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**Unit 6.1, Family Resource**

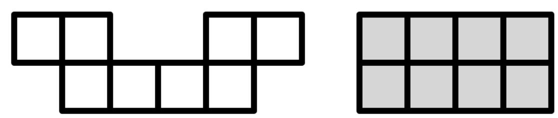
# Unit 1 Summary

| **Prior Learning** | **Math 6, Unit 1** | **Future Learning** |
|---|---|---|
| Grades 3–5<br>• Area of rectangles<br>• Classifying quadrilaterals<br>• Parallel and perpendicular lines<br>• Volume of rectangular prisms | • Area (parallelograms, triangles, and polygons)<br>• Surface area | Math 7<br>• Area and circumference of circles<br>• Volume and surface area of prisms<br>Math 8<br>• Volume of cylinders, cones, and spheres |

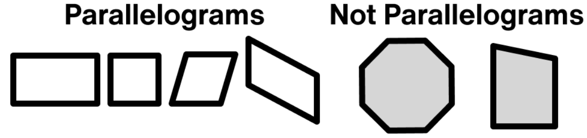
## Areas of Parallelograms

*Area* measures the number of square units that cover a shape without gaps or overlaps.

The area of each shape here is 8 square units.

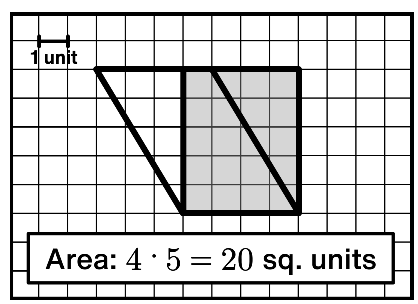


Parallelograms are four-sided shapes whose opposite sides are parallel and the same length.




The area of a parallelogram is equal to the area of the rectangle with the same base and height.

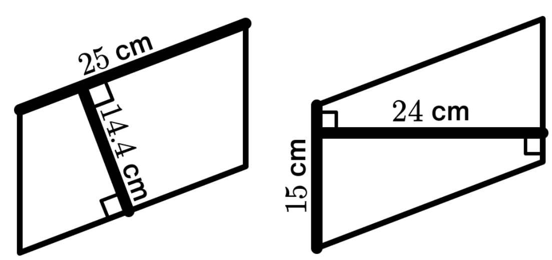
$$Area = base \cdot height$$




The base of a parallelogram can be any side.

The height is the perpendicular distance from the base to the opposite side.

The area of this parallelogram is $25 \cdot 14.4 = 360$, or $15 \cdot 24 = 360$ square centimeters.



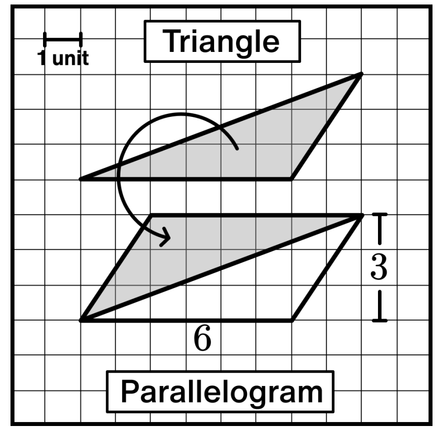
## Areas of Triangles

We can use our knowledge of parallelograms to determine the areas of triangles.

If we make a copy of a triangle, we can use the two triangles to form a parallelogram.

The area of this parallelogram is $6 \cdot 3 = 18$ square units, so the area of the triangle is $\frac{1}{2} \cdot 18 = 9$ square units.

We can write this in a formula as $Area = \frac{1}{2} \cdot base \cdot height$.

