Name:________________________ Class:________________ Date:__________

Chapter 3 - VECTORS AND TRIGONOMETRY

1. What happens when you multiply a vector by a positive scalar?
   a. Only the size of the vector will change accordingly.
   b. Only the direction of the vector will change accordingly.
   c. Both size and direction of the vector will change accordingly.
   d. Neither size nor direction of the vector will change.

ANSWER: a

2. What happens when you multiply a vector by a negative scalar?
   a. Only the size of the vector will change accordingly.
   b. Only the direction of the vector will change accordingly.
   c. Both the size and the direction of the vector will change accordingly.
   d. Neither the size nor the direction of the vector will change.

ANSWER: c

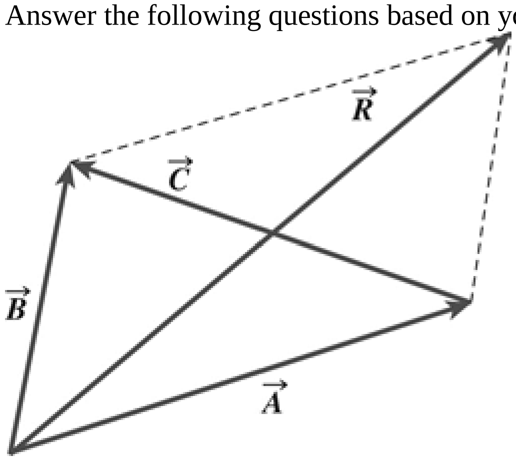
3. The acceleration of gravity $\vec{g}$ is 9.81 m/s^2 downward. What is $-2\vec{g}$?
   a. –19.6 m/s^2 downward
   b. –19.6 m/s^2 upward
   c. +19.6 m/s^2 downward
   d. +19.6 m/s^2 upward

ANSWER: d

4. Consider two vectors: $\vec{A}$= 5.00 m 30° north of east and $\vec{B}$= 7.00 m 30° south of west. Which of the following statements correctly describes these vectors?
   a. $7\vec{A} = 5\vec{B}$
   b. $7\vec{A} = -5\vec{B}$
   c. $5\vec{A} = 7\vec{B}$
   d. $5\vec{A} = -7\vec{B}$

ANSWER: b

Figure 3-1
Answer the following questions based on your observations of this figure:



5. In the figure above, how can vector $\vec{C}$ be expressed in terms of vectors $\vec{A}$ and $\vec{B}$?
   a. $\vec{A} - \vec{B}$
   b. $\vec{B} - \vec{A}$
   c. $\vec{A} + \vec{B}$
   d. $\vec{B} + \vec{A}$

ANSWER: b

6. In the figure above, how can vector $\vec{R}$ be expressed in terms of vectors $\vec{A}$ and $\vec{B}$?
   a. $\vec{A} - \vec{B}$
   b. $\vec{B} - \vec{A}$
   c. $\vec{A} + \vec{B}$
   d. $\vec{B} + 2\vec{A}$

ANSWER: c

7. In the figure above, how can vector $\vec{A}$ be expressed in terms of vectors $\vec{R}$ and $\vec{C}$?
   a. $\vec{R} - \vec{C}$
   b. $\vec{R} + \vec{C}$
   c. $0.5\vec{R} - 0.5\vec{C}$
   d. $2\vec{R} + 2\vec{C}$

ANSWER: c

Vectors A, B, R

Consider two vectors: $\vec{A}$= 15.0 m 30° north of east and $\vec{B}$= 4.00 m 30° south of west.

8. Calculate the resultant $\vec{R} = \vec{A} + \vec{B}$.
   a. $\vec{R}$ = 11.0 m 30° north of east
   b. $\vec{R}$ = 11.00 m 30° south of west
   c. $\vec{R}$ = 19.0 m 30° north of east
   d. $\vec{R}$ = 19.00 m 30° south of west

ANSWER: a

9. Calculate the vector $\vec{C} = \vec{A} - \vec{B}$.
   a. $\vec{C}$ = 11.0 m 30° north of east
   b. $\vec{C}$= 11.00 m 30° south of west
   c. $\vec{C}$ = 19.0 m 30° north of east
   d. $\vec{C}$ = 19.00 m 30° south of west

ANSWER: c

10. Calculate the vector $\vec{D} = -2\vec{A} + \vec{B}$.

a. $\vec{D}$ = –26.0 m 30° north of east

b. $\vec{D}$ = –26.00 m 30° south of west

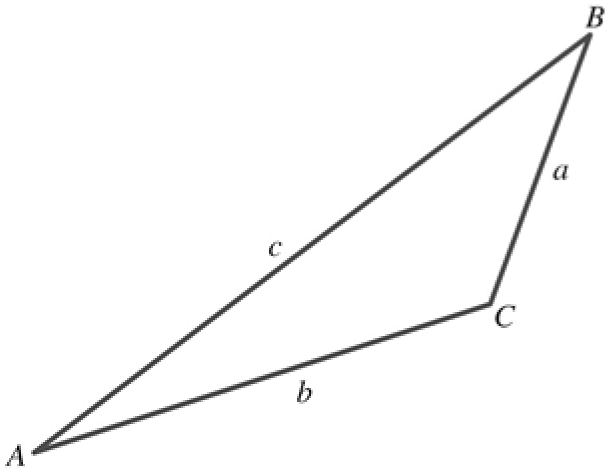
c. $\vec{D}$ = 34.0 m 30° north of east

d. $\vec{D}$ = 34.00 m 30° south of west

ANSWER: d

Obtuse Triangle A, B, C

Answer the following questions based on your observations of this figure:



