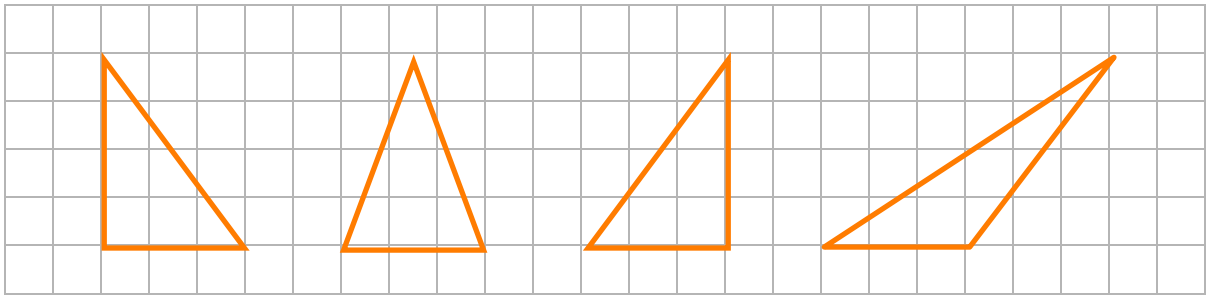
# Area of a Triangle
## Extend Your Learning
## Answers and Explanations

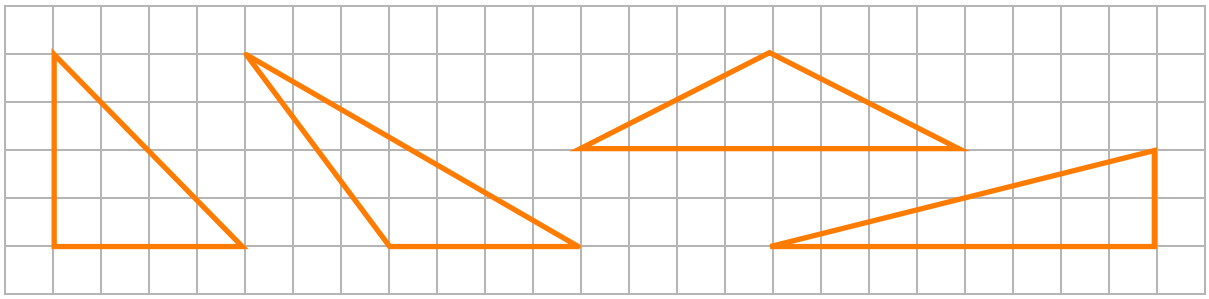
1. On the grid below, draw three triangles that are not congruent. Make the base of each triangle 3 units and the height of each triangle 4 units.
Four possible triangles are shown below. There are many more triangles possible.



Do the triangles have the same perimeter? Why or why not?
No. The bases of the triangles are equal, but the lengths of the other sides are different.

Do the triangles have the same area? Why or why not?
Yes. Each triangle has the same base and height, so they also have the same area. The area of each triangle is 6 square units (½ • 3 • 4 = 6).

2. On the grid below, draw three different triangles each having an area of 8 square units.
Four possible triangles are shown below. There are many more triangles possible.

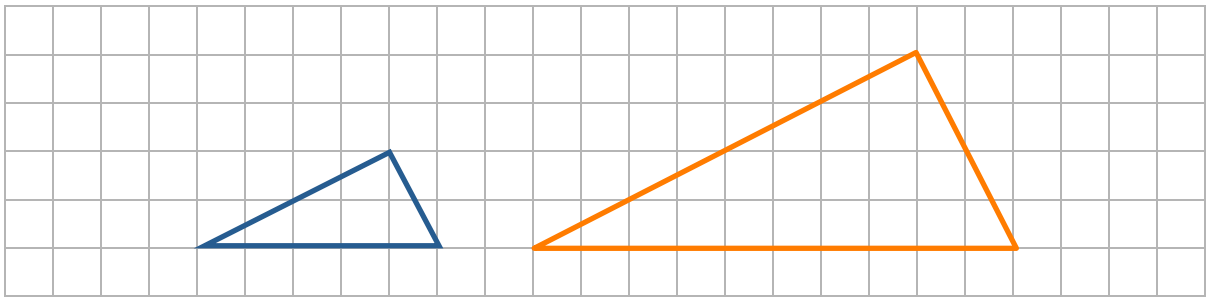


List all possible whole numbers you could use for the base and corresponding height of a triangle with an area of 8 square units.

| base | height |
|---|---|
| 1 | 16 |
| 2 | 8 |
| 4 | 4 |
| 8 | 2 |
| 16 | 1 |

The tables shows all possible whole numbers you could use for the base and height of a triangle with an area of 8 square units. You could draw many different triangles with each base and height listed in the table.

