Import Settings:
Base Settings: Brownstone Default
Information Field: Difficulty
Information Field: SectionDef
Highest Answer Letter: E
Multiple Keywords in Same Paragraph: No

Chapter: Chapter 1

Multiple Choice

1. Which one of the following is an SI base unit?
A) gram
B) slug
C) newton
D) centimeter
E) kilogram

Ans: E
Difficulty: Easy
SectionDef: Section 1-2 and Section 1-3

2. Complete the following statement: Today, the standard meter is defined in terms of
A) the distance from the earth's equator to the north pole.
B) the wavelength of light emitted from a krypton atom.
C) the wavelength of light emitted from a sodium atom.
D) a platinum-iridium bar kept in France.
E) the speed of light.

Ans: E
Difficulty: Medium
SectionDef: Section 1-2 and Section 1-3

3.   Complete the following statement: Today, the standard unit of mass is defined in terms of
A)   a specified volume of water at 4 °C.
B)   Planck's constant h.
C)   a specified number of cesium atoms.
D)   a standard platinum bar.
E)   the speed of light.

Ans: B

Difficulty: Medium
SectionDef: Section 1-2 and Section 1-3

4.   Complete the following statement: Today, the standard unit of time is defined in terms of
A)   the electromagnetic waves emitted by cesium atoms.
B)   the motion of the moon around the earth.
C)   the motion of a precision pendulum.
D)   the average solar day.
E)   the speed of light.

Ans: A
Difficulty: Medium
SectionDef: Section 1-2 and Section 1-3

5.   The mass of a raindrop is 4 milligrams.   Which one of the following statements indicates the correct mass of the raindrop in grams?
A)   The raindrop has a mass of 4×10^6 grams.
B)   The raindrop has a mass of 4×10^{-3} grams.
C)   The raindrop has a mass of 4×10^{-1} grams.
D)   The raindrop has a mass of 4×10^3 grams.
E)   The raindrop has a mass of 4×10^{-6} grams.

Ans: B
Difficulty: Medium
SectionDef: Section 1-2 and Section 1-3

6. Which one of the following is the longest length?
A) 10^0 meters
B) 10^2 centimeters
C) 10^4 millimeters
D) 10^5 micrometers
E) 10^7 nanometers

Ans: C
Difficulty: Medium
SectionDef: Section 1-2 and Section 1-3

7. In a diving competition, a woman dives from a platform that is ten meters above the surface of the water.   What is the height, expressed in feet, of the platform?
A)   13 feet
B)   18 feet
C)   24 feet
D)   33 feet
E)   47 feet

Ans: D
Difficulty: Medium
SectionDef: Section 1-2 and Section 1-3

8. A candy shop sells a pound of chocolate for $ 10.85.   What is the price of 1.50 kg of chocolate at the shop?
A) $ 8.17
B) $ 13.49
C) $ 17.98
D) $ 29.73
E) $ 35.81

Ans: E
Difficulty: Hard
SectionDef: Section 1-2 and Section 1-3

9. Complete the following statement: The ratio $\dfrac{1\ \text{milligram}}{1\ \text{kilogram}}$ is equal to

A) 10^2.
B) 10^3.
C) 10^6.
D) 10^{-3}.
E) 10^{-6}.

Ans: E
Difficulty: Medium
SectionDef: Section 1-2 and Section 1-3

10. Which one of the following choices is equivalent to 8.0 m²?

A) $8.0 \times 10^{-4}\ \text{cm}^2$
B) $8.0 \times 10^2\ \text{cm}^2$
C) $8.0 \times 10^{-2}\ \text{cm}^2$
D) $8.0 \times 10^4\ \text{cm}^2$
E) $8.0 \times 10^3\ \text{cm}^2$

Ans: D
Difficulty: Hard
SectionDef: Section 1-2 and Section 1-3

11. Which one of the following pairs of units may *not* be added together, even after the appropriate unit conversions have been made?

