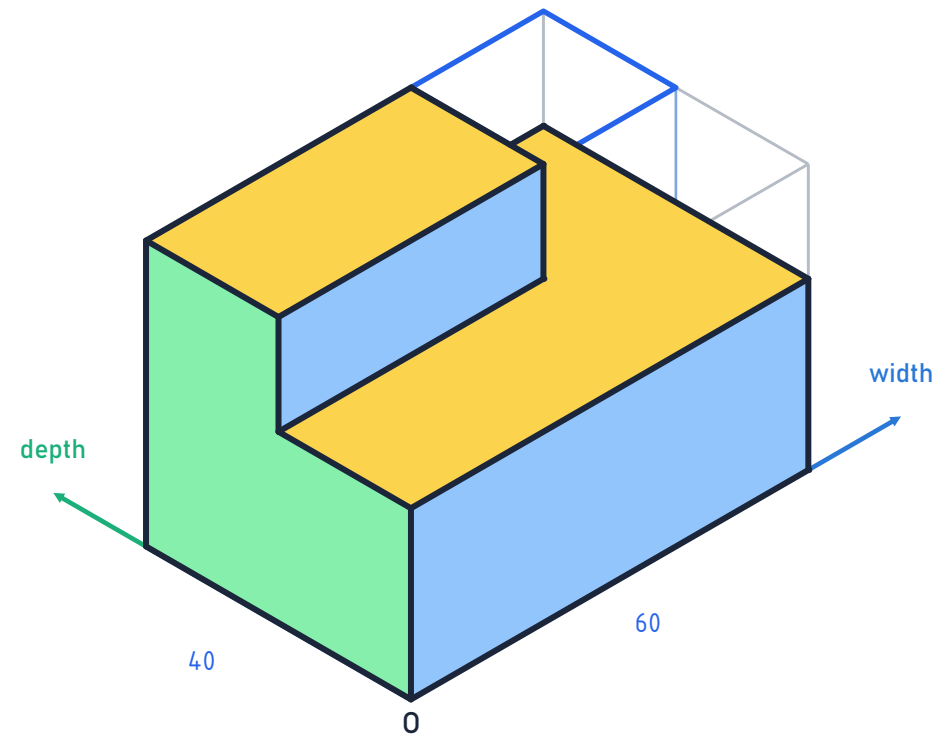
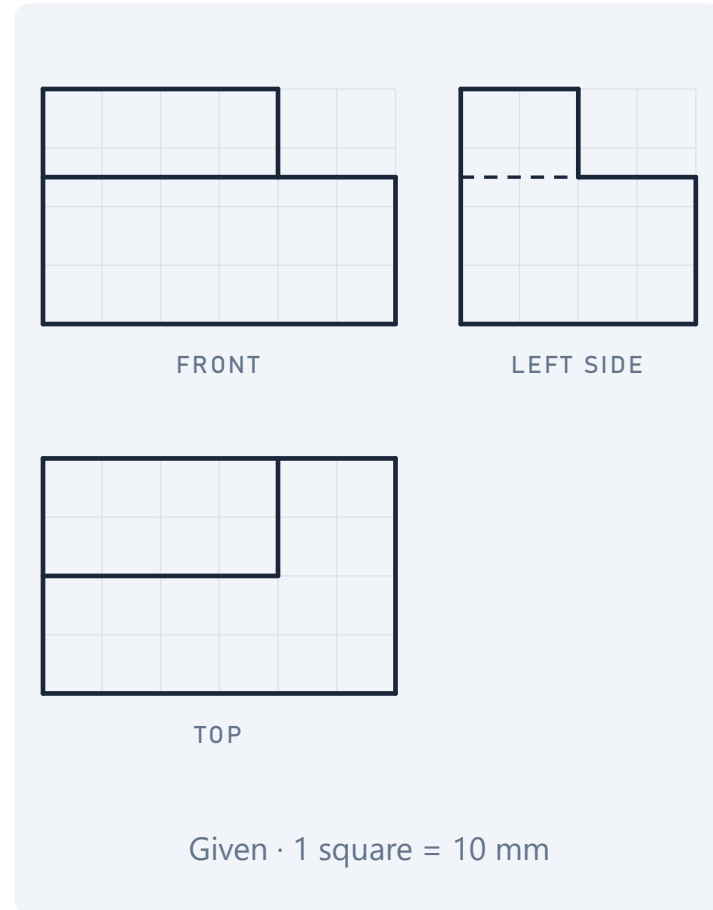
- 1 Draw the three axes from O
- 2 Mark width, depth, height; draw the box lightly
- 3 Draw the front shape on the front of the box
- 4 Carry every corner back by the depth
- 5 Darken the visible edges

## Example 2: a block with a notch



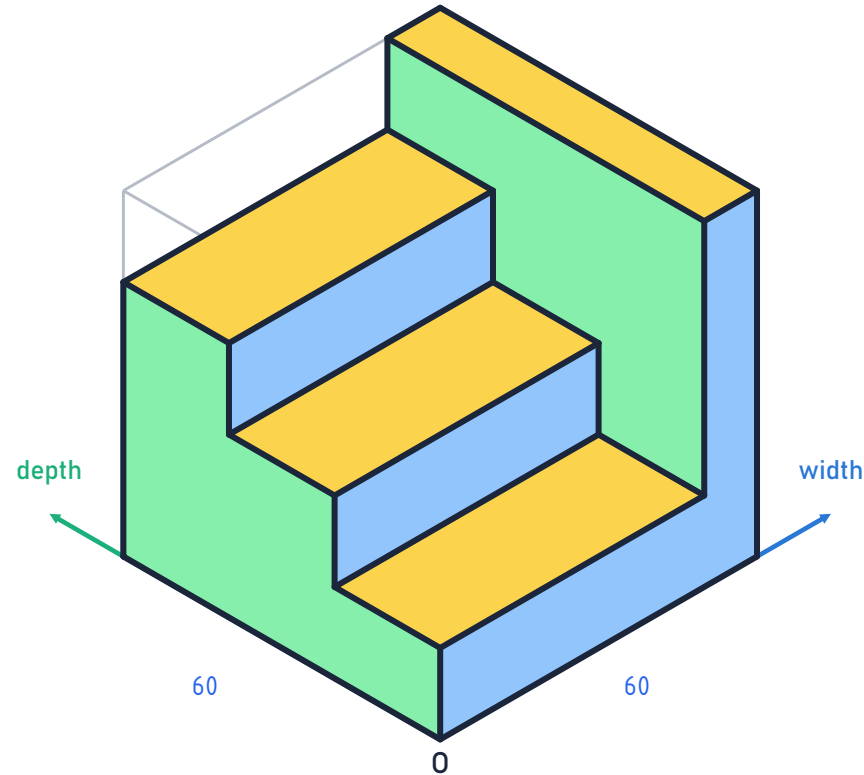
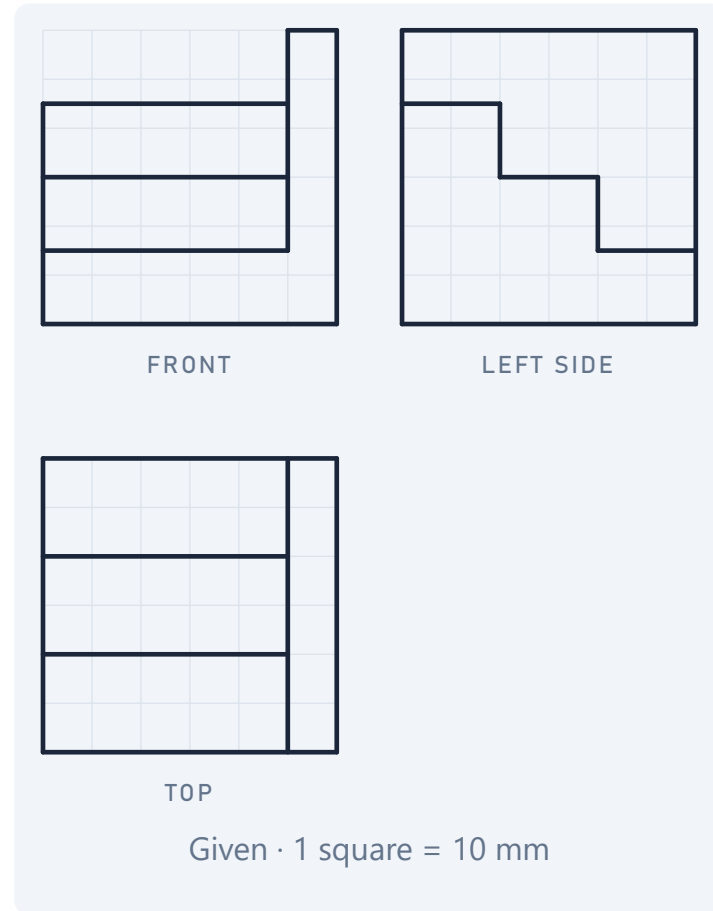
- 1 Draw the three axes from O
- 2 Mark width, depth, height; draw the box lightly
- 3 Draw the front shape on the front of the box
- 4 Carry every corner back by the depth
- 5 Darken the visible edges

