Area of a Triangle

Lesson 6.2

Finding the Area of a Triangle

Lesson Objective

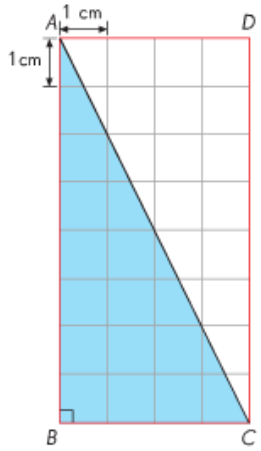
- Find the area of a triangle given its base and its height.

Vocabulary

area	acute triangle
right triangle	obtuse triangle

Area Rectangle = $\ell \times w$

Learn **The area of a triangle is half the area of a rectangle with the same 'base' and 'height' or half its base times height.**



The area of triangle ABC is half the area of rectangle $ABCD$.

$ABCD$ is a rectangle.

In triangle ABC, $\overline{AB}$ is perpendicular to $\overline{BC}$.

$\overline{BC}$ is the base and AB is the height.

The length of the base $\overline{BC} = 4$ cm and the height $AB = 8$ cm.

Area of triangle $ABC = \frac{1}{2} \times$ area of rectangle $ABCD$

$= \frac{1}{2} \times 4 \times 8$

$= \frac{1}{2} \times BC \times AB$

$= \frac{1}{2} \times$ base $\times$ height

Triangle $\frac{1}{2}b \cdot h$

$2 \cdot 8$

$16 u^2$

The length 4 cm and the width 8 cm of rectangle $ABCD$ are exactly the base and the height of triangle ABC.

So, $\frac{1}{2} \times 4 \times 8 = \frac{1}{2} \times BC \times AB$

$= \frac{1}{2} \times$ base $\times$ height

Hands-On Activity

WORKING TOGETHER

Triangles can be identified by type:

Right triangle — A triangle with exactly one right angle.

Acute triangle — A triangle with all angles measuring less than 90°.

Obtuse triangle — A triangle with one angle measuring greater than 90°.

On page 256, you saw that a right triangle ABC has an area that is half the area of the corresponding rectangle or $\frac{1}{2} \times$ base $\times$ height. You shall now check if the same is true of the area of the two other types of triangles.

1 In triangle DEF, $\overline{EF}$ is the base and DG is the height.

STEP **1** Use a copy of Figure 1. Cut out triangles DLM and DMN. Rearrange the two triangles as shown in Figure 2.

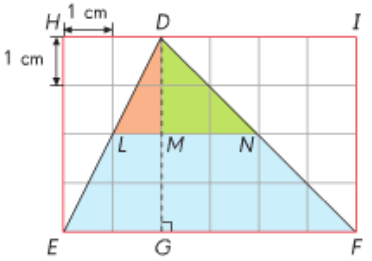


Figure 1

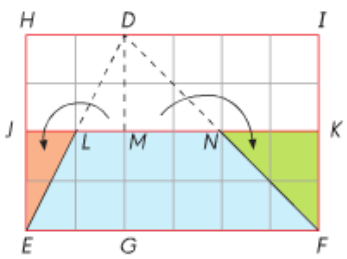


Figure 2

STEP **2** Complete.

Area of triangle DEF = area of rectangle ____

$= \frac{1}{2} \times$ area of rectangle ____

$= \frac{1}{2} \times EF \times IF$

$= \frac{1}{2} \times EF \times$ ____

$= \frac{1}{2} \times$ base $\times$ ____

2 In triangle PQR, $\overline{QR}$ is the base and PS is the height.

STEP **1** Use a copy of Figure 3. Cut out triangles PVX and VRX. Then rearrange the two triangles as shown in Figure 4.

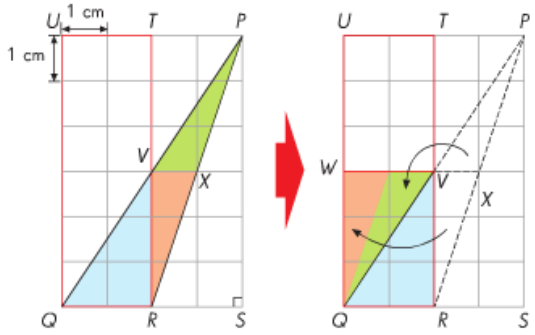


Figure 3

Figure 4

STEP **2** Complete.

Area of triangle PQR = area of rectangle ____

$= \frac{1}{2} \times$ area of rectangle ____

$= \frac{1}{2} \times QR \times TR$

$= \frac{1}{2} \times QR \times$ ____

$= \frac{1}{2} \times$ base $\times$ ____

What can you say of the area of triangle DEF? How about triangle PQR?