A) grams and milligrams
B) kilometers and kilograms
C) miles and kilometers
D) slugs and kilograms
E) centimeters and yards

Ans: B
Difficulty: Easy
SectionDef: Section 1-2 and Section 1-3

12. Which one of the following choices is equivalent to 44.5 mm?

A) $4.45 \times 10^1\ \text{m}$

B) 4.45×10^{-2} m
C) 44.5×10^{-1} m
D) 44.5×10^{-2} m
E) 4.45×10^{0} m

Ans: B
Difficulty: Medium
SectionDef: Section 1-2 and Section 1-3

13.   Which one of the following choices is equivalent to 152 m?
A) 1.52×10^{1} m
B) 1.52×10^{2} m
C) 1.52×10^{-1} m
D) 1.52×10^{-2} m
E) 1.52×10^{0} m

Ans: B
Difficulty: Easy
SectionDef: Section 1-2 and Section 1-3

14.   In the sport of horseshoe pitching, two stakes are 40.0 feet apart.   What is the distance in meters between the two stakes?
A)   24.4 m
B)   4.80 m
C)   18.3 m
D)   12.2 m
E)   15.7 m

Ans: D
Difficulty: Medium
SectionDef: Section 1-2 and Section 1-3

15.   The Boston Marathon is the oldest annual foot race, in which those that finish complete a distance of 26 miles, 385 yards.   Express this distance in kilometers.
A)   16.295 km
B)   16.398 km
C)   42.193km

D) 42.453 km
E) 56.496 km

Ans: C

Difficulty: Medium
SectionDef: Section 1-2 and Section 1-3

16. The surface of a lake has an area of 15.5 km². What is the area of the lake in m²?
A) 1.55×10^4 m²
B) 1.55×10^5 m²
C) 1.55×10^6 m²
D) 1.55×10^7 m²
E) 1.55×10^8 m²

Ans: D
Difficulty: Hard
SectionDef: Section 1-2 and Section 1-3

17. The mathematical relationship between three physical quantities is given by $a = \dfrac{b^2}{c}$. If the dimension of b is; $\dfrac{[L]}{[T]}$ and the dimension of c is [L]. Which one of the following choices is the dimension of a?

A) [L]

B) $\dfrac{[L]}{[T]^2}$

C) $\dfrac{[L]}{[T]}$

D) [T]

E) $\dfrac{[L]^2}{[T]^2}$

Ans: B

18. The distance d that a certain particle moves may be calculated from the expression $d = at + bt^2$ where a and b are constants; and t is the elapsed time. What must the dimensions of the quantities a and b be, respectively?

A) $\dfrac{[L]}{[T]}, \dfrac{[L]}{[T]^2}$

B) $[L], [L]^2$

C) $\dfrac{[L]}{[T]^2}, \dfrac{[L]}{[T]^3}$

D) $\dfrac{[L]}{[T]}, \dfrac{[L]^2}{[T]^2}$

E) $\dfrac{1}{[T]}, \dfrac{1}{[T]^2}$

Ans: A

19. Using the dimensions given for the variables in the table, determine which one of the following expressions is correct.

variable	dimension
f	$\dfrac{1}{[T]}$
l	$[L]$
g	$\dfrac{[L]}{[T]^2}$

A) $f = \dfrac{g}{2\pi l}$

B) $f = 2\pi g l$

C) $2\pi f = \sqrt{\dfrac{g}{l}}$

D) $2\pi f = \sqrt{\dfrac{l}{g}}$

E) $f = 2\pi \sqrt{gl}$

Ans: C

Difficulty: Hard
SectionDef: Section 1-2 and Section 1-3

20.   A certain physical quantity, R, is calculated using the formula: $R = 4a^2(b - c)$ where a, b, and c are distances.   What is the SI unit for R?
A)   cm
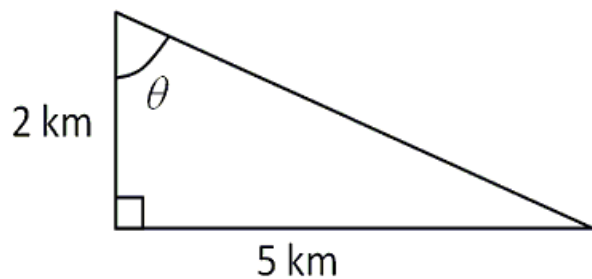B)   cm^2
C)   m
D)   m^2
E)   m^3

