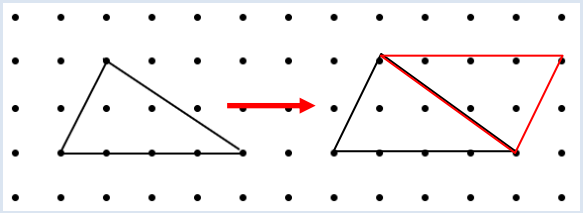
Unit 9: Area and Volume

Dear Parents/Guardians,

Unit 9 explores area and volume. In Lesson 1 students derive the formulas for finding the areas of polygons using visual models and use these formulas to solve various problems. In Lesson 2 students explore 3-D figures, draw nets of the figures, and calculate the surface area of each by finding the area of its related net. In Lesson 3 students explore volumes of rectangular prisms, focusing on prisms with fractional edge lengths.

Areas of Polygons

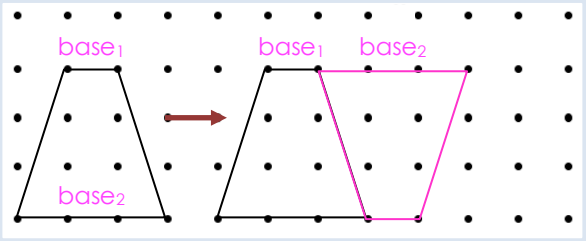
Students make copies of polygons and use a "cut-up" strategy to manipulate figures and derive area formulas for parallelograms, triangles, and trapezoids. They use the formula or the area of a rectangle to derive the area formulas for the other figures. (Please see tutorial link for deriving the area of parallelograms.) (Area = base × height or $A = b \times h$)



The area of the parallelogram (or the two triangles) is $A = b \times h$.

The area of one triangle is half of the area of the parallelogram.

$$A = \frac{1}{2}(b \times h)$$

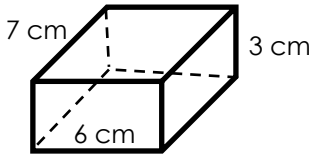


The area of the parallelogram (or the two trapezoids) is $A = b \times h$.
The area of one trapezoid is half of the area of the parallelogram.

$$A = \frac{1}{2}(\text{base}_1 + \text{base}_2) \times h$$

Surface Area of Prisms

Students create net drawings of prisms. They find the area of each polygon within the net, and find the total surface area of the prism.



Surface Area of Prism

Method 1: Add all of the net areas.

$SA = 42 + 42 + 21 + 21 + 18 + 18$

$SA = 162\ cm^2$

Method 2: Use the distributive property.

$SA = 2(42 + 21 + 18)$

$SA = 2(42) + 2(21) + 2(18)$

$SA = 162\ cm^2$

Areas of Net Polygons for Prism
(Note: Figures not drawn to scale.)

Top/bottom

Area = $\ell \times w$

$A = 7(6)$

$A = 42\ cm^2$

Sides (both)

Area = $\ell \times w$

$A = 7(3)$

$A = 21\ cm^2$

Front/back

Area = $w \times h$

$A = 6(3)$

$A = 18\ cm^2$

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Math Links GRADE 6

By the end of the unit, your student should know…

- How to use drawings or visuals of parallelograms, triangles, and trapezoids that can be cut up and rearranged to help make sense of how their area formulas are derived [Lesson 9.1]
- The area formulas of parallelograms, triangles, and trapezoids and how to use them to solve problems in context [Lesson 9.1]
- How to distinguish between prisms and pyramids, create them using nets, find the surface area using the nets, and solve surface area problems in context [Lesson 9.2]
- How to derive the formulas for the volume of rectangular prisms, find volumes with fractional edge lengths, and solve volume problems in context [Lesson 9.3]

Additional Resources

- For definitions and additional notes please refer to section 9.5.
- For deriving the formula for finding the area of a parallelogram: https://bit.ly/2BrBbJy
- For deriving the formula for finding the volume of a rectangular prism: https://bit.ly/2YOqVTS