Name _____

Math 3 Unit 3: Modeling With Geometry

		February 21 ● Shapes and nets ● Project assigned HW: worksheet 3.1, work on project	**February 22** ● Surface area and volume HW: worksheet 3.2, work on project	**February 23** ● Cross-sections ● Rotating 2D shapes to create 3D shapes HW: worksheet 3.3, work on project
February 26 ● Geometric modeling HW: worksheet 3.4, work on project	**February 27** ● More geometric modeling HW: worksheet 3.5, work on project	**February 28** ● Review for test HW: finish review, work on project	**March 1** ● TEST!!! HW: complete project	**March 2** ● Project presentations

3.1 - Nets and Shapes

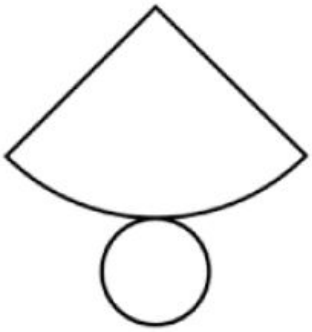
Match the name of each 3D figure to its net.

_____ 1. triangular prism _____ 2. square pyramid _____ 3. hexagonal pyramid

_____ 4. rectangular prism _____ 5. hexagonal prism _____ 6. triangular pyramid

_____ 7. cylinder _____ 8. cube _____ 9. cone

A



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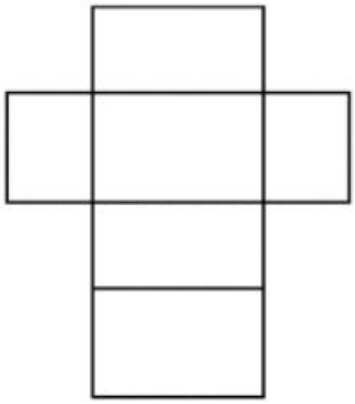

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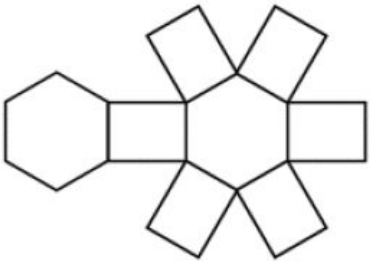

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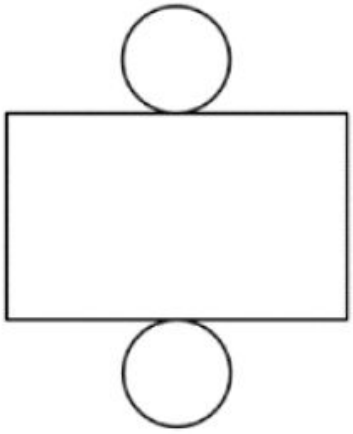

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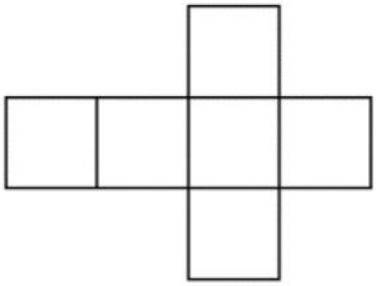

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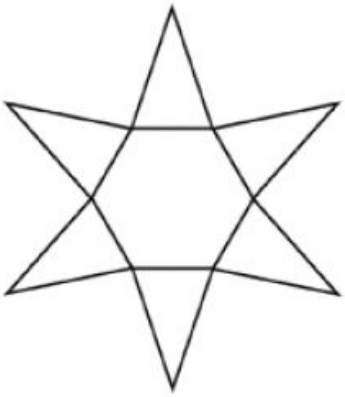

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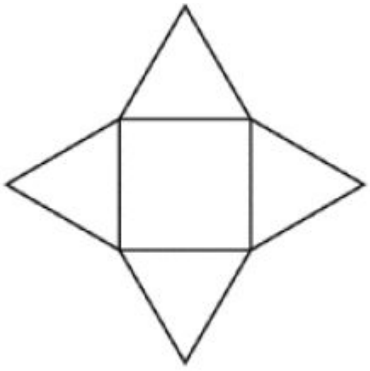