Ans: E
Difficulty: Medium
SectionDef: Section 1-2 and Section 1-3

21.   Which one of the following expressions may be used to correctly find the angle θ in the drawing?

2 km

5 km

A) $\theta = \cos^{-1}\left(\dfrac{5}{2}\right)$

B) $\theta = \tan^{-1}\left(\dfrac{5}{2}\right)$

C) $\theta = \sin^{-1}\left(\dfrac{2}{5}\right)$

D) $\theta = \tan^{-1}\left(\dfrac{2}{5}\right)$
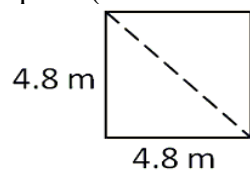
E) $\theta = \sin^{-1}\left(\dfrac{5}{2}\right)$

Ans: B
Difficulty: Easy
SectionDef: Section 1-4

22.   The length of each side of a square is 4.0 m.   What is the length of the diagonal of the square (shown as a dashed line in the figure)?

4.8 m

4.8 m

A)   2.8 m
B)   8.0 m
C)   5.7 m
D)   6.8 m
E)   16 m

Ans: D
Difficulty: Medium
SectionDef: Section 1-4

23.   Three sticks are arranged to form a right triangle.   If the lengths of the three sticks are 0.47 m, 0.62 m and 0.78 m, what are the three angles of the triangle?
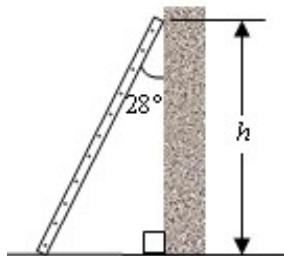A)   90°, 45°, and 45°
B)   90°, 62°, and 28°
C)   90°, 59°, and 31°
D)   90°, 48°, and 42°
E)   90°, 53°, and 37°

Ans: E
Difficulty: Medium
SectionDef: Section 1-4

24.   A 3.0-m ladder leans against a wall and makes an angle with the wall of 28° as shown in the drawing.   What is the height h above the ground where the ladder makes contact with the wall?

A)   2.6 m
B)   2.3 m
C)   2.1 m
D)   1.9 m
E)   1.6 m

Ans: A
Difficulty: Medium
SectionDef: Section 1-4

25.   A pole is held vertically by attaching wires at a height of 13.4 m above the ground.   The other end of each wire is anchored in the ground at a distance of 9.54 m from the base of the pole.   The pole makes a right angle with the ground.   What is the length of each wire?
A)   14.1 m
B)   19.7 m
C)   11.5 m

D) 16.4 m
E) 22.8 m

26.   A certain mountain road is inclined 3.1° with respect to the horizon.   What is the change in altitude of the car as a result of its traveling 2.90 km along the road?
A)   157 m
B)   181 m
C)   116 m
D)   203 m
E)   289 m

27.   A surveyor wants to find the shortest distance across a section of river.   A stake is placed on each bank of the river as shown in the figure.   She measures a distance of 30.0 m from one stake to another on the same side of the river, thus finding the third leg on a right triangle.   She then measures the angle θ and finds it equal to 75.9°.   What is the shortest distance across this section of river?

30.0 m
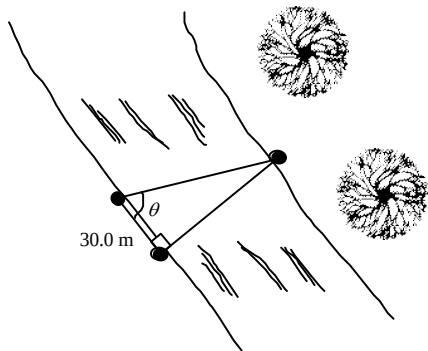
A)   89.2 m
B)   15.3 m
C)   119 m
D)   268 m
E)   29.0 m

28.   Which one of the following choices is a vector quantity?
A)   mass
B)   temperature
C)   time
D)   displacement
E)   volume

Ans: D
Difficulty: Easy
SectionDef: Section 1-5

29.   Which one of the following quantities is a vector quantity?
A)   the age of the earth
B)   the mass of a freight train
C)   the earth's pull on your body
D)   the temperature of an iced coffee
E)   the number of people attending a soccer game

Ans: C
Difficulty: Medium
SectionDef: Section 1-5

30.   Which one of the following statements is true concerning scalar quantities?
A)   Scalar quantities must be represented by base units.
B)   Scalar quantities have both magnitude and direction.
C)   Scalar quantities can be added to vector quantities using rules of trigonometry.
D)   Scalar quantities can be added to other scalar quantities using rules of trigonometry.
E)   Scalar quantities can be added to other scalar quantities using rules of ordinary addition.