# Example 3: cuts from two views



- 1 Draw the three axes from O
- 2 Draw the box  $60 \times 40 \times 40$  lightly
- 3 Side view: draw the L on the left face, carry it across
- 4 Top view: cut away the right end of the upper block
- 5 Darken the visible edges

# Example 4: a stair with a side wall



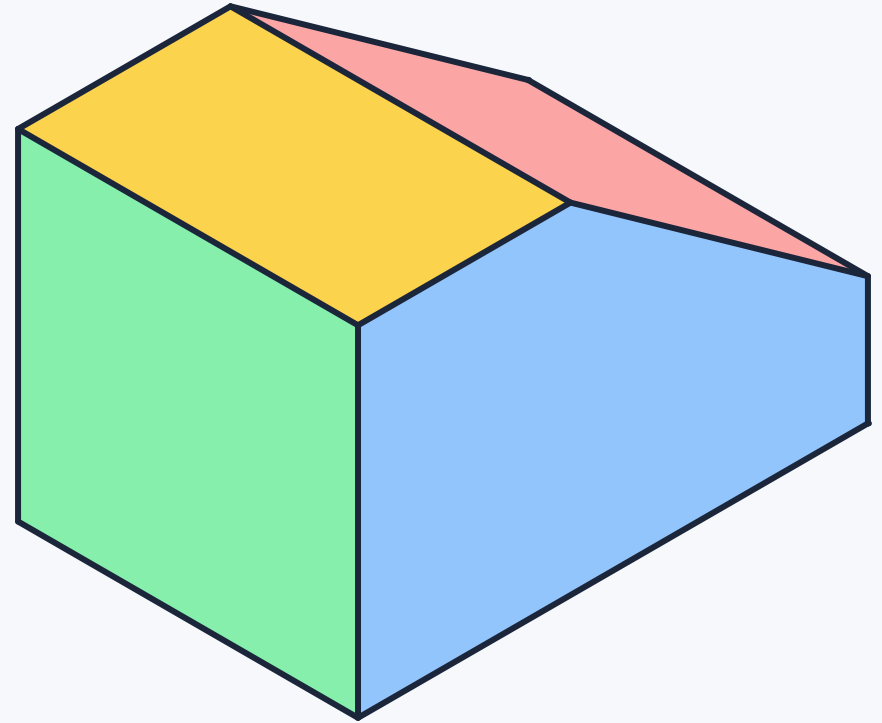
- 1 Draw the three axes from O
- 2 Draw the box  $60 \times 60 \times 60$  lightly
- 3 Side view: draw the stair profile on the left face
- 4 Carry it across 50; the 10 mm wall stays full height
- 5 Darken the visible edges

# 4.3

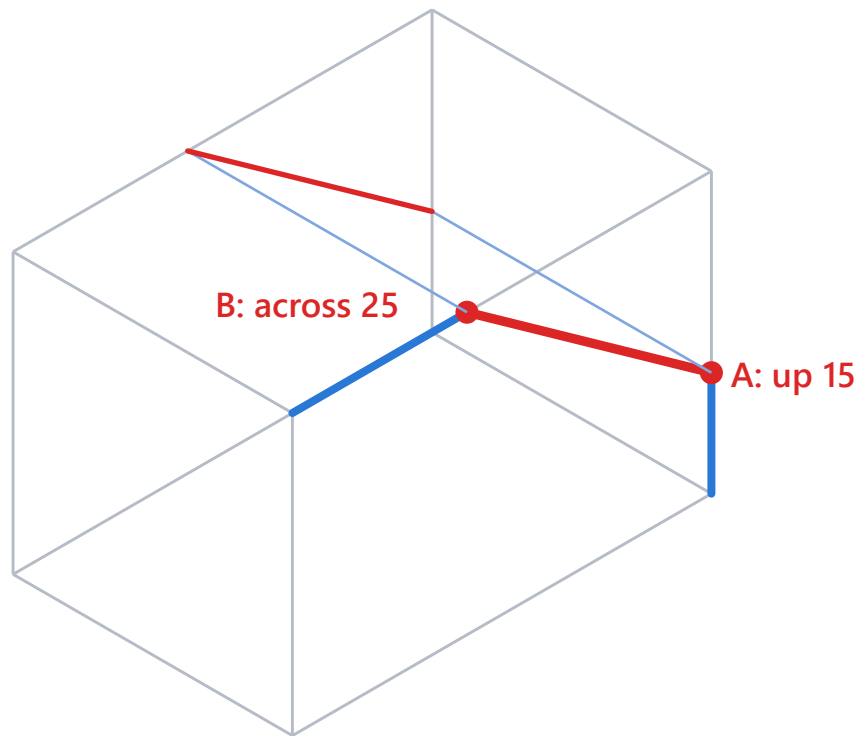
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## Inclined edges

A sloping edge cannot be measured:  
find its two ends.

