

Important Concepts . . .

Preview Review



Mathematics Grade 8
W3 - Review

Important Concepts of Grade 8 Mathematics

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W1 - Lesson 2	Working with Ratios and Rates
W1 - Lesson 3	Multiplying and Dividing Fractions
W1 - Lesson 4	Multiplying and Dividing Integers
W1 - Lesson 5	Working with Percents
W1 - Review	
W1 - Quiz	
W2 - Lesson 1	Modelling and Solving Linear Equations Using Algebra Tiles
W2 - Lesson 2	Solving Linear Equations
W2 - Lesson 3	Graphing and Analyzing Linear Relations
W2 - Lesson 4	Critiquing the Representation of Data
W2 - Lesson 5	Probability of Independent Events
W2 - Review	
W2 - Quiz	
W3 - Lesson 1	Pythagorean Theorem
W3 - Lesson 2	Calculating Surface Area
W3 - Lesson 3	Calculating Volume
W3 - Lesson 4	Drawing 3-D Objects
W3 - Lesson 5	Congruence of Polygons
W3 - Review	
W3 - Quiz	

Materials Required

Protractor
Ruler
Calculator

**No Textbook
Required**

**This is a stand-
alone course.**

Mathematics Grade 8

Version 6

Preview/Review W3 - L1

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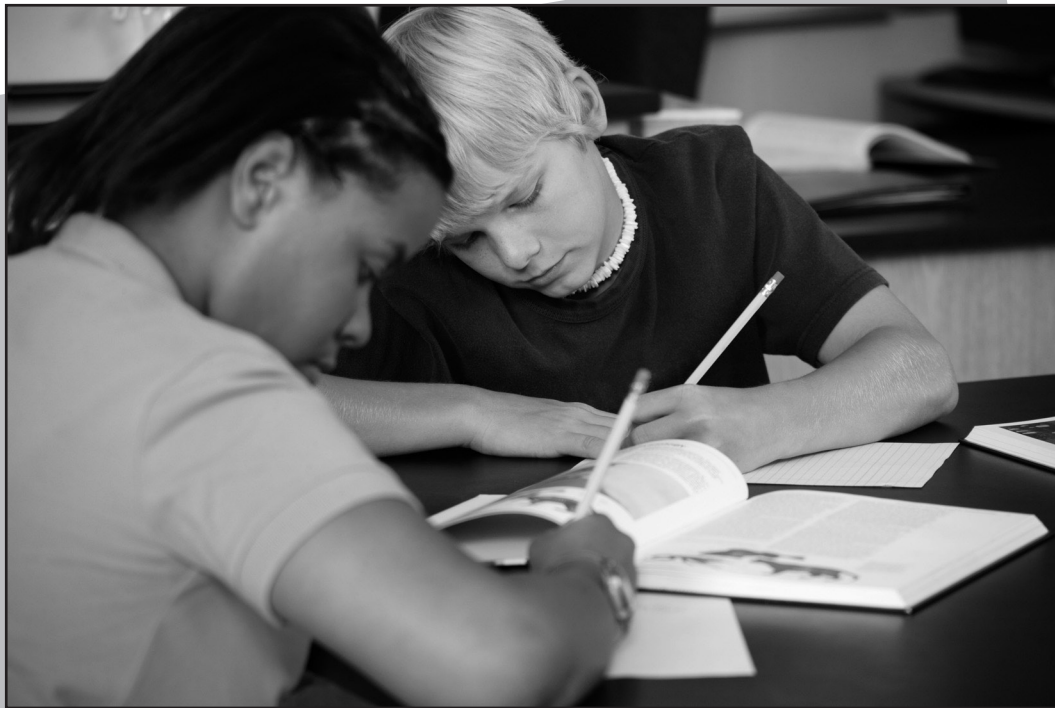
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Preview/Review Concepts for Grade Eight Mathematics



W3 - Review:

W3 – Review

Materials required:

- Paper, Pencil, Calculator, isometric dot paper, square dot paper, grid paper

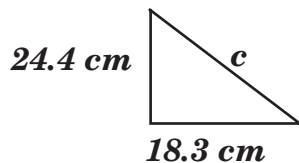
Part 1: The Pythagorean Theorem

The Pythagorean Theorem states that $a^2 + b^2 = c^2$, where a and b represent the sides of the right triangle and c represents the hypotenuse of the right triangle.

