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***College Physics, 1e* (Pearson)**
Topic 2 Vectors

2.1 Conceptual Questions

2.1.1 Graphical Addition

1) Graphical Addition: Two displacement vectors have magnitudes of 5.0 m and 7.0 m, respectively. If these two vectors are added together, the magnitude of the sum
A) is equal to 2.0 m.
B) could be as small as 2.0 m or as large as 12 m.
C) is equal to 12 m.
D) is equal to 8.6 m.
Answer: B
Topic: Graphical Addition

2) Graphical Addition: Two vectors, of magnitudes 20 mm and 50 mm, are added together. Which one of the following is a possible value for the magnitude of the resultant?
A) 10 mm
B) 20 mm
C) 40 mm
D) 80 mm
Answer: C
Topic: Graphical Addition

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3) Graphical Addition: The magnitude of the resultant of two vectors cannot be less than the magnitude of either of those two vectors.
A) True
B) False
Answer: B
Topic: Graphical Addition

4) Graphical Addition: A student adds two displacement vectors that have the magnitudes of 12.0 m and 5.0 m. What is the range of possible answers for the magnitude of the resultant vector?
Answer: Between 7.0 m and 17.0 m
Topic: Graphical Addition

5) Graphical Addition: If $\vec{A} + \vec{B} = \vec{C}$ and their magnitudes are given by $A + B = C$, then the vectors $\vec{A}$ and $\vec{B}$ are oriented
A) perpendicular relative to one other.
B) parallel to each other (in the same direction).
C) antiparallel to each other (in opposite directions).
D) It is impossible to know from the given information.
Answer: B
Topic: Graphical Addition

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6) Graphical Addition: If $\vec{A}$ - $\vec{B}$ = 0, then the vectors $\vec{A}$ and $\vec{B}$ have equal magnitudes and are directed in the same direction.
A) True
B) False
Answer: A
Topic: Graphical Addition

7) Graphical Addition: If three vectors add to zero, they must all have equal magnitudes.
A) True
B) False
Answer: B
Topic: Graphical Addition

8) Graphical Addition: The sum of two vectors of fixed magnitudes has the greatest magnitude when the angle between these two vectors is
A) 90°.
B) 180°.
C) 60°.
D) 0°.
E) 270°.
Answer: D
Topic: Graphical Addition

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9) Graphical Addition: The sum of two vectors of fixed magnitudes has its minimum magnitude when the angle between these vectors is
A) 0°.
B) 90°.
C) 270°.
D) 180°.
E) 360°.
Answer: D
Topic: Graphical Addition

10) Graphical Addition: Vectors $\vec{M}$ and $\vec{N}$ obey the equation $\vec{M}$ + $\vec{N}$ = 0. These vectors satisfy which one of the following statements?
A) Vectors $\vec{M}$ and $\vec{N}$ are at right angles to each other.
B) Vectors $\vec{M}$ and $\vec{N}$ point in the same direction.
C) Vectors $\vec{M}$ and $\vec{N}$ have the same magnitudes.
D) The magnitude of $\vec{M}$ is the negative of the magnitude of $\vec{N}$.
Answer: C
Topic: Graphical Addition

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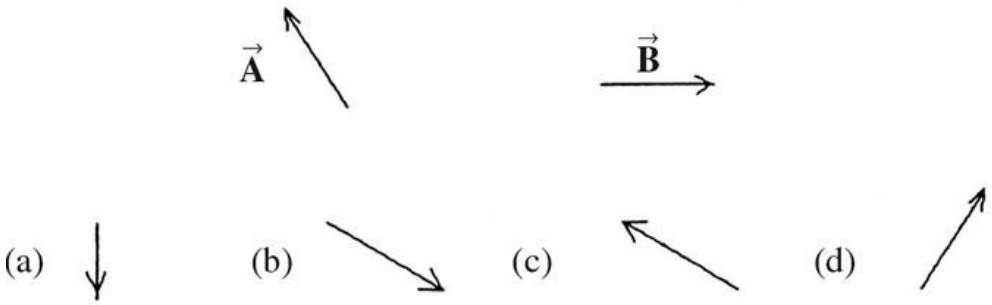
11) Graphical Addition: Consider two vectors $\vec{A}$ and $\vec{B}$ shown in the figure. The difference $\vec{A}$ - $\vec{B}$ is best illustrated by



A) choice (a)
B) choice (b)
C) choice (c)
D) choice (d)
Answer: C
Topic: Graphical Addition

12) Graphical Addition: Consider two vectors $\vec{A}$ and $\vec{B}$ shown in the figure. The difference $\vec{A}$ - $\vec{B}$ is best illustrated by

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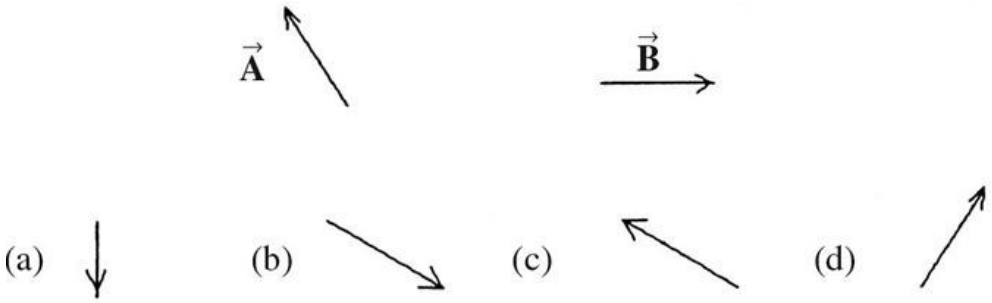

A) choice (a)
B) choice (b)
C) choice (c)
D) choice (d)
Answer: B
Topic: Graphical Addition

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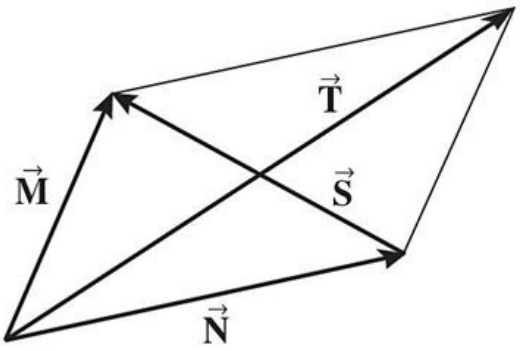
13) Graphical Addition: Refer to the figure, which shows four vectors $\vec{M}$, $\vec{N}$, $\vec{S}$, and $\vec{T}$.



