Due date: Wed May 23 08:00:00 pm 2018 (EDT)

The velocity vector $\mathbf{V}_1$ has a magnitude of 4.0 m/s and is directed along the +x-axis. The velocity vector $\mathbf{V}_2$ has a magnitude of 3.0 m/s. The sum of the two is $\mathbf{V}_3$, so that $\mathbf{V}_3 = \mathbf{V}_1 + \mathbf{V}_2$

Choices: **True**, **False**.

- The magnitude of $\mathbf{V}_3$ can be 6.0 m/s
- The magnitude of $\mathbf{V}_3$ can be 0.0
- The magnitude of $\mathbf{V}_3$ can be -4.0 m/s
- The magnitude of $\mathbf{V}_3$ can be 7.0 m/s
- The x-component of $\mathbf{V}_3$ can be 4.0 m/s
- The magnitude of $\mathbf{V}_3$ can be 8.0 m/s

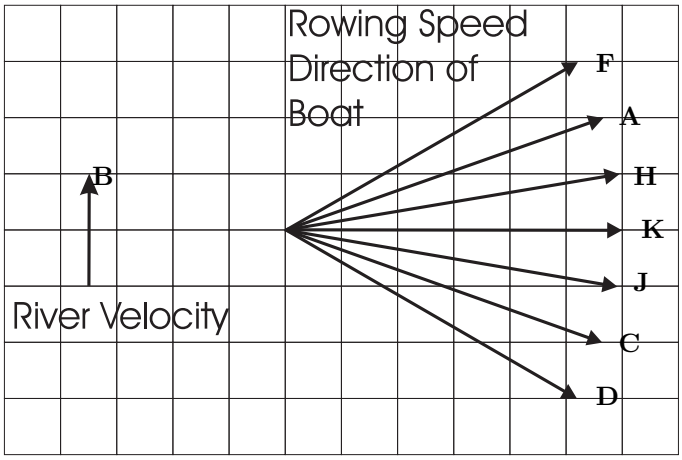
Tries 0/20

A boat crossing a 155.0 m wide river is directed so that it will cross the river as quickly as possible.

The boat has a speed of 5.30 m/s in still water and the river flows uniformly at 3.10 m/s. Calculate the total distance the boat will travel to reach the opposite shore.

Tries 0/20

A river is to be crossed by a girl using a row boat.



Assume that the water has uniform velocity, represented above by the vector labeled B. The rowing speed of the girl and a set of possible orientation of her boat are also shown. Select the direction (i.e., F, or C, or ...) in order to cross the river in the shortest time. (Notice that the number of tries is reduced.)

Tries 0/20

For which rowing orientation will the girl land on the opposite shore directly across from her starting position, neither upstream or downstream. (Notice that the number of tries is reduced.)

Tries 0/20

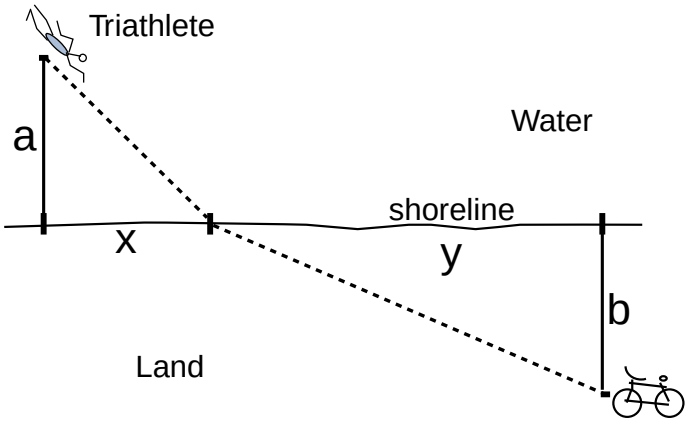
Select an answer for each .... below.

Choices: **Greater than**, **Less than**, **Equal to**.

- For an observer on shore, the speed of the boat for J is .... for K.
- The distance traveled in crossing for F is .... for D.
- Time to row across for F is .... for D.
- Time to row across for D is .... for C.
- Time to row across for F is .... for A.

Tries 0/20

A triathlete on the swimming leg of a triathlon is 150.0 m from the shore (**a**). The triathlete's bike is 80.0 m from the shore on the land (**b**). The component of her distance from the bicycle along the shore line, (x + y in the diagram), is 176.0 m.



If the triathlete's running speed is 7.95 m/s and swimming speed is 1.510 m/s, calculate the value of x so that the triathlete reaches her bike in the least amount of time.

Tries 0/20

Calculate the minimum time required to reach the bicycle.

Tries 0/20

An artillery shell is launched on a flat, horizontal field at an angle of $\alpha = 38.7°$ with respect to the horizontal and with an initial speed of $v_0 = 253$ m/s. What is the horizontal distance covered by the shell after 4.21 s of flight?

Tries 0/20

What is the height of the shell at this moment?

Tries 0/20

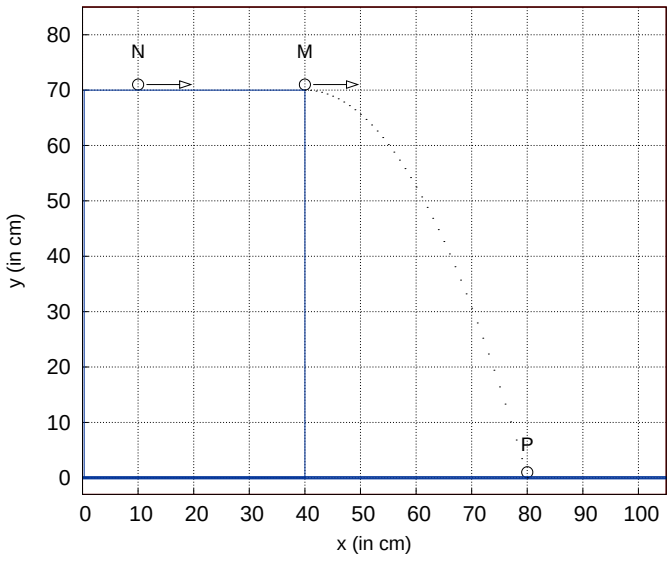
A baseball is projected horizontally with an initial speed of 15.9 m/s from a height of 1.79 m. At what horizontal distance will the ball hit the ground? (Neglect air friction.)