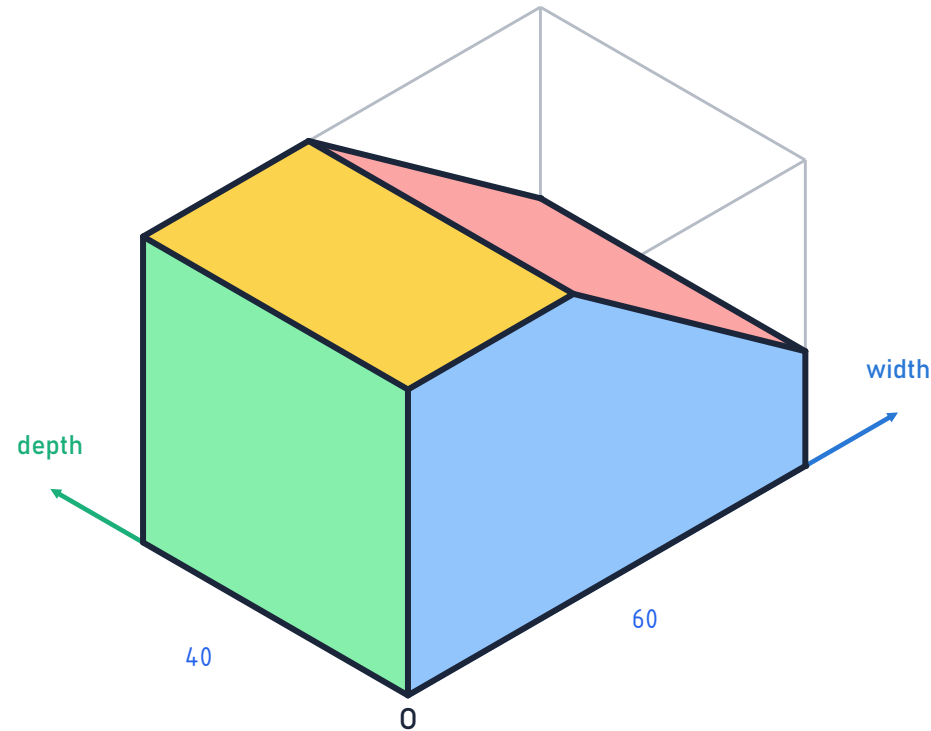
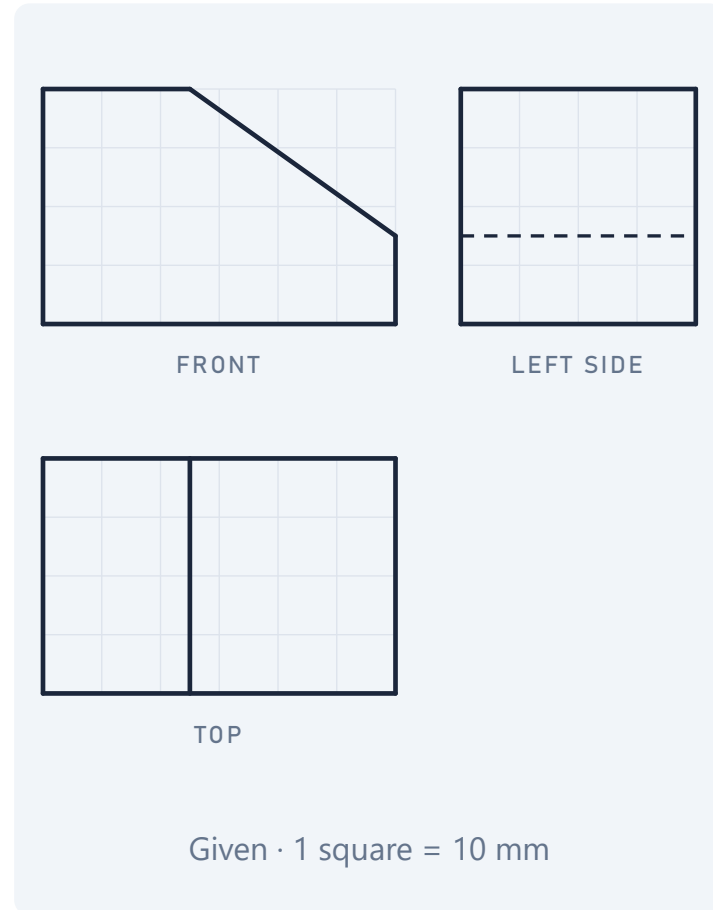


# Sloping edges: find the two ends



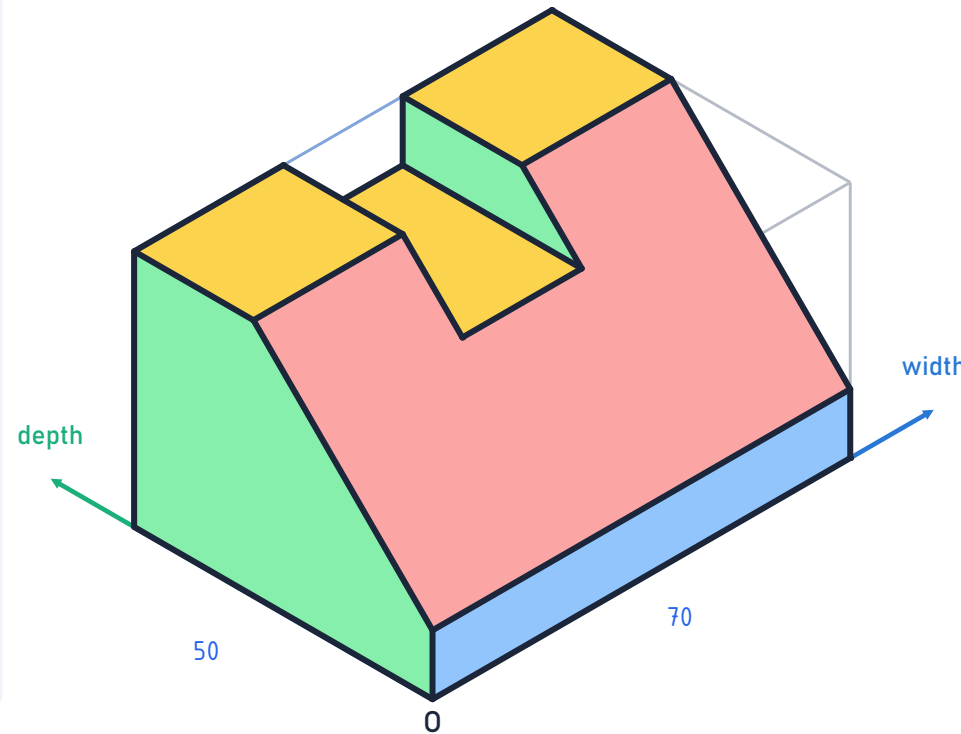
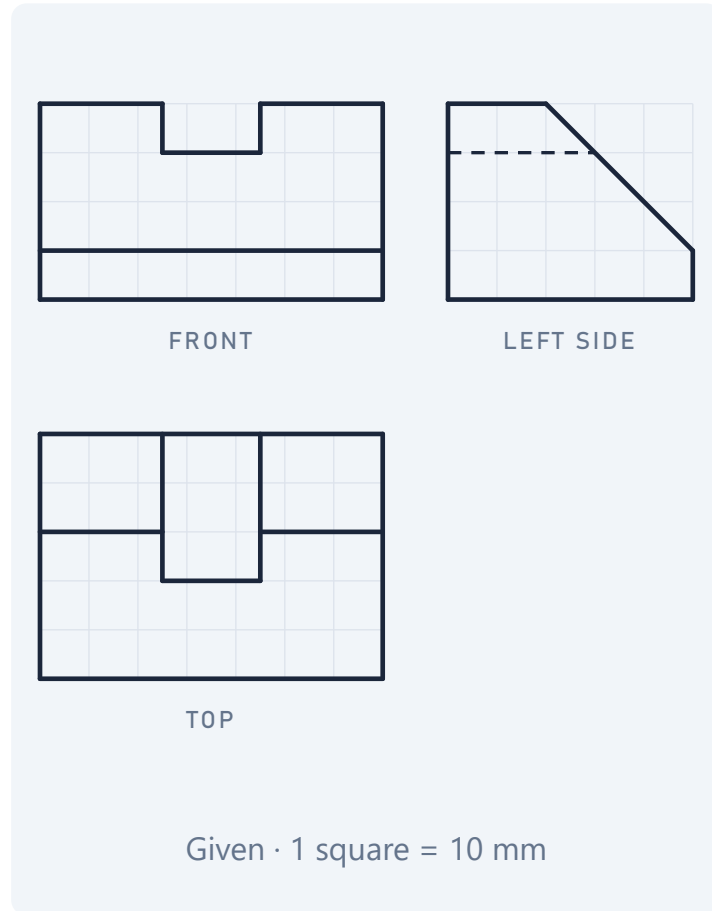
- Find point A on an isometric line (measure along an axis).
- Find point B the same way.
- Join A and B: the sloping edge.
- Carry both ends back by the depth and join again.