(a) Vector $\vec{S}$ as expressed in terms of vectors $\vec{M}$ and $\vec{N}$ is given by
A) $\vec{M} + \vec{N}$.
B) $\vec{M} - \vec{N}$.
C) $\vec{N} - \vec{M}$.

(b) Vector $\vec{T}$ as expressed in terms of vectors $\vec{M}$ and $\vec{N}$ is given by
A) $\vec{M} + \vec{N}$.
B) $\vec{M} - \vec{N}$.
C) $\vec{N} - \vec{M}$.

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Answer: (a) B (b) A
Topic: Graphical Addition

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2.1.2 Components

1) Components: If a vector pointing upward has a positive magnitude, a vector pointing downward has a negative magnitude.
A) True
B) False
Answer: B
Topic: Components

2) Components: If a vector's components are all negative, then the magnitude of the vector is negative.
A) True
B) False
Answer: B
Topic: Components

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3) Components: The magnitude of a vector can *never* be less than the magnitude of any of its components.
A) True
B) False
Answer: A
Topic: Components

4) Components: The magnitude of a vector an only zero if *all* of its components are zero.
A) True
B) False
Answer: A
Topic: Components

5) Components: If a vector $\vec{A}$ has components $A_x < 0$, and $A_y > 0$, then the angle that this vector makes with the positive *x*-axis must be in the range
A) 0° to 90°.
B) 90° to 180°.
C) 180° to 270°.
D) 270° to 360°.
E) It cannot be determined without additional information.
Answer: B
Topic: Components

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6) Components: If a vector $\vec{A}$ has components $A_x < 0$, and $A_y < 0$, then the angle that this vector makes with the positive *x*-axis must be in the range
A) 0° to 90°.
B) 90° to 180°.
C) 180° to 270°.
D) 270° to 360°.
E) It cannot be determined without additional information.
Answer: C
Topic: Components

7) Components: If a vector $\vec{A}$ has components $A_x > 0$, and $A_y < 0$, then the angle that this vector makes with the positive *x*-axis must be in the range
A) 0° to 90°.
B) 90° to 180°.
C) 180° to 270°.
D) 270° to 360°.
E) It cannot be determined without additional information.
Answer: D
Topic: Components

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8) Components: The eastward component of vector $\vec{A}$ is equal to the westward component of vector $\vec{B}$ and their northward components are equal. Which one of the following statements must be correct for these two vectors?
A) Vector $\vec{A}$ is parallel to vector $\vec{B}$.
B) Vector $\vec{A}$ is antiparallel (in the opposite direction) to vector $\vec{B}$.
C) Vector $\vec{A}$ must be perpendicular to vector $\vec{B}$.
D) The magnitude of vector $\vec{A}$ must be equal to the magnitude of vector $\vec{B}$.
E) The angle between vector $\vec{A}$ and vector $\vec{B}$ must be 90°.
Answer: D
Topic: Components

9) Components: Vector $\vec{A}$ is along the +*x*-axis and vector $\vec{B}$ is along the +*y*-axis. Which one of the following statements is correct with respect to these vectors?
A) The *x* component of vector $\vec{A}$ is equal to the *x* component of vector $\vec{B}$.
B) The *y* component of vector $\vec{A}$ is equal to the *y* component of vector $\vec{B}$.
C) The *x* component of vector $\vec{A}$ is equal to the *y* component of vector $\vec{B}$.
D) The *y* component of vector $\vec{A}$ is equal to the *x* component of vector $\vec{B}$.
Answer: D
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Topic: Components

2.2 Problems

2.2.1 Components

1) Components: A velocity vector has components 36 m/s westward and 22 m/s northward. What are the magnitude and direction of this vector?
Answer: 42 m/s at 31° north of west
Topic: Components

2) Components: The *x* component of vector $\vec{A}$ is 8.7 units, and its *y* component is -6.5 units. The magnitude of $\vec{A}$ is closest to
A) 9.9 units.
B) 7.9 units.
C) 8.9 units.
D) 11 units.
E) 12 units.
Answer: D
Topic: Components

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3) Components: When rolled down a mountainside at 7.0 m/s, the horizontal component of its velocity vector was 1.8 m/s. What was the angle of the mountain surface above the horizontal?
A) 75°
B) 57°
C) 33°
D) 15°
Answer: A
Topic: Components

4) Components: When Jeff ran up a hill at 7.0 m/s, the horizontal component of his velocity vector was 5.1 m/s. What was the vertical component of Jeff's velocity?
A) 4.8 m/s
B) 4.3 m/s
C) 3.8 m/s
D) 3.4 m/s
Answer: A
Topic: Components

5) Components: The *x* component of vector $\vec{A}$ is 5.3 units, and its *y* component is -2.3 units. The angle that vector $\vec{A}$ makes with the +*x*-axis is closest to
A) 340°.
B) 160°.
C) 250°.
D) 110°.
E) 23°.
Answer: A
Topic: Components

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6) Components: A vector in the *xy*-plane has an *x* component of -7.50 units. What must be the *y* component of this vector so that its magnitude is 10.0 units. (*Note:* There are *two* possible answers.)
Answer: +6.6 units and -6.6 units
Topic: Components

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7) Components: A displacement vector is 34.0 m in length and is directed 60.0° east of north. Selecting from the choices in the table below, what are the components of this vector?

choice	Northward component	Eastward component
1	29.4 m	17.0 m
2	18.2 m	28.1 m
3	22.4 m	11.5 m
4	17.0 m	29.4 m
5	25.2 m	18.2 m

A) choice 1
B) choice 2
C) choice 3
D) choice 4
E) choice 5
Answer: D
Topic: Components

8) Components: A player throws a football 50.0 m at 61.0° north of west. What is the westward component of the displacement of the football?
A) 64.7m
B) 55.0 m
C) 0.00 m
D) 74.0 m
E) 24.2 m
Answer: E
Topic: Components

