Short Answer

5.1 Vector Addition and Subtraction: Graphical Methods 56.

Find \overrightarrow{\text{A}} - \overrightarrow{\text{B}} for the following vectors: \overrightarrow{\text{A}} = (122\,\text{cm}, \angle\,145^\circ) \overrightarrow{\text{B}} = (110\,\text{cm}, \angle\,270^\circ)

a. 108 cm, \theta = 119.0^\circ
b. 108 cm, \theta = 125.0^\circ
c. 206 cm, \theta = 119.0^\circ
d. 206 cm, \theta = 125.0^\circ

57.

Find \overrightarrow{\text{A}} + \overrightarrow{\text{B}} for the following vectors: \overrightarrow{\text{A}} = (122\,\text{cm}, \angle\,145^\circ) \overrightarrow{\text{B}} = (110\,\text{cm}, \angle\,270^\circ)

a. 108 cm, \theta = 119.1^\circ
b. 108 cm, \theta = 201.8^\circ
c. 232 cm, \theta = 119.1^\circ
d. 232 cm, \theta = 201.8^\circ

58.

Consider six vectors of 2 cm each, joined from head to tail making a hexagon. What would be the magnitude of the addition of these vectors?

a. Zero
b. Six
c. Eight
d. Twelve

59.

Two people pull on ropes tied to a trolley, each applying 44 N of force. The angle the ropes form with each other is 39.5°. What is the magnitude of the net force exerted on the trolley?

a. 0.0 N
b. 79.6 N
c. 82.8 N
d. 88.0 N

5.2 Vector Addition and Subtraction: Analytical Methods 60.

True or False—A vector can form the shape of a right angle triangle with its x and y components.

a. True
b. False

61.

True or False—All vectors have positive x and y components.

a. True
b. False

62.

Consider \overrightarrow{\text{A}} - \overrightarrow{\text{B}} = \overrightarrow{\text{R}}. What is R_x in terms of A_x and B_x?

a. R_x = \frac{A_x}{B_x}
b. R_x = \frac{B_x}{A_x}
c. R_x = A_x + B_x
d. R_x = A_x - B_x

63.

Consider \overrightarrow{\text{A}} - \overrightarrow{\text{B}} = \overrightarrow{\text{R}}. What is R_y in terms of A_y and B_y?

a. R_y = \frac{A_y}{B_y}
b. R_y = \frac{B_y}{A_y}
c. R_y = A_y + B_y
d. R_y = A_y - B_y

64.

When a three dimensional vector is used in the study of atmospheric sciences, what is z?

a. Altitude
b. Heat
c. Temperature
d. Wind speed

65.

Which method is not an application of vector calculus?

a. To find the rate of change in atmospheric temperature
b. To study changes in wind speed and direction
c. To predict changes in atmospheric pressure
d. To measure changes in average rainfall

5.3 Projectile Motion

66.

How can you express the velocity, v, of a projectile in terms of its initial velocity, v_0, acceleration, a, and time, t?

a. v = at
b. v = v_0 + at

c. v + v_0 = at
d. v_0 + v + at

67.

In the equation for the maximum height of a projectile, what does v_{0y} stand for?

$h = \frac{v_{0y}^2}{2g}$

a. Initial velocity in the x direction
b. Initial velocity in the y direction
c. Final velocity in the x direction
d. Final velocity in the y direction

68.

True or False—Range is defined as the maximum vertical distance travelled by a projectile.

a. True
b. False

69.

For what angle of a projectile is its range equal to zero?

a. 0^\circ\! or 30^\circ
b. 0^\circ\! or 45^\circ
c. 90^\circ\! or 0^\circ
d. 90^\circ\! or 45^\circ

5.4 Inclined Planes 70.

What are the units of the coefficient of friction?

a. \text{N}
b. \text{m/s}
c. \text{m/s}^2
d. unitless

71.

Two surfaces in contact are moving slowly past each other. As the relative speed between the two surfaces in contact increases, what happens to the magnitude of their coefficient of kinetic friction?

a. It increases with the increase in the relative motion.
b. It decreases with the increase in the relative motion.
c. It remains constant and is independent of the relative motion.

72.

When will an object slide down an inclined plane at constant velocity?

a. When the magnitude of the component of the weight along the slope is equal to the magnitude of the frictional force.
b. When the magnitude of the component of the weight along the slope is greater than the magnitude of the frictional force.
c. When the magnitude of the component of the weight perpendicular to the slope is less than the magnitude of the frictional force.
d. When the magnitude of the component of the weight perpendicular to the slope is equal to the magnitude of the frictional force.

73.

A box is sitting on an inclined plane. At what angle of incline is the perpendicular component of the box's weight at its maximum?

a. 0^\circ
b. 30^\circ
c. 60^\circ
d. 90^\circ

5.5 Simple Harmonic Motion 74.

What is the term used for changes in shape due to the application of force?

a. Amplitude
b. Deformation
c. Displacement
d. Restoring force

75.

What is the restoring force?

a. The normal force on the surface of an object
b. The weight of a mass attached to an object
c. Force which is applied to deform an object from its original shape
d. Force which brings an object back to its equilibrium position

76.

For a given oscillator, what are the factors that affect its period and frequency?

a. Mass only
b. Force constant only
c. Applied force and mass
d. Mass and force constant

77.

For an object in simple harmonic motion, when does the maximum speed occur?

a. At the extreme positions
b. At the equilibrium position

c. At the moment when the applied force is removed
d. Midway between the extreme and equilibrium positions

78.

What is the equilibrium position of a pendulum?

a. When the tension in the string is zero
b. When the pendulum is hanging straight down
c. When the tension in the string is maximum
d. When the weight of the mass attached is minimum

79.

If a pendulum is displaced by an angle , what is the net restoring force it experiences?

a. $mg\sin$
b. $mg\cos$
c. $-mg\sin$
d. $-mg\cos$