Ans: E
Difficulty: Medium
SectionDef: Section 1-5

31. Two vectors $\vec{A}$ and $\vec{B}$ are added together to form a vector $\vec{C}$. The relationship between the magnitudes of the vectors is given by $A + B = C$. Which one of the following statements concerning these vectors is true?

A) $\vec{A}$ and $\vec{B}$ must be displacements.

B) $\vec{A}$ and $\vec{B}$ must have equal lengths.

C) $\vec{A}$ and $\vec{B}$ must point in opposite directions.

D) $\vec{A}$ and $\vec{B}$ must point in the same direction.

E) $\vec{A}$ and $\vec{B}$ must be at right angles to each other.

Ans: D
Difficulty: Hard
SectionDef: Section 1-5 and 1-6

32. Two vectors $\vec{A}$ and $\vec{B}$ are added together to form a vector $\vec{C}$. The relationship between the magnitudes of the vectors is given by: $A^2 + B^2 = C^2$. Which statement concerning these vectors is true? Note that $\vec{A}$ and $\vec{B}$ are not the zero vector.

A) $\vec{A}$ and $\vec{B}$ must be at right angles to each other.

B) $\vec{A}$ and $\vec{B}$ could have any orientation relative to each other.

C) $\vec{A}$ and $\vec{B}$ must have equal lengths.

D) $\vec{A}$ and $\vec{B}$ must be parallel.

E) $\vec{A}$ and $\vec{B}$ could be antiparallel.

Ans: A

Difficulty: Medium
SectionDef: Section 1-5 and 1-6

33. Three vectors $\vec{A}$, $\vec{B}$, and $\vec{C}$ add together to yield zero: $\vec{A} + \vec{B} + \vec{C} = 0$. The vectors $\vec{A}$ and $\vec{C}$ point in *opposite* directions and their magnitudes are related by the expression: $A = 2C$. Which one of the following conclusions is correct?

A) $\vec{A}$ and $\vec{B}$ have equal magnitudes and point in opposite directions.
B) $\vec{B}$ and $\vec{C}$ have equal magnitudes and point in the same direction.
C) $\vec{B}$ and $\vec{C}$ have equal magnitudes and point in opposite directions.
D) $\vec{A}$ and $\vec{B}$ point in the same direction, but $\vec{A}$ has twice the magnitude of $\vec{B}$.
E) $\vec{B}$ and $\vec{C}$ point in the same direction, but $\vec{C}$ has twice the magnitude of $\vec{B}$.

Ans: B
Difficulty: Hard
SectionDef: Section 1-5 and 1-6

34. What is the angle between the vectors $\vec{A}$ and $-\vec{A}$ when they are drawn from a common origin?
A) 0°
B) 90°
C) 180°
D) 270°
E) 360°

Ans: C
Difficulty: Easy
SectionDef: Section 1-5 and 1-6

35. What is the minimum number of vectors with *unequal* magnitudes whose vector sum can be zero?
A) two
B) three
C) four
D) five
E) six

Ans: B
Difficulty: Medium
SectionDef: Section 1-5 and 1-6

36. What is the minimum number of vectors with *equal* magnitudes whose vector sum can be

zero?
A) two
B) three
C) four
D) five
E) six

Ans: A
Difficulty: Easy
SectionDef: Section 1-5 and 1-6

37. A physics student adds two displacement vectors with magnitudes of 8.0 km and 6.0 km. Which one of the following statements is true concerning the magnitude of the resultant displacement?
A) It must be 10.0 km.
B) It must be 14.0 km.
C) It could be equal to zero kilometers, depending on how the vectors are oriented.
D) No conclusion can be reached without knowing the directions of the vectors.
E) It could have any value between 2.0 km and 14.0 km depending on how the vectors are oriented.

