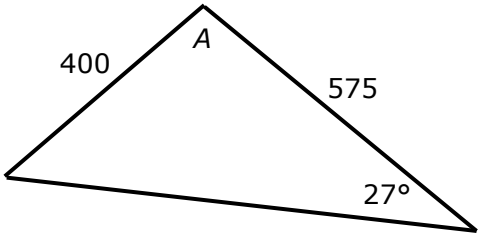
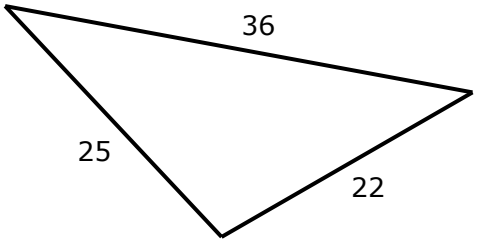
Level 2 Trigonometry Achieved + Merit #3

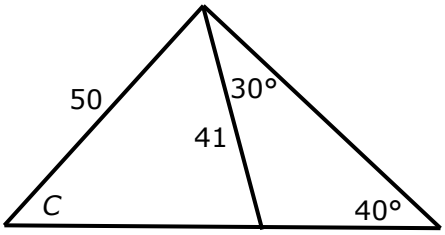
1. Calculate angle *A*



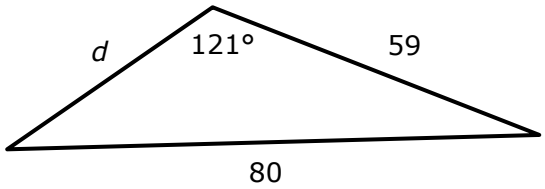
2. Calculate the area of this triangle



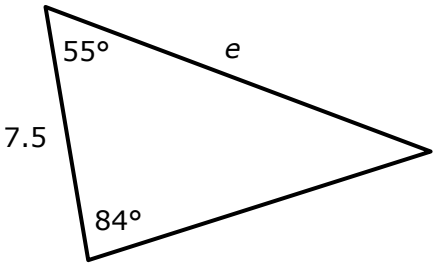
3. Calculate angle *C*



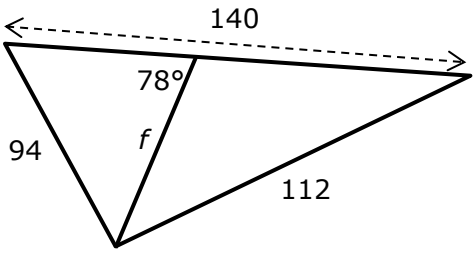
4. What the length of *d*?



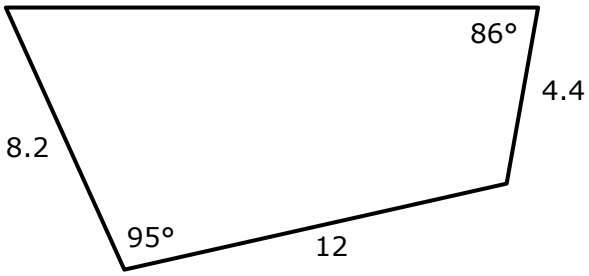
5. What is the length *e*?



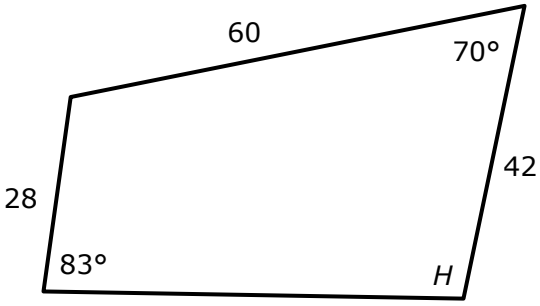
6. What is length *f*?



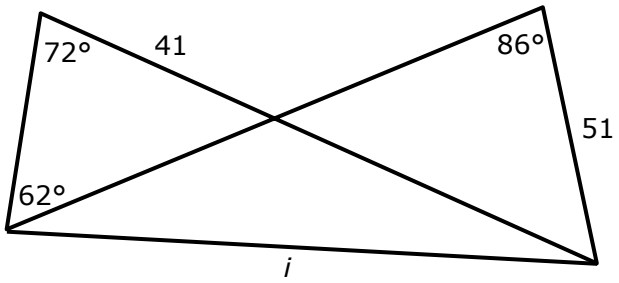
7. What is the area of this quadrilateral?



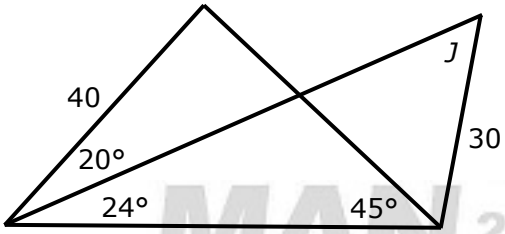
8. Calculate the size of angle *H*.