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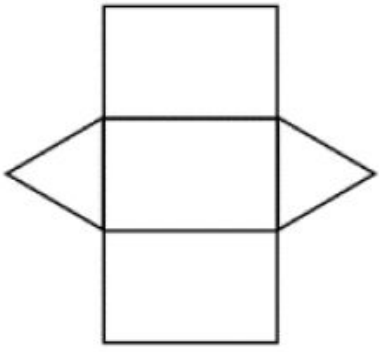

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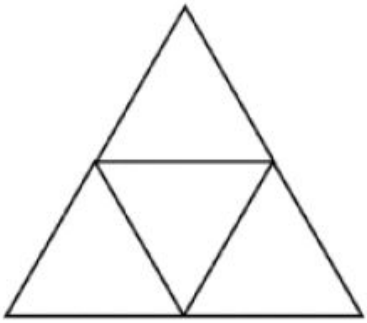
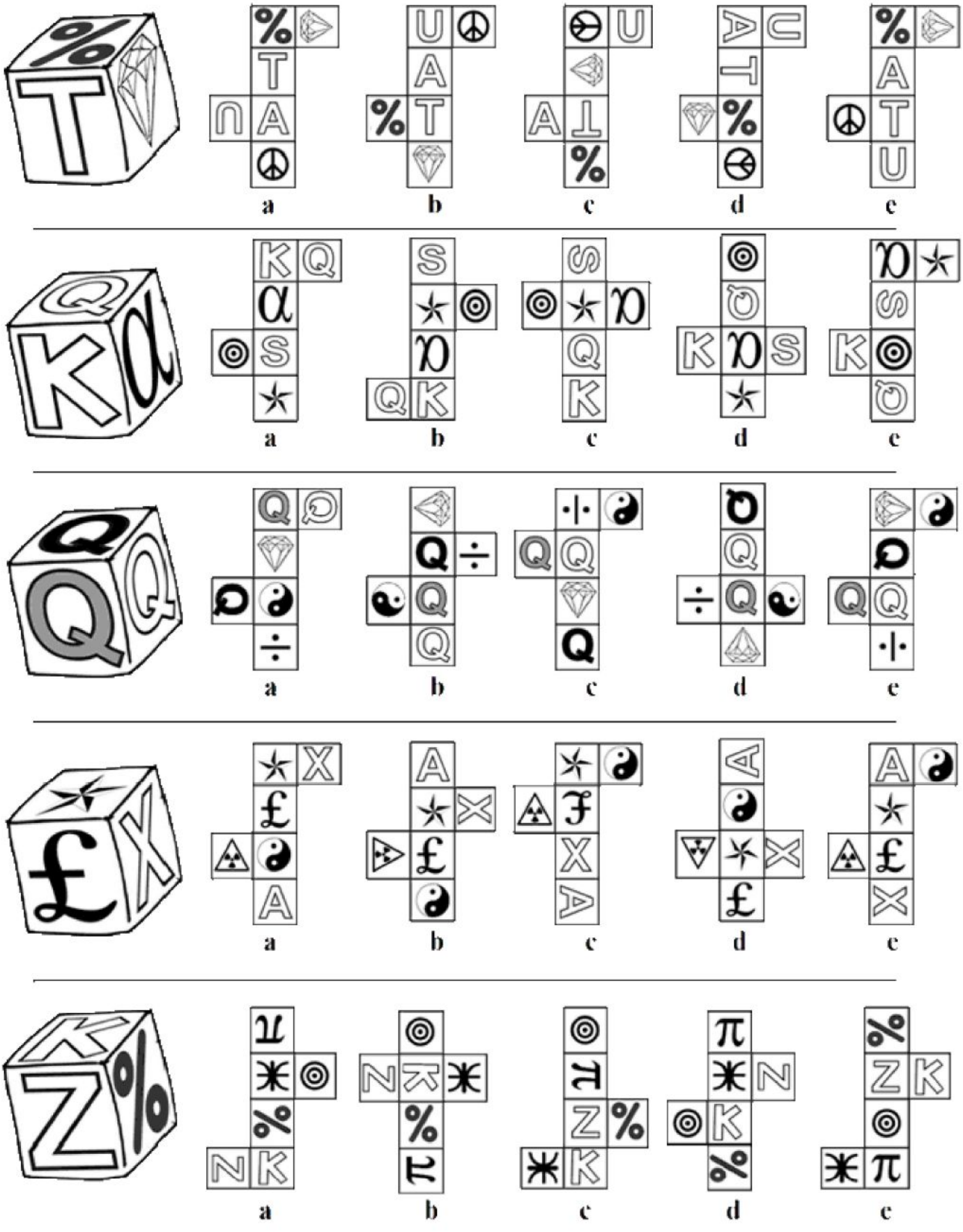


