InsightMath

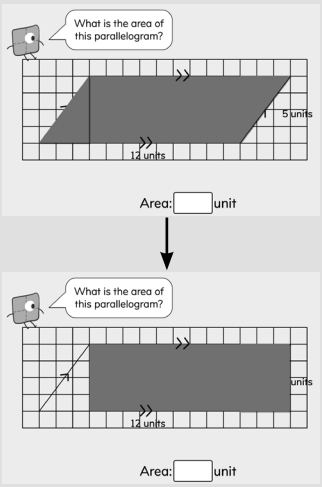
Exploring Two- and Three-Dimensional Space

Family Guide | Grade 6 | Unit 10

Your student is exploring the size of objects can be quantified in one, two, or three dimensions to serve a particular purpose or context.

Key Math Ideas

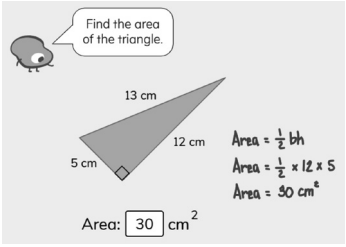
Students learn to find area of shapes beyond rectangles by breaking complex shapes into simpler parts. They explore triangles and parallelograms, and they discover the formula to find the area of each by making connections to the area of rectangles, as shown in the example to the right demonstrating how the area of a parallelogram can be determined using the area of the corresponding rectangle.



Students then move into measurement for 3-D shapes, including volume (how much space an object takes up) and surface area (the total area of the outside surface of a 3-D object). When finding volume, students consider how many cubes with side lengths of 1 and with fractional side lengths can fill a rectangular prism, and they explore numerical patterns. They then find the volume of rectangular prisms with whole and mixed number edge lengths using the formula for volume of rectangular prisms. While finding surface area, students explore which nets represent 3-D shapes and how to use them to find the surface area by considering the area of each face of the 3-D shape.

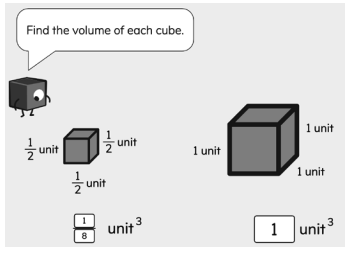
→ In the first half of the unit, your student will learn to

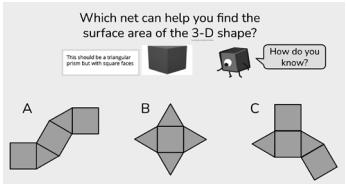
- find the area of squares by discovering and using the formula $A = s^2$, where s is the side length;
- find the area of of triangles and parallelograms by making connections to area of a rectangle;
- find the area of triangles by discovering and using the formulas $A = \frac{1}{2}bh$ and $A = \frac{(bh)}{2}$ where b is the base of the triangle and h is the height of the triangle;
- find the area of parallelograms by discovering and using the formula $A = bh$, where b is the base of the parallelogram and h is the height of the parallelogram;
- find the area of complex 2-D shapes by decomposing and composing into rectangles and triangles.



→ In the second half of the unit, your student will learn to

- find the volume of cubes by discovering and using the formula $V = s^3$, where s is the length of an edge;
- find the volume of rectangular prisms with fractional, mixed number, and whole number edge lengths using the formulas $V = lwh$ and $V = Ah$, where A is the area of the base;
- find the volume of 3-D shapes made up of two or more of rectangular prisms;
- match nets composed of rectangles and triangles to their corresponding 3-D shapes and use nets to find surface area, as shown in the example to the right;
- find the surface area of a cube using the formula, $A = 6s^2$, where s is the length of an edge;
- describe that area and surface area are 2-D measurements, which should be labeled with square units (such as in^2), and that volume is a 3-D measurement, which should be labeled with cubic units (such as in^3).





Helpful Hint

Students often recognize that the same object can be measured in multiple ways—by its perimeter (one dimension in linear units), area (two dimensions in square units), or volume (three dimensions in cubic units). Prompt your student to think about which unit their answer should be labeled with and why, encouraging them to think about how many dimensions they are measuring and how that determines what unit to use.

Tips for Supporting Your Student at Home

Questions to Ask Your Student

→ In the first half of the unit:

- How can you find the area of the triangle?
- How can you find the area of the parallelogram?
- How can you compose or decompose the 2-D shape to find the area?

→ In the second half of the unit:

- How can we find the volume of cubes with fractional or mixed number edge lengths?
- What strategies can we use to find the volume of irregular shapes?
- What would the 3-D shape look like if it was unfolded?
- How can you find the surface area of the 3-D shape?

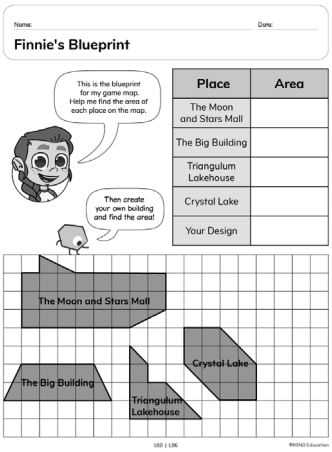
If...	Try...
your student confuses finding surface area for finding volume and uses the formula for volume ($V = lwh$) . . .	asking your student to share in their own words what they need to know to find the surface area, compared to volume. Support them to recognize that the surface area is the total area of the outside surface of a 3-D object, while volume is how much space an object takes up.

Student Strengths Spotlight

I make a plan to solve a problem and adapt my plan if I need to.	Students need to make a plan to find the surface area of 3-D shapes by considering which 2-D shapes make up the faces of the 3-D shape.
I ask my classmates to clarify their reasoning, and then I explain why I agree or disagree.	Students engage in discussions about how to find volume with fractional edge lengths, which provides opportunities to better understand each other's reasoning and expand their own understanding.
I determine what tools and strategies might help me solve this problem.	Students use nets to help them explore how to find the surface area of 3-D shapes, seeing them as a useful tool.
I consider how precise I need to be when solving problems.	Students recognize that precision is an essential part of measurement, both measuring rectangular prisms in cubic units and finding surface area in square units.

Try This Together!

- **Create Your Own Blueprint:** Ask your student to create their own blueprint of a city or playground they want to design using parallelograms, triangles, and complex shapes made from simple shapes. They can do so on grid paper or draw and measure them with a ruler. Have them find the area of each structure in their design, explaining their strategy and any formulas for area that they used.



- **Boxes at Home.** Have your student measure to find the edge lengths of boxes and cartons available at home, recording the lengths as fractional amounts when necessary. Use them to try the following activities:
  - » **Find and Compare Volumes:** Have your student find the volume of the boxes and determine which box has the greater volume.
  - » **Find Surface Area:** Have your students use the measurements to find the surface area of each box. Ask them to explain their strategy.