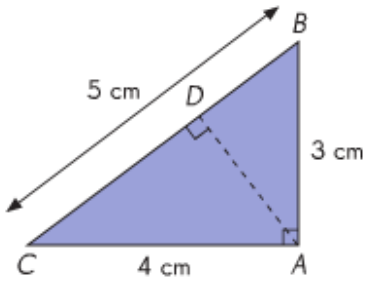
____

Hands-On Activity

WORK IN PAIRS

Try this.

In triangle *ABC*, ∠BAC is a right angle and *AD* is perpendicular to *BC*.



STEP 1 Measure the height *AD* in centimeters to the nearest tenth.

STEP 2 Using each side *AB*, *AC* and *BC* as the base, find the area of the triangle. Are all three answers the same?

Practice 2 Finding the Area of a Triangle

Find the area of each shaded triangle. Show each step and give your answer using the correct units.

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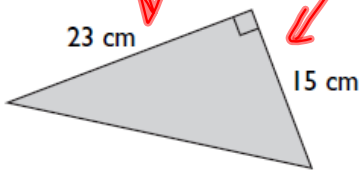
Example



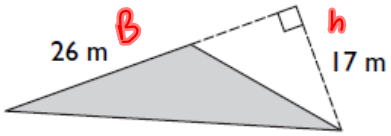
Base

height

$$\text{Area of triangle} = \frac{\frac{1}{2} \times 23 \times 15}{}$$

$$= \frac{172\frac{1}{2}\ \text{cm}^2}{}$$

1.



B h

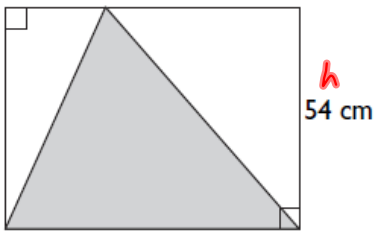
$A = \frac{1}{2} b \cdot h$

$A = 13 \cdot 17$

$A = 221\ m^2$

17
×13
151
+170
221

2.



h B

$A = \frac{1}{2} b \cdot h$

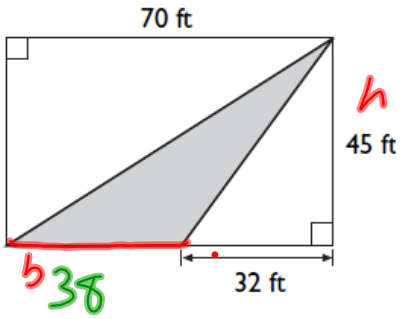
$A = \frac{1}{2} \cdot 72 \cdot 54$

$A = 36 \cdot 54$

$A = 1{,}944\ cm^2$

54
×36
324
+1620
1,944

3.



h b

$A = \frac{1}{2} b \cdot h$

$A = 19 \cdot 45$

$A = 855\ ft^2$

45
×19
405
450
855

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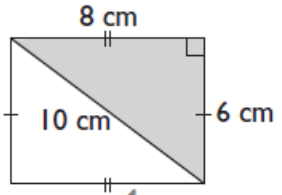
Find the area of each shaded triangle.

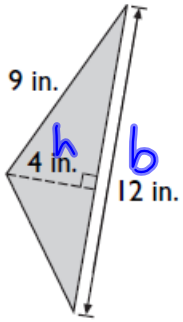
Example



Area = $\frac{1}{2} \times 8 \times 6$

= 24 cm^2

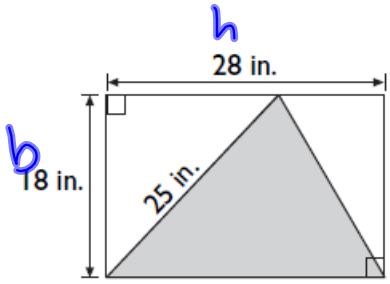
4.



Area = _____

= _____

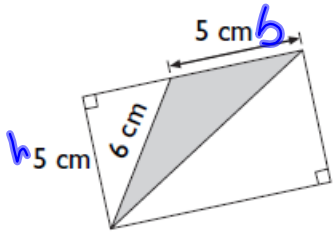
5.



Area = _____

= _____

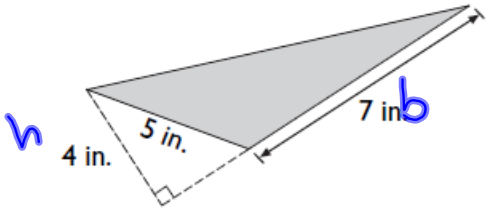
6.



Area = _____

= _____

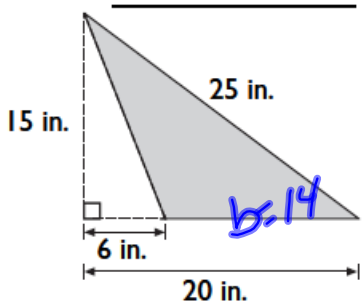
7.



Area = _____

= _____

8.



Area = _____

= _____