Ans: E
Difficulty: Medium
SectionDef: Section 1-5 and 1-6

38. A student adds two displacement vectors with magnitudes of 6.0 m and 8.0 m, respectively. Which one of the following could *not* be a possible choice for the resultant?
A) 2.3 m
B) 6.6 m
C) 10.0 m
D) 12.8 m
E) 14.8 m

Ans: E
Difficulty: Medium
SectionDef: Section 1-5 and 1-6

39. Two displacement vectors of magnitudes 21 cm and 79 cm are added. Which one of the following is the *only* possible choice for the magnitude of the resultant?
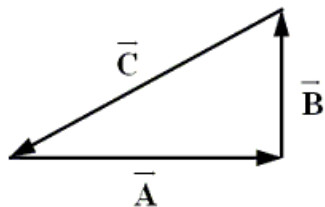A) 0 cm
B) 28 cm
C) 37 cm
D) 82 cm
E) 114 cm

Ans: D
Difficulty: Hard
SectionDef: Section 1-5 and 1-6

40. Which expression is *false* concerning the vectors shown in the sketch?

A) $\vec{C} = \vec{A} + \vec{B}$
B) $\vec{C} + \vec{A} = -\vec{B}$
C) $\vec{A} + \vec{B} + \vec{C} = 0$
D) $C < A + B$
E) $A^2 + B^2 = C^2$

Ans: A
Difficulty: Hard
SectionDef: Section 1-5 and 1-6

41. City A lies 30 km directly south of city B. A bus, beginning at city A travels 50 km at 37° north of east to reach city C. How far and in what direction must the bus go from city C to reach city B?
A) 20 km, west
B) 40 km, west
C) 80 km, west
D) 40 km, east
E) 80 km, east

Ans: B

42. Town A lies 20 km north of town B. Town C lies 13 km west of town A. A small plane flies directly from town B to town C. What is the displacement of the plane?
A) 33 km, 33° north of west
B) 19 km, 33° north of west
C) 24 km, 57° north of west
D) 31 km, 57° north of west
E) 6.6 km, 40° north of west

Ans: C
Difficulty: Medium
SectionDef: Section 1-5 and 1-6

43. A runaway dog walks 0.64 km due north. He then runs due west to a hot dog stand. If the magnitude of the dog's total displacement vector is 0.91 km, what is the magnitude of the dog's displacement vector in the due west direction?
A) 0.27 km
B) 0.33 km
C) 0.41 km
D) 0.52 km
E) 0.65 km

Ans: E
Difficulty: Medium
SectionDef: Section 1-5 and 1-6

44. An escaped convict runs 1.70 km due east of the prison. He then runs due north to a friend's house. If the magnitude of the convict's total displacement vector is 2.50 km, what is the direction of his total displacement vector with respect to due east?
A) 43° south of east
B) 47° north of east
C) 56° north of east
D) 34° south of east
E) 34° north of east

45.   Four members of the Main Street Bicycle Club meet at a certain intersection on Main Street.   The members then start from the same location, but travel in different directions.   A short time later, displacement vectors for the four members are:

$\vec{A}$ = 2.0 km, east; $\vec{B}$ = 5.2 km, north; $\vec{C}$ = 4.9 km, west; $\vec{D}$ = 3.0 km, south

What is the resultant displacement $\vec{R}$ of the members of the bicycle club:
$\vec{R}$ = $\vec{A}$ + $\vec{B}$ + $\vec{C}$ + $\vec{D}$?
A)   0.8 km, south
B)   0.4 km, 45° south of east
C)   3.6 km, 37° north of west
D)   4.0 km, east
E)   4.0 km, south

Ans: C
Difficulty: Hard
SectionDef: Section 1-5 and 1-6

46.   A force, $\vec{F}_1$, of magnitude 2.0 N and directed due east is exerted on an object.   A second force exerted on the object is $\vec{F}_2$ = 2.0 N, due north.   What is the magnitude and direction of a third force, $\vec{F}_3$, which must be exerted on the object so that the resultant force is zero?
A)   1.4 N, 45° north of east
B)   1.4 N, 45° south of west
C)   2.8 N, 45° north of east
D)   2.8 N, 45° south of west
E)   4.0 N, 45° east of north