The Pythagorean Theorem is used when working with right angle triangles. If you know the lengths of two of the three sides of the triangle, you can solve for the unknown side.

Example 1

Calculate the length of the unknown side of the following right triangle. Round the result to the nearest tenth of a unit if necessary.



Apply the formula and substitute the value for the known sides.

$$a^2 + b^2 = c^2$$

$$(24.4)^2 + (18.3)^2 = c^2$$

Evaluate the exponents and add the value of a^2 to the value of b^2 .

$$(24.4)^2 + (18.3)^2 = c^2$$

$$595.36 + 334.89 = c^2$$

$$930.25 = c^2$$

To determine the value of c , you must take the square root of both sides.

$$930.25 = c^2$$

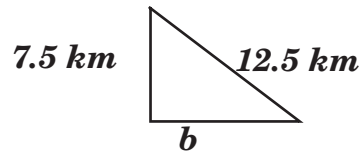
$$\sqrt{930.25} = \sqrt{c^2}$$

$$30.5 = c$$

The length of the unknown side is 30.5 cm.

Example 2

Calculate the length of the unknown side of the following right triangle. Round the result to the nearest tenth of a unit if necessary.



Apply the formula and substitute the value for the known sides.

$$a^2 + b^2 = c^2$$

$$(7.5)^2 + b^2 = (12.5)^2$$

Evaluate the exponents.

$$(7.5)^2 + b^2 = (12.5)^2$$

$$56.25 + b^2 = 156.25$$

Isolate b^2 by applying inverse operations to both sides of the equation.

$$56.25 - 56.25 + b^2 = 156.25 - 56.25$$

$$b^2 = 100$$

To determine the value of b , you must take the square root of both sides.

$$b^2 = 100$$

$$\sqrt{b^2} = \sqrt{100}$$

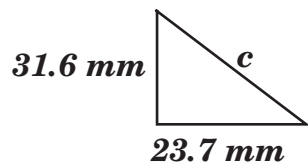
$$b = 10$$

The length of the unknown side is 10 km.

Practice Questions

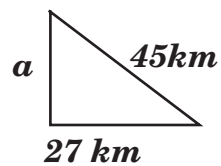
Calculate the length of the unknown sides of the following right triangles. Round the result to the nearest tenth of a unit if necessary.

1.



Answer:

2.



Answer:

Part 2: Calculating Surface Area

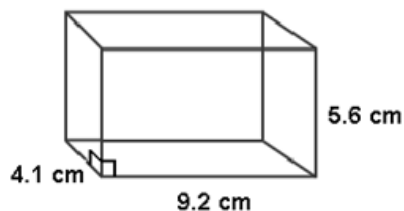
Surface area describes how much material is used to make the shell of a three-dimensional object.

Use the following formulas to calculate the surface area of 3-D objects:

<i>3-D object</i>	<i>Surface area formula</i>
Right Rectangular Prism	$SA = A_{\text{front \& back}} + A_{\text{both sides}} + A_{\text{top \& bottom}}$ $2(wh) + 2(lh) + 2(lw)$
Right Triangular Prism	$SA = A_{\text{front \& back}} + A_{\text{side1}} + A_{\text{side2}} + A_{\text{bottom}}$ $2\left(\frac{bh}{2}\right) + (lw)_{\text{side1}} + (lw)_{\text{side2}} + (lw)_{\text{bottom}}$
Right Cylinder	$SA = A_{\text{top\&bottom}} + A_{\text{side}}$ $= 2(\pi r^2) + (lh)$ $= 2(\pi r^2) + (\pi dh)$ $= 2(\pi r^2) + (2\pi rh)$

Example 1

Calculate the surface area of the following right rectangular prism.



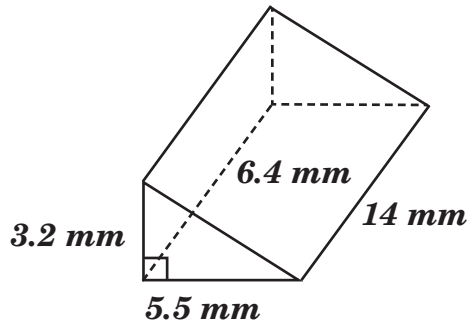
Answer:

Use the surface area formula, substitute in the known values, and evaluate.

$$\begin{aligned}
 SA &= A_{\text{front\&back}} + A_{\text{sides}} + A_{\text{top\&bottom}} \\
 &= 2(wh) + 2(lh) + 2(lw) \\
 &= 2(9.2)(5.6) + 2(4.1)(5.6) + 2(4.1)(9.2) \\
 &= 103.04 + 45.92 + 75.44 \\
 &= 224.4 \text{ cm}^2
 \end{aligned}$$

Example 2

Calculate the surface area of the following right triangular prism.