Tries 0/20

What is the speed of the baseball when it hits the ground?

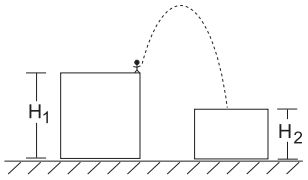
Tries 0/20

A very small steel marble is shown rolling at a constant speed on a horizontal table. The marble leaves the table at M, falls, and hits the ground at P. This is illustrated in the diagram below which is drawn to scale. Calculate the time it took the marble to travel from N to P.



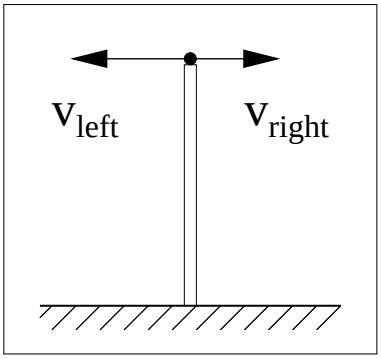
Tries 0/20

A boy standing on top of a building throws a small ball from a height of $H_1 = 31.0$ m. (See figure.) The ball leaves with a speed of 16.1 m/s, at an angle of 67.0 degrees from the horizontal, and lands on a building with a height of $H_2 = 15.0$ m. Calculate for how long the ball is in the air. (Neglect air friction, and use $g = 9.81$ m/s^2.)



Tries 0/20

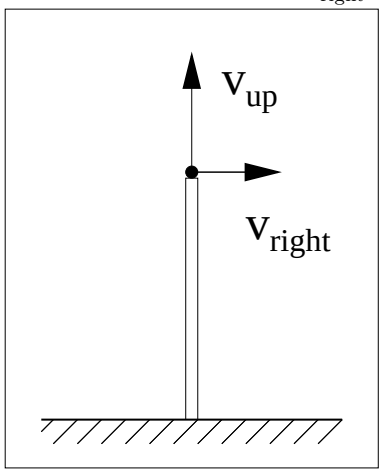
Two rocks are thrown from the top of a very tall tower. One of them is thrown horizontally to the left with an initial velocity of $v_{left} = 18.4$ m/s. The other rock is thrown horizontally to the right with an initial velocity of $v_{right} = 13.1$ m/s. (See figure.)



How far will the rocks be from each other after 5.45 s? (Neglect air resistance and assume that the rocks will not hit the ground within the time period in question.)

Tries 0/20

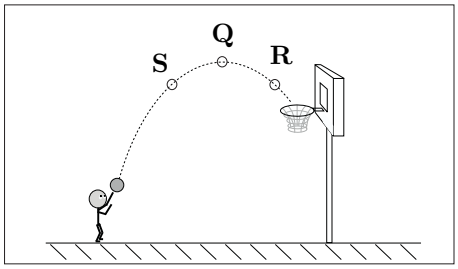
Two rocks are thrown from the top of a very tall tower. One of them is thrown vertically up with an initial velocity of v_{up} = 18.7 m/s. The other rock is thrown horizontally to the right with an initial velocity of v_{right} = 12.8 m/s. (See figure.)



How far will the rocks be from each other after 2.54 s? (Neglect air resistance and assume that the rocks will not hit the ground or the tower.)

Tries 0/20

A player shoots a basketball as shown below.



Points S and R are at the same height and Q is at the top of the trajectory. All statements refer to the basketball. Coordinate system: the **x**-axis is horizontal and points to the right, the **y**-axis is vertical and points up. (Neglect air friction.)

Choices: **greater than**, **less than**, **equal to**.

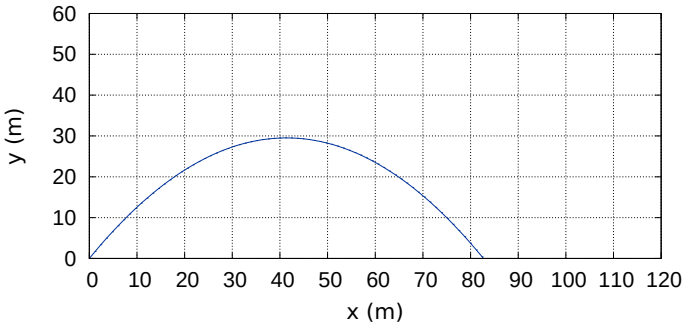
- The x-component of the velocity at Q is .... that at S.
- The y-component of the velocity at R is .... at S.
- The speed at R is .... that at S.
- The y-component of the acceleration at Q is .... zero.
- The acceleration at R is .... that at S.

Tries 0/20

If the range of a projectile's trajectory is eight times larger than the height of the trajectory, then what was the angle of launch with respect to the horizontal? (Assume a flat and horizontal landscape.)

Tries 0/20

After a long day of hard work astronauts on Planet-X are playing a little bit of golf. The ball is hit and it takes off with an initial speed of 17.8 m/s. The trajectory of the ball is shown in the figure.



What is the magnitude of the gravitational acceleration on Planet-X? (Planet-X doesn't have any atmosphere.)

Tries 0/20
