ALBERT

Name _____ Date _____

Area of a Triangle with Sine Worksheet

Geometry · Common Core HSG-SRT.D.9

> Derive the formula A = 1/2 ab sin(C) for the area of a triangle by drawing an auxiliary line from a vertex perpendicular to the opposite side.

Practice

Builds the skill step by step.

1. A triangle has sides 8 and 10 with an included angle of 30°. Use sin 30° = 0.5. What is its area?

2. A triangle has sides 6 and 7 with an included angle of 90°. What is its area?

3. A triangle has sides 12 and 5 with an included angle of 150°. Use sin 150° = 0.5. What is its area?

4. To derive Area = $\frac{1}{2}$ab sin C, you draw the height h from the vertex between sides a and c down to side b. Which expression gives h?

   A. b sin C

   B. a cos C

   C. a sin C

   D. a ÷ sin C

5. A triangle has sides a = 10 and b = 10 with an included angle C = 60°. Use sin 60° ≈ 0.8660. What is its area, rounded to the nearest tenth?

6. A triangle has sides a = 4 and b = 9 with an included angle C = 45°. Use sin 45° ≈ 0.7071. What is its area, rounded to the nearest tenth?

7. A triangle has sides 6 and 16 and an area of 24. What is the sine of the included angle?

8. A triangle has sides a = 5 and b = 8 with an included angle C = 120°. Use sin 120° ≈ 0.8660. What is its area, rounded to the nearest tenth?

9. A triangle has sides a = 6 and b = 6 with an included angle C = 60°. Use sin 60° ≈ 0.8660. What is its area, rounded to the nearest tenth? (This is an equilateral triangle.)

10. A triangle has sides 3 and 4 with an included right angle. What is its area?

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On Level

Grade-level practice.

1. A triangle has sides a = 14 and b = 9 with an included angle C = 40°. Use sin 40° ≈ 0.6428. What is its area, rounded to the nearest tenth?

2. A triangle has sides a = 7 and b = 12 with an included angle C = 110°. Use sin 110° ≈ 0.9397. What is its area, rounded to the nearest tenth?

3. A triangle has sides a = 20 and b = 15 with an included angle C = 25°. Use sin 25° ≈ 0.4226. What is its area, rounded to the nearest tenth?

4. A parallelogram has sides 8 and 12 with an angle of 30° between them. Use sin 30° = 0.5. What is its area?

5. A triangle has an area of 30, one side of 10 and an included angle of 30° (sin 30° = 0.5). How long is the other side next to that angle?

6. A triangle has sides a = 11 and b = 11 with an included angle C = 72°. Use sin 72° ≈ 0.9511. What is its area, rounded to the nearest tenth?

7. A triangle has sides a = 9 and b = 16 with an included angle C = 135°. Use sin 135° ≈ 0.7071. What is its area, rounded to the nearest tenth?

8. Derive the formula Area = $\frac{1}{2}$ab sin C for a triangle with sides a and b and included angle C.

9. A triangle has sides a = 5 and b = 13 with an included angle C = 90°. Use sin 90° ≈ 1.0000. What is its area, rounded to the nearest tenth?

10. A triangle has sides a = 7 and b = 7 with an included angle C = 30°. Use sin 30° ≈ 0.5000. What is its area, rounded to the nearest tenth?

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Challenge

Multi-step and word problems that stretch it.

1. A triangle has sides a = 12 and b = 18 with an included angle C = 80°. Use sin 80° ≈ 0.9848. What is its area, rounded to the nearest tenth?

2. A rhombus has sides of 10 and an angle of 60°. Use sin 60° ≈ 0.8660. What is its area, to the nearest tenth?

3. Two triangles each have sides 6 and 8. One has an included angle of 30°, the other 150°. Use sin 30° = sin 150° = 0.5. What is the difference in their areas?

4. For two fixed sides a and b, which included angle gives the largest triangle area?

   A. 90°

   B. 45°

   C. 60°

   D. 120°

5. A triangular garden has sides of 20 m and 30 m with an included angle whose sine is 0.6. What is its area?

6. A triangle has sides a = 25 and b = 40 with an included angle C = 65°. Use sin 65° ≈ 0.9063. What is its area, rounded to the nearest tenth?

7. A regular hexagon has sides of 6. It is made of 6 equilateral triangles. Use sin 60° ≈ 0.8660. What is its area, to the nearest tenth?

8. A triangle has an area of 50 and sides 10 and 20 next to angle C. What is sin C?

9. A triangle has sides a = 8 and b = 15 with an included angle C = 100°. Use sin 100° ≈ 0.9848. What is its area, rounded to the nearest tenth?

10. A triangle has sides 7 and 10 with an included angle of 90°, and another triangle has sides 7 and 10 with an included angle of 30° (sin 30° = 0.5). How many times as large is the first area?