

Problems

5.1 Vector Addition and Subtraction: Graphical Methods 25.

A person attempts to cross a river in a straight line by navigating a boat at 15 m/s . If the river flows at 5.0 m/s from his left to right, what would be the magnitude of the boat's resultant velocity? In what direction would the boat go, relative to the straight line across it?

- The resultant velocity of the boat will be 10.0 m/s . The boat will go toward his right at an angle of 26.6° to a line drawn across the river.
- The resultant velocity of the boat will be 10.0 m/s . The boat will go toward his left at an angle of 26.6° to a line drawn across the river.
- The resultant velocity of the boat will be 15.8 m/s . The boat will go toward his right at an angle of 18.4° to a line drawn across the river.
- The resultant velocity of the boat will be 15.8 m/s . The boat will go toward his left at an angle of 18.4° to a line drawn across the river.

26.

A river flows in a direction from south west to north east at a velocity of 7.1 m/s . A boat captain wants to cross this river to reach a point on the opposite shore due east of the boat's current position. The boat moves at 13 m/s . Which direction should it head towards if the resultant velocity is 19.74 m/s ?

- It should head in a direction 22.6° east of south.
- It should head in a direction 22.6° south of east.
- It should head in a direction 45.0° east of south.
- It should head in a direction 45.0° south of east.

5.2 Vector Addition and Subtraction: Analytical Methods 27.

A person walks 10.0 m north and then 2.00 m east. Solving analytically, what is the resultant displacement of the person?

- $\vec{R} = 10.2\text{ m}$, $\theta = 78.7^\circ$ east of north
- $\vec{R} = 10.2\text{ m}$, $\theta = 78.7^\circ$ north of east
- $\vec{R} = 12.0\text{ m}$, $\theta = 78.7^\circ$ east of north
- $\vec{R} = 12.0\text{ m}$, $\theta = 78.7^\circ$ north of east

28.

A person walks 12° north of west for 55 m and 63° south of west for 25 m . What is the magnitude of his displacement? Solve

analytically.

- a. 10.84 m
- b. 65.1 m
- c. 66.04 m
- d. 80.00 m

5.3 Projectile Motion 29.

A water balloon cannon is fired at 30 m/s at an angle of 50° above the horizontal. How far away will it fall?

- a. 2.35 m
- b. 3.01 m
- c. 70.35 m
- d. 90.44 m

30.

A person wants to fire a water balloon cannon such that it hits a target 100 m away. If the cannon can only be launched at 45° above the horizontal, what should be the initial speed at which it is launched?

- a. 31.3 m/s
- b. 37.2 m/s
- c. 980.0 m/s
- d. $1,385.9\text{ m/s}$

5.4 Inclined Planes 31.

A coin is sliding down an inclined plane at constant velocity. If the angle of the plane is 10° to the horizontal, what is the coefficient of kinetic friction?

- a. $\mu_k = 0$
- b. $\mu_k = 0.18$
- c. $\mu_k = 5.88$
- d. $\mu_k = \infty$

32.

A skier with a mass of 55 kg is skiing down a snowy slope that has an incline of 30° . Find the coefficient of kinetic friction for the skier if friction is known to be 25 N .

- a. $\mu_k = 0$
- b. $\mu_k = 0.05$
- c. $\mu_k = 0.09$
- d. $\mu_k = \infty$

5.5 Simple Harmonic Motion 33.

What is the time period of a 6 cm long pendulum on earth?

- a. 0.08 s
- b. 0.49 s
- c. 4.9 s
- d. 80 s

34.

A simple harmonic oscillator has time period 4 s . If the mass of the system is 2 kg , what is the force constant of the spring used?

- a. 0.125 N/m
- b. 0.202 N/m
- c. 0.81 N/m
- d. 4.93 N/m