

FISH TANKS

Performance Standard 7C.F

Students will need to draw a diagram of a rectangular prism-shaped and a triangular prism-shaped fish tank. Each diagram needs to be labeled with reasonable dimensions for a fish tank that might be purchased for a home. From these dimensions, the surface area and volume for each needs to be calculated. The dimensions, procedures and calculations will need to be justified.

- *Mathematical knowledge:* Determine area of rectangular and triangular prisms, surface areas and volume of rectangular and triangular prisms;
- *Strategic knowledge:* Select appropriate formulas or strategies;
- *Explanation:* Explain completely what was done and why it was done.

Procedures

1. ***In order to select and use appropriate technology, instruments, and formulas to solve problems, interpret results, and communicate findings (7C)***, students should experience sufficient learning opportunities to develop the following:
 - Select and justify an appropriate formula to find the area of triangles, parallelograms, and triangles.
 - Select an appropriate formula or strategy to find the surface area and volume of rectangular and triangular prisms.
2. The teacher sets the stage by saying to the students, “You are a design engineer who has just been hired by a company that manufactures fish tanks. Most of the tanks they manufacture are rectangular prisms in shape. You have designed a triangular prism-shaped tank that can fit in the corner of a room on a corner stand. Your boss likes your design and is willing to give it a try. You have now been assigned to assist in the packaging of both of these tanks for the retail market. A consumer label is to be placed on each tank with its dimensions and the volume it will hold. Each glass face of the tank is then to be covered with a removable plastic sheet for protection from scratching during shipping. The whole tank is then wrapped in thick brown paper. Your boss wants to see a sample of the consumer label for each tank, a diagram of the area of each plastic sheet used to cover the glass and the amount of brown wrapping paper it will take to cover each tank. Since you are a new employee, the boss also wants a written justification for your design, the dimensions and the procedures you used to figure the area, volume and amount of wrap needed.” (These directions may be written out for the students to have as they work on the assessment.)
3. Students should use graph paper and a straightedge for the drawings. Each student now needs to draw a rectangular prism-shaped fish tank and a triangular prism-shaped fish tank.
4. The student needs to label the dimensions of each tank keeping in mind the dimensions need to be reasonable for a fish tank purchased for a home.
5. After the drawings are completed, the student must calculate the area of front, side, and base glass panels of the rectangular tanks and the side and base panels for the triangular tank.
6. The student must justify dimensions and formulas used to calculate area, volume and surface area.
7. Drawings need to look three-dimensional and all line segments should be drawn with a straightedge. Lines not drawn with a straightedge will lower the overall score.
8. One drawing needs to be a rectangular prism and the other needs to be a triangular prism with a right angle. This fish tank is designed to fit in a corner of a room. Most corners are 90 degrees so one angle on the triangular base needs to be 90°.
9. The dimensions of the tanks need to be reasonable. On the rectangular prism the length should be less than 4 feet, the height less than 3 feet and the depth less than 2 ½ feet. The triangular prism tank should be less than 5 feet tall and the sides that meet to form the right triangle should be less than 3 feet. (Tanks of these maximum dimensions would be quite large and would take up considerable space. In the justification portion, teachers should be looking for students to say something about going to a corner of a room or a wall or some other area of a room and trying out the dimensions to see if they look reasonable.) Dimensions are to be clearly labeled in feet and inches. Line segments should be labeled with letters so when the student refers to the area, s/he can state “The area of face ABCD or ▭PQR is so many square feet (or inches).”
10. The area of each face needs to be calculated and labeled. Formulas and equations to be used need to be written out on the paper. The actual calculation does not need to be shown if the student uses a calculator. If no calculator is used, work should be shown. **

11. The volume of each prism needs to be calculated with formulas and equations shown.**
12. Surface area of each prism needs to be calculated with formulas and equations shown.**
13. ** “Equation shown” means the student puts the dimensions from his/her drawing into the formula s/he has chosen to use so the teacher can see how the student went about calculating what is asked for. If the student decides to use a calculator and no equation (what s/he puts into the calculator) is shown, the teacher will have a difficult time finding the nature of the errors.
14. In writing, the student must justify all decisions s/he made in the dimensions of the tanks (including possible placement in a room), formulas used to calculate information for the consumer tag, calculation of area of plastic coverings for the glass, and surface area as it relates to brown paper wrapping.

Examples of Student Work not available

Resources

- ½ inch or larger graph paper
- Straightedge
- Calculator
- Mathematics Rubric

Time Requirements

- Two class periods