# Example 5: a block with a sloping face



- 1 Draw the three axes from O
- 2 Draw the box  $60 \times 40 \times 40$  lightly
- 3 Front shape: find the two ends of the slope
- 4 Carry every corner back by the depth
- 5 Darken the visible edges

# Example 6: a small dam with a spillway

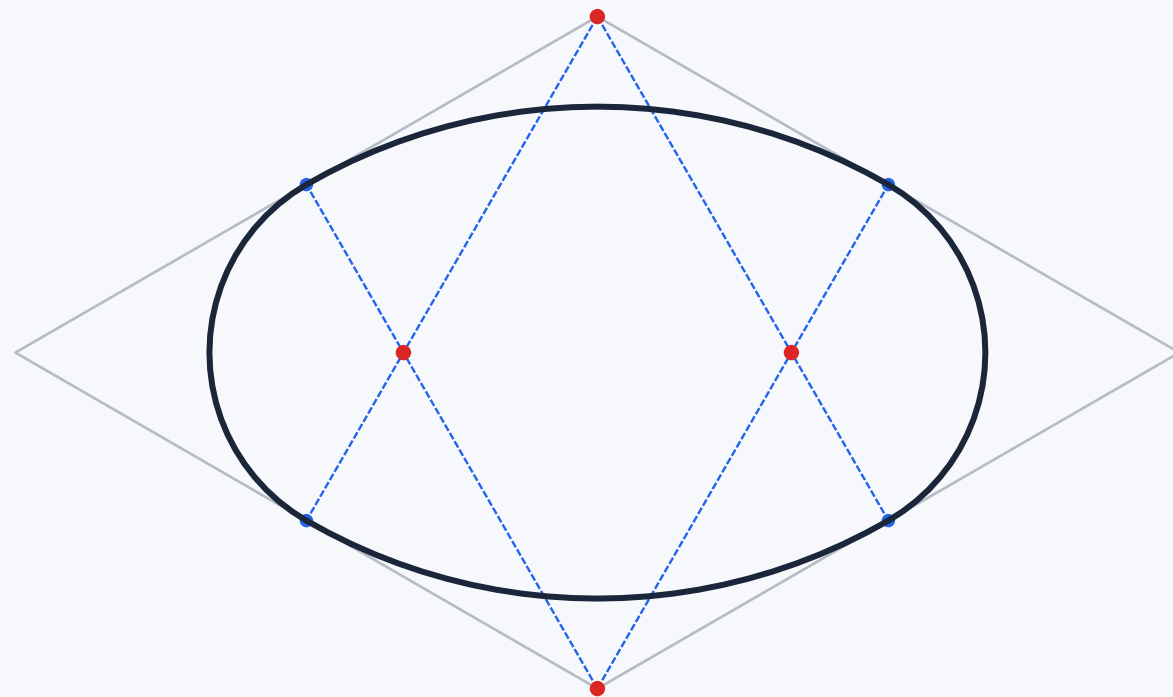


- 1 Draw the three axes from O
- 2 Draw the box  $70 \times 50 \times 40$  lightly
- 3 Side view: find the ends of the slope, draw the profile
- 4 Carry the profile across the width (70)
- 5 Front view: cut the spillway, 20 wide and 10 deep
- 6 Darken the visible edges

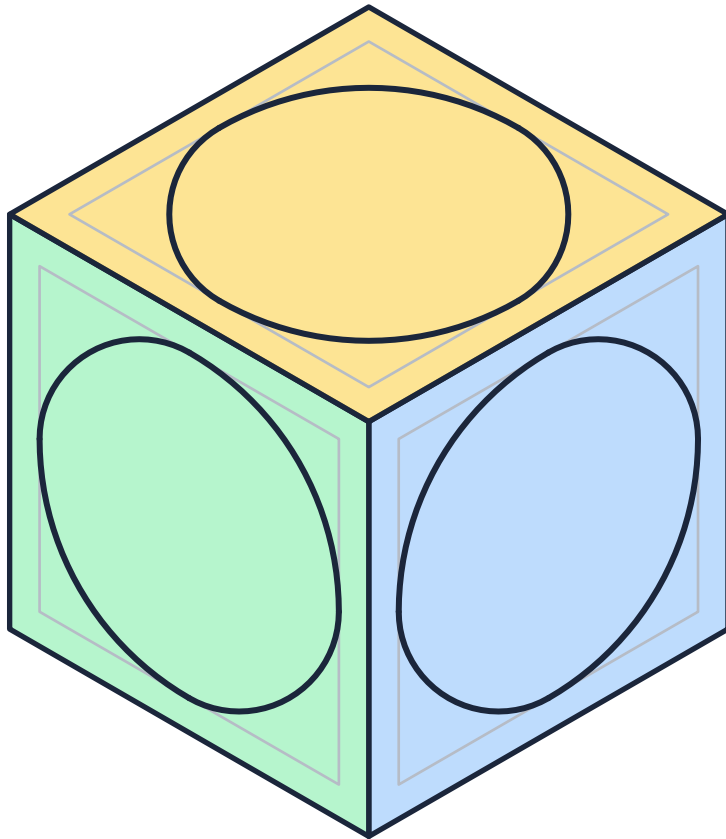
# 4.4

## Circles in isometric

A circle becomes an ellipse,  
drawn with four arcs.

