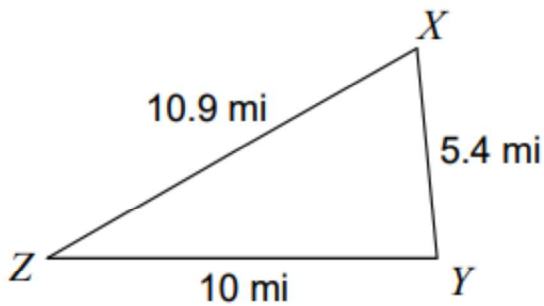


## Solving Triangles

### 12.3 Practice – Areas of Triangles

Find the area of each triangle to the nearest tenth. If you have to round before your final answer, use three decimal places.

1.

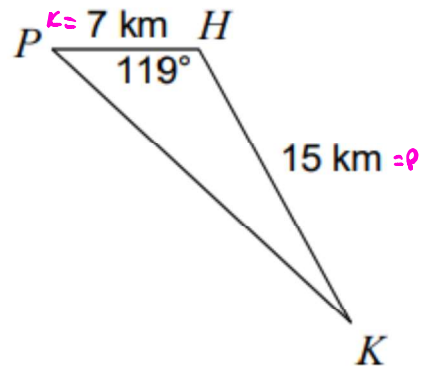


$$\begin{aligned}
 s &= \frac{1}{2}(a+b+c) \\
 s &= \frac{1}{2}(10.9+5.4+10) \\
 s &= \frac{1}{2}(26.30) \\
 s &= 13.15
 \end{aligned}$$

$$\begin{aligned}
 A &= \sqrt{s(s-a)(s-b)(s-c)} \\
 &= \sqrt{(13.15)(13.15-10.9)(13.15-5.4)(13.15-10)} \\
 &= \sqrt{13.15(2.25)(7.75)(3.15)}
 \end{aligned}$$

$$A \approx 27.0 \text{ mi}^2$$

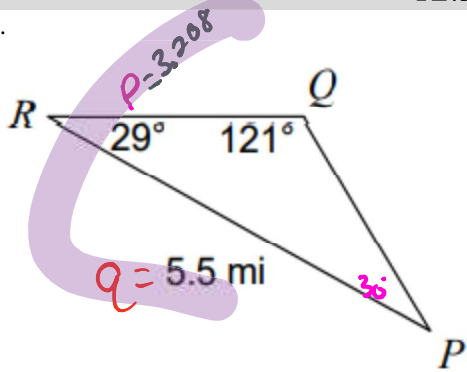
2.



$$\begin{aligned}
 A &= \frac{1}{2} KP \sin H \\
 A &= \frac{1}{2} (7)(15) \sin(119^\circ) \\
 A &= 45.9 \text{ km}^2
 \end{aligned}$$

Solving Triangles  
12.3 Practice – Areas of Triangles

3.

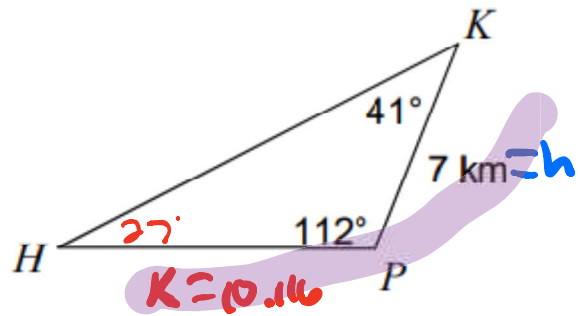


$$\begin{aligned} \textcircled{1} \\ m\angle P + 29^\circ + 121^\circ &= 180^\circ \\ m\angle P + 150^\circ &= 180^\circ \\ m\angle P &= 30^\circ \end{aligned}$$

$$\begin{aligned} \textcircled{2} \\ \frac{\sin 121^\circ}{5.5} &= \frac{\sin 30^\circ}{P} \\ P \sin 121^\circ &= 5.5 \sin 30^\circ \\ P &= \frac{5.5 \sin 30^\circ}{\sin 121^\circ} \\ P &= 3.208 \end{aligned}$$

$$\begin{aligned} \textcircled{3} \\ A &= \frac{1}{2} p q \sin R \\ &= \frac{1}{2} (3.208)(5.5) \sin 29^\circ \\ A &\approx 4.3 \text{ mi}^2 \end{aligned}$$