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9) Components: A vector $\vec{A}$ has components A_x = 12.0 m and A_y = 5.00 m.
(a) What is the angle that vector $\vec{A}$ makes with the +x-axis?
(b) What is the magnitude of vector $\vec{A}$?
Answer: (a) 22.6° (b) 13.0 m
Topic: Components

10) Components: The x and y components of a vector in a horizontal plane are 4.00 m and 3.00 m, respectively.
(a) What is the magnitude of this vector?
(b) What angle does this vector make with the positive +y-axis.
Answer: (a) 5.00 m (b) 53.1°
Topic: Components

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11) Components: A boy jumps with a velocity of magnitude 20.0 m/s at an angle of 25.0° above the horizontal. What is the horizontal component of the boy's velocity?
A) 18.1 m/s
B) 15.6 m/s
C) 8.45 m/s
D) 12.6 m/s
E) 9.33 m/s
Answer: A
Topic: Components

12) Components: The magnitude of $\vec{A}$ is 5.5 m, and this vector lies in the second quadrant and makes an angle of 34 ° with the +*y*-axis. The components of $\vec{A}$ are closest to:
A) A_x = -3.1 m, A_y = 4.6 m.
B) A_x = 3.1 m, A_y = -4.6 m.
C) A_x = 4.6 m, A_y = -3.1 m.
D) A_x = -4.6 m, A_y = 3.1 m.
E) A_x = -4.6 m, A_y = -3.1 m.
Answer: A
Topic: Components

13) Components: The components of vectors $\vec{B}$ and $\vec{C}$ are given as follows:
B_x = -9.2 C_x = -4.5
B_y = -6.1 C_y = 4.3
The angle (less than 180°) between vectors $\vec{B}$ and $\vec{C}$ is closest to
A) 77°.
B) 103°.
C) 10°.
D) 170°.
E) 84°.
Answer: A
Topic: Components

2.2.2 Addition by Components

1) Addition by Components: A car travels 20 km west and then 20 km south. Use components to find the magnitude of its displacement vector?
A) 0 km
B) 20 km
C) 28 km
D) 40 km
Answer: C
Topic: Addition by Components

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2) Addition by Components: You walk 33 m to the north, then turn 60° to your right and walk another 45 m. Use components to find how far you end up from your starting point.
A) 68 m
B) 39 m
C) 75 m
D) 35 m
Answer: A
Topic: Addition by Components

3) Addition by Components: You walk 53 m to the north, then you turn 60° to your right and walk another 45 m. Use components to determine the direction of your displacement vector. Express your answer as an angle relative to east.
A) 63° N of E
B) 50° N of E
C) 57° N of E
D) 69° N of E
Answer: A
Topic: Addition by Components

4) Addition by Components: The components of vectors $\vec{A}$ and $\vec{B}$ are given as follows:
$A_x = 7.6$ $B_x = -5.1$
$A_y = -9.2$ $B_y = -6.8$
What is the magnitude of the vector difference $\vec{B} - \vec{A}$?
A) 13
B) 3.5
C) 16
D) 170
E) 3.4
Answer: A
Topic: Addition by Components

5) Addition by Components: If vector $\vec{A}$ has components $A_x = -3.0$ lb and $A_y = -4.0$ lb, and vector $\vec{B}$ has components $B_x = 3.0$ lb and $B_y = -8.0$ lb, what is the magnitude of vector $\vec{C} = \vec{A} - \vec{B}$?
A) 13 lb
B) 16 lb
C) 140 lb
D) 7.2 lb
Answer: D
Topic: Addition by Components

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6) Addition by Components: Vector $\vec{A}$ has magnitude 2 units and is directed to the north. Vector $\vec{B}$ has magnitude 5 units and is directed to the south. Calculate the magnitude and direction of $\vec{A}$ - $\vec{B}$.

A) 7 units, north
B) 7 units, south
C) 3 units, north
D) 3 units, south
Answer: A
Topic: Addition by Components

7) Addition by Components: Two perpendicular vectors, $\vec{A}$ and $\vec{B}$, are added together giving vector $\vec{C}$. If the magnitudes of both vectors $\vec{A}$ and $\vec{B}$ are doubled without changing their directions, the magnitude of vector $\vec{C}$ will

A) increase by a factor of 8.
B) increase by a factor of 4.
C) increase by a factor of 2.
D) increase by a factor of $\sqrt{2}$.
E) not change.
Answer: C
Topic: Addition by Components

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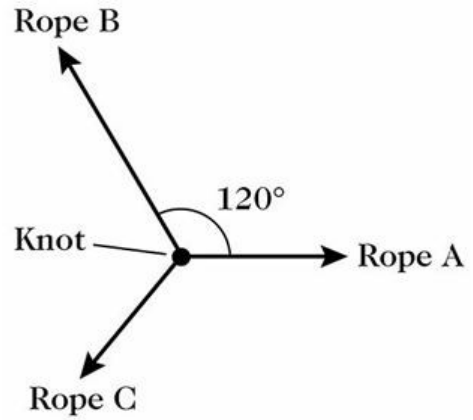
8) Addition by Components: Three ropes are tied in a knot as shown in the figure. One student pulls on rope A with 1.0 pound of force, and another student pulls on rope B with 7.0 pounds of force. How *hard* and in what *direction* must you pull on rope C to *balance* the first two pulls? Give the direction by specifying the angle (clockwise or counterclockwise) of the pull with the direction of rope A.



Answer: 6.6 lb at 68° clockwise from rope A
Topic: Addition by Components

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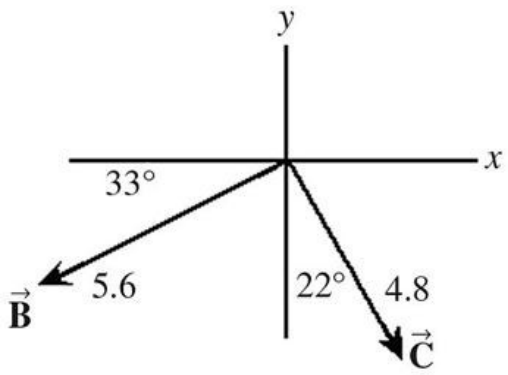
9) Addition by Components: The figure shows two vectors $\vec{B}$ and $\vec{C}$, along with their magnitudes and directions. The vector $\vec{D}$ is given by $\vec{D} = \vec{B} - \vec{C}$.