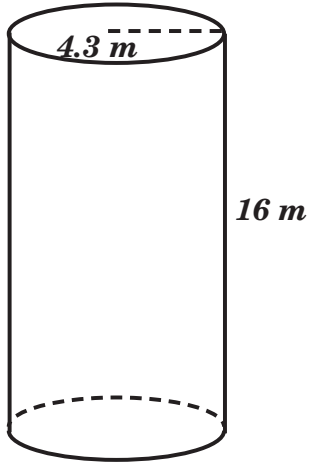
Answer:

Use the surface area formula, substitute in the known values, and evaluate.

$$\begin{aligned}
 SA &= A_{\text{front\&back}} + A_{\text{side1}} + A_{\text{side2}} + A_{\text{bottom}} \\
 &= 2\left(\frac{bh}{2}\right) + (lw)_{\text{side1}} + (lw)_{\text{side2}} + (lw)_{\text{bottom}} \\
 &= 2\left(\frac{(5.5)(3.2)}{2}\right) + (14)(6.4)_{\text{side1}} + (14)(3.2)_{\text{side2}} + (14)(5.5)_{\text{bottom}} \\
 &= 17.6 + 89.6 + 44.8 + 77 \\
 &= 229\text{mm}^2
 \end{aligned}$$

Example 3

Calculate the surface area of the following right cylinder.



Answer:

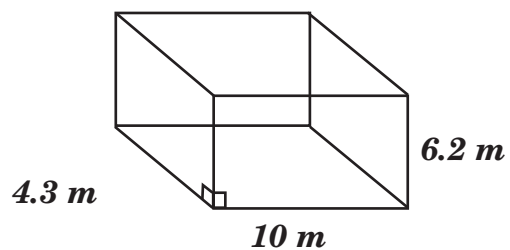
Use the surface area formula, substitute in the known values, and evaluate.

$$\begin{aligned}
 SA &= A_{\text{top \& bottom}} + A_{\text{side}} \\
 &= 2(\pi r^2) + (\pi rh) \\
 &= 2(\pi)(4.3)^2 + 2(\pi)(4.3)(16) \\
 &= 2(3.14)(4.3)^2 + 2(3.14)(4.3)(16) \\
 &= 116.12 + 432.06 \\
 &= 548.18m^2
 \end{aligned}$$

Practice Questions

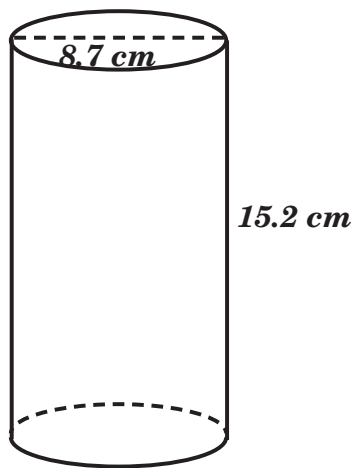
Calculate the surface area of each of the following right prisms. Round the answers to the nearest hundredth of a unit.

1.



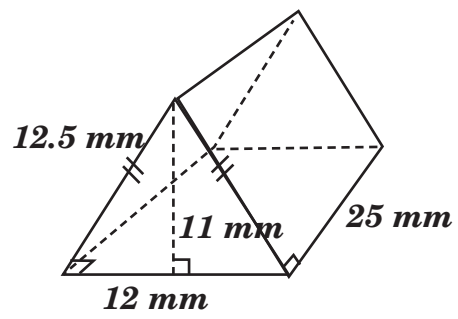
Answer:

2.



Answer:

3.



Answer:

Part 3: Calculating Volume

Volume is the amount of space a 3-D object occupies.

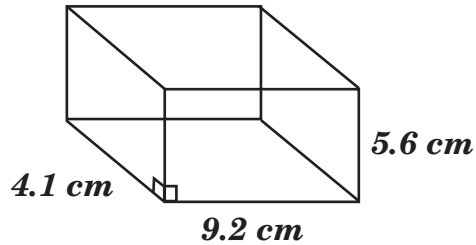
To calculate the volume of any right prism, calculate the area of its base and multiply by its length or height.

