Bonus Homework for §8.4 Calculus 2 2/14/2005

Each problem is worth zero points, but there is a chance you'll learn some math.

1. A force of 8 pounds is required to hold a spring stretched 6 inches beyond its natural length. How much work is done in stretching it from 6 inches to 12 inches beyond its natural length?

k = 16, Work = 6 foot-pounds

2. A spring has a natural length of 10cm. If 5N of force are required to hold it stretched to a length of 12cm, how much work is required to stretch it from natural length to 15cm?

k = 250, Work = 0.3125 Joules

3. Suppose that 6J of work are required to hold a spring stretched to a length of 60cm rather than its natural length of 50cm. How much work is required to stretch it from 50cm to 80cm?

k = 1200, Work = 54 Joules

4. If 10 foot-pounds of work stretches a spring from its natural length of 8 inches to a length of 12 inches, how much force is required to hold it stretched to that 12 inch length?

k = 180, Force = 60 pounds

5. If 3N of force holds a spring stretched to a length of 20cm and 5N of force holds it stretched to a length of 25cm, how much work is required to stretch it from 20cm to 25cm?

l = 12.5cm, k = 2/5, Work = 0.002 Joules

6. If a spring requires 30 foot-pounds of work to stretch from a natural length of 24 inches to 30 inches, how far will 15 foot-pounds of work stretch it?

k = 240, distance $\approx$ 0.35 feet beyond natural length $\approx$ 28 inches

7. Generalize problem 6: If n foot-pounds of work stretch a spring from natural length to f feet beyond natural length, how far will $n/2$ foot-pounds of work stretch it?

$$k = \frac{2n}{f^2}, \quad b = \frac{f}{\sqrt{2}}$$