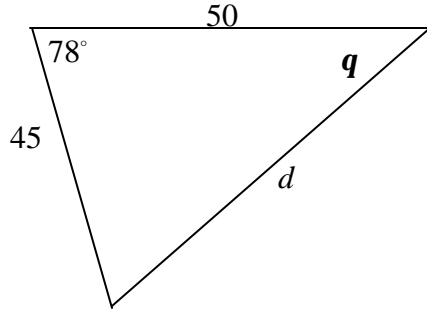


1.



$$d^2 = 50^2 + 45^2 - 2(50)(45)\cos 78^\circ \approx 3589.397$$

$$d \approx 59.91 \text{ feet}$$

a. $\frac{\sin q}{45} = \frac{\sin 78^\circ}{59.91}$

$$\sin q = \frac{45 \sin 78^\circ}{59.91} \approx 0.7347$$

$$q \approx 47.3^\circ$$

b. $59.91 \text{ feet} \cdot \frac{\text{hr}}{3 \text{ feet}} \approx 19.97 \text{ or } 20 \text{ hours}$

2 a.

$$\frac{\sin a}{36.0} = \frac{\sin 32.0^\circ}{24.5}$$

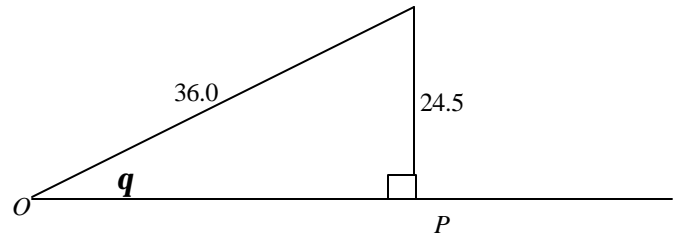
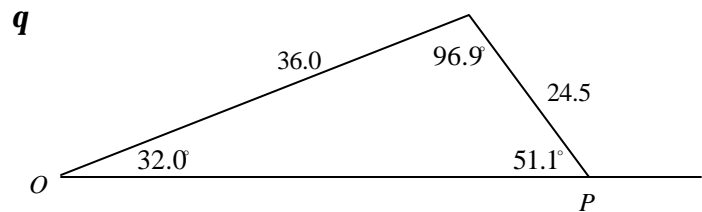
$$\sin q = \frac{36.0 \sin 32.0^\circ}{24.5} \approx 0.7786$$

$$q \approx 51.1^\circ \text{ or } 128.9^\circ$$

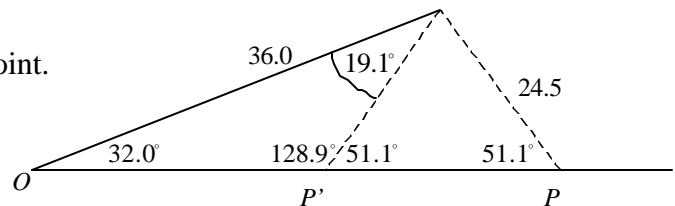
$$\frac{OP}{\sin 96.9^\circ} = \frac{24.5}{\sin 32.0^\circ}$$

$$OP = \frac{(\sin 96.9^\circ)24.5}{\sin 32.0^\circ} \approx 45.9 \text{ cm}$$

b. $\sin q = \frac{24.5}{36.0}$ so $q = \sin^{-1}\left(\frac{24.5}{36.0}\right) \approx 42.9^\circ$



- c. The maximum distance OP is 45.9 cm.
Let P' be the minimum position of the point.
We want OP' .
From part a, there are two situations
where q is minimum.



