Physics 20: Pre-Requisite Skills Continued

Name: *Key.*

Pt. A: Solve for the given variable. Show your work.

1) $d = v_{ave}t$ $t = $ $\dfrac{d}{V_{ave}}$

2) $v_{ave} = \dfrac{v_1 + v_2}{2}$ $v_2 = $ $2V_{ave} - V_1$

$2V_{ave} = V_1 + V_2$

3) $a = \dfrac{v_2^2 - v_1^2}{2d}$ $d = $ $\dfrac{V_2^2 - V_1^2}{2a}$

$2d = \dfrac{V_2^2 - V_1^2}{a}$

4) $d = v_1 t + \frac{1}{2}at^2$ $a = $ $\dfrac{2(d - V_1 t)}{t^2}$

$d - V_1 t = \frac{1}{2}at^2$

$2(d - V_1 t) = at^2$

5) $a_c = \dfrac{v_c^2}{r}$ $v_c = $ $\sqrt{a_c r}$

$a_c r = V_c^2$

6) $T = \dfrac{1}{f}$

$f = \dfrac{1}{T}$

7) $T = 2\pi\sqrt{\dfrac{m}{k}}$

$m = \dfrac{T^2 k}{4\pi^2}$

$$\left(\dfrac{T}{2\pi}\right)^2 = \dfrac{m}{k}$$

8) $\dfrac{1}{f} = \dfrac{1}{d_o} + \dfrac{1}{d_i}$

$d_i = \dfrac{fd_o}{d_o - f}$
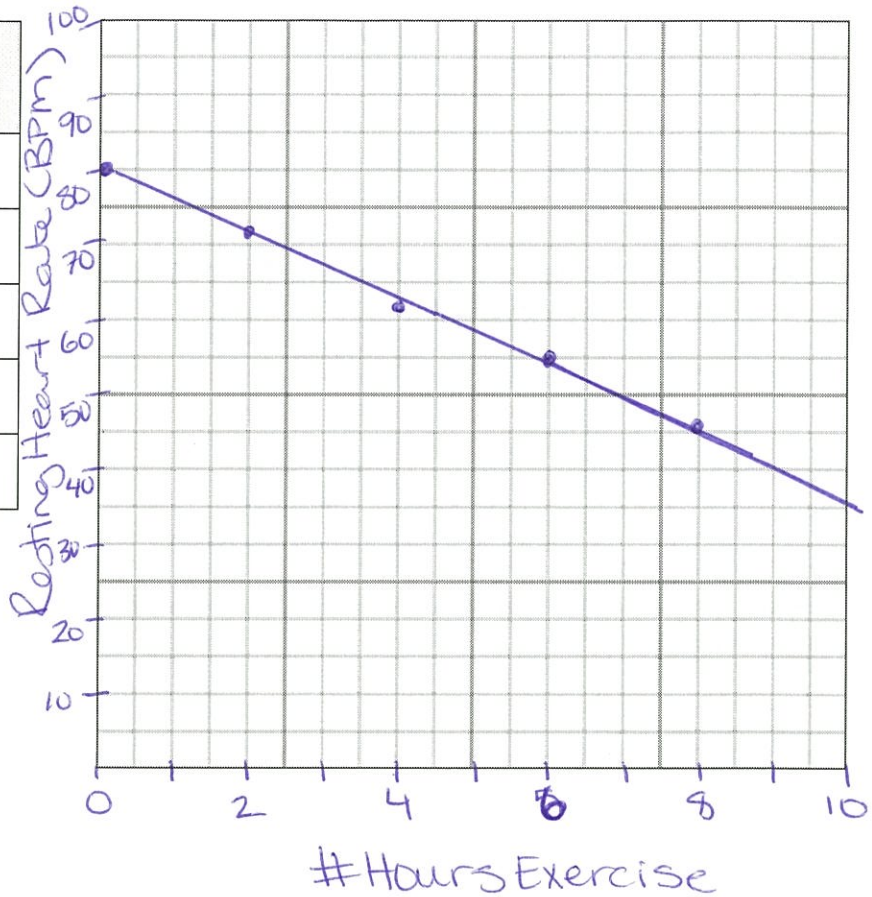
$$\dfrac{1}{f} - \dfrac{1}{d_o} = \dfrac{1}{d_i}$$

$$\dfrac{d_o - f}{fd_o} = \dfrac{1}{d_i}$$

Pt. B: Graphing –the following data showing the resting heart rate of people corresponding to number of hours of exercise per week:

