

There is a board of 5 men and 6 women.

How many ways could the board...

1) ... elect a president, vice president and treasurer?

$${}_{11}P_3 = \boxed{990}$$

2) ... select a committee of 3 members?

$${}_{11}C_3 = \boxed{165}$$

3) ... select a committee of 2 men and 3 women?

$${}_5C_2 \cdot {}_6C_3 = \boxed{200}$$

4) ... arrange the 11 members around a conference table?

$$\frac{11!}{11} = \boxed{3,628,800}$$

Word

Problems

WB 304

Four main types of questions (not the only kind you will see, just the most common).

A. **Elevation**
Move Closer
Elevation - Key words
Uses:

Law of Sine

B. **2 Angles**
Dist. Between - Key words
Uses:

Law of Sine

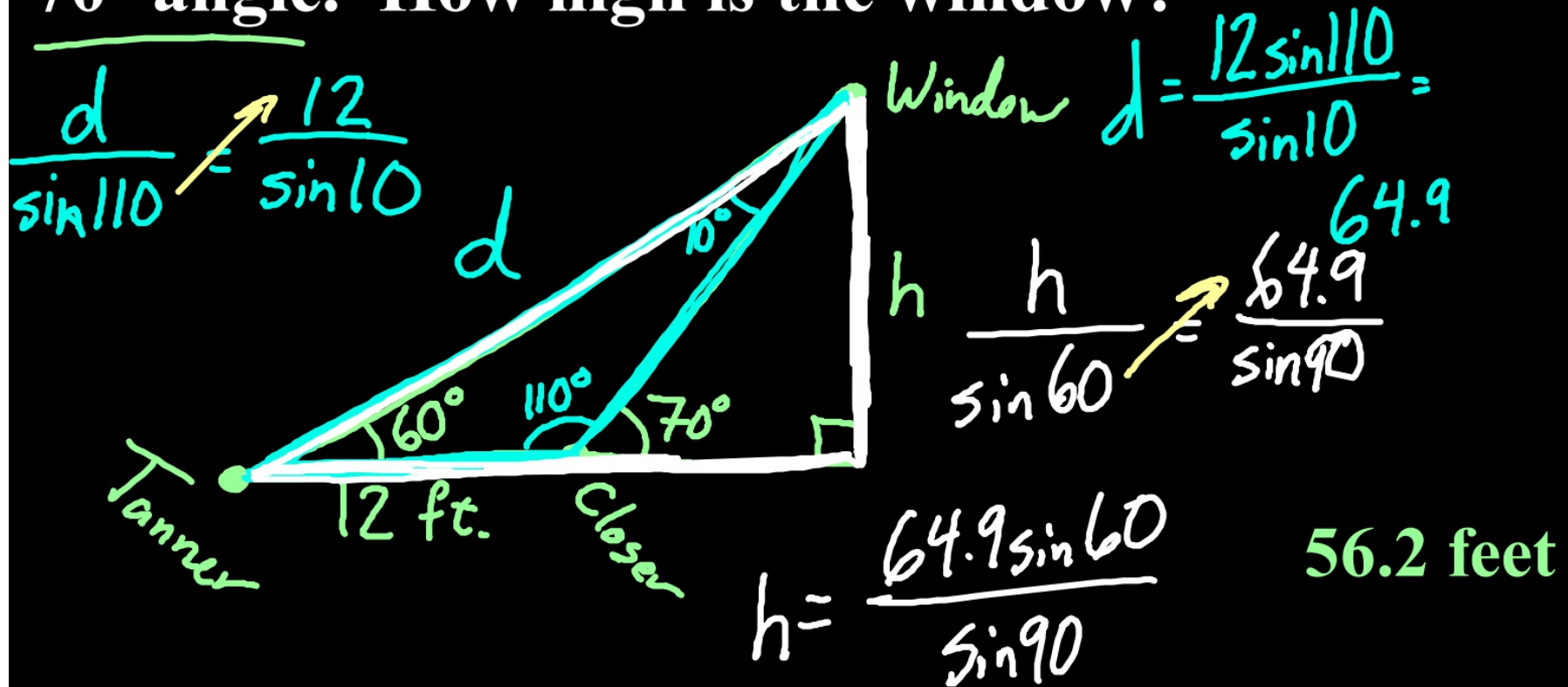
C. **2 Dist.**
Angle Between - Key words
Uses:

Law of Cosine

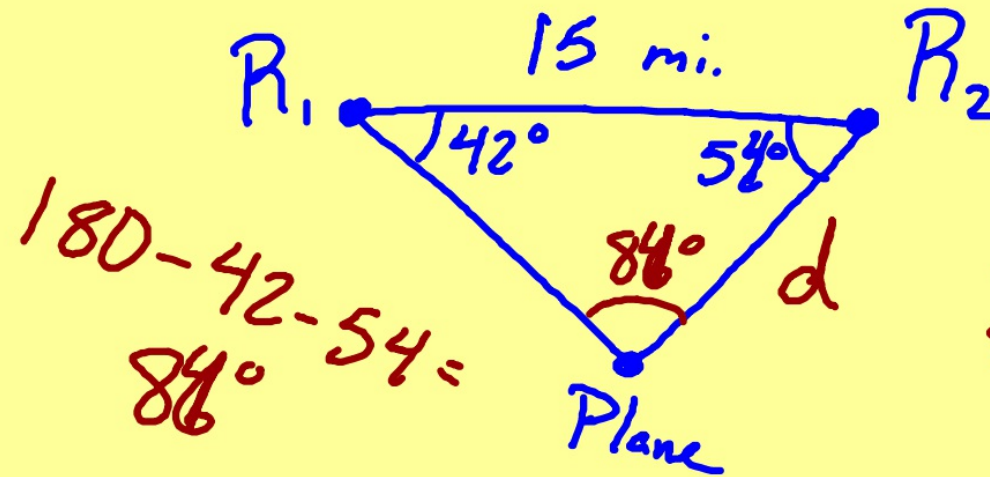
D. **Elevation**
Depression - Key words
Uses:

Tangent Shortcut

1) Tanner wants to throw a rock at a friend's apartment window and gets curious how high it is. He measures the angle of elevation to be 60° , walks 12 ft closer and measures a 70° angle. How high is the window?



2) Two ranger stations are 15 miles apart. There is a plane crash in the forest nearby. The angle formed from the line between to the wreck is 42° and 54°. How far is the closer station from the wreck?



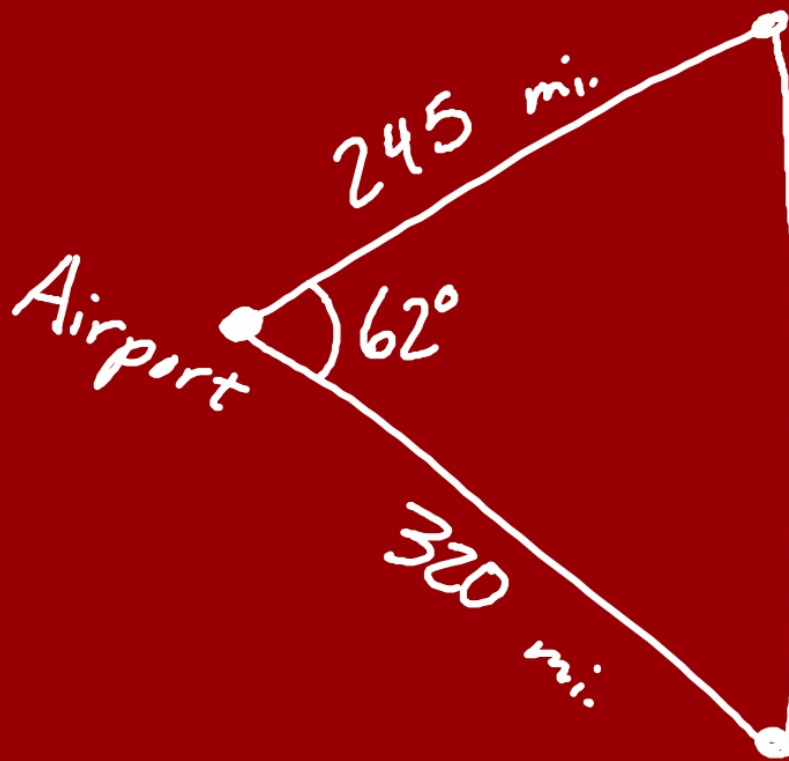
Dist.
Between

$$\frac{d}{\sin 42} = \frac{15}{\sin 84}$$

$$d = \frac{15 \sin 42}{\sin 84}$$

10.1 miles

3) Two airplanes leave from the same airport. One plane flies 245 miles and the other flies 320 miles, with a 62° angle between them. How far apart are the planes when they reach their destination?