Ans: D
Difficulty: Hard
SectionDef: Section 1-5 and 1-6

47.   A sailboat leaves a harbor and sails 1.8 km in the direction 65° south of east, where the captain stops for lunch.   A short time later, the boat sails 1.1 km in the direction 15° north of east.   What is the magnitude of the resultant displacement from the harbor?
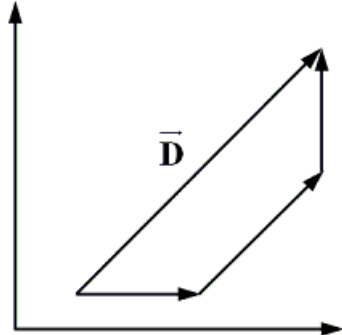
A) 2.3 km
B) 1.5 km
C) 2.9 km
D) 1.2 km
E) 0.59 km

Ans: A
Difficulty: Hard
SectionDef: Section 1-6 and 1-7

48. Three vectors $\vec{A}$, $\vec{B}$, and $\vec{C}$ have the following x and y components:
$A_x = 1$ m, $A_y = 0$ m, $B_x = 1$ m, $B_y = 1$ m, $C_x = 0$ m, $C_y = -1$ m
According to the graph, how are $\vec{A}$, $\vec{B}$, and $\vec{C}$ combined to result in the vector $\vec{D}$?

A) $\vec{D} = \vec{A} - \vec{B} - \vec{C}$
B) $\vec{D} = \vec{A} - \vec{B} + \vec{C}$
C) $\vec{D} = \vec{A} + \vec{B} - \vec{C}$
D) $\vec{D} = \vec{A} + \vec{B} + \vec{C}$
E) $\vec{D} = -\vec{A} + \vec{B} + \vec{C}$

Ans: C
Difficulty: Medium
SectionDef: Section 1-5 and 1-6

49. A displacement vector has a magnitude of 810 m and points at an angle of 18° above the positive x axis. What are the x and y scalar components of this vector?

	x scalar component	y scalar component
A)	770 m	250 m
B)	560 m	585 m

C)	585 m	560 m
D)	250 m	750 m
E)	713 m	385 m

Ans: A
Difficulty: Easy
SectionDef: Section 1-7

50. Which one of the following statements concerning vectors and scalars is *false*?
A) In calculations, the vector components of a vector may be used in place of the vector itself.
B) It is possible to use vector components that are not perpendicular.
C) A scalar component may be either positive or negative.
D) A vector that is zero may have components other than zero.
E) Two vectors are equal only if they have the same magnitude and direction.

Ans: D
Difficulty: Medium
SectionDef: Section 1-7

51. A displacement vector is 23 km in length and directed 65° south of east. What are the components of this vector?

	Eastward Component	*Southward Component*
A)	21 km	9.7 km
B)	23 km	23 km
C)	23 km	0 km
D)	9.7 km	21 km
E)	0 km	23 km

Ans: D
Difficulty: Easy
SectionDef: Section 1-7

52. The x and y components of a displacement vector are –3.00 m and +4.00 m, respectively. What angle does this vector make with the positive x axis?
A) 233°
B) 127°
C) –53.0°

D) 53.0°
E) 37.0°

53. A race car will make one lap around a circular track of radius R. When the car has traveled *halfway* around the track, what is the magnitude of the car's displacement from the starting point?
A) $2R$
B) R
C) πR
D) $2\pi R$
E) zero meters

54. A bug crawls 2.25 m along the base of a wall. Upon reaching a corner, the bug's direction of travel changes from south to west. The bug then crawls 3.15 m before stopping. What is the magnitude of the bug's displacement?
A) 5.40 m
B) 2.72 m
C) 3.87 m
D) 4.11 m
E) 3.29 m

55. During the execution of a play, a football player carries the ball for a distance of 33 m in the direction 58° north of east. To determine the number of meters gained on the play, find the northward component of the ball's displacement.
A) 8.0 m

B)   16 m
C)   24 m
D)   28 m
E)   32 m

Ans: D
Difficulty: Easy
SectionDef: Section 1-7

56.   A bird flies 25.0 m in the direction 55° east of south to its nest on a cliff.   The bird then flies 75.0 m in the direction 55° west of north to the top of a tree.   What are the northward and westward components of the resultant displacement of the bird from its nest?

	northward	westward
A)	29 m	41 m
B)	41 m	29 m
C)	35 m	35 m
D)	81 m	57 m
E)	57 m	81 m