(a) What is the magnitude of vector $\vec{D}$?

(b) What angle does vector $\vec{D}$ make with the +*x*-axis?

Answer: (a) 6.6 (b) 170°

Topic: Addition by Components

10) Addition by 1. Components: Displacement vector $\vec{A}$ is 5.5 cm long and points along the +*x*-axis. Displacement vector $\vec{B}$ is 7.5 cm long and points at +30° to the -*x*-axis.

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(a) Determine the *x* and *y* components of vector $\vec{A}$.

(b) Determine the *x* and *y* components of vector $\vec{B}$.

(c) Determine the *x* and *y* components of the resultant of these two vectors.

(d) Determine the magnitude and direction of the resultant of these two vectors.

Answer: (a) A_x = 5.5 cm, A_y = 0 cm (b) B_x = -6.5 cm, B_y = 3.8 cm

(c) R_x = -1.0 cm, R_y = 3.8 cm (d) 3.9 cm at 75° above the -*x* axis

Topic: Addition by Components

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11) Addition by 1. Components: Displacement vector $\vec{A}$ is 75 cm long and points at 30° above the +*x*-axis. Displacement vector $\vec{B}$ is 25 cm long and points along the -*x*-axis. Displacement vector $\vec{C}$ is 40 cm long and points at 45° below the -*x*-axis.
(a) Determine the *x* and *y* components of vector $\vec{A}$.
(b) Determine the *x* and *y* components of vector $\vec{B}$.
(c) Determine the *x* and *y* components of vector $\vec{C}$.
(d) Determine the *x* and *y* components of the resultant of these three vectors.
(e) Determine the magnitude and direction of the resultant of these three vectors.
Answer: (a) A_x = 65 cm, A_y = 38 cm (b) B_x = -25 cm, B_y = 0 cm
(c) C_x = -28 cm, C_y = -28 cm (d) R_x = 12 cm, R_y = 9 cm
(e) 15 cm at 38° above the +*x*-axis
Topic: Addition by Components

12) Addition by 1. Components: Vector $\vec{M}$ = 4.00 m points eastward and vector $\vec{N}$ = 3.00 m points southward. The resultant vector $\vec{M} + \vec{N}$ is given by
A) 5.00 m at an angle of 36.9° south of east.
B) 5.00 m at an angle of 53.1° south of east.
C) 5.00 m at an angle of 71.6° south of east.
D) 5.00 m at an angle of 18.4° south of east.
E) 5.00 m at an angle of 26.6° south of east.
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Answer: A
Topic: Addition by Components

13) Addition by 1. Components: Vector $\vec{A}$ has a magnitude of 6.0 m and points 30° north of east. Vector $\vec{B}$ has a magnitude of 4.0 m and points 30° east of north. The resultant vector $\vec{A} + \vec{B}$ is given by
A) 0.70 m at an angle of 42° north of east.
B) 14 m at an angle of 42° north of east.
C) 1.1 m at an angle of 42° north of east.
D) 9.7 m at an angle of 42° north of east.
E) 2.0 m at an angle of 42° north of east.
Answer: D
Topic: Addition by Components

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14) Addition by 1. Components: Vector $\vec{A}$ has a magnitude of 6.0 m and points 30° north of east. Vector $\vec{B}$ has a magnitude of 4.0 m and points 30° west of north. The resultant vector $\vec{A} + \vec{B}$ is given by
A) 9.8 m at an angle of 64° east of north.
B) 9.8 m at an angle of 26° north of east.
C) 7.2 m at an angle of 26° east of north.
D) 3.3 m at an angle of 26° north of east.
E) 3.3 m at an angle of 64° east of north.
Answer: C
Topic: Addition by Components

15) Addition by 1. Components: Vector $\vec{A}$ has a magnitude of 6.0 m and points 30° north of east. Vector $\vec{B}$ has a magnitude of 4.0 m and points 30° west of south. The resultant vector $\vec{A} + \vec{B}$ is given by
A) 2.7 m at an angle of 8.3° south of east.
B) 2.7 m at an angle of 8.3° east of south.
C) 3.2 m at an angle of 8.3° east of south.
D) 3.2 m at an angle of 8.3° south of east.
E) 2.3 m at an angle of 8.3° south of east.
Answer: D
Topic: Addition by Components

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16) Addition by 1. Components: Vector $\vec{A}$ has a magnitude of 6.0 m and points 30° south of east. Vector $\vec{B}$ has a magnitude of 4.0 m and points 30° west of south. The resultant vector $\vec{A} + \vec{B}$ is given by
A) 7.2 m at an angle of 64° south of east.
B) 3.3 m at an angle of 64° south of east.
C) 9.8 m at an angle of 26° south of east.
D) 9.8 m at an angle of 64° south of east.
E) 3.3 m at an angle of 26° south of east.
Answer: A
Topic: Addition by Components

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17) Addition by 1. Components: Vector $\vec{A}$ has a magnitude of 4.0 m and points 30° south of east. Vector $\vec{B}$ has a magnitude of 2.0 m and points 30° north of west. The resultant vector $\vec{A} + \vec{B}$ is given by
A) 10.0 m at an angle 30° south of east.
B) 10.0 m at an angle 60° east of south.
C) 2.0 m at an angle 60° south of east.
D) 2.0 m at an angle 30° south of east.
E) 1.0 m at an angle 30° east of south.
Answer: D
Topic: Addition by Components

18) Addition by 1. Components: Vector $\vec{A}$ has a magnitude of 7.0 m and points 30° east of north. Vector $\vec{B}$ has a magnitude of 5.0 m and points 30° west of south. The resultant vector $\vec{A} + \vec{B}$ is given by
A) 10.0 m at an angle 60° north of east.
B) 10.0 m at an angle 30° east of north.
C) 2.0 m at an angle 30° north of east.
D) 2.0 m at an angle 60° north of east.
E) 1.0 m at an angle 60° east of north
Answer: D
Topic: Addition by Components

