

# Geometry

1. Express these trig ratios as fractions (exact values):

a.  $\sin 30$

d.  $\sin 45$

g.  $\sin 60$

b.  $\cos 30$

e.  $\cos 45$

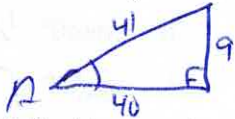
h.  $\cos 60$

c.  $\tan 30$

f.  $\tan 45$

i.  $\tan 60$

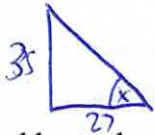
2. If  $\sin A = 9/41$ , find  $\cos A$  and  $\tan A$ .



$$\cos A = \frac{40}{41}$$

$$\tan A = \frac{9}{40}$$

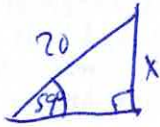
3. If a 35-foot tree casts a 27-foot shadow, find the angle of elevation to the sun at that time.



$$\tan X = \frac{35}{27}$$

$$X = \tan^{-1}\left(\frac{35}{27}\right) = 52.4^\circ$$

4. A 20-foot ladder makes an angle of elevation of  $59^\circ$ , how high up does it reach?



$$\sin(59^\circ) = \frac{X}{20}$$

$$X = 20 \sin(59^\circ) = 17.1 \text{ ft}$$

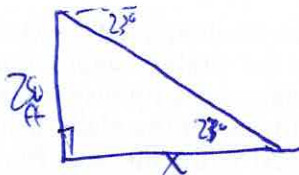
5. What angle of elevation for the ladder in #4 will be necessary for the ladder to reach up 18 feet?



$$\sin(X) = \frac{18}{20}$$

$$X = \sin^{-1}\left(\frac{18}{20}\right) \approx 64.2^\circ$$

6. An airplane at an altitude of 250 feet, coming in for landing, sights the beginning of the runway at an angle of declination of  $23^\circ$ . How far is the plane from being directly over the start of the runway?

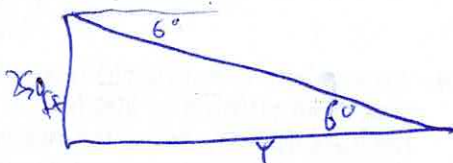


$$\tan(23^\circ) = \frac{250}{X}$$

$$X \tan(23^\circ) = 250$$

$$X = \frac{250}{\tan 23^\circ} = 589.0$$

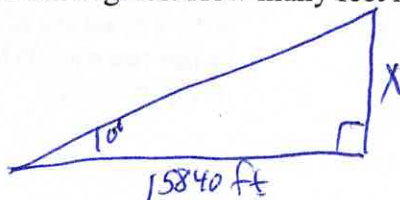
7. If the airplane in #6 also sights the end of the runway at an angle of declination of  $6^\circ$ , what is the length of the runway?



$$Y = \frac{250}{\tan 6^\circ} = 2378.6 \text{ ft}$$

$$Y - X = 1789.6 \text{ ft long}$$

8. An observer three miles from the launching of a space shuttle observes the shuttle at an angle of elevation of ten degrees. How many feet high is the shuttle at that time? (Note: 1 mile = 5280 feet.)



$$\tan(10^\circ) = \frac{X}{15840}$$

$$X = 15840 \tan(10^\circ) =$$

$$\underline{2793 \text{ ft}}$$