$A = \frac{1}{2}ab\sin C$

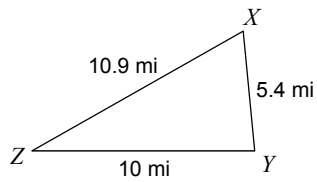
12.3 Area of Triangles

$A = \sqrt{s(s-a)(s-b)(s-c)}$

s = semiperimeter

Find the area of each triangle to the nearest tenth.

1)



$S = \frac{10.9+10+5.4}{2}$

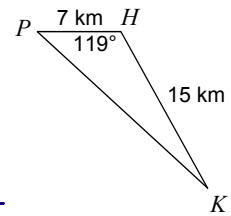
$S = 13.15$

$A = \sqrt{13.15(13.15-10)(13.15-5.4)(13.15-10.9)}$

$A = \sqrt{722.3048} \approx 26.8757$

$\boxed{A = 26.9 \text{ mi}^2}$

2)

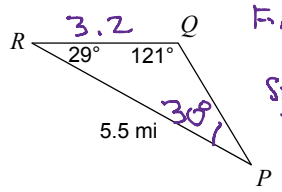


$A = \frac{1}{2}KP\sin H$

$A = \frac{1}{2}(7)(15)\sin 119°$

$\boxed{A = 45.9}$

3)



Find P.

$\frac{\sin 30}{p} = \frac{\sin 121}{5.5}$

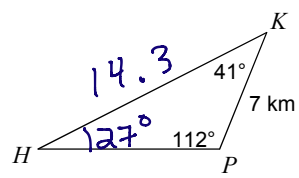
$p = \frac{5.5\sin 30}{\sin 121} = 3.208$

$A = \frac{1}{2}pq\sin R$

$A = \frac{1}{2}(3.2)(5.5)\sin 29°$

$\boxed{A = 4.246 \approx 4.3 \text{ mi}^2}$

4)



Find H & p.

$\frac{\sin 27}{7} = \frac{\sin 112}{p}$

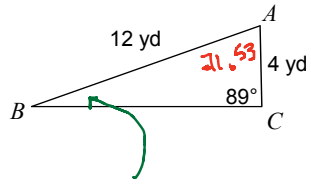
$p = \frac{7\sin 112}{\sin 27}$

$p = 14.296$

$A = \frac{1}{2}hp\sin K = \frac{1}{2}(7)(14.3)\sin 41°$

$\boxed{A = 32.8 \text{ Km}^2}$

5)



$\frac{\sin 89}{12} = \frac{\sin B}{4}$

$\sin B = \frac{4\sin 89}{12} =$

$\sin B = .3333$

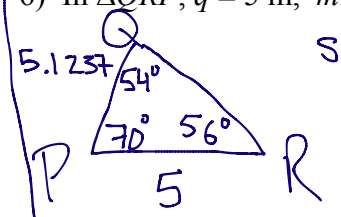
$B = 19.468°$

Find A: $A = 71.5318°$

$A = \frac{1}{2}bc\sin A = \frac{1}{2}(4)(12)\sin 71.53°$

$\boxed{A = 22.8 \text{ yd}^2}$

6) In ΔQRP, $q = 5$ m, $m\angle R = 56°$, $m\angle Q = 54°$ Find P



$\frac{\sin 54}{5} = \frac{\sin 56}{r}$

$r = \frac{5\sin 56}{\sin 54}$

$r = 5.1237$

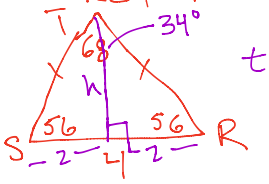
$A = \frac{1}{2}qr\sin 70°$

$A = \frac{1}{2}(5)(5.1237)\sin 70°$

$\boxed{A = 12.0 \text{ m}^2}$

7) In ΔRST, $m\angle S = 56°$, $m\angle R = 56°$, $t = 4$ cm

ΔRST is isosceles!



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

$h = 2 \tan 56$

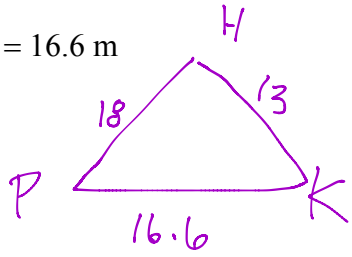
$h = 2.965$

$A_\Delta = \frac{1}{2} bh$

$A = \frac{1}{2}(4)(2.965) = 5.9 \text{ cm}^2$

Because this is isosceles, we can drop the height and use trig!!
Or do it the way we do the others...

8) In ΔHPK, $p = 13$ m, $k = 18$ m, $h = 16.6$ m



$A = \sqrt{s(s-a)(s-b)(s-c)}$

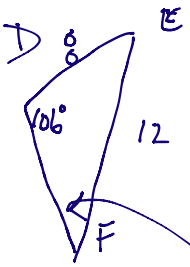
$s = \frac{18+13+16.6}{2} = 23.8$

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

$A = \sqrt{10733.9904}$

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

9) In ΔDEF, $f = 8$ ft, $m\angle D = 106°$, $d = 12$ ft



$\frac{\sin 106}{12} = \frac{\sin E}{8}$

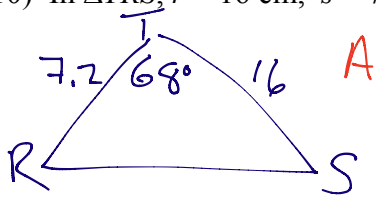
$\sin E = \frac{8 \sin 106}{12} = .6408$

$E = 39.85$ $\quad F = 34.14$

$A = \frac{1}{2} f d \sin E = \frac{1}{2}(8)(12)\sin(34.14)$

$A = 26.94217 \approx 26.9 \text{ ft}^2$

10) In ΔTRS, $r = 16$ cm, $s = 7.2$ cm, $m\angle T = 68°$



$A = \frac{1}{2} r s \sin T$

$= \frac{1}{2}(16)(7.2)\sin 68°$

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