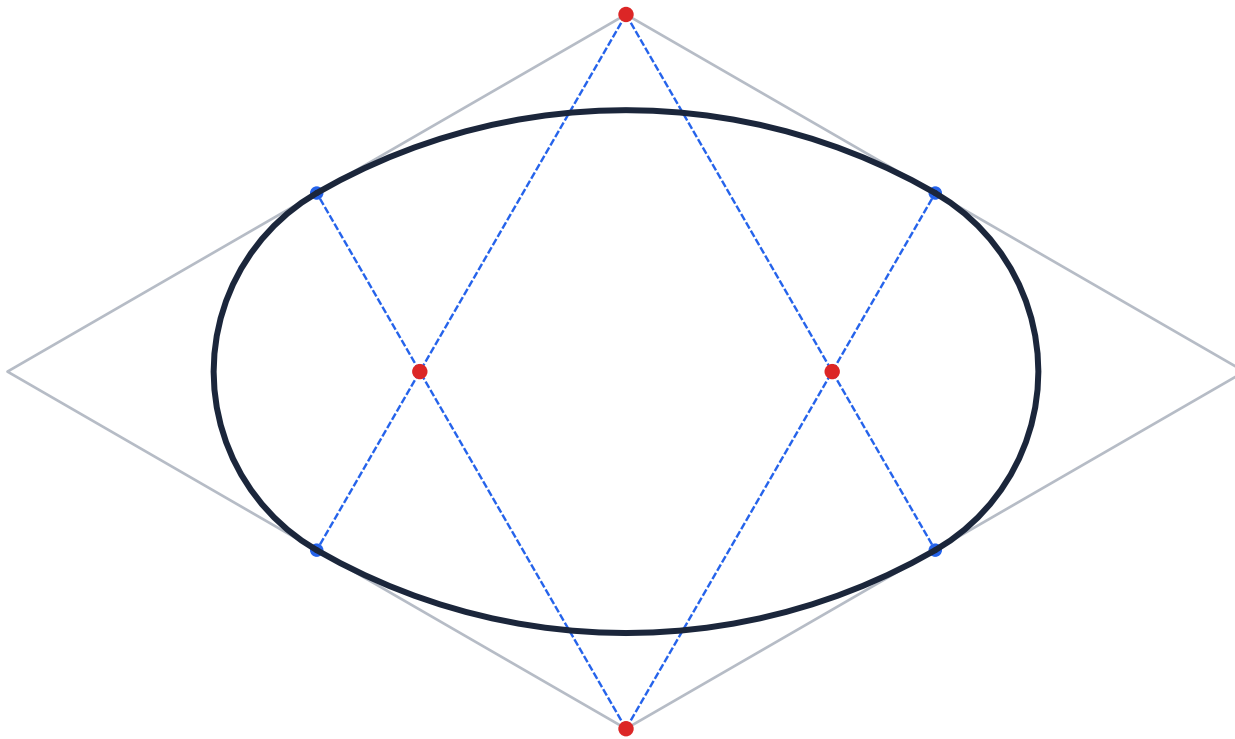


# A circle becomes an ellipse



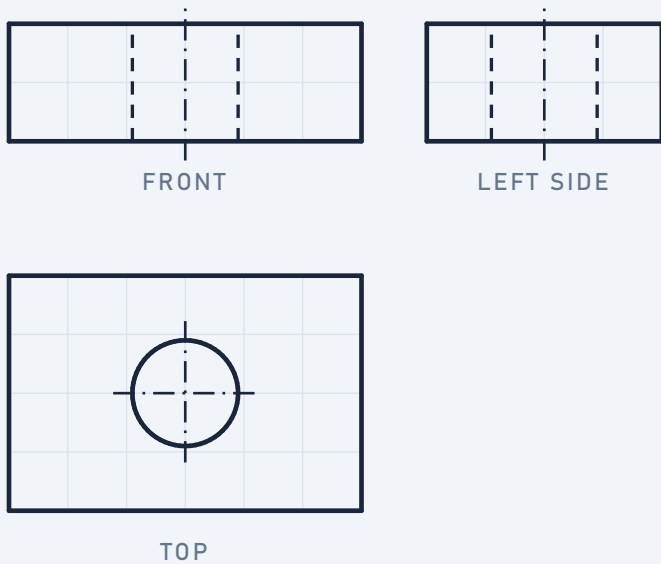
- A circle on any face becomes an ELLIPSE.
- It always fits in a rhombus: the square around the circle, drawn in isometric.
- We draw it with a compass: the four-centre method.

# The four-centre ellipse

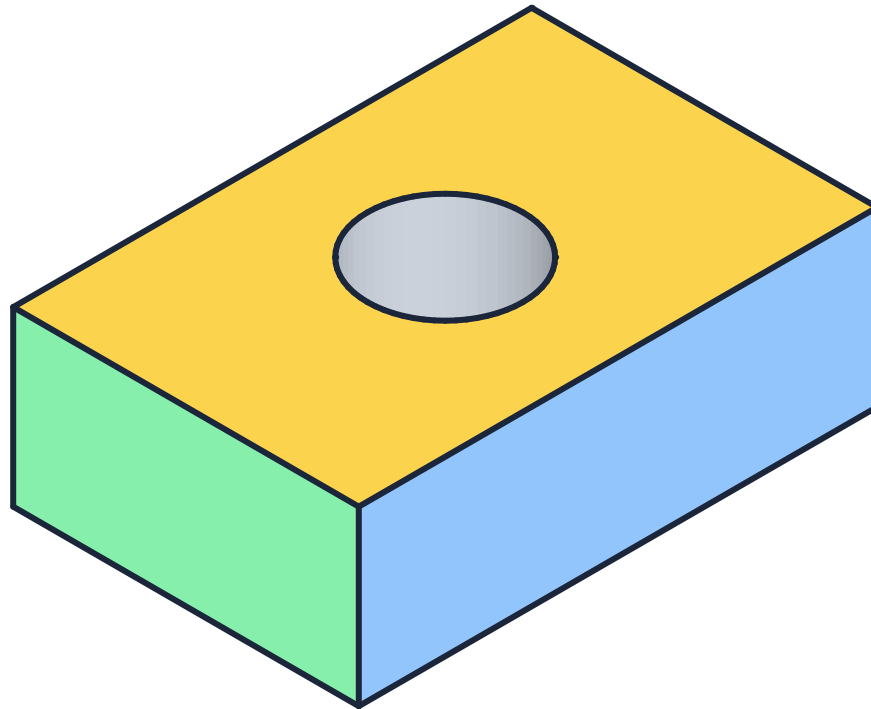


- 1 Draw the rhombus: the square around the circle (side = diameter).
- 2 Mark the middle of each side.
- 3 From each  $120^\circ$  corner, draw lines to the middles of the two far sides.
- 4 The four centres: the two  $120^\circ$  corners and the two crossing points.
- 5 Draw four arcs with the compass, from middle to middle.

## Example 7: a hole in the top face

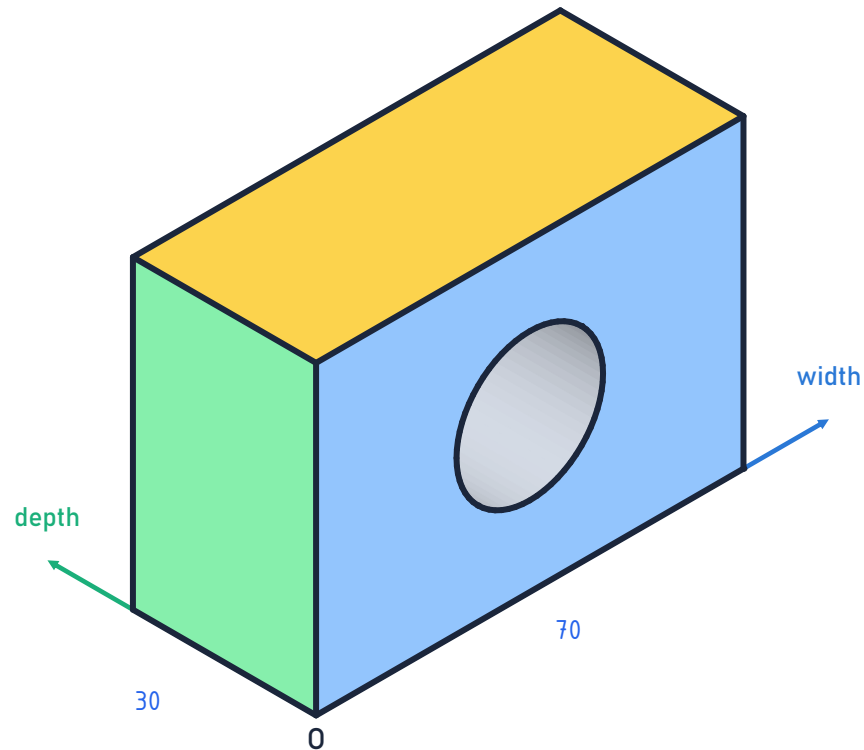
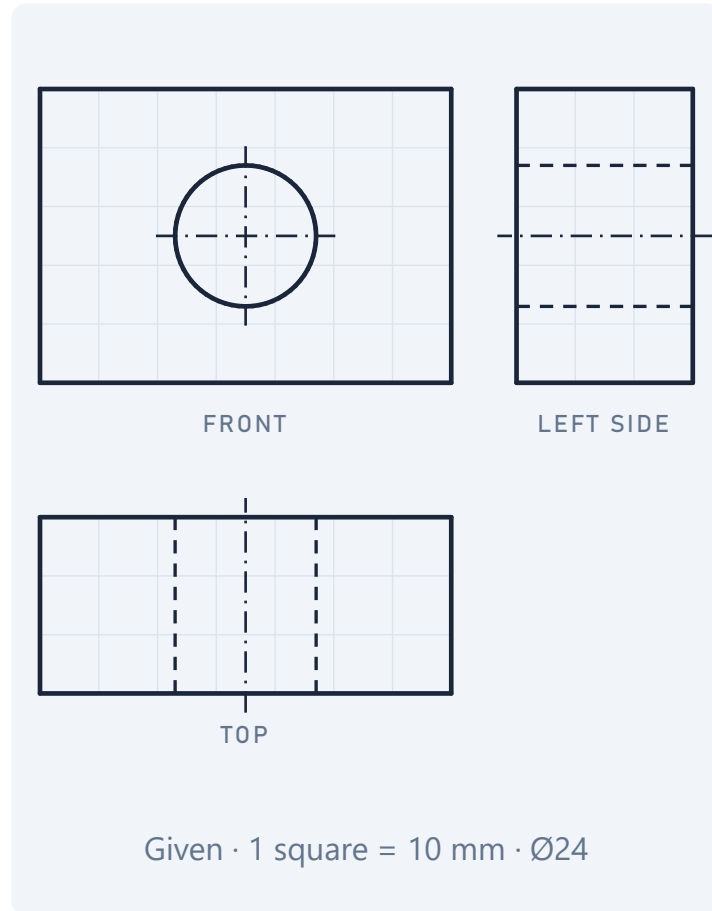