Ans: A
Difficulty: Hard
SectionDef: Section 1-7

57.   Use the component method of vector addition to find the resultant of the following three vectors:

$$\vec{A} = 56 \text{ km, east}$$
$$\vec{B} = 11 \text{ km, } 22° \text{ south of east}$$
$$\vec{C} = 88 \text{ km, } 44° \text{ west of south}$$

A)   81 km, 14° west of south
B)   97 km, 62° south of east
C)   52 km, 66° south of east
D)   68 km, 86° south of east
E)   66 km, 7.1° west of south

Ans: D
Difficulty: Medium
SectionDef: Section 1-8

58.   Use the component method of vector addition to find the components of the resultant of the four displacements shown in the figure.   The magnitudes of the displacements are: $A = 2.25$ cm, $B = 6.35$ cm, $C = 5.47$ cm, and $D = 4.19$ cm.

x component y component
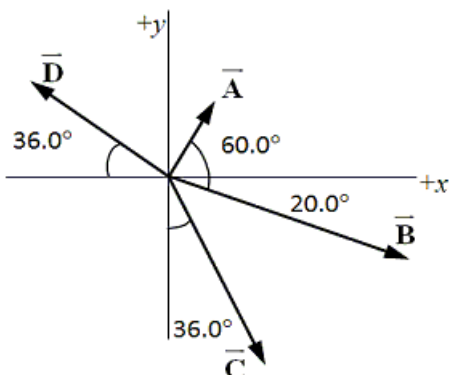
	x component	y component
A)	2.19 cm	−6.92 cm
B)	3.71 cm	−1.09 cm
C)	5.45 cm	−2.82 cm
D)	1.09 cm	−3.71 cm
E)	6.93 cm	−2.19 cm

Ans: E
Difficulty: Easy
SectionDef: Section 1-8

59.   A vector $\vec{F}_1$ has a magnitude of 40.0 units and points 35.0° above the positive x axis.   A second vector $\vec{F}_2$ has a magnitude of 65.0 units and points in the negative x direction.   Use the component method of vector addition to find the magnitude and direction, relative to the positive x axis, of the resultant $\vec{F} = \vec{F}_1 + \vec{F}_2$.
A)   53.3 units, 141.8° relative to the +x axis
B)   53.3 units, 52.1° relative to the +x axis
C)   39.6 units, 144.6° relative to the +x axis
D)   39.6 units, 54.6° relative to the +x axis
E)   46.2 units, 136.0° relative to the +x axis

Ans: C
Difficulty: Medium
SectionDef: Section 1-8

60. Two vectors $\vec{A}$ and $\vec{B}$, are added together to form the vector $\vec{C} = \vec{A} + \vec{B}$. The relationship between the magnitudes of these vectors is given by: $C_x = A \cos 30° + B$ and $C_y = -A \sin 30°$. Which statement best describes the orientation of these vectors?

A) $\vec{A}$ points in the negative x direction while $\vec{B}$ points in the positive y direction.

B) $\vec{A}$ points in the negative y direction while $\vec{B}$ points in the positive x direction.

C) $\vec{A}$ points 30° below the positive x axis while $\vec{B}$ points in the positive x direction.

D) $\vec{A}$ points 30° above the positive x axis while $\vec{B}$ points in the positive x direction.

E) $\vec{A}$ points 30° above the negative x axis while $\vec{B}$ points in the positive x direction.

Ans: C
Difficulty: Hard
SectionDef: Section 1-8

61. Which one of the following answers would give the correct number of significant figures when the following masses are added together: 3.6 kg, 113 kg, and 4.19 kg?
A) 121 kg
B) 120.8 kg
C) 120.79 kg
D) 1.20×10^2 kg
E) 120.8×10^3 kg

Ans: A
Difficulty: Easy
SectionDef: Additional Problems

62. A physics text has 544 sheets (1088 pages) and is 34.3 millimeters thick between the inside front cover and the inside back cover. What is the thickness of a single sheet?
A) 6.36×10^{-4} m
B) 3.16×10^{-2} m
C) 6.28×10^{-3} m
D) 7.24×10^{-6} m
E) 6.31×10^{-5} m