$$\frac{OP'}{\sin 19.1^\circ} = \frac{24.5}{\sin 32.0^\circ}$$

$$OP' = \frac{(\sin 19.1^\circ)24.5}{\sin 32.0^\circ} \approx 15.1 \text{ cm}$$

$$45.9 - 15.1 = 30.8 \text{ cm}$$

3. Answer Key to Rescue the Princess

$$\frac{\sin M}{250} = \frac{\sin 30^\circ}{150}$$

$$\sin M = \frac{250 \sin 30^\circ}{150}$$

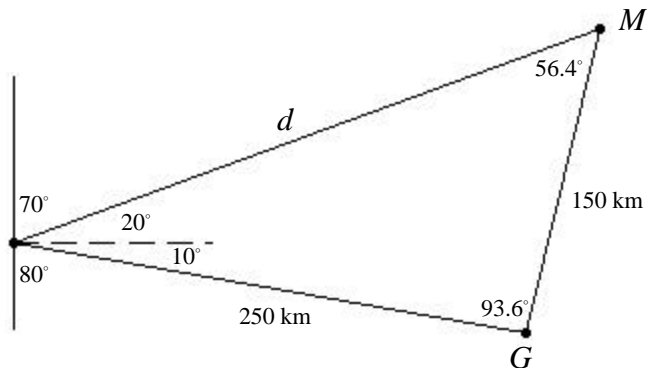
$$\sin M \approx 0.8333$$

$$M \approx 56.4^\circ$$

$$G = 180^\circ - 56.4^\circ - 30^\circ \\ \approx 93.6^\circ$$

$$\frac{d}{\sin 93.6^\circ} = \frac{150}{\sin 30^\circ}$$

$$d = \frac{150 \sin 93.6^\circ}{\sin 30^\circ} \\ \approx 299.4 \text{ km}$$



In a half hour, Luke's speeder would need to travel $\frac{299.4 \text{ km}}{0.5 \text{ hr}} \approx 598.8 \text{ km/hr}$ to reach Leia. Drat!

Choice B.

There are two angles M_1 and M_2 whose sine is 0.8333:

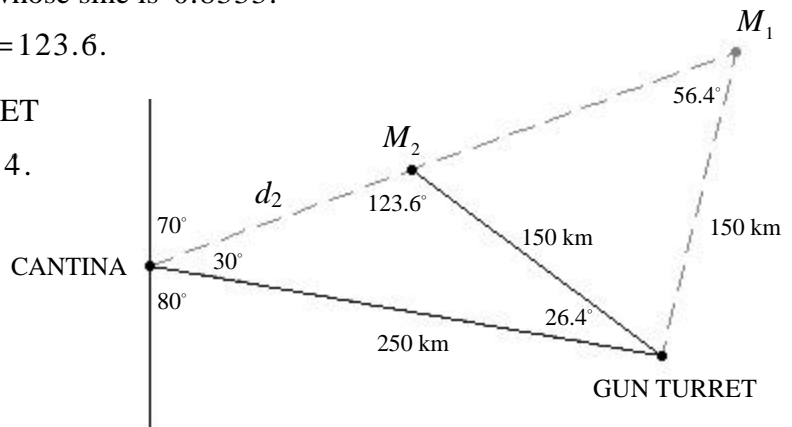
$$M_1 \approx 56.4^\circ \text{ and } M_2 \approx 180^\circ - 56.4^\circ = 123.6^\circ.$$

Then the angle at the GUN TURRET

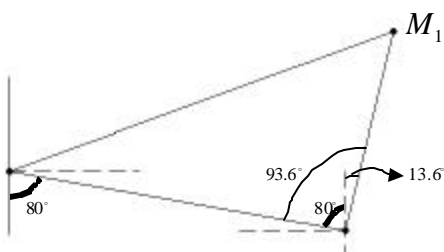
would be $180^\circ - 123.6^\circ - 30^\circ = 26.4^\circ$.

$$\frac{d_2}{\sin 26.4^\circ} = \frac{150}{\sin 30^\circ}$$

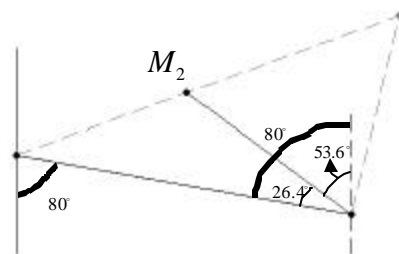
$$d_2 = \frac{150 \sin 26.4^\circ}{\sin 30^\circ} \\ \approx 133.4 \text{ km}$$



Leia could actually be only 133.4 km away from the Cantina.



$93.6^\circ - 80^\circ = 13.6^\circ$ so N 13.6° E to hit M_1



$80^\circ - 26.4^\circ = 53.6^\circ$ so N 53.6° W to hit M_2