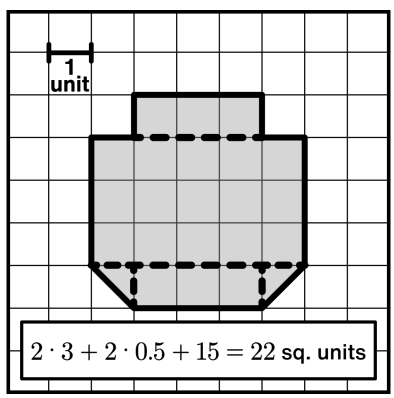


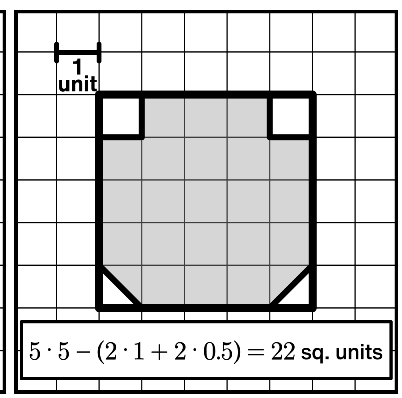

## Areas of Polygons

Polygons are a category of 2-D shapes that have straight sides that do not cross or leave gaps.

To determine the area of a polygon, we can **decompose** (break) it into smaller pieces, then add the areas of each piece.

We can also **surround** the polygon with a shape whose area we know and then **subtract** the unshaded parts.



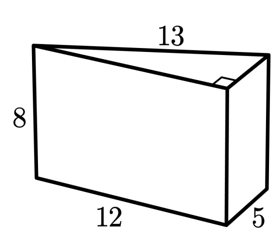



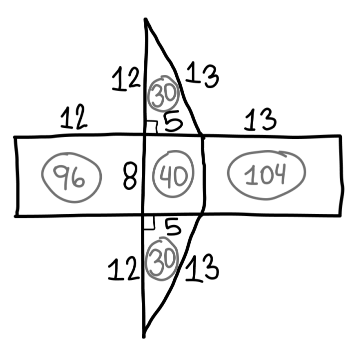

## Surface Area

The *surface area* of a solid (also called a *polyhedron*) is the sum of the areas of its faces.

One way to determine the surface area of a polyhedron is to draw its *net*, a 2-D figure that can be folded to make a prism, pyramid, or other solid.

The surface area of this *triangular prism* is $30 \cdot 2 + 40 + 96 + 104 = 300$ square units.



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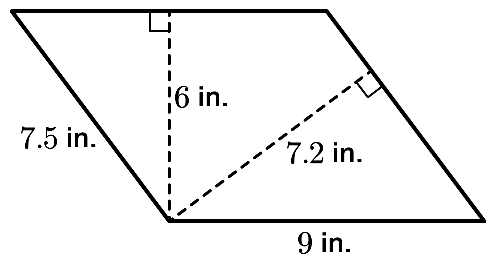
# Try This at Home

## Areas of Parallelograms

Andrea and Elena are investigating this parallelogram.




1.1 Andrea says that $9$ inches is the base and $6$ inches is the height. Elena says that $7.5$ inches is the base and $7.2$ inches is the height. Who do you agree with?

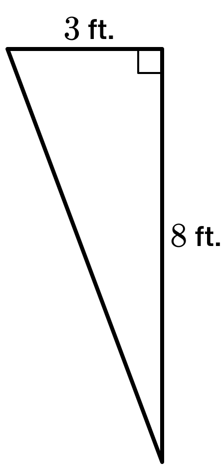
Explain your reasoning.

1.2 Calculate the area of the parallelogram.

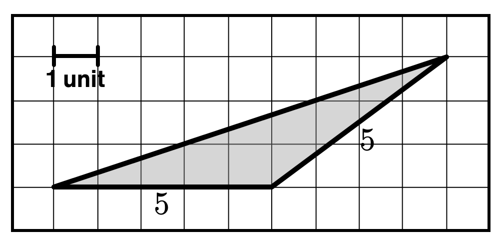
## Areas of Triangles

Calculate the area of each triangle.

2.1




2.2



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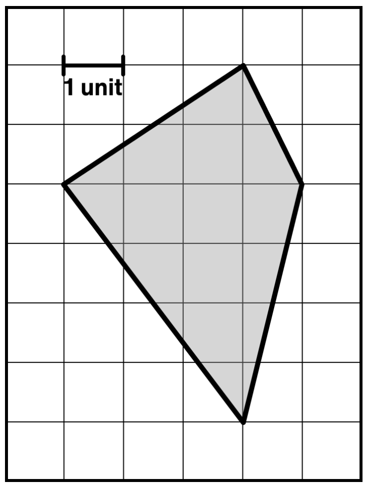
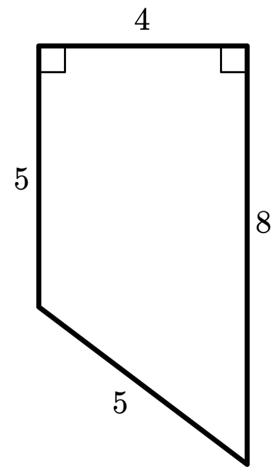
## Areas of Polygons

Calculate the area of each polygon.

