

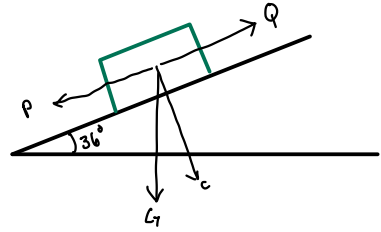
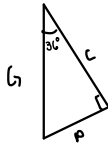
SI Week 12 Answers

1. a. $\tan(36^\circ) = \frac{p}{c}$
 $\tan(36^\circ) = \frac{p}{690} \Rightarrow p = 690 \tan(36^\circ)$
 $p = 501.31$

Notice that $|Q| = |P| \therefore Q = 501.31$

$p^2 + c^2 = G^2 \therefore 501^2 + 690^2 = 727101$

$G = \sqrt{727101} \Rightarrow G = 852.7$



b. Find Q:

$\sin(14^\circ) = \frac{p}{G}$

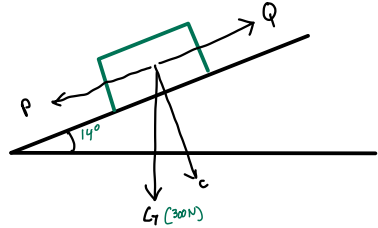
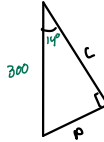
$\sin(14^\circ) = \frac{p}{300} \Rightarrow p = 300 \sin(14^\circ)$
 $p = 72.58$

$|P| = |Q| \therefore Q = 72.58$

Find c:

$p^2 + c^2 = G^2$

$c = \sqrt{G^2 - p^2} \Rightarrow c = \sqrt{300^2 - 72.58^2}$
 $c = 291.09$



c. Remember, $W = F_x D$, so we need the force in the x direction

$F_x = F \cos(\theta) \quad W = F_x D$

$F_x = 30 \cos(7^\circ) \quad W = 9.767 \cdot 14$

$F_x = 9.767 \text{ N} \quad W = 136.74 \text{ J}$

2.

$$a. (-2, \frac{\pi}{4})$$

$$x = r \cos \theta$$

$$x = -2 \cos(\frac{\pi}{4})$$

$$x = -2 \cdot \frac{\sqrt{2}}{2}$$

$$x = -\sqrt{2}$$

$$y = r \sin \theta$$

$$y = -2 \sin(\frac{\pi}{4})$$

$$\therefore$$

$$y = -\sqrt{2}$$

$$(-\sqrt{2}, -\sqrt{2})$$

$$b. x = -1 \cdot \cos(\frac{11\pi}{6})$$

$$x = -1 \cdot \frac{\sqrt{3}}{2}$$

$$x = -\frac{\sqrt{3}}{2}$$

$$y = -1 \cdot \sin(\frac{11\pi}{6})$$

$$y = -1 \cdot (-\frac{1}{2})$$

$$y = \frac{1}{2}$$

$$(-\frac{\sqrt{3}}{2}, \frac{1}{2})$$

$$c. x = r \cos \theta$$

$$y = r \sin \theta$$

$$r^2 = x^2 + y^2$$

$$\therefore r^2 - 3r \cos \theta = 0$$

$$r(r - 3 \cos \theta) = 0$$

$$\therefore \begin{aligned} r &= 0 & \text{or } r - 3 \cos \theta &= 0 \\ & & \text{or } r &= 3 \cos \theta \end{aligned}$$

pole, which included in

$$r = 3 \cos \theta$$

$$d. y = -\frac{\sqrt{3}}{3} x$$

$$r \sin \theta = -\frac{\sqrt{3}}{3} r \cos \theta$$

$$r \sin \theta + \frac{\sqrt{3}}{3} r \cos \theta = 0$$

$$r(\sin \theta + \frac{\sqrt{3}}{3} \cos \theta) = 0$$

$$r = 0 \quad \text{or} \quad \sin \theta + \frac{\sqrt{3}}{3} \cos \theta = 0$$

$$\text{or} \quad \sin \theta = -\frac{\sqrt{3}}{3} \cos \theta$$

$$\text{or} \quad \tan \theta = -\frac{\sqrt{3}}{3}$$

$\therefore$

pole,

included in $\rightarrow$

$$\theta = -\frac{\pi}{6}$$