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19) Addition by 1. Components: Vector $\vec{A}$ has a magnitude of 6.0 m and points 30° east of south. Vector $\vec{B}$ has a magnitude of 4.0 m and points 30° west of north. The resultant vector $\vec{A} + \vec{B}$ is given by
A) 2.0 m at an angle of 30° north of west.
B) 2.0 m at an angle of 30° east of south.
C) 10.0 m at an angle of 60° north of west.
D) 10.0 m at an angle of 60° east of south.
E) 1.0 m at an angle of 60° north of west.
Answer: B
Topic: Addition by Components

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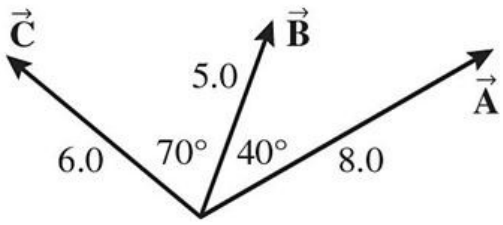
20) Addition by 1. Components: Vector $\vec{A}$ has a magnitude of 8.0 m and points east, vector $\vec{B}$ has a magnitude of 6.0 m and points north, and vector $\vec{C}$ has a magnitude of 5.0 m and points west. The resultant vector $\vec{A} + \vec{B} + \vec{C}$ is given by
A) 2.0 m at an angle 63° north of east.
B) 2.0 m at an angle 63° east of north.
C) 6.7 m at an angle 63° east of north.
D) 6.7 m at an angle 63° north of east.
E) 3.8 m at an angle 67° north of east
Answer: D
Topic: Addition by Components

21) Addition by 1. Components: The figure shows three vectors and their magnitudes and relative directions. The magnitude of the resultant of the three vectors is closest to



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A) 19.
B) 16.
C) 13.
D) 10.
E) 7.0.
Answer: C
Topic: Addition by Components

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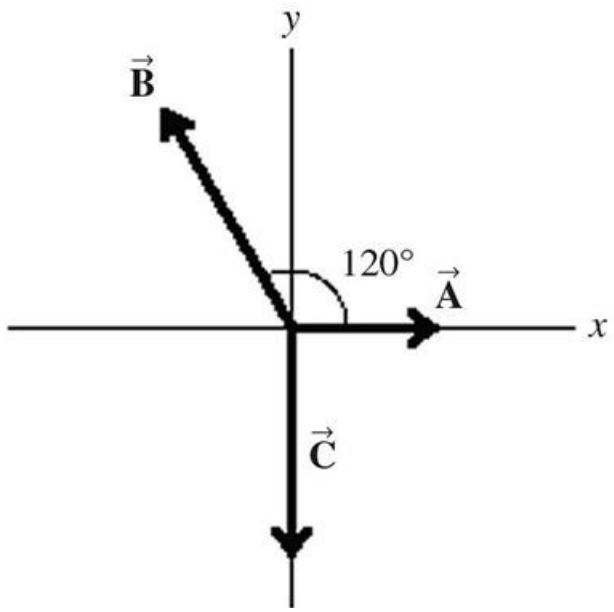
22) Addition by 1. Components: Find the magnitude and direction of the resultant of the three force vectors, $\vec{A}$, $\vec{B}$, and $\vec{C}$, shown in the figure. These vectors have the following magnitudes: A = 5.0 lb, B = 7.9 lb, and C = 8.0 lb. Express the direction of the resultant by specifying the angle it makes with the +x-axis, with counterclockwise angles taken to be positive.



Answer: 1.6 lb, 312°
Topic: Addition by Components

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23) Addition by 1. Components: Two boys, Joe and Sam, who are searching for buried treasure start underneath the same tree. Joe walks 12 m east and then 12 m north, while Sam walks 15 m west and then 10 m south. Both boys then stop. Find the magnitude and direction of the vector from Sam to Joe. Express the direction of this vector by specifying the angle it makes with the west-to-east direction.
Answer: 35 m at 39° north of east
Topic: Addition by Components

24) Addition by 1. Components: An airplane undergoes the following displacements, all at the same altitude: First, it flies 59.0 km in a direction 30.0° east of north. Next, it flies 58.0 km due south. Finally, it flies 100 km 30.0° north of west. Use components to determine how far the airplane ends up from its starting point.
A) 71.5 km
B) 73.0 km
C) 74.4 km
D) 70.1 km
E) 68.7 km
Answer: A
Topic: Addition by Components

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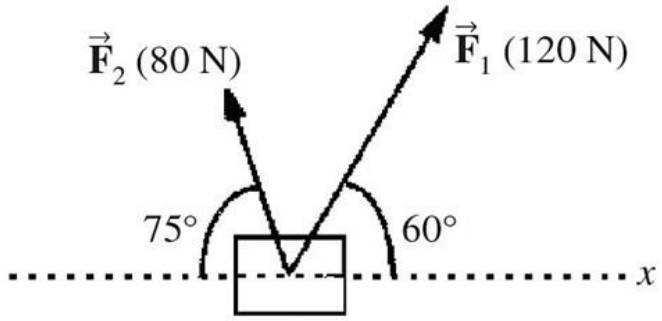
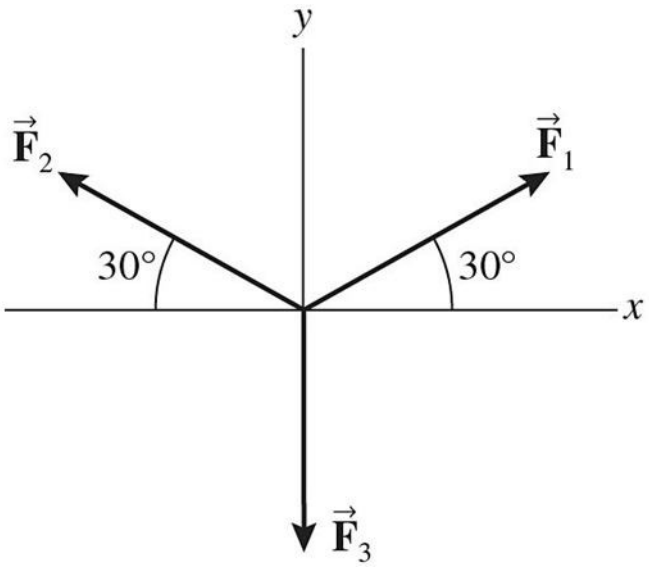
25) Addition by 1. Components: Two forces are acting on an object as shown in the figure. Assume that all the quantities shown are accurate to three significant figures.