Use the following formulas to calculate the volume of 3-D objects:

<i>3-D object</i>	<i>Surface area formula</i>
Right Rectangular Prism	$V = A_{\text{base}} \times h$ $V = A_{\text{rectangular prism}} \times h$ $V = (lw) \times h$ $V = lwh$
Right Triangular Prism	$V = A_{\text{base}} \times h$ $V = A_{\text{triangle}} \times l$ $V = \left(\frac{bh}{2} \right) \times l$
Right Cylinder	$V = A_{\text{base}} \times h$ $V = A_{\text{circle}} \times h$ $V = \pi r^2 \times h$ $V = \pi r^2 h$

Example 1

Calculate the volume of the following right rectangular prism.



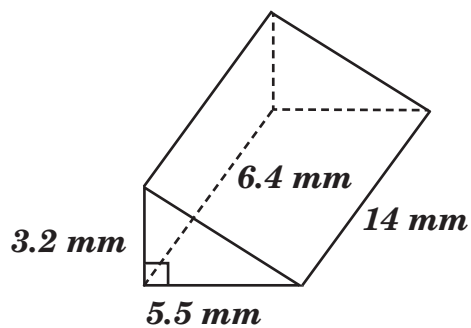
Answer:

Use the volume formula, substitute in the known values, and evaluate.

$$\begin{aligned}
 V &= lwh \\
 &= (4.1)(9.2)(5.6) \\
 &= 211.23\text{cm}^2
 \end{aligned}$$

Example 2

Calculate the volume of the given right triangular prism.

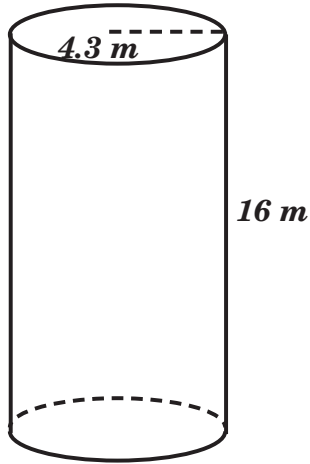


Use the volume formula, substitute in the known values, and evaluate.

$$\begin{aligned}
 V &= \left(\frac{bh}{2} \right) \times l \\
 &= \left(\frac{(5.5)(3.2)}{2} \right) \times (14) \\
 &= 8.8 \times 14 \\
 &= 123.2\text{mm}^3
 \end{aligned}$$

Example 3

Calculate the volume of the given right cylinder. Use $\pi = 3.14$.



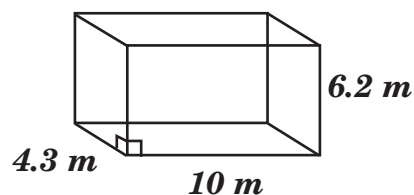
Use the volume formula, substitute in the known values, and evaluate.

$$\begin{aligned} V &= \pi r^2 h \\ &= (3.14)(4.3)^2(16) \\ &= 928.94\text{m}^3 \end{aligned}$$

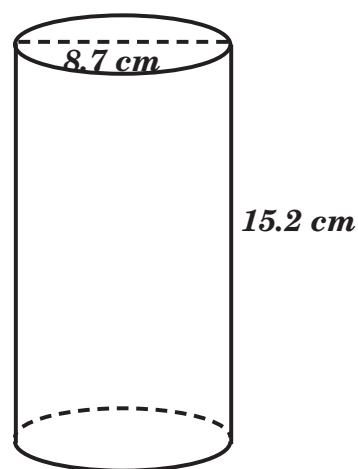
Practice Questions

Calculate the volume of each of the following right prisms. Round the answers to the nearest hundredth of a unit.

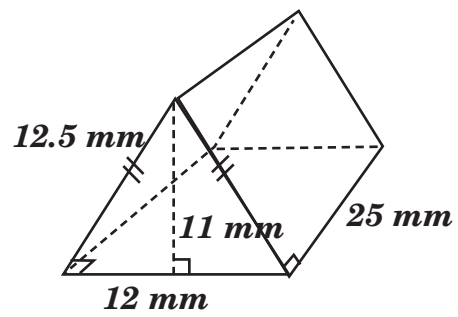
1.



2.



3.