# Hours Exercise	Resting Heart Rate (BPM)
0	80
2	73
4	63
6	55
8	46

Resting Heart Rate (BPM)

Hours Exercise

a) Graph the data on the grid provided. Label the graph.

b) Make a line of best fit.

c) Interpolate the resting heart rate of a person who exercises for 5 hours per week.

59 BPm

d) Extrapolate the resting heart rate for a person who exercises 10 hours per week.
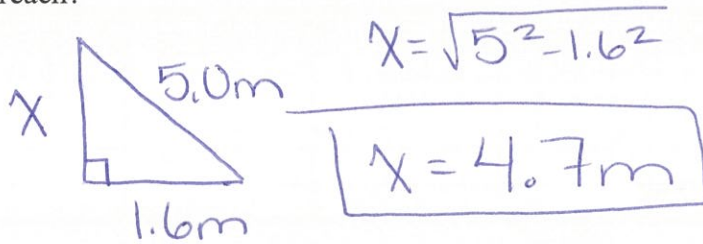
35 BPm

e) Calculate the slope of the line and determine what it means.

$$m = \frac{rise}{run} = \frac{-45}{10} = -4.5 \, BPm/\text{hour exercise}$$

heart rate decreases 4.5 BPm for each hour exercise/week increase.

Pt. C: Show all work, including a diagram, to receive full marks.

1. If the bottom of a 5.0 m ladder is 1.6 m from a wall, how high on the wall does it reach?

$$X = \sqrt{5^2 - 1.6^2}$$

$$\boxed{X = 4.7m}$$

5.0m

X

1.6m

2. A wire from the top of a telephone pole to a point on the ground 6.0 m from the pole is 10 m long. How high is the pole?

$$X = \sqrt{10^2 - 6.0^2}$$

$$\boxed{X = 8.0m}$$

X

10m

6.0m
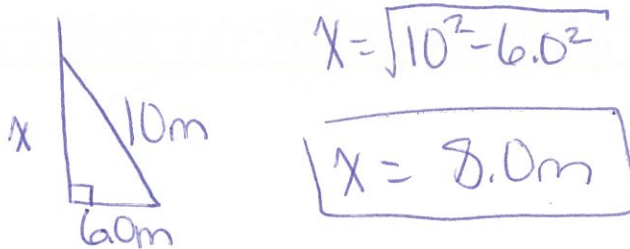
3. *Using trigonometric ratios* solve for θ or the identified variable "x" for the following right triangles.

6.0

x

7.0

θ

5.0

x

35°

5.0

5.0

θ
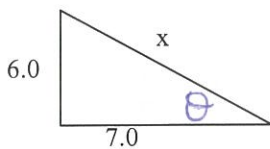
$$X = \sqrt{6.0^2 + 7.0^2}$$

$$\boxed{X = \sqrt{85}} \text{ exact}$$

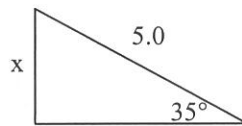$$\boxed{X \approx 9.2} \text{ approx.}$$
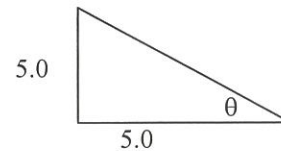
__or__

$$\tan\theta = \frac{6.0}{7.0} \quad \theta = 40.6012...°$$

$$\sin 40.6012...° = \frac{6.0}{X}$$

$$\boxed{X = 9.2}$$

$$\sin 35° = \frac{X}{5.0}$$

$$\boxed{X \doteq 2.9}$$

$$\tan\theta = \frac{5.0}{5.0}$$

$$\boxed{\theta = 45°}$$