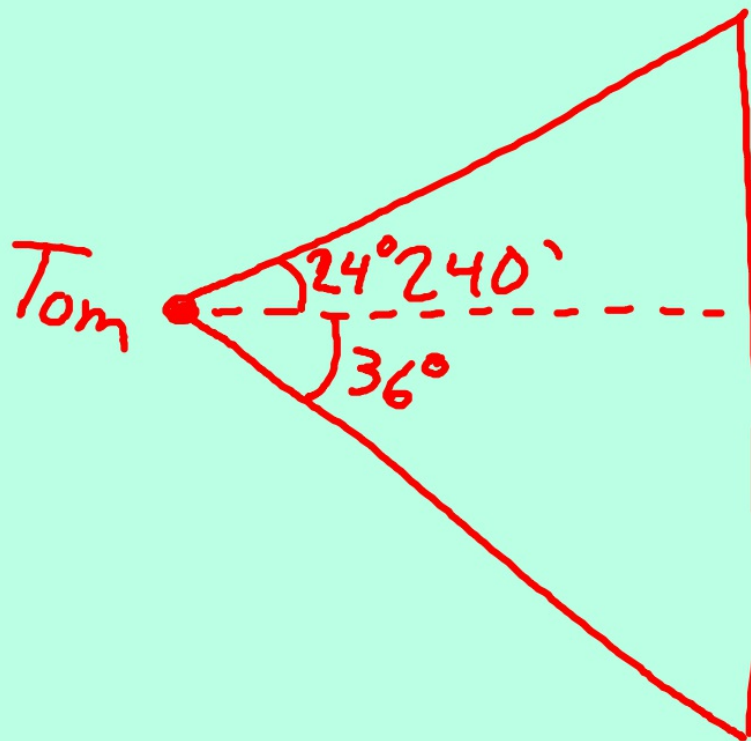
$$d^2 = 245^2 + 320^2 - 2(245)(320)\cos 62^\circ$$

$\sqrt{\text{Ans}}$

298 miles

4) Tom looks out of his apartment at another building 240 ft away. The angle of elevation to the top is 24° and the angle of depression to the bottom is 36° . How tall is the other building?

TANGENT



$$240 \tan 24 + 240 \tan 36$$

281.2 feet

Other Examples

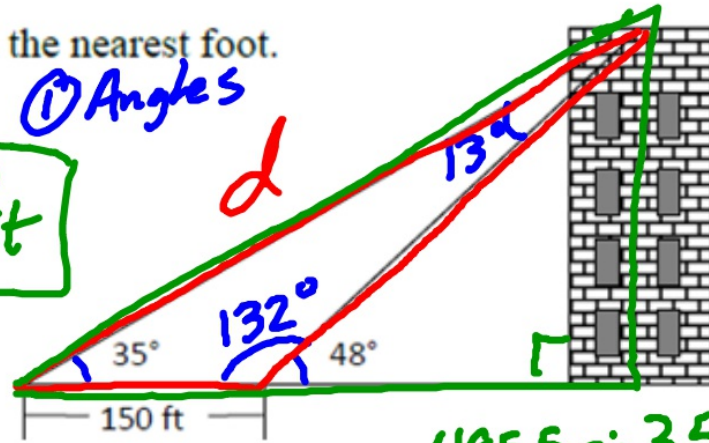
21. Find the height of the building in the figure below to the nearest foot.

