LESSON MAKER PRO

Triangles in Action

Use right triangles to find lengths and areas.

HIGH SCHOOL · GDA.GM.J.35.e

GDA.GM.J.35.e "Use trigonometric ratios and the Pythagorean Theorem to solve right triangles in applied problems, including finding areas of regular polygons."

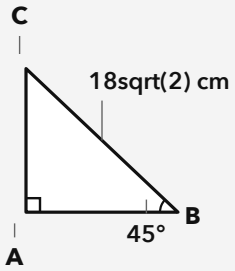
NAME _____ DATE _____

THE BIG IDEA

In a right triangle, sin θ = opposite/hypotenuse, cos θ = adjacent/hypotenuse, and tan θ = opposite/adjacent. You can also use $a^2 + b^2 = c^2$ to find a missing side. To find the area of a regular polygon, split it into equal triangles or use A = (1/2)Pa, where P is the perimeter and a is the apothem.

WORKED EXAMPLE

Find the lengths of AB and AC in the triangle shown.

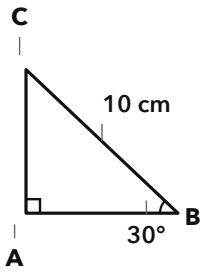


1. cos 45° = AB/(18sqrt(2)) = sqrt(2)/2.
2. AB = 18 cm.
3. sin 45° = AC/(18sqrt(2)) = sqrt(2)/2.
4. AC = 18 cm.

Answer: AB = 18 cm and AC = 18 cm.

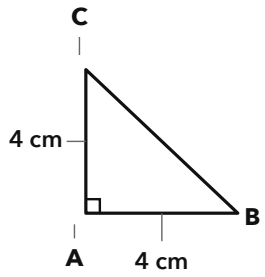
PRACTICE 6 problems

1 Find AC in the triangle shown.



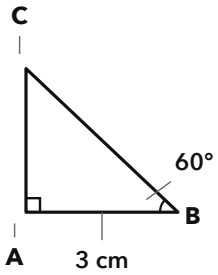
ANSWER _____

2 Find BC in the triangle shown.



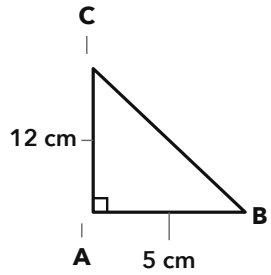
ANSWER _____

3 Find BC in the triangle shown.



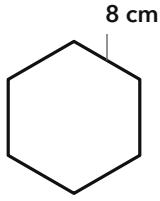
ANSWER _____

4 Find BC in the triangle shown.



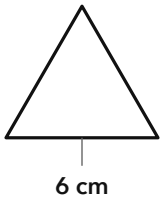
ANSWER _____

5 Find the area of the regular hexagon shown.



ANSWER _____

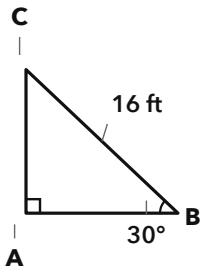
6 Find the area of the equilateral triangle shown.



ANSWER _____

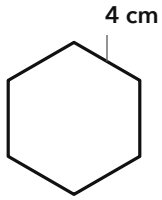
APPLY IT Show your work

1 A skate ramp has the cross section shown. What is its height AC?



ANSWER _____

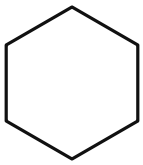
2 A school club designs a regular hexagonal sticker with the side length shown. What is its area?



ANSWER _____

CHALLENGE One step up

The regular hexagon shown has an area of $54\sqrt{3}$ cm^2. Find its side length and perimeter. Explain how you found them.



WORK SPACE AND ANSWER

ANSWER KEY

Triangles in Action

PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	Find AC in the triangle shown.	**5 cm**
2	Find BC in the triangle shown.	**4sqrt(2) cm**
3	Find BC in the triangle shown.	**6 cm**
4	Find BC in the triangle shown.	**13 cm**
5	Find the area of the regular hexagon shown.	**96sqrt(3) cm^2**
6	Find the area of the equilateral triangle shown.	**9sqrt(3) cm^2**

PART 2 · APPLY IT

1. **8 ft** AC is opposite the 30° angle. AC = 16 sin 30° = 8 ft.
2. **24sqrt(3) cm^2** Each of the six equal triangles has height 2sqrt(3) cm and area 4sqrt(3) cm^2. Multiply by six.

CHALLENGE

The side length is 6 cm, and the perimeter is 36 cm. If the side length is s, the area of its six equal triangles is (3sqrt(3)/2)s^2. Setting this equal to 54sqrt(3) gives $s^2 = 36$, so s = 6.

Accept equivalent exact forms, including fractions instead of decimals. Do not require students to use the same ratio or area method shown in the key.