

## Pendulum Answers

1. a. period =  $\frac{\text{seconds}}{\text{cycle}}$   $\frac{56 \text{ sec}}{32 \text{ cycle}} = \boxed{1.75 \text{ s}}$

b. frequency =  $\frac{\text{cycles}}{\text{second}}$   $\frac{32 \text{ cycles}}{56 \text{ sec}} = \boxed{.57 \text{ Hz}}$

c. length:  $T = 2\pi\sqrt{\frac{L}{g}}$   $1.75 = 2\pi\sqrt{\frac{L}{9.8}}$   
 $\boxed{L = 0.76 \text{ m}}$

2.  $T = 2\pi\sqrt{\frac{L}{g}}$   $T = 2\pi\sqrt{\frac{16}{9.8}}$   $\boxed{T = 8 \text{ s}}$

3.  $T = 2\pi\sqrt{\frac{L}{g}}$   $2 = 2\pi\sqrt{\frac{L}{9.8}}$   $\boxed{L = .99 \text{ m}}$

4.  $T = \frac{1}{f}$   $T = \frac{1}{.8 \text{ Hz}}$   $T = 1.25$   $1.25 = 2\pi\sqrt{\frac{L}{9.8}}$   
 $\boxed{L = 0.4 \text{ m}}$

5.  $T = 2\pi\sqrt{\frac{L}{g}}$   $10 = 2\pi\sqrt{\frac{L}{1.6}}$   $\boxed{L = 0.04 \text{ m}}$

6.  $T = 2\pi\sqrt{\frac{L}{g}}$   $T = 2\pi\sqrt{\frac{1 \text{ m}}{9.8}} = T = 2 \text{ s}$   $f = \frac{1}{T} = \frac{1}{2}$   
 $\boxed{f = 0.5 \text{ Hz}}$

7.  $f$  is still  $0.5 \text{ Hz}$ .

8.  $T = 2\pi\sqrt{\frac{L}{g}}$   $T = 2\pi\sqrt{\frac{4}{9.8}}$   $\boxed{T = 4 \text{ s}}$

10.  $T = 2\pi\sqrt{\frac{L}{g}}$   $10 = 2\pi\sqrt{\frac{L}{9.8}}$   $\boxed{L = .25 \text{ m}}$

$$14. T = 2\pi\sqrt{\frac{L}{g}} \quad 2.4s = 2\pi\sqrt{\frac{1.3}{g}} \quad \boxed{g = 8.9 \text{ m/s}^2}$$

$$15. f = \frac{1}{T} = \frac{1}{3.0} \quad \boxed{f = .3 \text{ Hz}}$$

$$18. T = \frac{1}{f} \quad T = \frac{1}{.8} \quad T = 1.25s \quad T = 2\pi\sqrt{\frac{L}{g}} \quad 1.25s = 2\pi\sqrt{\frac{L}{9.8}} \\ \boxed{L = 0.4m}$$

$$19. T = \frac{1}{f} \quad T = \frac{1}{.57} \quad T = 1.75s \quad T = 2\pi\sqrt{\frac{L}{g}} \quad 1.75s = 2\pi\sqrt{\frac{.75}{g}} \\ \boxed{g = 9.7 \text{ m/s}^2}$$

$$20. T = 2\pi\sqrt{\frac{L}{g}} \quad 1s = 2\pi\sqrt{\frac{L}{1.6}} \quad \boxed{L = .04m}$$

$$23. T = 2\pi\sqrt{\frac{L}{g}} \quad 6.9s = 2\pi\sqrt{\frac{L}{9.8}} \quad \boxed{L = 11.8m}$$