Given · 1 square = 10 mm · hole Ø18



- 1 Draw the box  $60 \times 40 \times 20$
- 2 Mark the centre lines of the hole on the top face
- 3 Draw the ellipse (four-centre method)
- 4 Darken: inside the hole only its wall shows

## Example 8: a hole in the front face



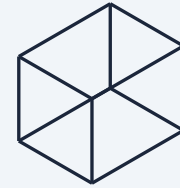
- 1 Draw the three axes from O
- 2 Draw the box  $70 \times 30 \times 50$  lightly
- 3 Front face: centre lines, rhombus  $24 \times 24$ , four-centre ellipse
- 4 Darken: we see into the opening, not through it

# Key terms



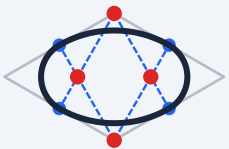
## Box method

Draw the box around the object first, then cut the object out of it.



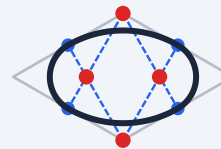
## Construction box

The light box  $W \times D \times H$  that contains the object.



## Rhombus

A square drawn in isometric: a diamond with  $60^\circ$  and  $120^\circ$  corners.



## Four-centre ellipse

An ellipse drawn with four compass arcs inside the rhombus.

# 4.5

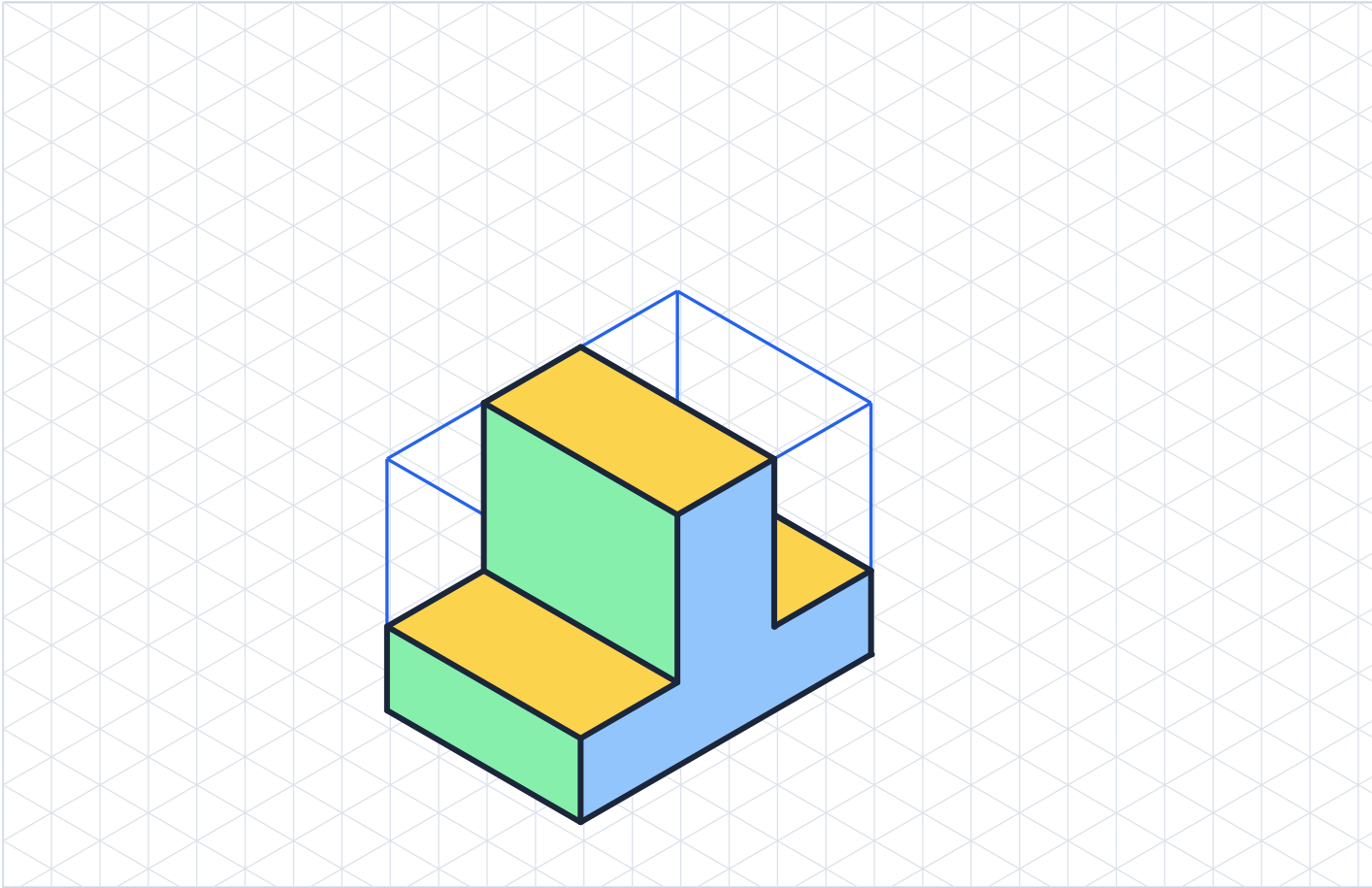
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## From views to isometric

Practice: three views in,  
one isometric drawing out.



# Sketching on isometric grid paper



- The grid lines ARE the isometric axes.
- One grid step = 10 mm (or 1 square in the views).
- Count steps along the lines: no ruler, no set square.
- Box first, then the shape, then darken.