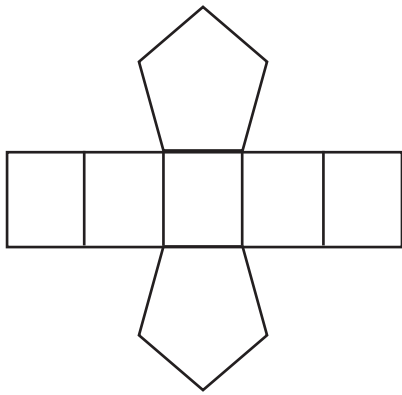
Answer:

Part 4: Drawing 3-D Objects

Nets are diagrams that illustrate all the different shapes that make up a three-dimensional object. In other words, a net illustrates what an object would look like if it was laid out flat.

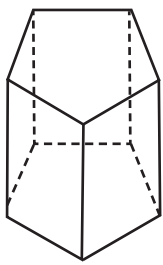
Example 1

Which 3-D object can be created from the given net?



The net has 5 congruent rectangles and 2 pentagonal bases. When folded, the congruent rectangles will join the pentagonal bases.

This is a net of a pentagonal prism.



To draw a 3-D object, you must sketch it from three different views: the front, top and side views.

There is a special way to set up the drawings as you create them.

Step 1: Draw the front view.

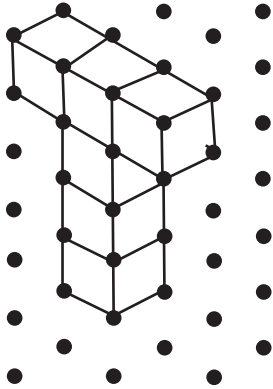
Step 2: Draw the top view and place it above the front view.

Step 3: Draw the side views and place them beside the front view.

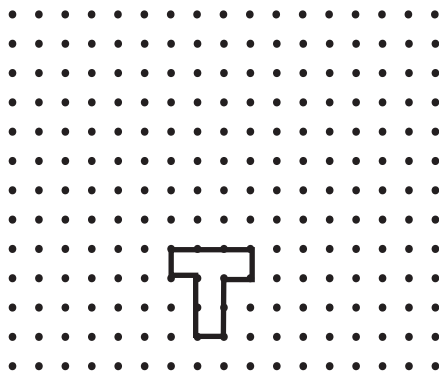
Step 4: Draw in the broken lines to show how the different views align.

Example 2

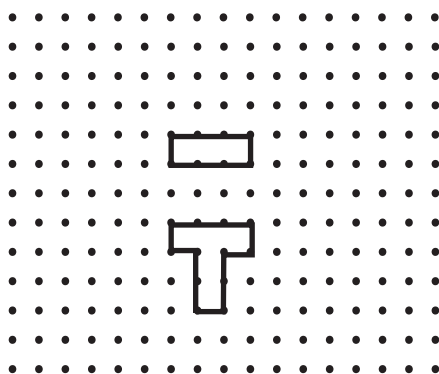
Draw the front, top, and side views of the following 3-D object.



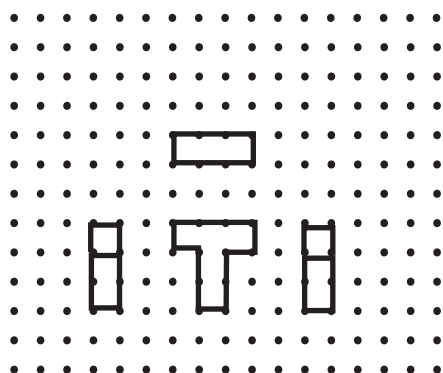
Step 1: Draw the front view.



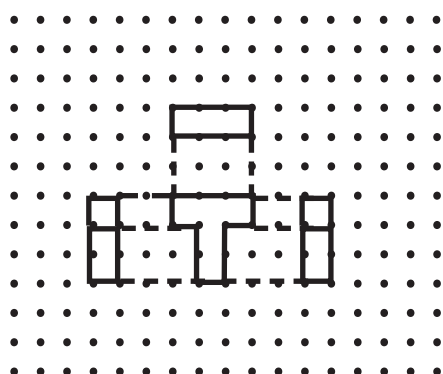
Step 2: Draw the top view and place it above the front view.



Step 3: Draw the side views and place them beside the front view.