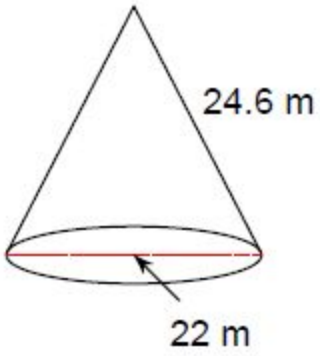
For each 3D cube given, match it to the correct corresponding net.



3.2 - Surface Area and Volume

Determine the surface area of each figure below.

1



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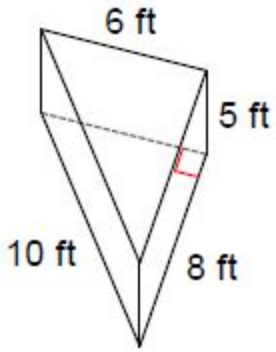

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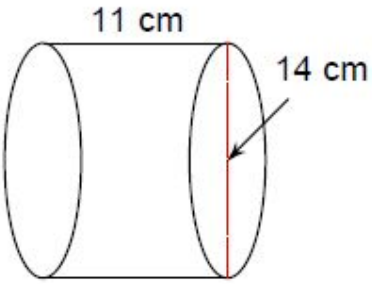

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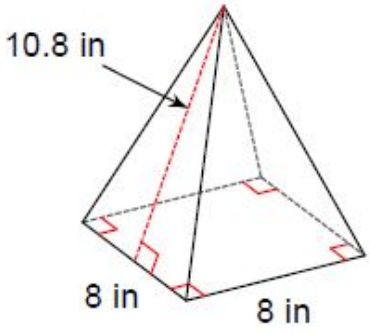

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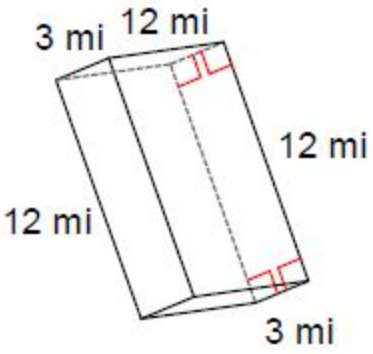

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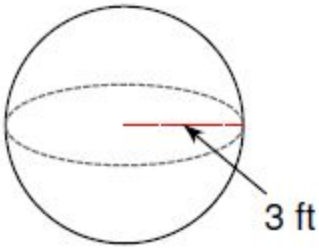
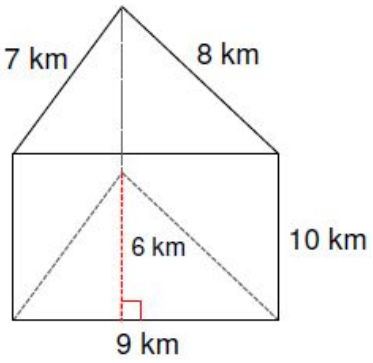


Determine the volume of each figure below.

