

Halliday Resnick Walker

**FUNDAMENTALS OF PHYSICS
SIXTH EDITION**

Selected Solutions

Chapter 1

1.9

1.17

9. We use the conversion factors found in Appendix D.

$$1 \text{ acre} \cdot \text{ft} = (43,560 \text{ ft}^2) \cdot \text{ft} = 43,560 \text{ ft}^3.$$

Since $2 \text{ in.} = (1/6) \text{ ft}$, the volume of water that fell during the storm is

$$V = (26 \text{ km}^2)(1/6 \text{ ft}) = (26 \text{ km}^2)(3281 \text{ ft/km})^2(1/6 \text{ ft}) = 4.66 \times 10^7 \text{ ft}^3.$$

Thus,

$$V = \frac{4.66 \times 10^7 \text{ ft}^3}{4.3560 \times 10^4 \text{ ft}^3/\text{acre} \cdot \text{ft}} = 1.1 \times 10^3 \text{ acre} \cdot \text{ft}.$$

17. The last day of the 20 centuries is longer than the first day by

$$(20 \text{ century})(0.001 \text{ s/century}) = 0.02 \text{ s}.$$

The average day during the 20 centuries is $(0 + 0.02)/2 = 0.01 \text{ s}$ longer than the first day. Since the increase occurs uniformly, the cumulative effect T is

$$\begin{aligned} T &= (\text{average increase in length of a day})(\text{number of days}) \\ &= \left(\frac{0.01 \text{ s}}{\text{day}} \right) \left(\frac{365.25 \text{ day}}{\text{y}} \right) (2000 \text{ y}) \\ &= 7305 \text{ s} \end{aligned}$$

or roughly two hours.