4.



$$\begin{aligned} \textcircled{1} \\ m\angle H + 41^\circ + 112^\circ &= 180^\circ \\ m\angle H + 153^\circ &= 180^\circ \\ m\angle H &= 27^\circ \end{aligned}$$

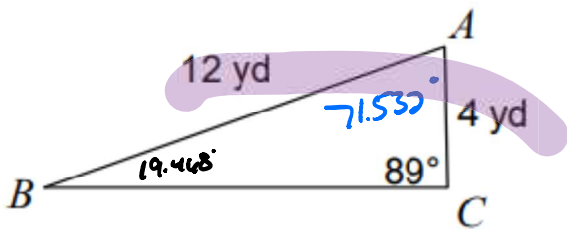
$$\begin{aligned} \textcircled{2} \\ \frac{\sin 27^\circ}{7} &= \frac{\sin 41^\circ}{K} \\ K \sin 27^\circ &= 7 \sin 41^\circ \\ K &= \frac{7 \sin 41^\circ}{\sin 27^\circ} \\ K &= 10.116 \end{aligned}$$

$$\begin{aligned} \textcircled{3} \\ A &= \frac{1}{2} K h \sin 112^\circ \\ &= \frac{1}{2} (10.116)(7) \sin 112^\circ \\ A &= 32.8 \text{ km}^2 \end{aligned}$$

# Solving Triangles

## 12.3 Practice – Areas of Triangles

5.



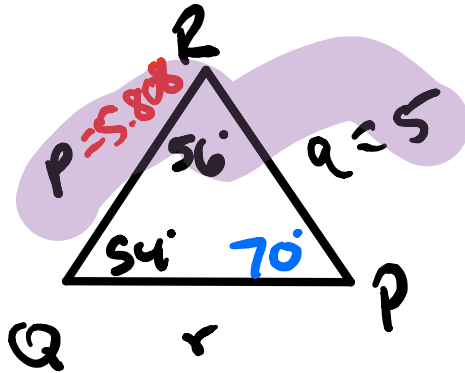
$$\begin{aligned} \textcircled{1} \quad \frac{\sin 89^\circ}{12} &= \frac{\sin B}{4} \\ \frac{4 \sin 89^\circ}{12} &= \sin B \\ \sin^{-1}\left(\frac{4 \sin 89^\circ}{12}\right) &= B \\ 19.468^\circ &\approx B \end{aligned}$$

$$\begin{aligned} \textcircled{2} \quad m\angle A + 19.468^\circ + 89^\circ &= 180^\circ \\ m\angle A + 108.468^\circ &= 180^\circ \\ m\angle A &= 71.532^\circ \end{aligned}$$

$$\begin{aligned} \textcircled{3} \quad A &= \frac{1}{2} bc \sin A \\ &= \frac{1}{2} (4)(12) \sin 71.532^\circ \\ A &\approx 23.0 \text{ yd}^2 \end{aligned}$$

6.

In  $\triangle QRP$ ,  $q = 5$  m,  $m\angle R = 56^\circ$ ,  $m\angle Q = 54^\circ$



$$\begin{aligned} \textcircled{1} \quad m\angle P + 56^\circ + 54^\circ &= 180^\circ \\ m\angle P + 110^\circ &= 180^\circ \\ m\angle P &= 70^\circ \end{aligned}$$

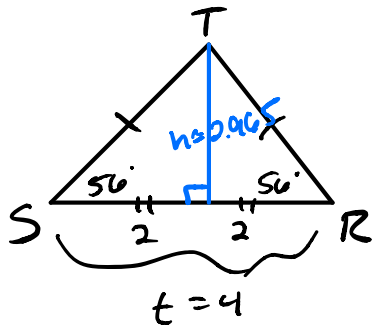
$$\begin{aligned} \textcircled{2} \quad \frac{\sin 54^\circ}{5} &= \frac{\sin 70^\circ}{p} \\ p \sin 54^\circ &= 5 \sin 70^\circ \\ p &= \frac{5 \sin 70^\circ}{\sin 54^\circ} \\ p &= 5.808 \end{aligned}$$

$$\begin{aligned} \textcircled{3} \quad A &= \frac{1}{2} pq \sin R \\ &= \frac{1}{2} (5.808)(5) \sin 56^\circ \\ A &= 12.0 \text{ m}^2 \end{aligned}$$