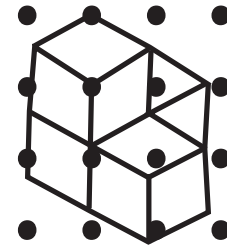
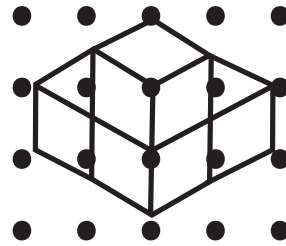
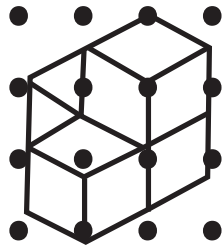
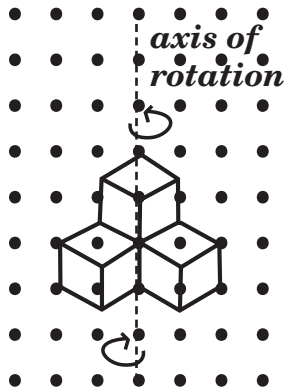
Step 4: Draw in the broken lines to show how the different views align.



An object can be rotated horizontally around a vertical axis of rotation. The rotation can be clockwise or counterclockwise.

Horizontal Rotation

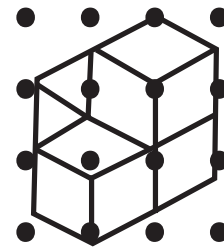
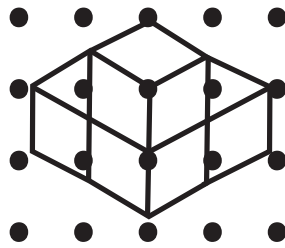
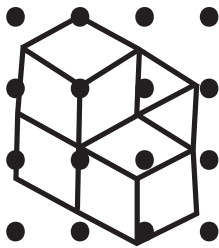
original position 90° rotation clockwise 180° rotation clockwise 270° rotation clockwise



90° rotation
counterclockwise

180° rotation
counterclockwise

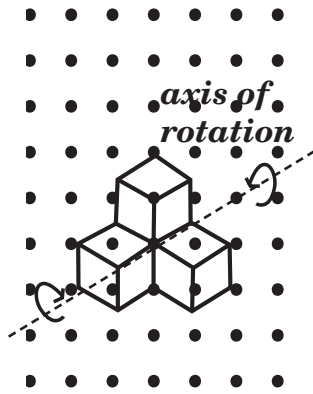
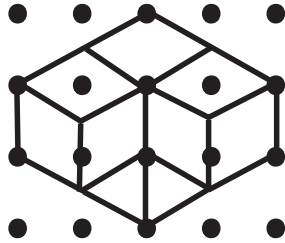
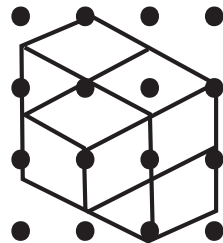
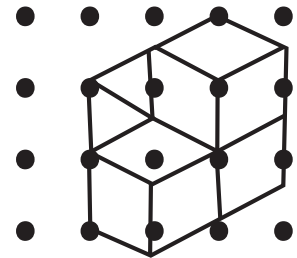
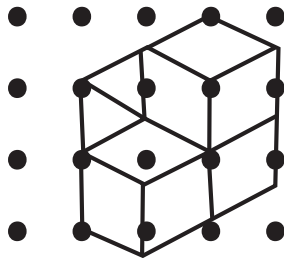
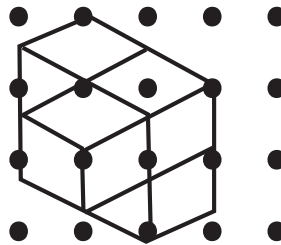
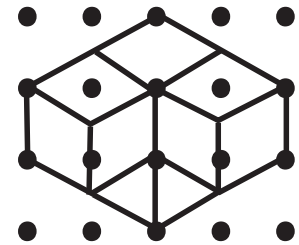
270° rotation
counterclockwise



An object can also be rotated vertically around a horizontal axis of rotation. The rotation can be toward your or way from you.