(a) What is the magnitude of the resultant force on the object?
(b) What is the direction of the resultant force?
Answer: (a) 185 N (b) 77.8° above the +*x*-axis
Topic: Addition by Components

26) Addition by 1. Components: Three forces, $\vec{F}_1$, $\vec{F}_2$, and $\vec{F}_3$, each of magnitude 70 N, all act on an object as shown in the figure. The magnitude of the resultant force acting on the object is



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A) 35 N.
B) 70 N.
C) 140 N.
D) 210 N.
E) 0 N.
Answer: E
Topic: Addition by Components

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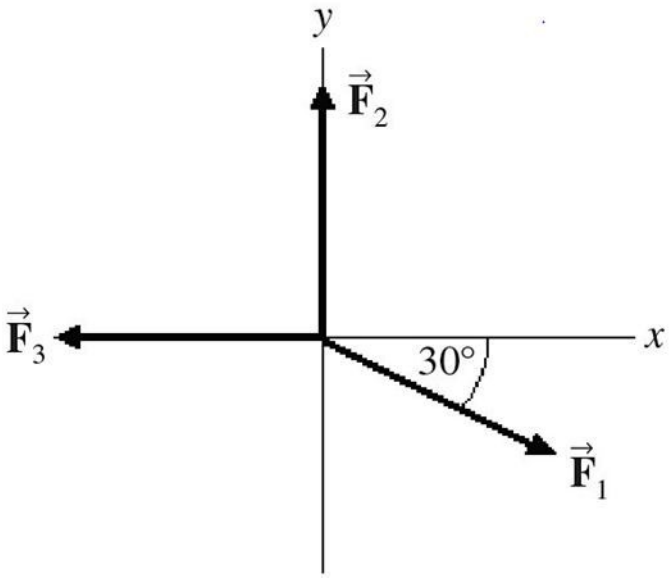
27) Addition by 1. Components: Three forces, $\vec{F}_1$, $\vec{F}_2$, and $\vec{F}_3$, all act on an object, as shown in the figure. The magnitudes of the forces are: F_1 = 80.0 N, F_2 = 60.0 N, and F_3 = 40.0 N. The resultant force acting on the object is given by



A) 180 N at an angle of 60.0° with respect to +*x*-axis.
B) 60.0 N at an angle of 90.0° with respect to +*x*-axis.
C) 20.0 N at an angle of 34.3° with respect to +*x*-axis.
D) 35.5 N at an angle of 34.3° with respect to +*x*-axis.
E) 40.0 N at an angle of 60.0° with respect to +*x*-axis.
Answer: D
Topic: Addition by Components

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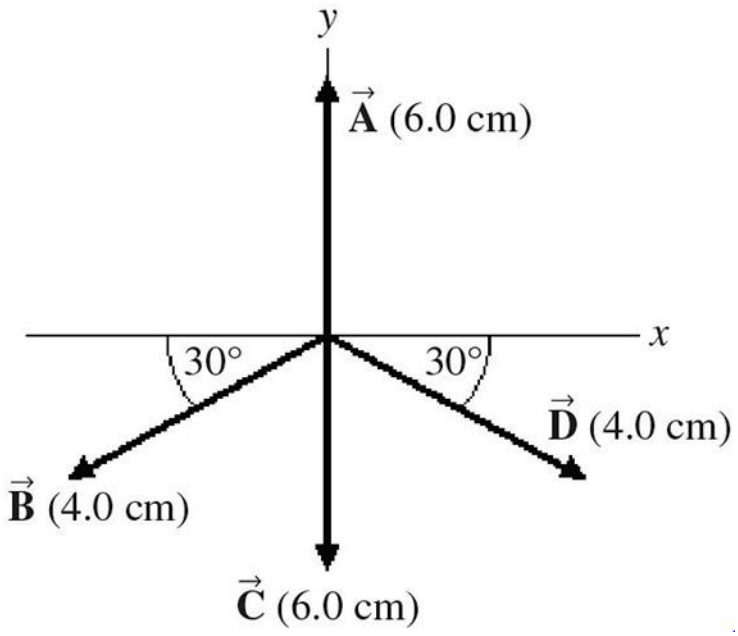
28) Addition by 1. Components: Four vectors, $\vec{A}$, $\vec{B}$, $\vec{C}$, and $\vec{D}$, are shown in the figure. The sum of these four vectors is a vector having magnitude and direction



A) 4.0 cm, along +*x*-axis.
B) 4.0 cm, along -*x*-axis.
C) 4.0 cm, along +*y*-axis.
D) 4.0 cm, along -*y*-axis.
E) 4.0 cm, 45° above +*x*-axis.
Answer: D
Topic: Addition by Components

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29) Addition by 1. Components: Vector $\vec{A}$ has a magnitude of 8.0 m and points 30° north of east; vector $\vec{B}$ has a magnitude of 6.0 m and points 30° west of north; and vector $\vec{C}$ has a magnitude of 5.0 m and points 30° west of south. The resultant vector $\vec{A} + \vec{B} + \vec{C}$ is given by
A) 2.7 m at an angle 74° north of east.
B) 5.9 m at an angle 74° north of east.
C) 4.8 m at an angle 74° east of north.
D) 5.1 m at an angle 74° north of east.
E) 2.1 m at an angle 66° east of north.
Answer: D
Topic: Addition by Components