# Your turn: draw the isometric (A)

1 square = 10 mm · box method · no hidden lines

1

2

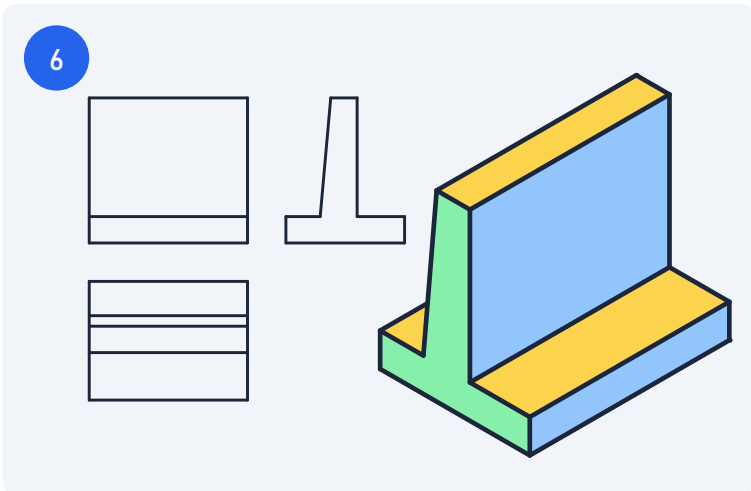
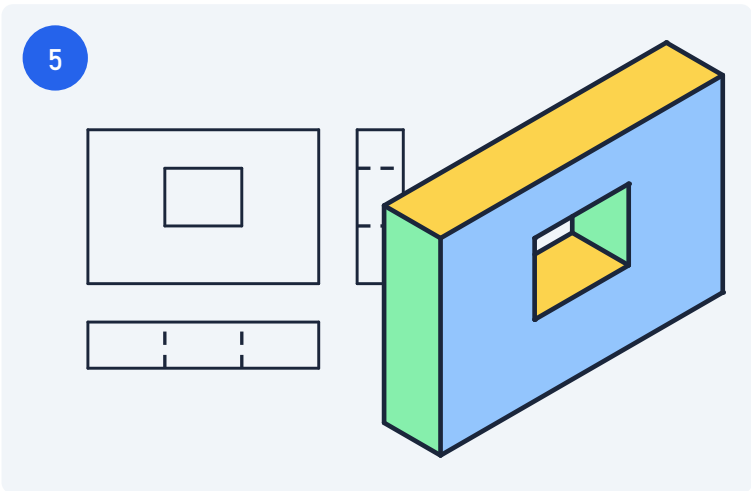
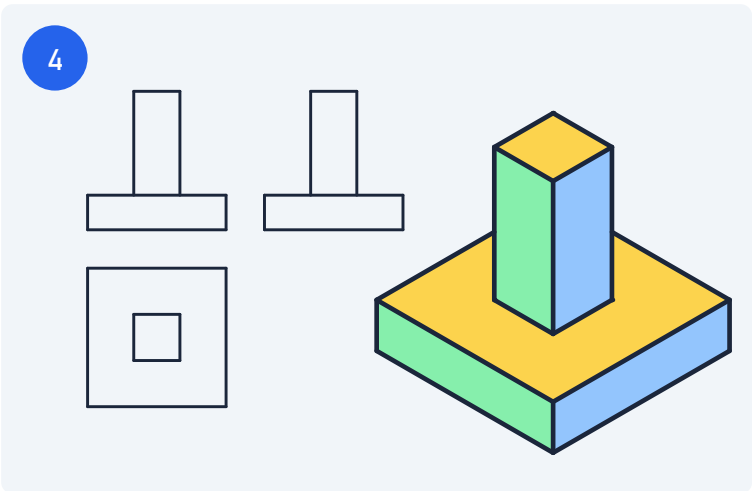
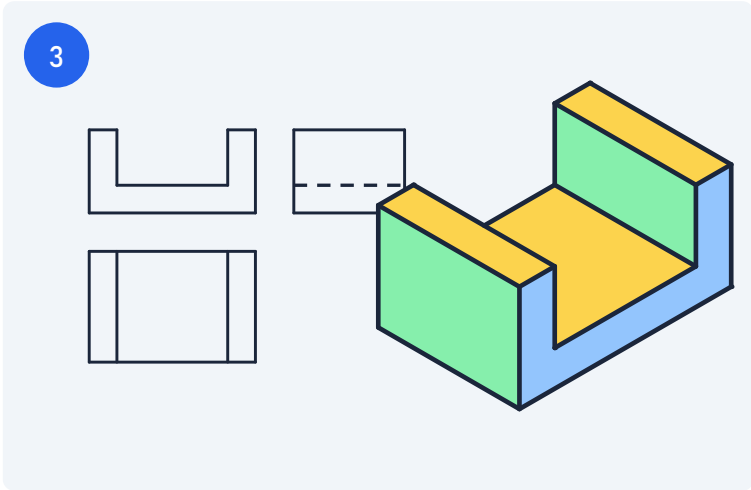
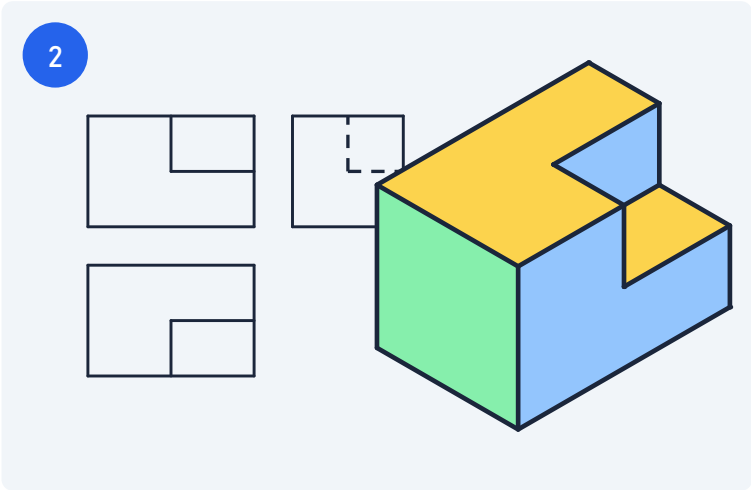
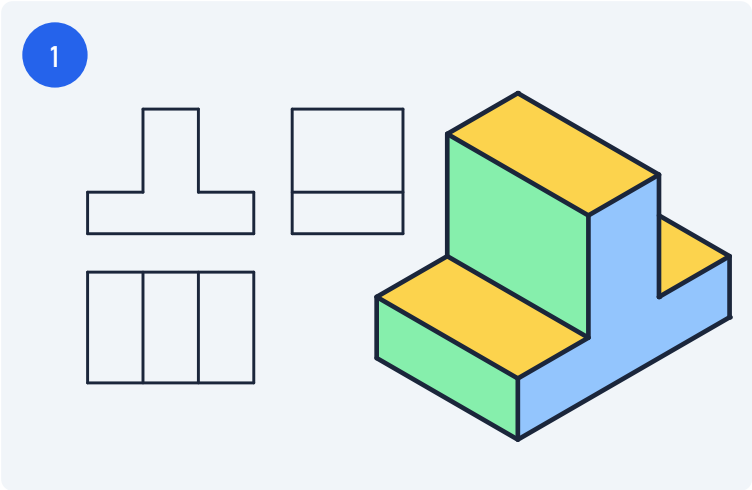
3

4

5

6

# Answers (A)



# Your turn: draw the isometric (B)

1 square = 10 mm · box method · no hidden lines

1

Exercise 1 shows three orthographic views of a stepped block on a grid. The front view (top left) shows a base of 4 units, with a 2-unit wide section on the left and a 2-unit wide section on the right that is 2 units high. The top view (bottom left) shows a 4x4 square divided into four 2x2 quadrants. The side view (top right) shows a 4x2 rectangle divided into two horizontal sections.

2

Exercise 2 shows three orthographic views of a rectangular block with a slanted top. The front view (top left) shows a 4x2 rectangle divided into two horizontal sections. The top view (bottom left) shows a 4x2 rectangle divided into two horizontal sections. The side view (top right) shows a 4x2 rectangle with a slanted top edge.

3

Exercise 3 shows three orthographic views of a rectangular block with a central hole. The front view (top left) shows a 4x2 rectangle with a 2x1 central hole. The top view (bottom left) shows a 4x2 rectangle with dashed lines indicating the hole. The side view (top right) shows a 4x2 rectangle with dashed lines indicating the hole.

4

Exercise 4 shows three orthographic views of a stepped block with a central hole. The front view (top left) shows a base of 4 units, with a 2-unit wide section on the left and a 2-unit wide section on the right that is 2 units high. The top view (bottom left) shows a 4x4 square divided into four 2x2 quadrants. The side view (top right) shows a 4x2 rectangle divided into two horizontal sections.

