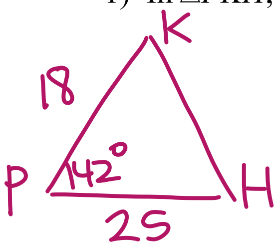
Precalculus Name________________________________

Solving Triangles and Area Formula Notes

Date________________ Period____

Solve each triangle. Round your answers to the nearest tenth.

1) In $\triangle PKH$, $h = 18$ yd, $m\angle P = 142°$, $k = 25$ yd



$p^2 = 18^2 + 25^2 - 2(18)(25)\cos(142^\circ)$

$\sqrt{p^2} = \sqrt{1{,}658\ 209678} \rightarrow \boxed{p = 40.721}$

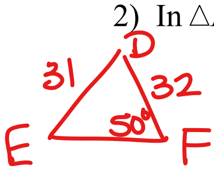
$\frac{\sin(142^\circ)}{40.721} = \frac{\sin H}{18}$

$\sin^{-1}\left(\frac{18\sin 142^\circ}{40.721}\right) = \boxed{H = 15\ 792^\circ}$

$\angle K = 180^\circ - 142^\circ - 15\ 792^\circ$

$\boxed{\angle K = 22\ 208^\circ}$

2) In $\triangle FDE$, $m\angle F = 50°$, $e = 32$ km, $f = 31$ km



$\Delta 1$	$\Delta 2$
$\angle E = 52\ 256^\circ$	$\angle E = 127\ 744^\circ$
$\angle D = 77\ 744^\circ$	$\angle D = 2\ 256^\circ$
$d = 39\ 545$	$d = 1\ 593$

$\frac{\sin 50^\circ}{31} = \frac{\sin E}{32}$

$\sin^{-1}\left(\frac{32\sin 50^\circ}{31}\right) = E$ $\angle E = 52.256^\circ$

2nd Δ??

$180 - 52.256$

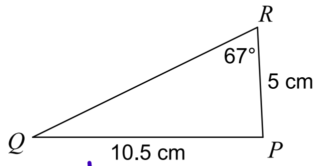
$\boxed{\angle E = 127\ 744^\circ}$

$\frac{\sin 50^\circ}{31} = \frac{\sin 77\ 744}{d}$ $\frac{\sin 50^\circ}{31} = \frac{\sin 2\ 256^\circ}{d}$

$d = \frac{31\sin(77\ 744)}{\sin(50)}$ $d = \frac{31\sin(2\ 256)}{\sin(50)}$

Find the area of each triangle to the nearest tenth.

3)



$Area_{\Delta} = \frac{1}{2} ab \sin C$

$\frac{\sin 67°}{10.5} = \frac{\sin Q}{5}$

$Q = \sin^{-1}\left(\frac{5 \sin 67°}{10.5}\right)$

$\angle Q = 25.998°$

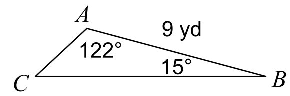
$\angle P = 180° - 67° - 25.998°$

$\angle P = 87.002°$

$A_{\Delta} = \frac{1}{2}(10.5)(5)\sin(87.002)$

$\boxed{A = 26.214 \text{ cm}^2}$

4)



Find $\angle C$

$180° - 122° - 15° = 43°$

$\frac{\sin 43°}{9} = \frac{\sin 15°}{b}$

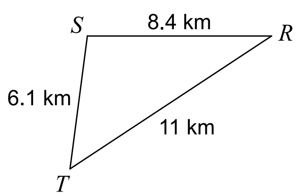
$b = \frac{9 \sin(15°)}{\sin(43°)}$

$b = 3.4155$

$A_{\Delta} = \frac{1}{2}(9)(3.4155)\sin(122°)$

$= 13.034 \text{ yd}^2$

5)



$11^2 = (6.1)^2 + (8.4)^2 - 2(6.1)(8.4)\cos S$

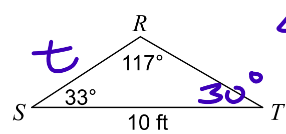
$\frac{11^2 - (6.1)^2 - (8.4)^2}{-2(6.1)(8.4)} = \cos S$

$\cos^{-1}(\uparrow) = S = 97.417°$

$A = \frac{1}{2}(6.1)(8.4)\sin 97.417$

$\boxed{A = 25.406 \text{ km}^2}$

6)



$\angle T = 180 - 33 - 117$
$= 30°$

$\frac{\sin 30°}{t} = \frac{\sin 117°}{10}$

$\frac{10 \sin(30°)}{\sin 117°} = t = 5.612$

$A = \frac{1}{2}(5.612)(10)\sin 33° = 15.282 \text{ ft}^2$

Alternate

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

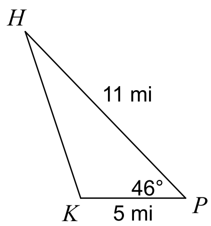
where $s \rightarrow$ semiperimeter $\rightarrow \frac{\text{Perimeter}}{2}$

$s = 12.75$

$A = \sqrt{12.75(12.75-11)(12.75-6.1)(12.75-8.4)}$

$= 25.406 \text{ km}^2$

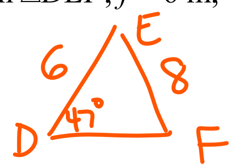
7)



$$A_\Delta = \frac{1}{2}(11)(5)\sin(46^\circ)$$

$$= 19.782\text{ mi}^2$$

8) In $\triangle DEF$, $f = 6$ m, $d = 8$ m, $m\angle D = 47°$



$$\frac{\sin F}{6} = \frac{\sin(47^\circ)}{8}$$

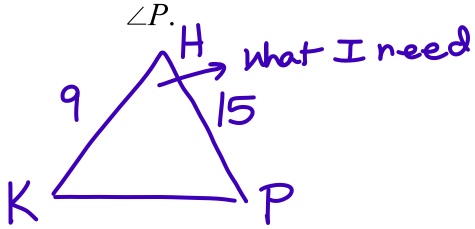
$$\sin F = \frac{6\sin(47^\circ)}{8}$$

$$F = \sin^{-1}\left(\frac{6\sin(47^\circ)}{8}\right) \rightarrow F = 33.265^\circ$$

$$\angle E = 180^\circ - 33.265^\circ - 47^\circ = 99.735^\circ$$

$$A = \frac{1}{2}(6)(8)\sin 99.735^\circ = 23.654\text{ m}^2$$

9) Assuming the area of $\triangle KHP$ is 59.3 cm^2, $p = 9$ cm, $k = 15$ cm and $\angle H$ is obtuse, find the measure of $\angle P$.



$$59.3 = \frac{1}{2}(9)(15)\sin H$$

$$\frac{59.3}{\frac{1}{2}(9)(15)} = \sin H$$

$$\sin^{-1}\left(\frac{59.3}{\frac{1}{2}(9)(15)}\right) = H$$

$$\angle H = 61.464^\circ\ ?$$

$\angle H$ is actually

$$180^\circ - 61.464^\circ = 118.536^\circ$$

$$h^2 = 9^2 + 15^2 - 2(9)(15)\cos 118.536^\circ$$

$$h = 20.856$$

$$\frac{\sin P}{9} = \frac{\sin 118.536}{20.856}$$

$$P = \sin^{-1}\left(\frac{9\sin 118.536}{20.856}\right)$$

$$\boxed{\angle P = 22.278^\circ}$$