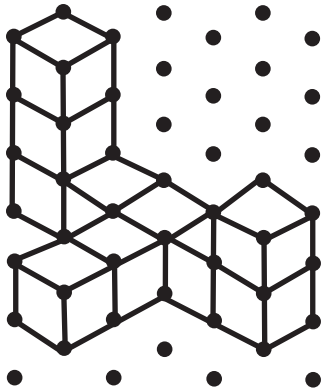
Vertical Rotation

Original position

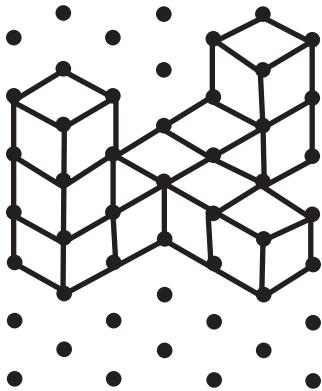
90° rotation
toward you180° rotation
toward you270° rotation
toward you90° rotation away
from you180° rotation away
from you270° rotation away
from you

Example 1

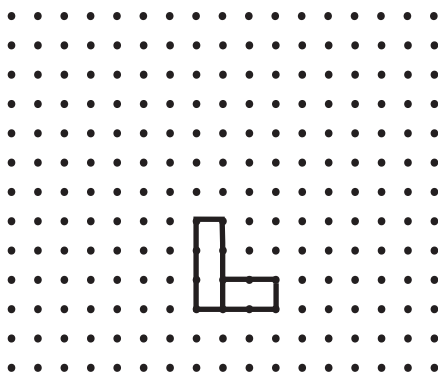
The following object is rotated 270° clockwise about the horizontal axis. Draw the front, top, and side views after the rotation is applied.



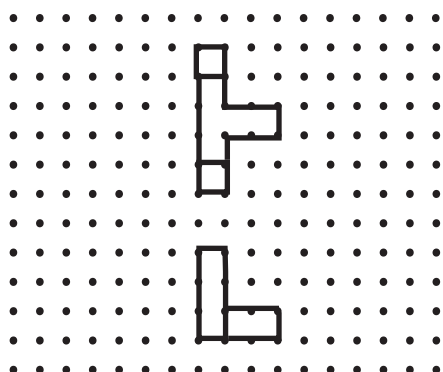
Step 1: Determine the image of the original object after the rotation is applied.



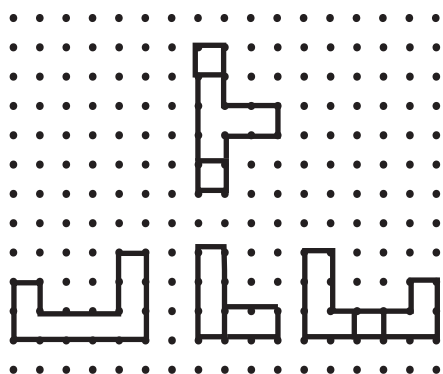
Step 2: Draw the front view.



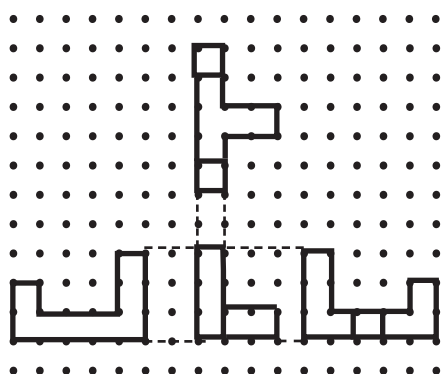
Step 3: Draw the top view and place it above the front view.



Step 4: Draw the side views and place them beside the front view.

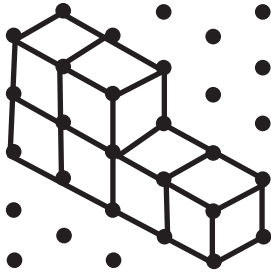


Step 5: Draw in the broken lines to show how the different views align.



Practice Questions

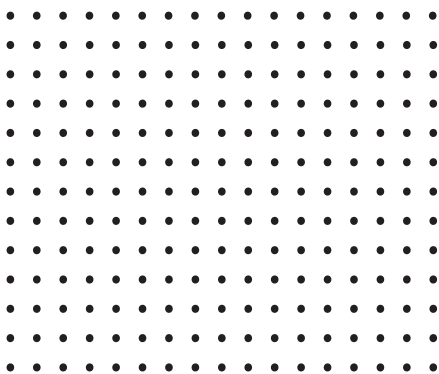
- The following object is rotated 180° towards you about the vertical axis. Draw the front, top, and side views after the rotation is applied.



