

*A2.A.74: Determine the area of a triangle or a parallelogram, given the measure of two sides and the included angle*

1. 060704b, P.I. A2.A.74

Jack is planting a triangular rose garden. The lengths of two sides of the plot are 8 feet and 12 feet, and the angle between them is  $87^\circ$ . Which expression could be used to find the area of this garden?

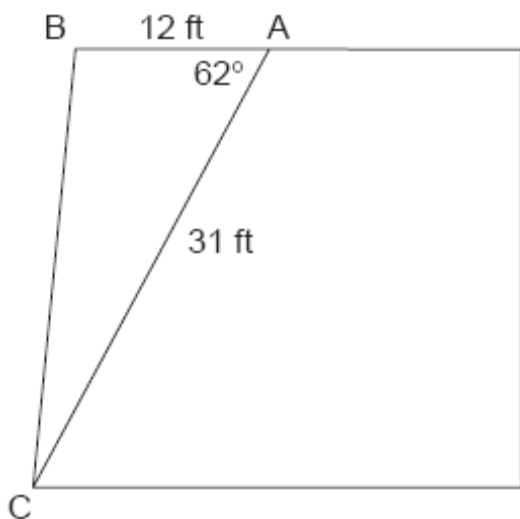
[A]  $\frac{1}{2} \bullet 8 \bullet 12 \bullet \sin 87^\circ$

[B]  $\frac{1}{2} \bullet 8 \bullet 12 \bullet \cos 87^\circ$

[C]  $8 \bullet 12 \bullet \sin 87^\circ$       [D]  $8 \bullet 12 \bullet \cos 87^\circ$

2. 010225b, P.I. A2.A.74

The accompanying diagram shows the floor plan for a kitchen. The owners plan to carpet all of the kitchen except the "work space," which is represented by scalene triangle  $ABC$ . Find the area of this work space to the *nearest tenth of a square foot*.



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3. 080226b, P.I. A2.A.74

Two sides of a triangular-shaped pool measure 16 feet and 21 feet, and the included angle measures  $58^\circ$ . What is the area, to the *nearest tenth of a square foot*, of a nylon cover that would exactly cover the surface of the pool?

4. 080324b, P.I. A2.A.74

The triangular top of a table has two sides of 14 inches and 16 inches, and the angle between the sides is  $30^\circ$ . Find the area of the tabletop, in square inches.

5. 060525b, P.I. A2.A.74

A landscape architect is designing a triangular garden to fit in the corner of a lot. The corner of the lot forms an angle of  $70^\circ$ , and the sides of the garden including this angle are to be 11 feet and 13 feet, respectively. Find, to the *nearest integer*, the number of square feet in the area of the garden.

6. 010723b, P.I. A2.A.74

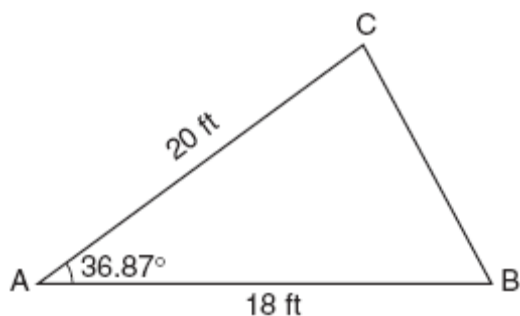
In  $\triangle ABC$ ,  $AC = 18$ ,  $BC = 10$ , and

$\cos C = \frac{1}{2}$ . Find the area of  $\triangle ABC$  to the *nearest tenth of a square unit*.

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7. 080628b, P.I. A2.A.74

The accompanying diagram shows a triangular plot of land that is part of Fran's garden. She needs to change the dimensions of this part of the garden, but she wants the area to stay the same. She increases the length of side  $AC$  to 22.5 feet. If angle  $A$  remains the same, by how many feet should side  $AB$  be *decreased* to make the area of the new triangular plot of land the same as the current one?



8. 060825b, P.I. A2.A.74

The accompanying diagram shows the peak of a roof that is in the shape of an isosceles triangle. A base angle of the triangle is  $50^\circ$  and each side of the roof is 20.4 feet. Determine, to the *nearest tenth of a square foot*, the area of this triangular region.

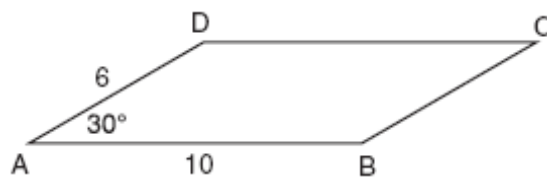


9. 060121b, P.I. A2.A.74

Gregory wants to build a garden in the shape of an isosceles triangle with one of the congruent sides equal to 12 yards. If the area of his garden will be 55 square yards, find, to the *nearest tenth of a degree*, the *three* angles of the triangle.

10. 010924b, P.I. A2.A.74

In the accompanying diagram of parallelogram  $ABCD$ ,  $m\angle A = 30^\circ$ ,  $AB = 10$ , and  $AD = 6$ . What is the area of parallelogram  $ABCD$ ?



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[1] A

[2] 164.2, and appropriate work is shown.

[1] Appropriate work is shown, but one computational or rounding error is made.

or [1] 164.2, but no work is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously

[2] incorrect procedure.

[2] 142.5, and appropriate work is shown, such as  $\frac{1}{2}(16)(21)(\sin 58^\circ)$ .

[1] Appropriate work is shown, but one computational or rounding error is made.

or [1] An incorrect trigonometric function is used, but an appropriate answer is found, such

as  $\frac{1}{2}(16)(21)(\sin 58^\circ)$ , resulting in an answer of 89 or 89.0.

or [1] 142.5, but no work is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously

[3] incorrect procedure.

[2] 56, and appropriate work is shown, such as  $\frac{1}{2} \cdot 14 \cdot 16 \cdot \sin 30$ .

[1] Appropriate work is shown, but one computational error is made.

or [1] Appropriate work is shown, but one conceptual error is made.

or [1] 56, but no work is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously

[4] incorrect procedure.

[2] 67, and appropriate work is shown, such as  $A = \frac{1}{2}(11)(13)\sin 70^\circ$ .

[1] Appropriate work is shown, but one computational or rounding error is made.

or [1] Appropriate work is shown, but one conceptual error is made.

or [1] 67, but no work is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously

[5] incorrect procedure.

[2] 77.9, and appropriate work is shown, such as evaluating  $\frac{1}{2}ab\sin C$ .

[1] Appropriate work is shown, but one computational or rounding error is made.

or [1] Appropriate work is shown, but one conceptual error is made, such as writing  $\cos C$ .

or [1] 77.9, but no work is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously

[6] incorrect procedure.

[4] 2, and appropriate work is shown, such as determining that the 108 square feet and the new length of  $AB$  is 16 feet.

[3] Appropriate work is shown, but one computational error is made.

or [3] The area of the original triangle and the new length of side  $AB$  are found correctly, but the length is not subtracted to find the difference.

[2] Appropriate work is shown, but two or more computational errors are made.

or [2] Appropriate work is shown, but one conceptual error is made.

or [2] Appropriate work is shown, but one computational error is made, and the length is not subtracted to find the difference.

[1] Appropriate work is shown, but one conceptual error and one computational error are made.

or [1] The area of the original triangle is found correctly, but no further correct work is shown.

or [1] 2, but no work is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously

[7] incorrect procedure.

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[2] 204.9, and appropriate work is shown.

[1] Appropriate work is shown, but one computational or rounding error is made.

or [1] Appropriate work is shown, but one conceptual error is made.

or [1] 204.9, but no work is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously

[8] incorrect procedure.

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[2] 49.8, 65.1, and 65.1, and the appropriate use of the area formula is shown.

[1] Appropriate work is shown, but one computational or rounding error is made.

or [1] Only one or two angles are found correctly.

or [1] Cosine is used instead of sine, but appropriate work is shown.

or [1] The setup is appropriate, but incorrect work is shown, such as the sine of the angle but not the angle is found.

or [1] 49.8, 65.1, and 65.1, but no work is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously

[9] incorrect procedure.

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[2] 30, and appropriate work is shown.

[1] Appropriate work is shown, but one computational error is made.

or [1] Appropriate work is shown, but one conceptual error is made, such as finding only half the area of the parallelogram.

or [1] The altitude of the parallelogram is found to be 3, but no further correct work is shown.

or [1] 30, but no work is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously

[10] incorrect procedure.

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