

Quiz #3

Please print your name:

Problem 1. A mountain climber is about to haul up a hanging rope. How much work will this take if the rope is 10 ft long and weighs 0.1 lb/ft?

(For full credit, you need to write down an integral for the amount of work.)

Solution. Make a sketch! Consider the piece of the rope of length dx which needs to be pulled up x feet. The work for this small piece is $F \cdot d = (0.1 dx) \cdot (x)$.

Since there is such pieces from $x = 0$ to $x = 10$, the total work required is

$$\text{work} = \int_0^{10} 0.1x \, dx = 0.1 \left[\frac{1}{2}x^2 \right]_0^{10} = 0.1 \cdot 50 = 5 \text{ ft-lb.}$$

□

Problem 2. (Bonus) What is (roughly) the speed of light (in vacuum)? Circle the correct choice for a small bonus.

(a) 300,000 km/s = 186,000 miles/s

(c) 300 km/s = 186 miles/s

(b) 20,000 km/s = 12,400 miles/s

(d) 343 m/s = 1126 ft/s

Which of the following is closest to the radius of earth?

(a) 300,000 km = 186,000 miles

(c) 6,370 km = 3,960 miles

(b) 20,000 km = 12,400 miles

(d) 1,740 km = 1080 miles

Solution.

- The correct choice is (a).

[Choice (d) is the speed of sound in air.]

- The correct choice is (c).

[Choice (d) is the radius of the moon.]

□