# Solving Triangles

## 12.3 Practice – Areas of Triangles

7. In  $\triangle RST$ ,  $m\angle S = 56^\circ$ ,  $m\angle R = 56^\circ$ ,  $t = 4$  cm



$$\tan 56^\circ = \frac{h}{2}$$

$$2 \tan 56^\circ = h$$

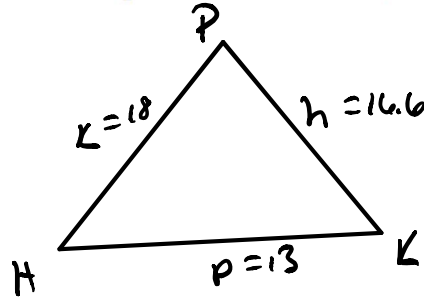
$$2.965 \approx h$$

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

$$= \frac{1}{2}(4)(2.965)$$

$$A \approx 5.9 \text{ cm}^2$$

8. In  $\triangle HPK$ ,  $p = 13$  m,  $k = 18$  m,  $h = 16.6$  m



$$S = \frac{1}{2}(p+k+h)$$

$$S = \frac{1}{2}(13+18+16.6)$$

$$S = \frac{1}{2}(47.6)$$

$$S = 23.8$$

$$A = \sqrt{S(S-p)(S-k)(S-h)}$$

$$= \sqrt{23.8(23.8-13)(23.8-18)(23.8-16.6)}$$

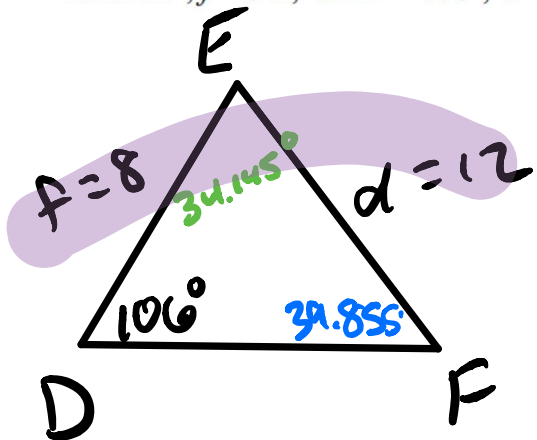
$$= \sqrt{23.8(10.8)(5.8)(7.2)}$$

$$A \approx 103.6 \text{ m}^2$$

# Solving Triangles

## 12.3 Practice – Areas of Triangles

9. In  $\triangle DEF$ ,  $f = 8$  ft,  $m\angle D = 106^\circ$ ,  $d = 12$  ft



①

$$\frac{\sin 106^\circ}{12} = \frac{\sin F}{8}$$

$$\frac{8 \sin 106^\circ}{12} = \sin F$$

$$\sin^{-1}\left(\frac{8 \sin 106^\circ}{12}\right) = F$$

$$39.855^\circ \approx F$$

②

$$m\angle E + 106^\circ + 39.855^\circ = 180^\circ$$

$$m\angle E + 145.855^\circ = 180^\circ$$

$$m\angle E = 34.145^\circ$$

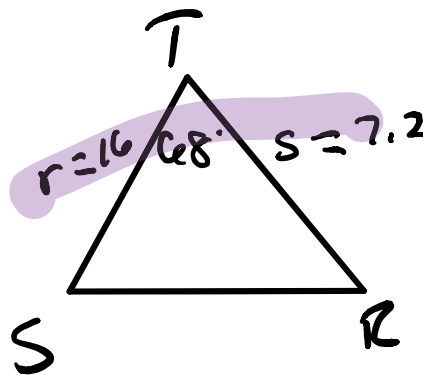
③

$$A = \frac{1}{2} fd \sin E$$

$$= \frac{1}{2} (8)(12) \sin 34.145^\circ$$

$$A \approx 26.9 \text{ ft}^2$$

10. In  $\triangle TRS$ ,  $r = 16$  cm,  $s = 7.2$  cm,  $m\angle T = 68^\circ$



$$A = \frac{1}{2} sr \sin T$$

$$= \frac{1}{2} (7.2)(16) \sin 68^\circ$$

$$A \approx 53.4 \text{ cm}^2$$

# Solving Triangles

## 12.3 Practice – Areas of Triangles