② Law of Sine

$$\frac{d}{\sin 132} = \frac{150}{\sin 13}$$

$$d = \frac{150 \sin 132}{\sin 13} = 495.5$$

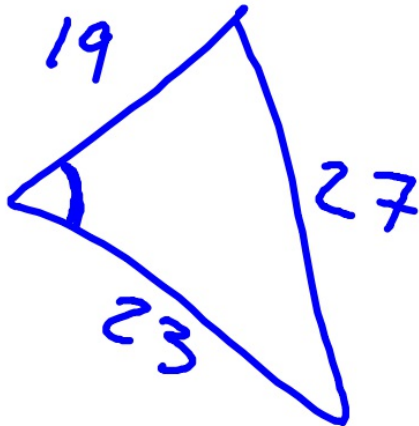
$$284.2 \text{ ft}$$



$$\frac{h}{\sin 35} = \frac{495.5}{\sin 90}$$

$$h = \frac{495.5 \sin 35}{\sin 90}$$

22. Peter has three sticks measuring 19 inches, 23 inches, and 27 inches. He lays them down to form a triangle. Find the measure of the angle enclosed by the 19 inch and 23 inch sides to the nearest degree.

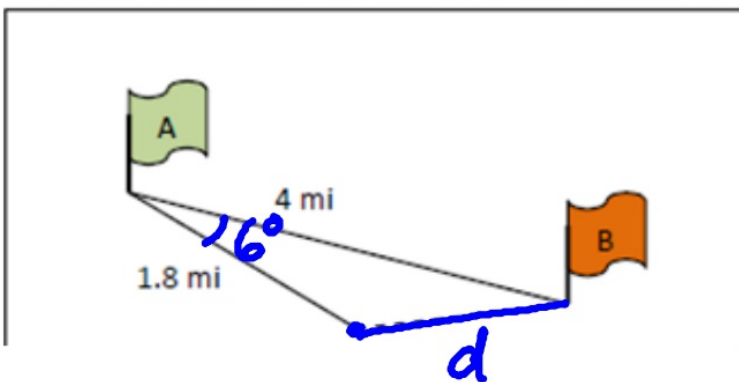


$$27^2 = 19^2 + 23^2 - 2(19)(23) \cos A$$

$$\cos^{-1} \left(\frac{27^2 - 19^2 - 23^2}{-2(19)(23)} \right) = A$$

$$79^\circ$$

23. Mary is orienteering across a large flat plain from Marker A to Marker B which are 4 miles apart. After walking 1.8 miles she realizes she is 6° off-course. To the nearest tenth of a mile, how far from Marker B is she when she realizes her error?



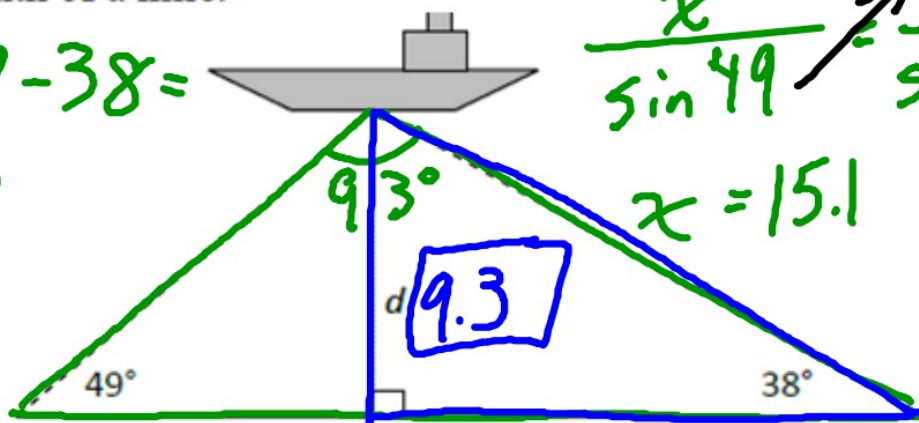
$$d^2 = 4^2 + 1.8^2 - 2(4)(1.8)\cos 6$$

$$d = \sqrt{\text{Ans}}$$

$$d = 2.2 \text{ miles}$$

24. Triangulation can be used to find the location of an object by measuring the angles to the object from two points at the end of a baseline. Two lookouts 20 miles apart on the coast spot a ship at sea. Using the figure below find the distance, d , the ship is from shore to the nearest tenth of a mile.

$$180 - 49 - 38 = 93$$



$$\frac{x}{\sin 49} = \frac{20}{\sin 93}$$

$$x = \frac{20 \sin 49}{\sin 93}$$

$$x = 15.1$$

$$\frac{d}{\sin 38} = \frac{15.1}{\sin 90}$$

$$d = \frac{15.1 \sin 38}{\sin 90}$$

Lookout A

20 miles

Lookout B

WB 305

#1-12

E.C. for All