7



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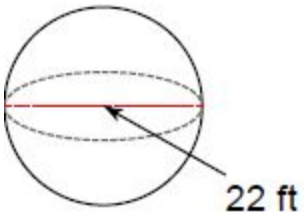

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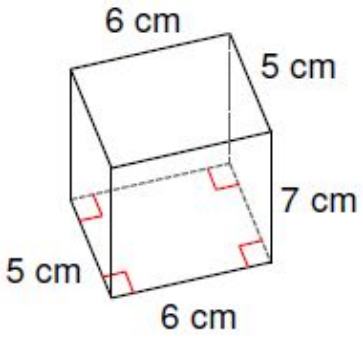

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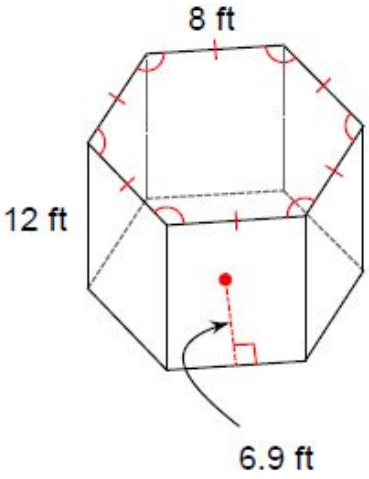

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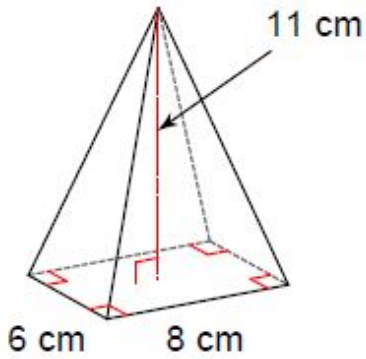

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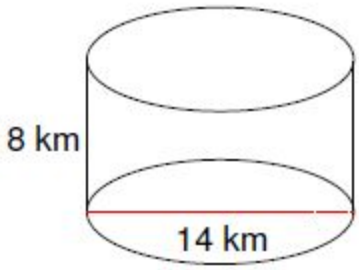
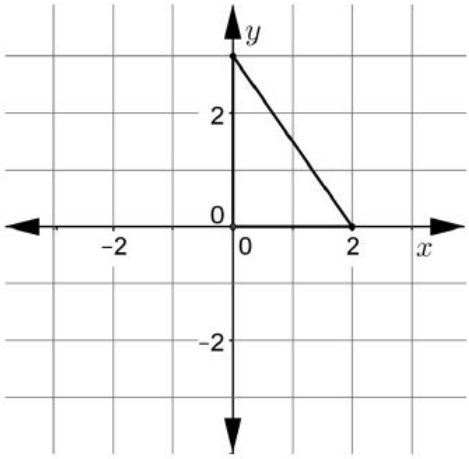
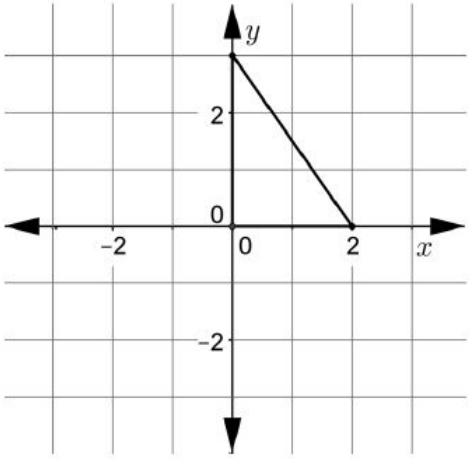


