

10.5

Isometric Drawings of Cube Structures

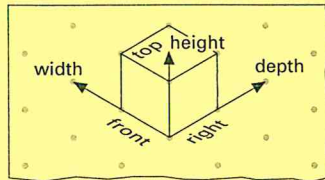
You will need

- linking cubes
- a ruler
- triangle dot paper
- coloured pencils

▶ GOAL

Make realistic drawings of cube structures on triangle dot paper.

Learn about the Math



isometric drawing
a 3-D view of an object in which

- vertical edges are drawn vertically
- width and depth are drawn diagonally
- equal lengths of the object are equal on the drawing

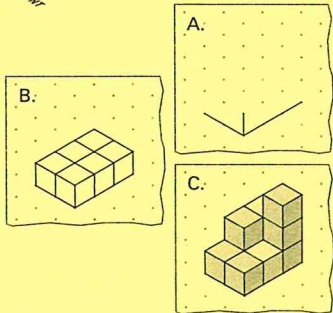
Miguel built a cube structure. He wants to fax an **isometric drawing** of his structure to Heather.

? How can Miguel draw the cube structure?

Example 1: Making an isometric drawing

Use triangle dot paper to make an isometric drawing.

Miguel's Solution



I started by using the bottom layer of the structure. I placed the structure in the position for drawing.

- First I drew the vertical part of the front cube and the bottom of the front and right side on triangle dot paper. I used one space to represent the height, two spaces for the width, and three spaces for the depth.
- Then I completed the bottom layer. I used one space to represent the height, width, and depth of each cube.
- I added the other layers and erased hidden lines to finish my drawing.

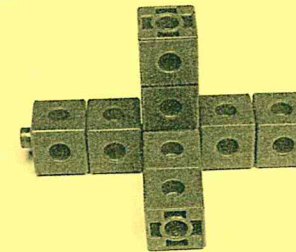
Reflecting

1. Explain how Miguel placed the bottom layer to show a view that he could use to make an isometric drawing.
2. Describe a different way Miguel could have placed the bottom layer to make an isometric drawing.
3. Could Miguel have made an isometric drawing of the structure without first breaking up the layers? Explain.

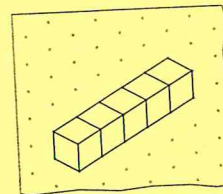
Work with the Math

Example 2: Drawing a cube structure

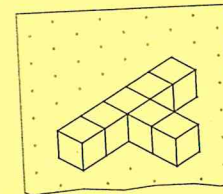
Make an isometric drawing of this cube structure. Shade your drawing to make it look 3-D.



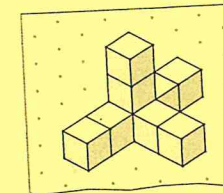
Solution



Place the cube structure to prepare for making an isometric drawing. Draw one row of the bottom layer.



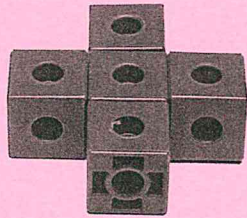
Complete the bottom layer, erasing hidden lines.



Finish the drawing, erasing the remaining hidden lines and shading.

A Checking

4. Build this cube structure. Make an isometric drawing to represent your cube structure.

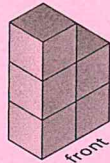


B Practising

5. a) Build this cube structure.

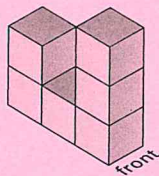
- b) Turn it so that you can see the left side.

- c) Make an isometric drawing to show what you see.



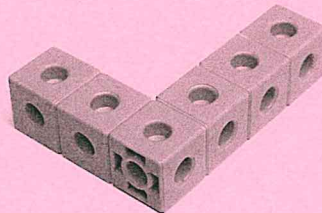
6. a) Build this cube structure.

- b) Make an isometric drawing of the left-side view.

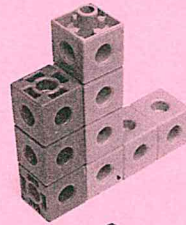


7. Build the following cube structures. Make an isometric drawing of each structure.

a)



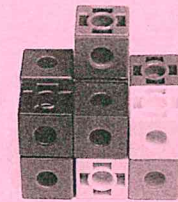
b)



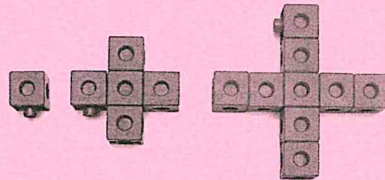
c)



d)



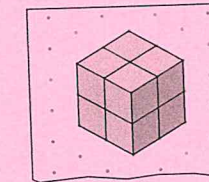
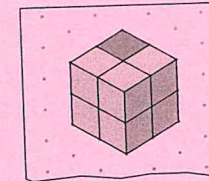
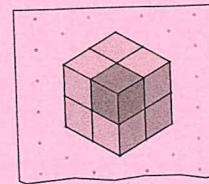
8. a) Build these cube structures. Make an isometric drawing of each structure.