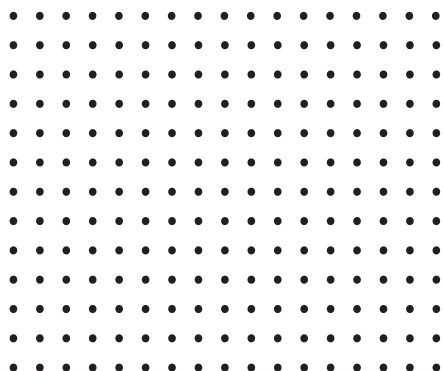
Answer:

Step 1: Determine the image of the original object after the rotation is applied.

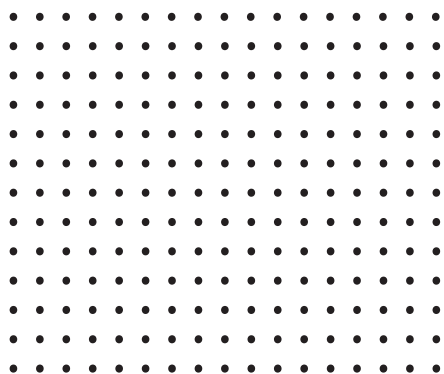
Step 2: Draw the front view.



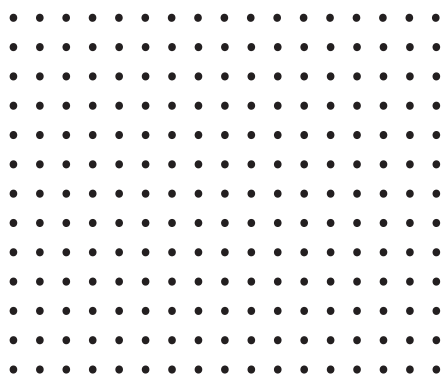
Step 3: Draw the top view and place it above the front view.



Step 4: Draw the side views and place them beside the front view.



Step 5: Draw in the broken lines to show how the different views align.



Part 5: Congruence of Polygons

Transformations: the act of moving a shape from one location to another location on the coordinate plane without changing its size or shape

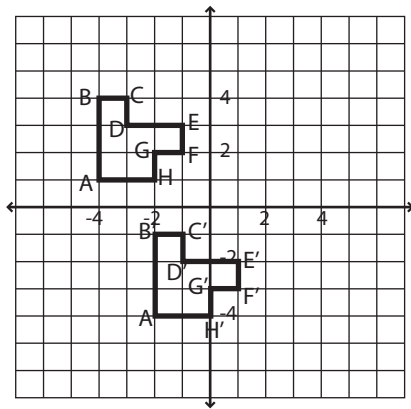
Translation: a move in a straight line to another position on the same flat surface

Reflection: a shape and its image in a line of reflection

Rotation: a shape turned about a fixed point

Example 1

Identify the transformation illustrated in the following diagram.



Step 1: Determine the coordinates of the original shape.

$$A(-4,1), B(-4,4), C(-3,4), D(-3,3), E(-1,3), F(-1,2), G(-2,2), H(-2,1)$$

Step 2: Determine the coordinates of the image.

$$A'(-2,-4), B'(-2,-1), C'(-1,-1), D'(-1,-2), E'(1,-2), F'(1,-3), G'(0,-3), H'(0,-4)$$

Step 3: Determine the transformation.

The shape has moved 2 units to the right and 5 units down. This diagram illustrates a translation.

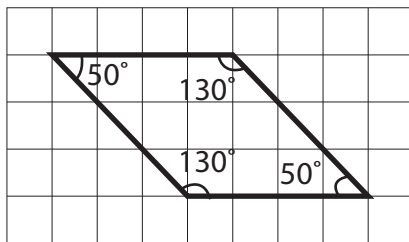
Tessellation: a design that consists of congruent copies of a shape with no overlaps or gaps; a tessellation can consist of one shape or a combination of shapes.

To make a tessellation, take the original shape and apply a series of translations, reflections, and rotations to it.

In order for a shape to tessellate, the point where the vertices of the original shape meet, the sum of the angles is 360° .

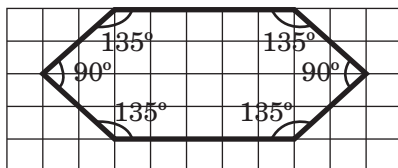
Practice Questions

1. Tessellate the following shape.



Answer:

2. Determine if the following shape will tessellate.



Answer:

