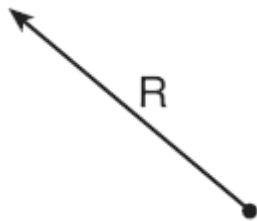


## CHAPTER 11-5

### VECTORS

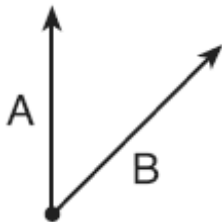
1. 010808b

The accompanying diagram shows a resultant force vector,  $R$ .

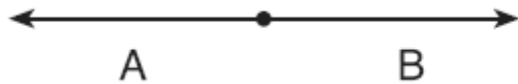


Which diagram best represents the pair of component force vectors,  $A$  and  $B$ , that combined to produce the resultant force vector  $R$ ?

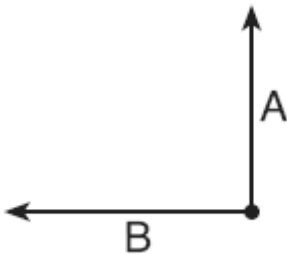
[A]



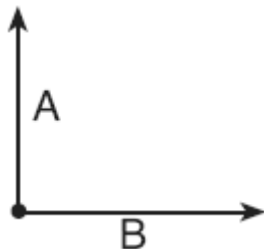
[B]



[C]



[D]



2. 080228b, P.I. A2.A.73

Two tow trucks try to pull a car out of a ditch. One tow truck applies a force of 1,500 pounds while the other truck applies a force of 2,000 pounds. The resultant force is 3,000 pounds. Find the angle between the two applied forces, rounded to the *nearest degree*.

3. 010430b, P.I. A2.A.73

One force of 20 pounds and one force of 15 pounds act on a body at the same point so that the resultant force is 19 pounds. Find, to the *nearest degree*, the angle between the two original forces.

4. 060428b, P.I. A2.A.73

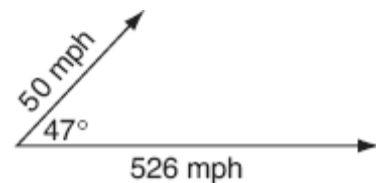
Two equal forces act on a body at an angle of  $80^\circ$ . If the resultant force is 100 newtons, find the value of one of the two equal forces, to the *nearest hundredth of a newton*.

5. 010827b, P.I. A2.A.73

The measures of the angles between the resultant and two applied forces are  $65^\circ$  and  $42^\circ$ , and the magnitude of the resultant is 24 pounds. Find, to the *nearest pound*, the magnitude of the larger force.

6. 060734b, P.I. A2.A.73

A jet is flying at a speed of 526 miles per hour. The pilot encounters turbulence due to a 50-mile-per-hour wind blowing at an angle of  $47^\circ$ , as shown in the accompanying diagram.



Find the resultant speed of the jet, to the *nearest tenth of a mile per hour*. Use this answer to find the measure of the angle between the resultant force and the wind vector, to the *nearest tenth of a degree*.

7. 010734b, P.I. A2.A.73

Two forces of 40 pounds and 20 pounds, respectively, act simultaneously on an object. The angle between the two forces is  $40^\circ$ . Find the magnitude of the resultant, to the *nearest tenth of a pound*. Find the measure of the angle, to the *nearest degree*, between the resultant and the larger force.

## CHAPTER 11-6

### USING TRIGONOMETRY TO FIND AREA

8. 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?

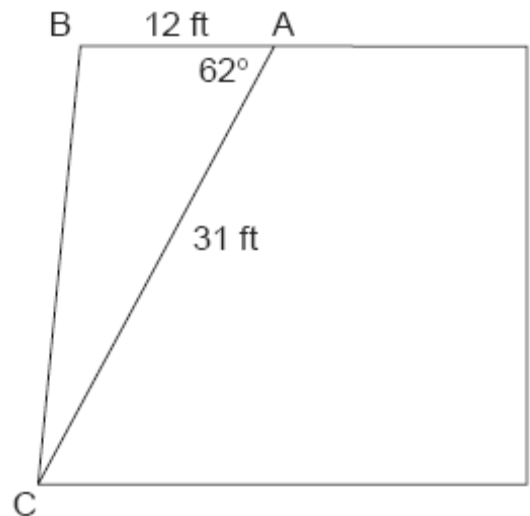
[A]  $\frac{1}{2} \bullet 8 \bullet 12 \bullet \cos 87^\circ$

[B]  $8 \bullet 12 \bullet \cos 87^\circ$

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

9. 010225b, P.I. A2.A.73

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*.