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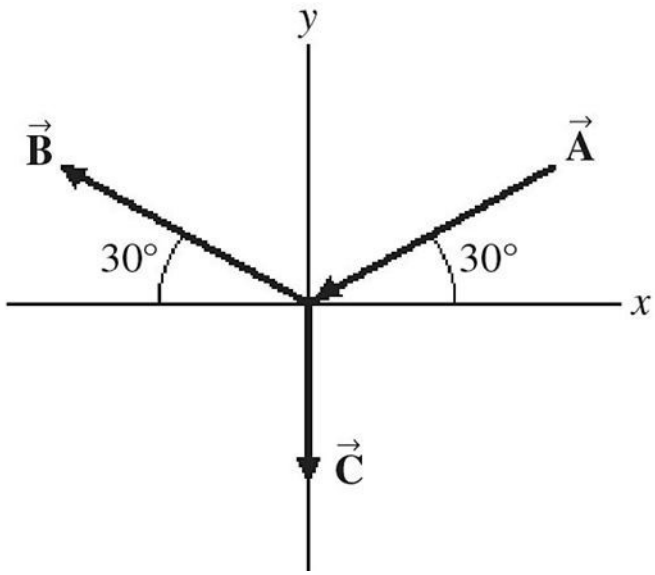
30) Addition by 1. Components: The figure shows three vectors, $\vec{A}$, $\vec{B}$, and $\vec{C}$, having magnitudes 7.0 cm, 6.0 cm, and 4.0 cm, respectively. Find the *x* and *y* components of the resultant of these three vectors.



Answer: -11 cm (*x* component), -4.5 cm (*y* component)
Topic: Addition by Components

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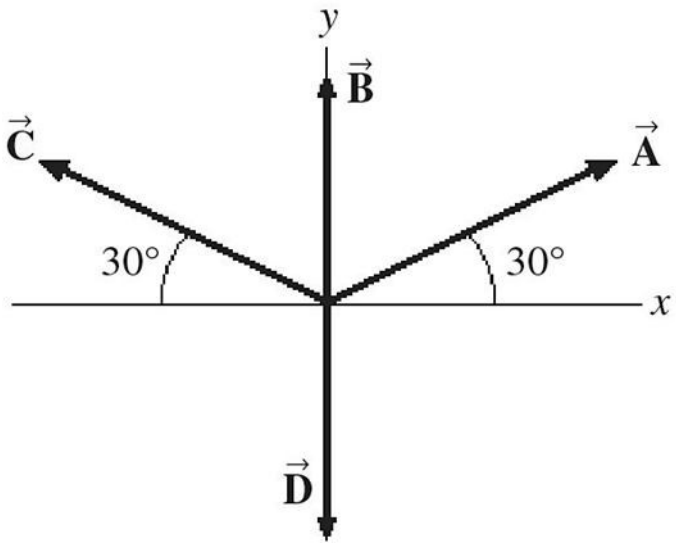
31) Addition by 1. Components: The figure shows four vectors, $\vec{A}$, $\vec{B}$, $\vec{C}$, and $\vec{D}$, having magnitudes 10.0 m, 8.00 m, 6.00 m, and 2.00 m, respectively. Find the magnitude of the sum of these four vectors.



Answer: 14.4 m
Topic: Addition by Components

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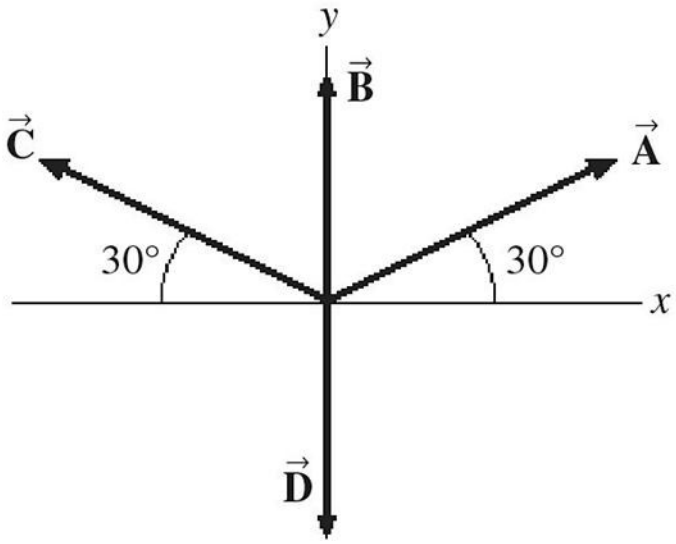
32) Addition by 1. Components: The figure shows four vectors, $\vec{A}$, $\vec{B}$, $\vec{C}$, and $\vec{D}$, having magnitudes 12.0 m, 10.0 m, 8.0 m, and 4.0 m, respectively. The sum of these four vectors is



A) 16.4 m at an angle 77.8° with respect to +*x*-axis.
B) 16.4 m at an angle 12.3° with respect to +*x*-axis.
C) 19.5 m at an angle 77.8° with respect to +*x*-axis.
D) 19.5 m at an angle 12.3° with respect to +*x*-axis.
E) 8.20 m at an angle 77.8° with respect to +*x*-axis.
Answer: A
Topic: Addition by Components

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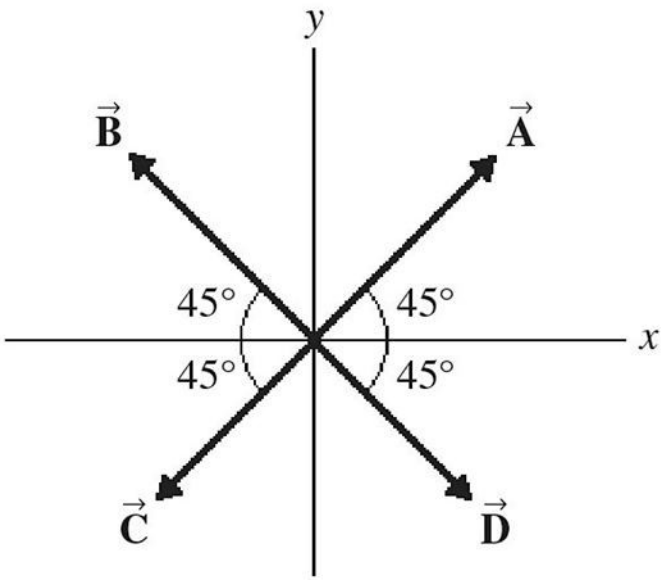
33) Addition by 1. Components: The figure shows four vectors, $\vec{A}$, $\vec{B}$, $\vec{C}$, and $\vec{D}$. Vectors $\vec{A}$ and $\vec{B}$ each have a magnitude of 7.0 cm, and vectors $\vec{C}$ and $\vec{D}$ each have a magnitude of 4.0 cm. Find the *x* and *y* components of the sum of these four vectors.