Ans: E
Difficulty: Easy
SectionDef: Additional Problems

63. Justine and her friends exit the physics classroom and walk 0.70 km to their math class. While walking, Justine's average step length is 58 cm. Approximately, how many steps does she take in walking between these two classes?
A) 310
B) 720
C) 1200
D) 3100
E) 7200

Ans: C
Difficulty: Medium
SectionDef: Additional Problems

Reference: Ref 1-1

Two vectors, $\vec{A}$ and $\vec{B}$, are added together to form the vector $\vec{C} = \vec{A} + \vec{B}$. The relationship between the magnitudes of these vectors is given by:
$C_x = 0$
$C_y = A \sin 60° + B \sin 30°$
A_x and A_y point in the positive x and y directions, respectively.

64. Which one of the following statements best describes the orientation of vectors $\vec{A}$ and $\vec{B}$?
A) $\vec{A}$ and $\vec{B}$ point in opposite directions.
B) $\vec{A}$ points 60° above the positive x axis while $\vec{B}$ points 30° above the negative x axis.
C) $\vec{A}$ points 60° above the negative x axis while $\vec{B}$ points 30° above the positive x axis.
D) $\vec{A}$ points 60° below the positive x axis while $\vec{B}$ points 30° above the positive y axis.
E) $\vec{A}$ points 60° below the positive x axis while $\vec{B}$ points 30° below the positive y axis.

Ans: B
Refer To: Ref 1-1
Difficulty: Hard
SectionDef: Additional Problems

65. How does the magnitude of $\vec{A}$ compare with that of $\vec{B}$?
A) $A = B$
B) $A = 1.7B$
C) $A = 0.4B$
D) $A = 0.5B$
E) $A = 0.7B$

Ans: B
Refer To: Ref 1-1
Difficulty: Hard
SectionDef: Additional Problems

Reference: Ref 1-2

The table gives the x and y components of two vectors $\vec{A}$ and $\vec{B}$:

Vector	x component	y component
$\vec{A}$	+15 units	+10 units
$\vec{B}$	+15 units	−10 units

66. Which one of the following statements concerning these vectors is true?
A) The vector $\vec{A} - \vec{B}$ has no x component.
B) The two vectors have different magnitudes.
C) $\vec{A}$ makes a 56° angle with the positive x axis.
D) $\vec{B}$ makes a 34° angle with the positive y axis.
E) The vector $\vec{A} + \vec{B}$ makes a 34° angle with the positive x axis.

Ans: A
Refer To: Ref 1-2
Difficulty: Medium
SectionDef: Additional Problems

67.   Determine the magnitude of the vector sum, $\vec{A} + \vec{B}$.
A)   5 units
B)   15 units
C)   20 units
D)   30 units
E)   50 units

Ans: D
Refer To: Ref 1-2
Difficulty: Medium
SectionDef: Additional Problems

68.   Determine the magnitude of the vector difference, $\vec{A} - \vec{B}$.
A)   5 units
B)   15 units
C)   20 units
D)   30 units
E)   50 units

Ans: C
Refer To: Ref 1-2
Difficulty: Medium
SectionDef: Additional Problems

Reference: Ref 1-3

A boat radioed a distress call to a Coast Guard station.   At the time of the call, a vector $\vec{A}$ from the station to the boat had a magnitude of 45.0 km and was directed 15.0° east of north.   A vector from the station to the point where the boat was later found is $\vec{B}$ = 30.0 km, 15.0° north of east.

69.   What are the components of the vector from the point where the distress call was made to the point where the boat was found?   In other words, what are the components of vector $\vec{C}$ = $\vec{B} - \vec{A}$?

	x component	y component
A)	35.7 km, west	17.4 km, north
B)	40.6 km, east	51.2 km, south
C)	17.3 km, west	51.2 km, south
D)	40.6 km, east	35.7 km, north
E)	17.3 km, east	35.7 km, south

Ans: E
Refer To: Ref 1-3
Difficulty: Hard
SectionDef: Additional Problems

70. How far did the boat travel from the point where the distress call was made to the point where the boat was found?

In other words, what is the magnitude of vector $\vec{C}$?
A) 65.3 km
B) 39.7 km
C) 26.5 km
D) 54.0 km
E) 42.5 km

Ans: B
Refer To: Ref 1-3
Difficulty: Medium
SectionDef: Additional Problems