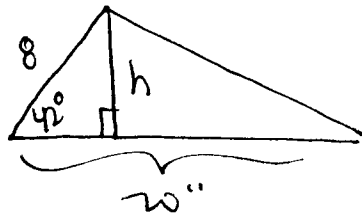


USING TRIG RATIOS

#1



$$\sin 42^\circ = \frac{h}{8}$$

$$8 \cdot \sin 42^\circ = h$$

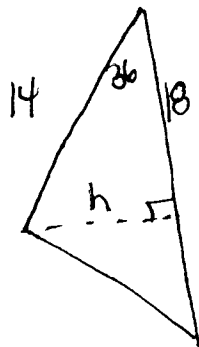
$$A = \frac{1}{2}bh$$

$$= \frac{1}{2}(20) \text{ need height}$$

$$A = \frac{1}{2}(20)(8 \cdot \sin 42^\circ)$$

$$A \approx 53.53$$

$$53.53 \text{ in}^2$$



$$\sin 36^\circ = \frac{h}{14}$$

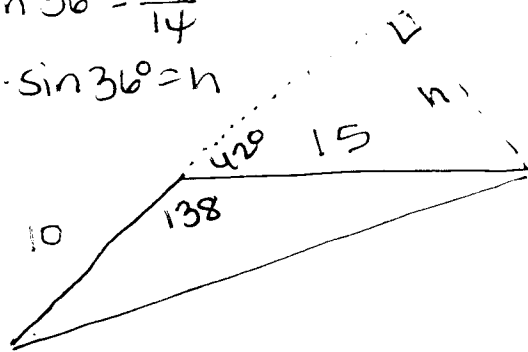
$$14 \cdot \sin 36^\circ = h$$

$$A = \frac{1}{2}bh$$

$$= \frac{1}{2}(18)(14 \cdot \sin 36^\circ)$$

$$\approx 74.06$$

$$74.06 \text{ in}^2$$



$$\sin 42^\circ = \frac{h}{15}$$

$$15 \sin 42^\circ = h$$

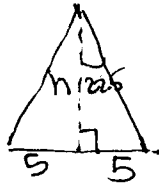
$$A = \frac{1}{2}bh$$

$$= \frac{1}{2}(10)(15 \sin 42^\circ)$$

$$\approx 50.8$$

$$50.18 \text{ in}^2$$

② AREA OCTAGON = 8 TRIANGLE
 $= 8 \cdot \frac{1}{2} b \cdot h = 8 \cdot \frac{1}{2} (10) (\tan 22.5^\circ)$
 ≈ 482.84



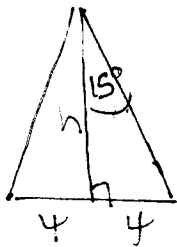
$$\tan(22.5^\circ) = \frac{5}{h}$$

$$h = \frac{5}{\tan(22.5^\circ)}$$

$$\boxed{482.84 \text{ in}^2}$$

AREA
 ③ DODECAGON = 12 TRIANGLE

$$= 12 \cdot \frac{1}{2} b \cdot h = \frac{1}{2} (8) \left(\frac{4}{\tan 15^\circ} \right)$$



$$\tan 15^\circ = \frac{4}{h}$$

$$h = \frac{4}{\tan 15^\circ}$$

$$\approx 59.71$$

$$\boxed{59.71 \text{ in}^2}$$

$$\times 12 = \boxed{716.55 \text{ in}^2}$$

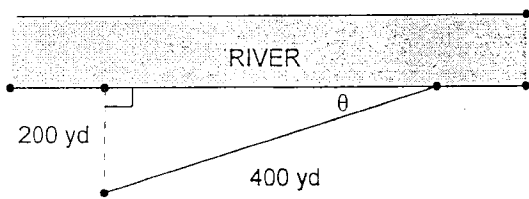
④ a. $L = 2\pi r \cdot \frac{\theta}{360}$
 $= 2\pi(10) \cdot \frac{25+90}{360}$
 $= 20\pi \left(\frac{115}{360} \right)$
 $= \frac{115}{18} \pi \approx 2.62$
 units

$$= 20.64$$

 units

b) $S = \pi r^2 \cdot \frac{\theta}{360}$
 $= \pi(10)^2 \cdot \frac{115}{360}$
 $= \frac{575}{18} \pi$
 $\approx 100.36 \text{ units}^2$

4. A person is standing 200 yards from a river. Rather than walk directly to the river, the person walks 400 yard along a straight path to the river's edge. Find the acute angle θ between this path and the river's edge, as indicated.



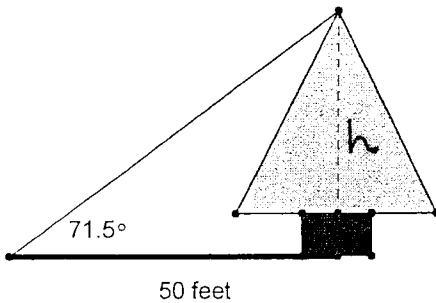
$$\sin \theta = \frac{200}{400}$$

$$\sin \theta = \frac{1}{2}$$

$$\theta = 30^\circ$$

$$\sin^{-1}\left(\frac{1}{2}\right) = \theta$$

5. A surveyor is standing 50 feet from the center of the base of a large tree. The surveyor measures the angle of elevation to the top of the tree as 71.5° . How tall is the tree?

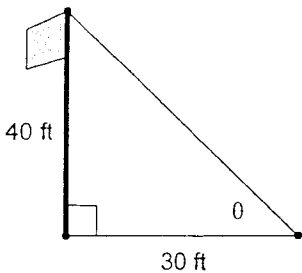


$$\tan 71.5^\circ = \frac{h}{50}$$

$$50(\tan 71.5^\circ) = h$$

$$149.43 \text{ ft} = h$$

6. A 40-foot flagpole casts a 30-foot shadow. Find θ , the angle of elevation of the sun.

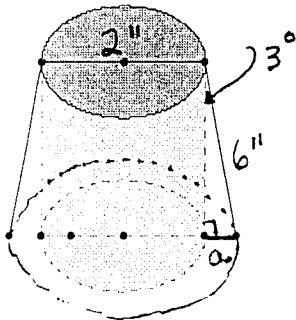


$$\tan \theta = \frac{40}{30}$$

$$\tan^{-1}\left(\frac{40}{30}\right) = \theta$$

$$\theta = 53.13^\circ$$

7. A tapered shaft has a diameter of 2 inches at the small end and is 6 inches long. If the taper is 3° , find the diameter d of the large end of the shaft.



$$\sin 3^\circ = \frac{a}{6}$$

$$6(\sin 3^\circ) = a$$

$$0.31 = a$$

$$d = 2 + 2(.31)$$

$$d = 2.63 \text{ in}$$