10. 080226b, P.I. A2.A.73

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?

11. 080324b, P.I. A2.A.73

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.

12. 060525b, P.I. A2.A.73

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.

13. 010723b

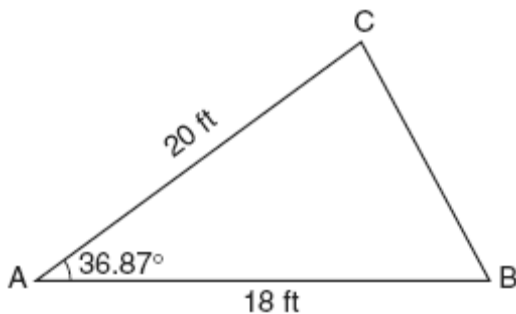
In  $\triangle ABC$ ,  $AC = 18$ ,  $BC = 10$ , and

$\cos C = \frac{1}{2}$ . Find the area of  $\triangle ABC$  to the

*nearest tenth of a square unit.*

14. 080628b, P.I. A2.A.73

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?



15. 060121b

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.

[1] C

[4] 63, and appropriate work is shown.

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

or [3] Appropriate work is shown, but the supplement of the angle is found, resulting in an answer of 117.

[2] Appropriate work is shown, but more than one computational or rounding error is made.

or [2] A conceptual error is made when applying the Law of Cosines.

[1] A correctly labeled diagram is drawn, but no further correct work is shown.

or [1] 63, 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.

[4] 116, and appropriate work is shown.

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

or [3] Appropriate work is shown, but the supplement of the correct answer, 64, is found.

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

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

[1] The correct substitutions are made into the Law of Cosines, but no further correct work is shown.

or [1] 116, 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.

[4] 65.27, and appropriate work is shown,

such as  $\frac{100}{\sin 100} = \frac{x}{\sin 40}$ .

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

or [3] Appropriate work is shown, but calculations are performed in radians, resulting in an answer of -147.15.

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

or [2] Appropriate work is shown, but one conceptual error is made, such as the use of an incorrect trigonometric function.

or [2] An incorrect diagram is drawn, but appropriate work is shown, and an appropriate answer is found.

[1] A correctly labeled diagram is drawn, but no further correct work is shown.

or [1] 65.27, 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.

[4] 23, and appropriate work is shown, such as using the Law of Sines.

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

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

or [2] Appropriate work is shown, but one conceptual error is made, such as finding 17, the smaller force.

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

or [1] 23, 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.

[6] 561.3 and 43.3, and appropriate work is shown, such as using the Law of Cosines and the Law of Sines.

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

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

or [4] The resultant speed is found correctly, but no further correct work is shown.

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

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

[1] Correct substitutions are made into the Law of Cosines, but no further correct work is shown.

or [1] 561.3 and 43.3, but no work is shown.

[0] 561.3 or 43.3, but no work is shown.

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

[6] obviously incorrect procedure.

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[6] 56.8 and 13, and appropriate work is shown, such as using the Law of Cosines and the Law of Sines.

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

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

or [4] The Law of Cosines is used correctly to determine the magnitude of the resultant, but no further correct work is shown.

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

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

or [2] 56.8 and 13, but no work is shown.

[1] Appropriate work is shown to find the measure of the angle, but one computational or rounding error is made, and no further correct work is shown.

or [1] Correct substitutions are made into the Law of Cosines, but no further correct work is shown.

or [1] 56.8, 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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[8] D

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[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

[9] incorrect procedure.

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[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 incorrect procedure.

[10]

[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 incorrect procedure.

[11]

[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 incorrect procedure.

[12]

[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 incorrect procedure.

[13]

[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 incorrect procedure.

[14]

[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

[15] incorrect procedure.