Answer: 0.00 cm (*x* component), 4.2 cm (*y* component)
Topic: Addition by Components

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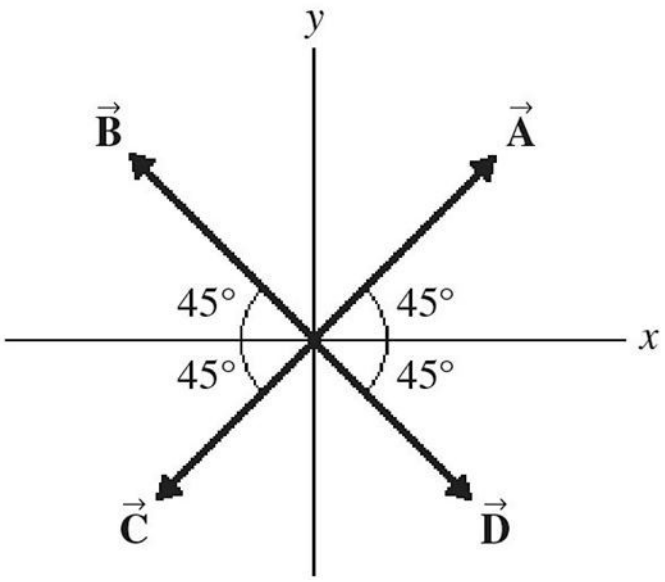
34) Addition by 1. Components: The figure shows four vectors, $\vec{A}$, $\vec{B}$, $\vec{C}$, and $\vec{D}$. Vectors $\vec{A}$ and $\vec{B}$ both have a magnitude of 7.0 cm, and vectors $\vec{C}$ and $\vec{D}$ both have a magnitude of 4.0 cm. Find the magnitude and direction of the sum of these four vectors.



Answer: 4.2 cm along the +*y*-axis
Topic: Addition by Components

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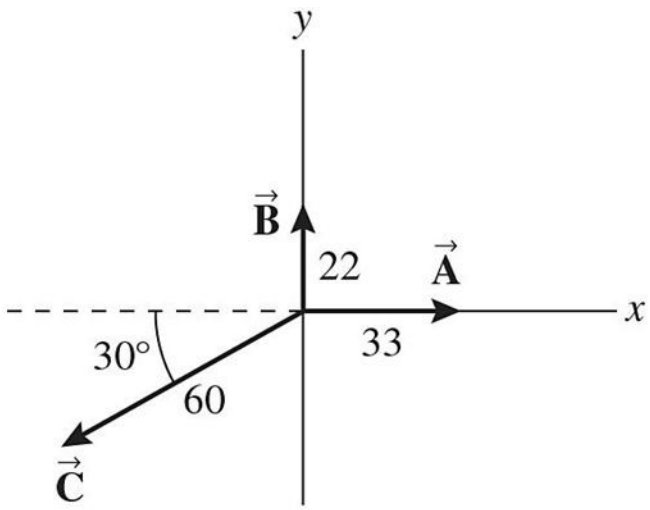
35) Addition by 1. Components: The figure shows three vectors, $\vec{A}$, $\vec{B}$, and $\vec{C}$, along with their magnitudes. Determine the magnitude and direction of the vector given by $\vec{A} - \vec{B} - \vec{C}$.



Answer: 85 m at 5.4° above the +*x*-axis
Topic: Addition by Components

36) Addition by 1. Components: The figure shows three vectors, $\vec{A}$, $\vec{B}$, and $\vec{C}$, along with their magnitudes. Determine the magnitude and direction of the vector given by $\vec{A} + \vec{B} - \vec{C}$.

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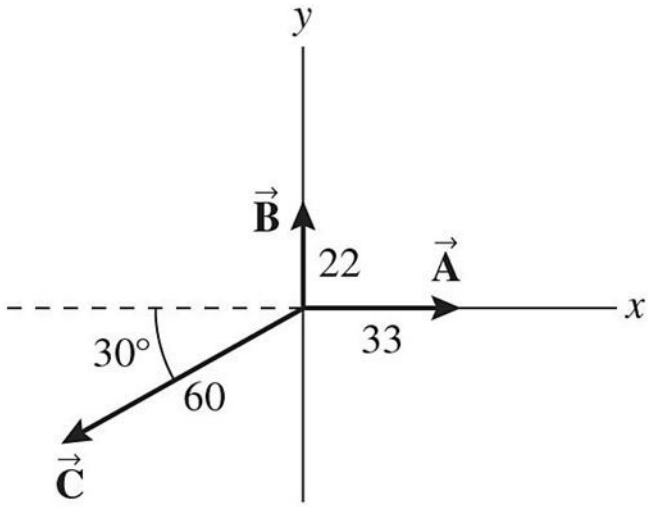

Answer: 100 m at 31° above the +*x*-axis
Topic: Addition by Components

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37) Addition by 1. Components: Three vectors, $\vec{S}$, $\vec{T}$, and $\vec{U}$, have the components shown in the table. What is the magnitude of the resultant of these three vectors?

	x component	*y* component
$\vec{S}$	3.50 m	-4.50 m
$\vec{T}$	2.00 m	0.00 m
$\vec{U}$	-5.50 m	2.50 m

A) 5.50 m
B) 13.0 m
C) 11.1 m
D) 7.00 m
E) 2.00 m
Answer: E
Topic: Addition by Components

38) Addition by 1. Components: Three vectors, $\vec{S}$, $\vec{T}$, and $\vec{U}$, have the components shown in the table. What angle does the resultant of these three vectors make with the +*x*-axis?

	x component	*y* component
$\vec{S}$	-3.5 m	4.5 m
$\vec{T}$	0.00 m	-6.5 m
$\vec{U}$	5.5 m	-2.5 m

A) 24° above the +*x*-axis
B) 24° below the +*x*-axis
C) 66° above the +*x*-axis
D) 66° below the +*x*-axis
Answer: D
Topic: Addition by Components

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