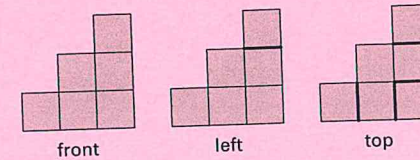
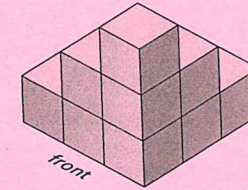
- b) Make an isometric drawing of the cube structure you get by layering the cube structures in part (a) with the orange layer on the bottom and the green layer on the top.

- c) Imagine adding another layer to the bottom of the cube structure in part (b), or build this layer. Make an isometric drawing to represent the new cube structure.

9. Explain how you know each of the following could be an isometric drawing of the same cube structure.



11. For this cube structure, which view is incorrect? Explain.



C Extending

12. Use the cube structures in question 7.

- a) Turn each cube structure a quarter turn clockwise. Make an isometric drawing of each.
b) Repeat part (a) for a half turn clockwise.

13. Sometimes different linking cube structures can be represented by the same isometric drawing.

- a) Use different numbers of cubes to build two structures that can be represented by the same isometric drawing for at least one view.

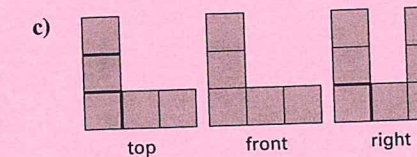
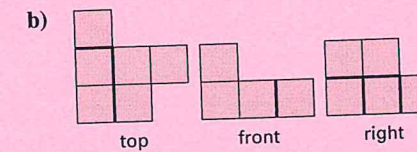
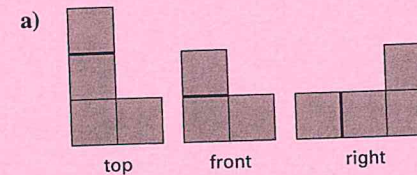
- b) Are the structures different for at least one view? Explain.

- c) Draw the top, front, left-side, and right-side views for one of your structures.

- d) Ask someone to use your drawings to build the cube structure.

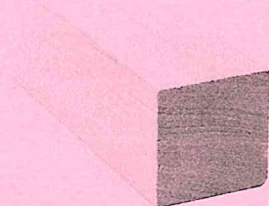
- e) Explain whether your drawings provided enough information to rebuild your cube structure accurately.

10. The top, front, and right-side views are shown for different cube structures. Build each cube structure and represent it using an isometric drawing.



A Checking

4. Use triangle dot paper to make an isometric drawing of this rectangular prism. Look at a 3-D model if you need help.



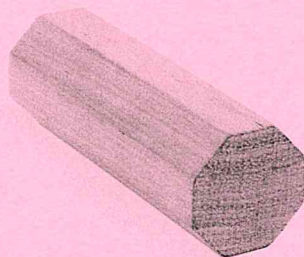
B Practising

5. Make an isometric drawing of each prism on triangle dot paper. Look at 3-D models if you need help.

a)

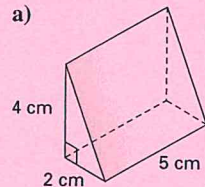


b)

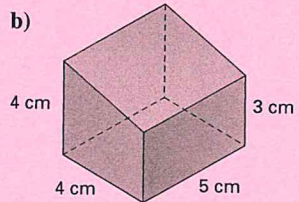


6. Make an isometric drawing of each object. Use triangle dot paper.

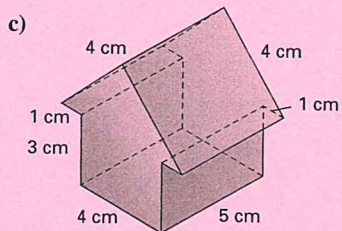
a)



b)

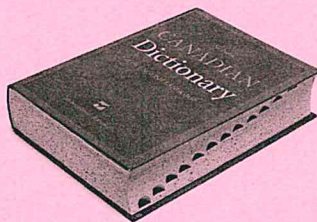


c)

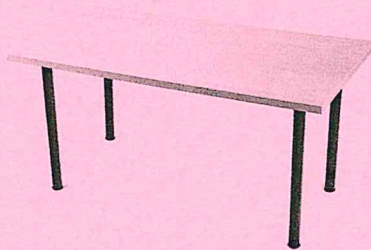


7. Make an isometric drawing of each object.

a)



b)



7. c)

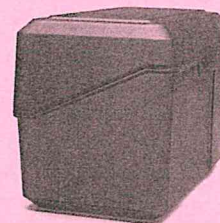


d)

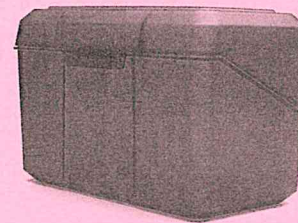


8. Make an isometric drawing of each view of the recipe box on triangle dot paper.

a)



b)



C Extending

9. Choose an object in a picture in this lesson. Make an isometric drawing of the object from a different view.

10. a) Choose an object in the classroom. Make an isometric drawing of it.
 b) Make an isometric drawing of the same object from a different view.
 c) Explain how your drawings in parts (a) and (b) are the same and how they are different.

11. a) Make an isometric drawing of a prism that has a pentagonal base.
 b) Explain how you chose the view for your drawing in part (a).

12. Explain why an isometric drawing looks 3-D.

13. Make an isometric drawing of the object whose top, front, and side views are shown below.