11. Referring to the figure above, if *A* = 23.5°, *B* = 35.2°, and *b* = 15.2 cm, find the length of *a*.

a. 9.12 cm

b. 10.5 cm

c. 11.7 cm

d. 12.3 cm

ANSWER: b

12. Referring to the figure above, if *A* = 23.5°, *B* = 35.2°, and *b* = 15.2 cm, find the length of *c*.

a. 10.3 cm

b. 17.9 cm

c. 19.6 cm

d. 22.5 cm

ANSWER: d

13. Referring to the figure above, if *C* = 105°, *a* = 9.50 cm, and *b* = 14.2 cm, find the length of *c*.

a. 15.1 cm

b. 16.6 cm

c. 19.0 cm

d. 23.5 cm

ANSWER: c

14. Referring to the figure above, if B = 38.5°, a = 7.50 cm, and c = 19.8 cm, find the length of b.
   a. 13.4 cm
   b. 14.7 cm
   c. 16.3 cm
   d. 17.6 cm

ANSWER: b

15. Referring to the figure above, if B = 43.2°, a = 8.50 cm, and b = 13.8 cm, find the length of c.
   a. 14.9 cm
   b. 16.5 cm
   c. 18.7 cm
   d. 21.3 cm

ANSWER: c

16. Referring to the figure above, if A = 23.6°, a = 6.60 cm, and b = 12.5 cm, find the length of c.
   a. 14.5 cm
   b. 15.8 cm
   c. 17.7 cm
   d. 18.3 cm

ANSWER: b

Vector Example #2

Consider two vectors: $\vec{A} = 15.0$ m 30° north of east and $\vec{B} = 8.00$ m 75° north of east.

17. Calculate the resultant $\vec{R} = \vec{A} + \vec{B}$.
   a. $\vec{R}$ = 21.3 m 30° north of east
   b. $\vec{R}$ = 21.4 m 45.3° north of east
   c. $\vec{R}$ = 23.0 m 30° north of east
   d. $\vec{R}$ = 23.0 m 45.3° north of east

ANSWER: b

18. Calculate the vector $\vec{C} = \vec{A} - \vec{B}$.
   a. $\vec{C}$ = 7.00 m 30° north of east
   b. $\vec{C}$ = 7.00 m 45.3° north of west
   c. $\vec{C}$ = 10.9 m 13.9° south of east
   d. $\vec{C}$ = 10.9 m 23.9° south of west

ANSWER: c

19. Vector $\vec{A}$ has a magnitude of 25.0 m at angle 35° to the horizontal (x-axis). Calculate its respective x- and y-

components.

a. 14.3 m and 20.5 m

b. 18.2 m and 23.6 m

c. 20.5 m and 14.3 m

d. 23.6 m and 18.6 m

ANSWER: c

20. The *x*- and *y*-components of vector $\vec{A}$ are 34.3 m and 61.6 m respectively. Calculate the magnitude of vector $\vec{A}$.

a. 35.2 m

b. 61.9 m

c. 70.5 m

d. 95.9 m

ANSWER: c

Vector Example #3

The *x*- and *y*-components of vector $\vec{A}$ are –17.4 m and 21.5 m respectively.

21. Calculate its angle with respect to the positive *x*-axis.

a. –51.0°

b. 39.0°

c. 51.0°

d. 129°

ANSWER: c

22. Calculate its angle with respect to the positive *y*-axis.

a. –51.0°

b. 39.0°

c. 51.0°

d. 129°

ANSWER: b

23. Consider two vectors: $\vec{A}$ = 15.0 m 30.0° north of east and $\vec{B}$ = 8.00 m 75.0° north of east. Calculate the *x*-component of the resultant $\vec{R} = \vec{A} + \vec{B}$.

a. 11.6 m

b. 13.2 m

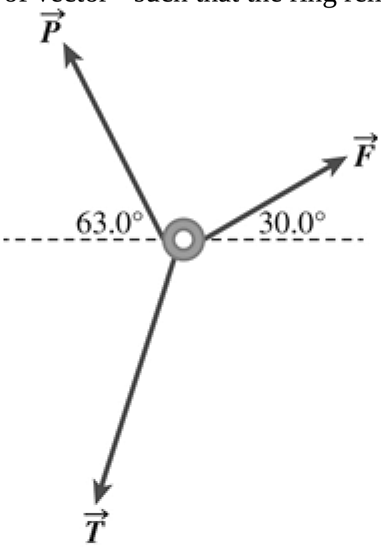
c. 15.1 m

d. 17.3 m

ANSWER: c

24. Three men are pulling on ropes attached to a small ring. $\vec{F}$ = 15.0 N 30° north of east and $\vec{P}$ = 23.0 N 63.0° north of west, as shown in the figure below. $\vec{T}$ is unknown. Using the component technique, calculate the magnitude and direction

of vector $\vec{T}$ such that the ring remains stationary.



a. 24.6 N, 84.8° south of north
b. 24.6 N, 84.8° south of west
c. 28.1 N, 84.8° south of east
d. 28.1 N, 84.8° south of west

ANSWER: c

25. Consider two vectors: $\vec{A}$= 15.0 m 30° north of east and $\vec{B}$= 8.00 m 125° north of east. Calculate the *x*-component of the resultant $\vec{R} = \vec{A} + \vec{B}$.

a. 8.40 m
b. 13.2 m
c. 15.1 m
d. 17.3 m

ANSWER: a

26. Consider two vectors: $\vec{A}$= 15.0 m 30° north of east and $\vec{B}$= 8.00 m 125° north of east. Using the component technique, calculate the vector $\vec{R} = \vec{A} + \vec{B}$.

a. 11.7 m, 30.1° north of east
b. 11.7 m, 30.1° north of west
c. 16.4 m, 59.1° north of east
d. 16.4 m, 59.1° north of west

ANSWER: a