3.3 - Rotations of 2D Shapes to Create 3D Shapes

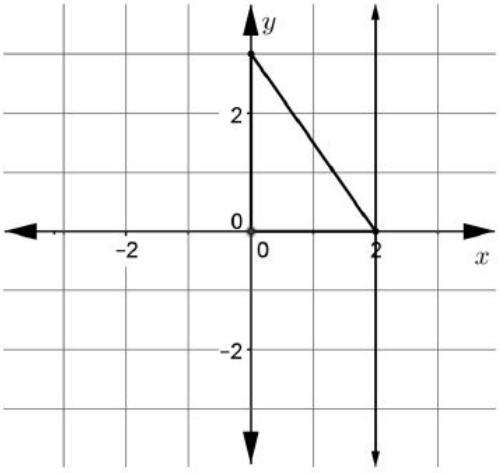
1. Describe in detail the solid formed by rotating a right triangle with vertices at (0, 0), (2, 0), and (0, 3) about the vertical axis. Include the dimensions (height, length, width, radius, etc) of the solid in your description.



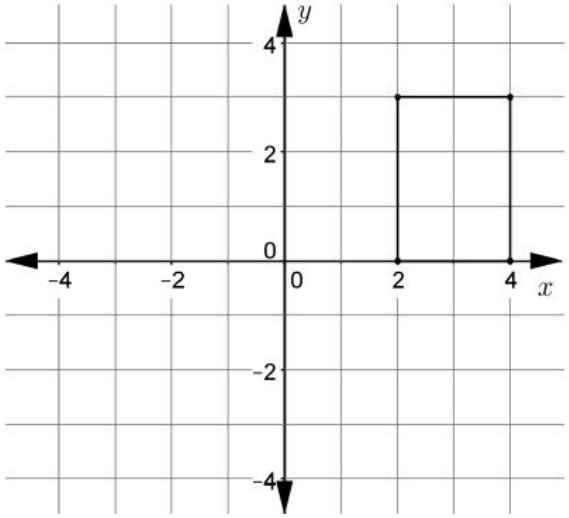
2. Describe in detail the solid formed by rotating a right triangle with vertices at (0, 0), (2, 0), and (0, 3) about the horizontal axis. Include the dimensions (height, length, width, radius, etc) of the solid in your description.



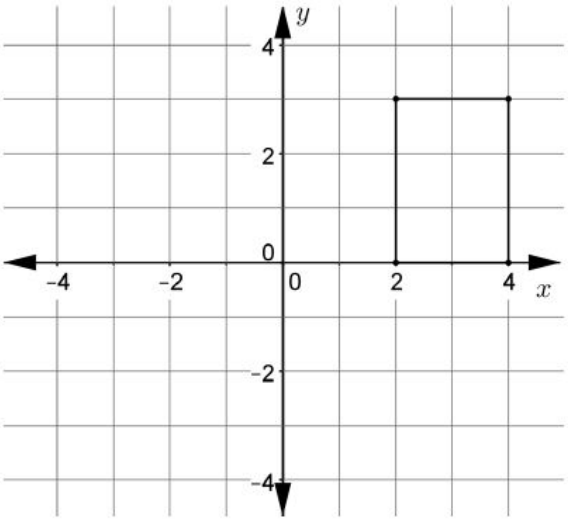
3. Imagine the solid formed by rotating the same right triangle about the line $x = 2$. Describe this solid in detail including its dimensions.



4. Describe in detail the solid formed by rotating a 2 x 3 rectangle with vertices (2, 0), (4, 0), (2, 3) and (4, 3) about the x-axis. Include the dimensions (height, length, width, radius, etc) of the solid in your description.



5. Describe in detail the solid formed by rotating a 2 x 3 rectangle with vertices (2, 0), (4, 0), (2, 3), and (4, 3) about the y-axis. Include the dimensions (height, length, width, radius, etc) of the solid in your description.

