Concept Items

5.1 Vector Addition and Subtraction: Graphical Methods 1.

There is a vector $\vec{A}$, with magnitude 5 units pointing towards west and vector $\vec{B}$, with magnitude 3 units, pointing towards south. Using vector addition, calculate the magnitude of the resultant vector.

a. 4.0
b. 5.8
c. 6.3
d. 8.0

2.

If you draw two vectors using the head-to-tail method, how can you then draw the resultant vector?

a. By joining the head of the first vector to the head of the last
b. By joining the head of the first vector with the tail of the last
c. By joining the tail of the first vector to the head of the last
d. By joining the tail of the first vector with the tail of the last

3.

A global angle is an angle with the positive x-axis (considered to be an angle of 0°), and the terminal angle as the angle formed after a counterclockwise rotation. What is the global angle of 20° south of west?

a. 110^\circ
b. 160^\circ
c. 200^\circ
d. 290^\circ

5.2 Vector Addition and Subtraction: Analytical Methods 4.

What is the angle between the x and y components of a vector?

a. 0^\circ
b. 45^\circ
c. 90^\circ
d. 180^\circ

5.

Two vectors are equal in magnitude and opposite in direction. What is the magnitude of their resultant vector?

a. The magnitude of the resultant vector will be zero.
b. The magnitude of the resultant vector will be twice the magnitude of the original vector.

c. The magnitude of the resultant vector will be same as magnitude of the original vector.
d. The magnitude of the resultant vector will be half the magnitude of the original vector.

6.

How can we express the x and y-components of a vector in terms of its magnitude, A, and direction, global angle \theta?

a. A_x = A \cos \theta; A_y = A \sin \theta
b. A_x = A \cos \theta; A_y = A \cos \theta
c. A_x = A \sin \theta; A_y = A \cos \theta
d. A_x = A \sin \theta; A_y = A \sin \theta

7.

True or False—Every 2-D vector can be expressed as the product of its x and y-components.

a. True
b. False

5.3 Projectile Motion 8.

Horizontal and vertical motions of a projectile are independent of each other. What is meant by this?

a. Any object in projectile motion falls at the same rate as an object in free fall, regardless of its horizontal velocity.
b. All objects in projectile motion fall at different rates, regardless of their initial horizontal velocities.
c. Any object in projectile motion falls at the same rate as its initial vertical velocity, regardless of its initial horizontal velocity.
d. All objects in projectile motion fall at different rates and the rate of fall of the object is independent of the initial velocity.

9.

Using the conventional choice for positive and negative axes described in the text, what is the y-component of the acceleration of an object experiencing projectile motion?

a. {-9.8}\,\text{m/s}
b. {-9.8}\,\text{m/s}^2
c. 9.8\,\text{m/s}
d. 9.8\,\text{m/s}^2

5.4 Inclined Planes 10.

True or False—Kinetic friction is less than the limiting static friction because once an object is moving, there are fewer points of contact, and the friction is reduced. For this reason, more force is needed to start moving an object than to keep it in motion.

a. True
b. False

11.

When there is no motion between objects, what is the relationship between the magnitude of the static friction f_\text{s} and the normal force N?

a. f_\text{s} \le N
b. f_s \le \mu_\text{s}N
c. f_s \ge N
d. f_s \ge \mu_\text{s}N

12.

What equation gives the magnitude of kinetic friction?

a. f_\text{k} = \mu_\text{s}N
b. f_\text{k} = \mu_\text{k}N
c. f_\text{k} \le \mu_\text{s}N
d. f_\text{k} \le \mu_\text{k}N

5.5 Simple Harmonic Motion 13.

Why is there a negative sign in the equation for Hooke's law?

a. The negative sign indicates that displacement decreases with increasing force.
b. The negative sign indicates that the direction of the applied force is opposite to that of displacement.
c. The negative sign indicates that the direction of the restoring force is opposite to that of displacement.
d. The negative sign indicates that the force constant must be negative.

14.

With reference to simple harmonic motion, what is the equilibrium position?

a. The position where velocity is the minimum
b. The position where the displacement is maximum
c. The position where the restoring force is the maximum
d. The position where the object rests in the absence of force

15.

What is Hooke's law?

a. Restoring force is directly proportional to the displacement from the mean position and acts in the the opposite direction of the displacement.
b. Restoring force is directly proportional to the displacement from the mean position and acts in the same direction as the displacement.
c. Restoring force is directly proportional to the square of the displacement from the mean position and acts in the opposite direction of the displacement.
d. Restoring force is directly proportional to the square of the displacement from the mean position and acts in the same direction as the displacement.