3. Sketch a triangle that is similar to the following triangle. Make the base and height of your new triangle twice the length of the original base and height.

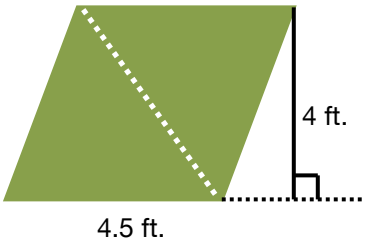


Find the area of each triangle.

| Triangle | base | height | Area (½bh) |
|---|---|---|---|
| Original Triangle | 5 units | 2 units | ½ • 5 • 2 = 5 sq. units |
| New Triangle | 10 units | 4 units | ½ • 10 • 4 = 20 sq. units |

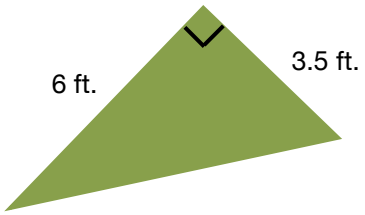
Describe what happened to the area when the base and height were doubled.
The area of the new triangle is 4 times as large as the area of the original triangle.

4. Max needs to fertilize several small sections of lawn around a miniature golf course. He needs to know the area of the lawn to determine how much fertilizer to apply. He knows how to find the area of rectangular-shaped sections, but he is having trouble finding the area of each of the following sections. Determine the area of each section of lawn.

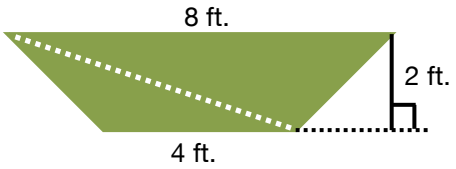



**Method 1:** Find the area of the parallelogram.
A = bh
= 4.5 • 4
= 18 sq. ft.

**Method 2:** Divide the region into two congruent triangles as shown and double the area of one triangle.
A = 2(½bh)
= 2 (½ • 4.5 • 4)
= 18 sq. ft.




A = ½bh
= ½ • 6 • 3.5
= 10.5 sq. ft.

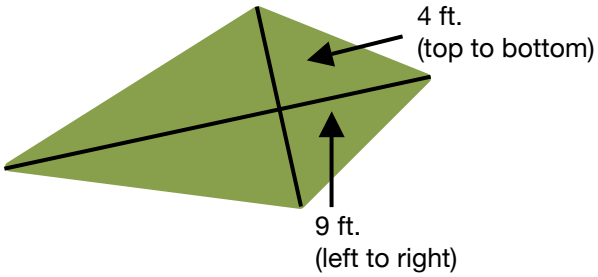



**Method 1:** Find the area of the trapezoid.

$A = \frac{1}{2}(b_1 + b_2)h$
$= \frac{1}{2}(8 + 4)2$
$= 12$ sq. ft.

**Method 2:** Divide the region into two triangles as shown and find the area of each triangle.

$A = \frac{1}{2}bh + \frac{1}{2}bh$
$= (\frac{1}{2} \cdot 4 \cdot 2) + (\frac{1}{2} \cdot 8 \cdot 2)$
$= 4 + 8$
$= 12$ sq. ft.




**Method 1:** Find the area of the top and bottom triangles.

$A = \frac{1}{2}bh + \frac{1}{2}bh$
$= (\frac{1}{2} \cdot 9 \cdot 2) + (\frac{1}{2} \cdot 9 \cdot 2)$
$= 9 + 9$
$= 18$ sq. ft.

**Method 2:** Find the area of the left and right triangles.

$A = \frac{1}{2}bh + \frac{1}{2}bh$
$= (\frac{1}{2} \cdot 4 \cdot 4.5) + (\frac{1}{2} \cdot 4 \cdot 4.5)$
$= 9 + 9$
$= 18$ sq. ft.