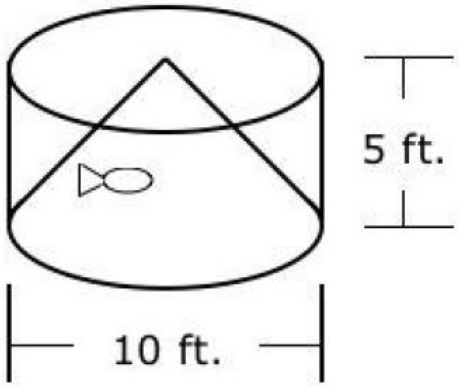


3.4 - Geometric Modeling

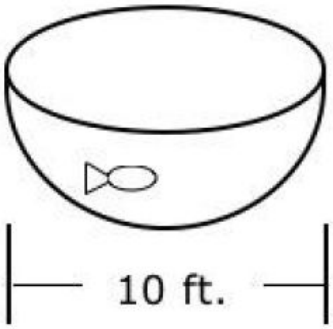
The management of an ocean life museum will choose to include either Aquarium A or Aquarium B in a new exhibit.

Aquarium A is a right cylinder with a diameter of 10 feet and a height of 5 feet. Covering the lower base of Aquarium A is an "underwater mountain" in the shape of a 5-foot-tall right cone. This aquarium would be built into a pillar in the center of the exhibit room.

Aquarium B is half of a 10-foot-diameter sphere. This aquarium would protrude from the ceiling of the exhibit room.



Aquarium A

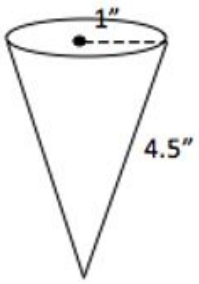


Aquarium B

1. How many cubic feet of water will Aquarium A hold?

2. How many cubic feet of water will Aquarium B hold?

You have been hired by the owner of a local ice cream parlor to assist in his company's new venture. The company will soon sell its ice cream cones in the freezer section of local grocery stores. The manufacturing process requires that the ice cream cone be wrapped in a cone-shaped paper wrapper with a flat circular disc covering the top. The company wants to minimize the amount of paper that is wasted in the process of wrapping the cones. Use the dimensions of the ice cream cone to the right to complete the following tasks.



3. Sketch the net for your ice cream cone. (Ignore any overlap required for assembly).

4. Determine the surface area of your ice cream cone.

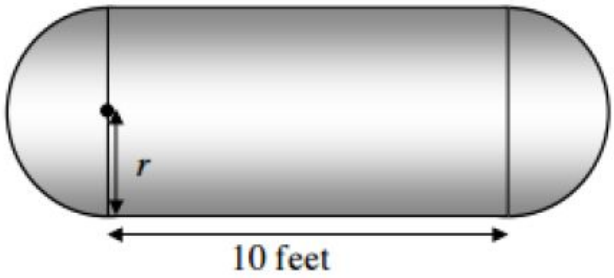
5. Determine the volume of ice cream that can be held *inside* the cone.

6. The company has a large rectangular piece of paper that measures 39 inches by 59 inches. Estimate the maximum number of complete wrappers (sized to fit the ice cream cone) that could be cut from this one piece of paper.

3.5 - More Geometric Modeling

People who live in isolated or rural areas have their own tanks of natural gas to run appliances like stoves, washers, and water heaters.

These tanks are made in the shape of a cylinder with hemispheres on the ends.



The Insane Propane Tank Company makes tanks with this shape, in different sizes. The cylinder part of every tank is exactly 10 feet long, but the radius of the hemispheres, r , will be different depending on the size of the tank.

1. The standard tank is 6 feet in diameter. What is the surface area of the standard tank?

2. What is the volume of the standard tank?

3. If the company wants to double the volume of their standard tank, what should the radius of the new tank be?

The Fresha Drink Company is marketing a new soft drink.

The drink will be sold in a can that holds 200 cm^3 .

4. If the radius of Can A is 4cm, what is the height of the can?

5. If the height of Can B is 7cm, what is the radius of the can?

6. If the diameter of Can C is 8cm, what is the height of the can?

7. The Fresha Drink company wants to build their cans using the least amount of materials possible (smallest surface area). Which of the three can options should they select?