3.1

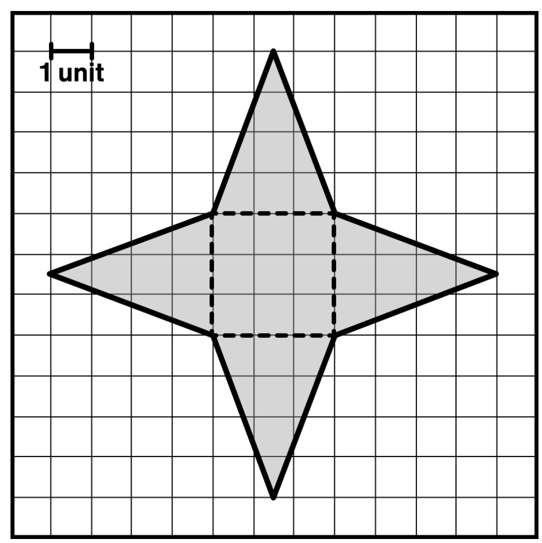



3.2




## Surface Area

Nia drew this net of a polyhedron.




4.1 If this net were folded, what type of polyhedron would it make?

A. Triangular prism
B. Triangular pyramid
C. Square prism
D. Square pyramid

4.2 Nia said the surface area was $57$ square units because she calculated $9 \cdot 1 + 12 \cdot 4 = 57$.

What did Nia do well? What could you say or ask to help her see her mistake?

4.3 Calculate the surface area of the polyhedron.

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**Solutions:**

1.1 They are both correct.

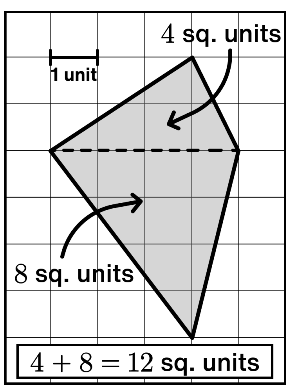
*Explanations vary.* Andrea and Elena each used a different side of the parallelogram as the base. They each chose the height that was perpendicular to the base.

1.2 $54$ square inches. $9 \cdot 6 = 54$ and $7.5 \cdot 7.2 = 54$.

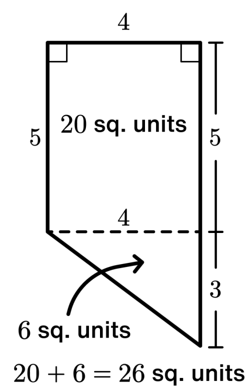
2.1 $12$ square feet. The area of the triangle is half the area of an $8$-by-$3$-foot rectangle. The area of the rectangle is $8 \cdot 3 = 24$ square feet, so the area of the triangle is $\frac{1}{2} \cdot 24 = 12$ square feet.

2.2 $7.5$ square units. A base of the triangle is $5$ units. The height for this base is $3$ units, so the area is $\frac{1}{2} \cdot 5 \cdot 3 = 7.5$ square units.

3.1 $12$ square units




3.2 $26$ square units




4.1 D. Square pyramid. The base of the polyhedron is a square, and the rest of the faces are triangles that come to a point, so it is a pyramid.

4.2 Nia calculated the area of the square in the middle of the net correctly and recognised that if she found the area of one triangle, she could multiply it by $4$ and add it to the area of the square to find the total surface area.
I would ask her to explain how she calculated the area of each triangle to see if she can notice the error she made for herself.

4.3 $33$ square units. The area of the square is $9$ square units. The area of each triangle is $\frac{1}{2} \cdot 3 \cdot 4 = 6$ square units, so the surface area is $9 \cdot 1 + 6 \cdot 4 = 33$ square units.