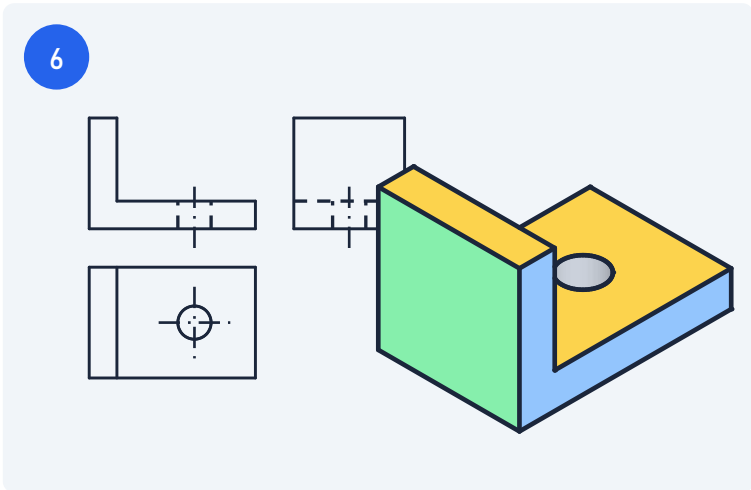
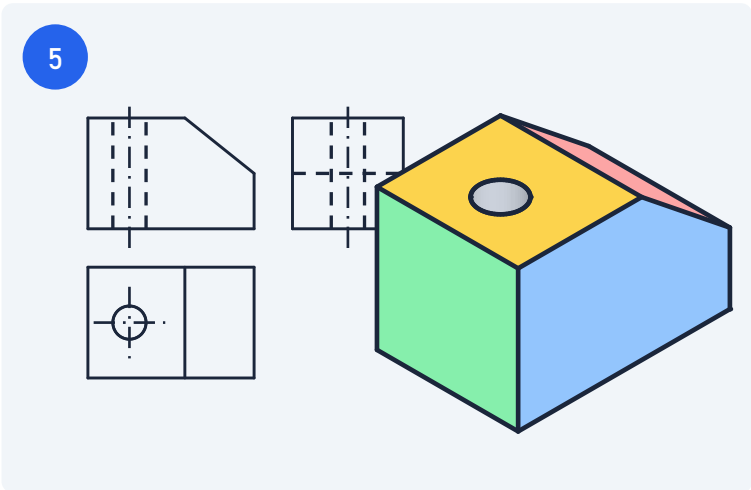
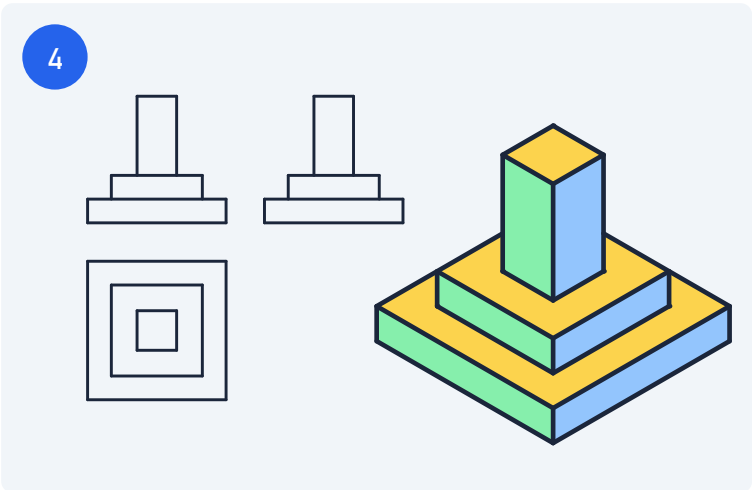
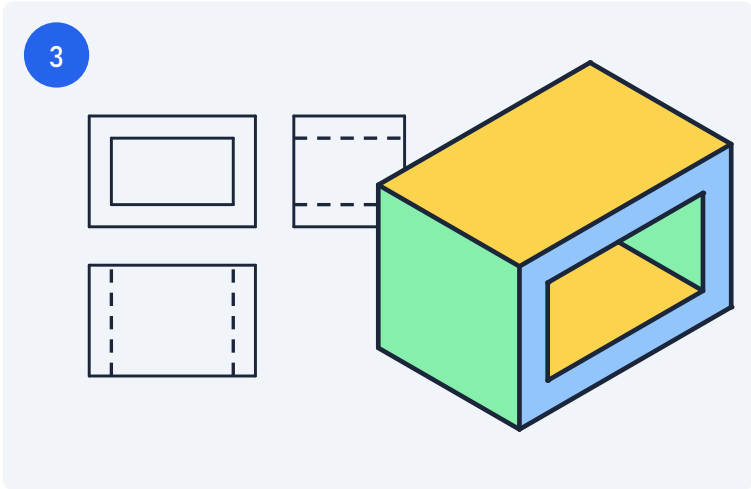
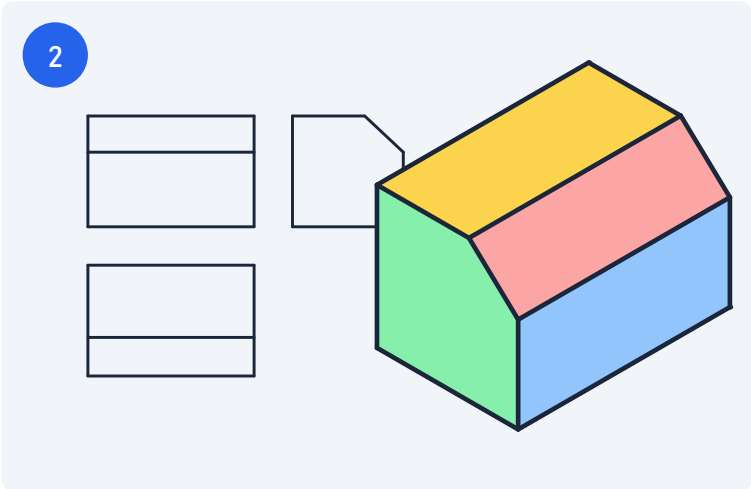
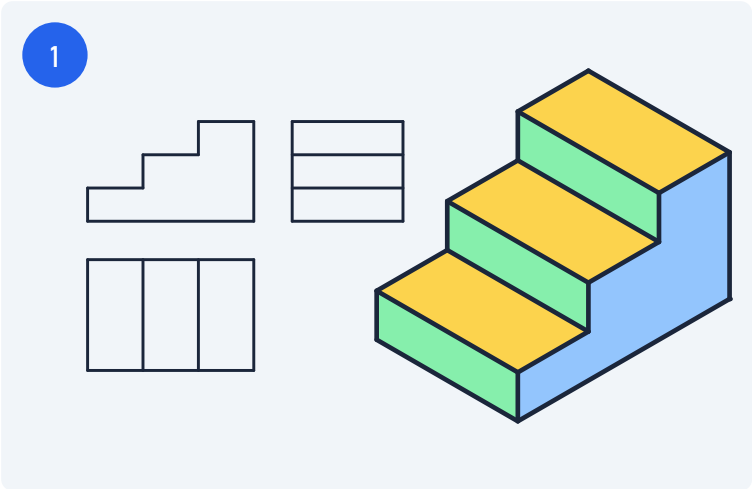
5

Exercise 5 shows three orthographic views of a rectangular block with a slanted top and a central hole. The front view (top left) shows a 4x2 rectangle with a slanted top edge. The top view (bottom left) shows a 4x2 rectangle with dashed lines indicating the hole. The side view (top right) shows a 4x2 rectangle with dashed lines indicating the hole.

6

Exercise 6 shows three orthographic views of a rectangular block with a slanted top and a central hole. The front view (top left) shows a 4x2 rectangle with a slanted top edge. The top view (bottom left) shows a 4x2 rectangle with dashed lines indicating the hole. The side view (top right) shows a 4x2 rectangle with dashed lines indicating the hole.

# Answers (B)



# Quick check

1

The isometric axes are drawn ... apart.

a) 90°

b) 120°

c) 45°

d) 60°



2

Which lines can you measure at true length?

a) any line

b) parallel to an axis

c) sloping lines

d) circles



3

A circle on an isometric drawing appears as ...

a) a circle

b) an ellipse

c) a square

d) a parabola



4

Hidden edges in an isometric drawing are usually ...

a) dashed

b) thick

c) left out

d) centre lines



# What comes next

1

## Part 5

Dimensions on views and on isometric drawings; exam-level drawings.

2

## Workshop

Isometric drawings from given views, on A3/A4 template sheets.

3

## Midterm

Drawn with instruments: everything from Parts 1 to 5.

Bring your complete kit, template sheets and isometric grid paper.