Use the passage below to answer questions 9–10.

A spring scale has a spring with a force constant of 250 N/m and a weighing pan with a mass of 0.075 kg. During one weighing, the spring is stretched a distance of 12 cm from equilibrium. During a second weighing, the spring is stretched a distance of 18 cm.

9. How much greater is the elastic potential energy of the stretched spring during the second weighing than during the first weighing?

A. $\frac{9}{4}$

B. $\frac{3}{2}$

C. $\frac{2}{3}$

D. $\frac{4}{9}$

10. If the spring is suddenly released after each weighing, the weighing pan moves back and forth through the equilibrium position. What is the ratio of the pan's maximum speed after the second weighing to the pan's maximum speed after the first weighing? Consider the force of gravity on the pan to be negligible.

F. $\frac{9}{4}$

G. $\frac{3}{2}$

H. $\frac{2}{3}$

J. $\frac{4}{9}$

SHORT RESPONSE

11. A student with a mass of 66.0 kg climbs a staircase in 44.0 s. If the distance between the base and the top of the staircase is 14.0 m, how much power will the student deliver by climbing the stairs?

Base your answers to questions 12–13 on the information below.

A 75.0 kg man jumps from a window that is 1.00 m above a sidewalk.

12. Write the equation for the man's speed when he strikes the ground.

13. Calculate the man's speed when he strikes the ground.

EXTENDED RESPONSE

Base your answers to questions 14–16 on the information below.

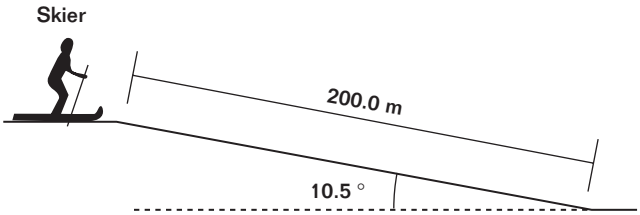
A projectile with a mass of 5.0 kg is shot horizontally from a height of 25.0 m above a flat desert surface. The projectile's initial speed is 17 m/s. Calculate the following for the instant before the projectile hits the surface:

14. The work done on the projectile by gravity.

15. The change in kinetic energy since the projectile was fired.

16. The final kinetic energy of the projectile.

17. A skier starts from rest at the top of a hill that is inclined at 10.5° with the horizontal. The hillside is 200.0 m long, and the coefficient of friction between the snow and the skis is 0.075. At the bottom of the hill, the snow is level and the coefficient of friction is unchanged. How far does the skier move along the horizontal portion of the snow before coming to rest? Show all of your work.



Test TIP When solving a mathematical problem, you must first decide which equation or equations you need to answer the question.