9. Calculate the length *i*



10. Calculate angle *J*



Answers: Level 2 Trigonometry Achieved + Merit #3

If you get the answer, then you have done it right, even if you do it another way.

Note three different skills gets you Achieved. you do not have to get to the end of problem.

1. Find the bottom left angle, x.

   $\sin x = \frac{\sin 27}{400} \times 575 = 0.652611$ $\quad x = \sin^{-1}(0.652611) = 40.739°$

   $A = 180 - 27 - 40.739 = 112.261°$

2. Top right angle = x, top left = y, bottom = z

   $\cos x = \frac{36^2 + 22^2 - 25^2}{2 \times 36 \times 22} = \frac{1155}{1584}$ $\quad x° = \cos^{-1}\left(\frac{1155}{1584}\right) = 43.183°$

   Area = ½ × 22 × 36 × sin 43.183 = 270.997

   (or via $y = 37.029°$ or via $z = 99.788°$)

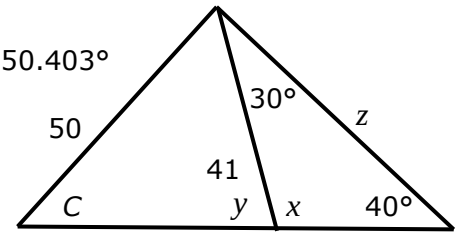
3. $x = 180 - 30 - 40 = 110°$ $\quad y = 180 - 110 = 70°$

   $\sin C = \frac{\sin 70}{50} \times 41 = 0.77055$ $\quad C = \sin^{-1}(0.77055) = 50.403°$

   or, using the outside triangle

   $z = \frac{41}{\sin 40} \times \sin(110) = 59.938$

   $\sin C = \frac{\sin 40}{50} \times 59.938 = 0.77055$ $\quad C = \sin^{-1}(0.77055) = 50.403°$



4. Let left hand angle = x and right hand angle = y.

   $\sin x = \frac{\sin 121}{80} \times 59 = 0.63216$ $\quad x = \sin^{-1}(0.63216) = 39.210°$

   $y = 180 - 121 - 39.210 = 19.790°$ $\quad d = \frac{80}{\sin 121} \times \sin(19.79) = 31.599$

5. The remaining angle is 180 – 55 – 84 = 41°

   $y = \frac{7.5}{\sin 41} \times \sin(84) = 11.369$

6. Only the outside triangle has three pieces of information

   Call the left angle x.

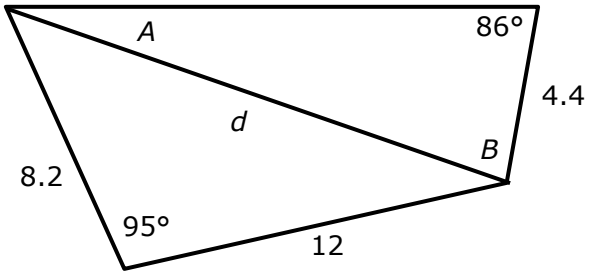
   That will give the third piece of information for the left triangle.

   $\cos x = \frac{140^2 + 94^2 - 112^2}{2 \times 140 \times 94} = \frac{15892}{26320}$ $\quad x° = \cos^{-1}\left(\frac{15892}{26320}\right) = 52.8575°$

   Now we can solve the left triangle.

   $f = \frac{94}{\sin 78} \times \sin(52.8575) = 76.605$

7.



$d^2 = 8.2^2 + 12^2 - 2 \times 8.2 \times 12 \times \cos 95$

$= 228.39 \qquad d = \sqrt{228.39} = 15.113$

$\sin A = \frac{\sin 86}{15.113} \times 4.4 = 0.209044$

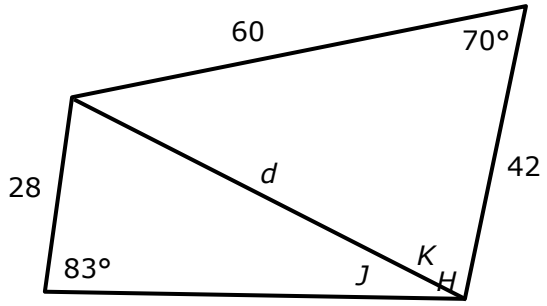
$A = \sin^{-1}(0.209044) = 16.884°$

$B = 180 - 86 - 16.884 = 77.116°$

Area = top triangle + bottom triangle

$= ½ \times 4.4 \times 15.113 \times \sin 77.116 + ½ \times 12 \times 8.2 \times \sin 95 = 32.41 + 49.01 = 81.42$

8.



$d^2 = 42^2 + 60^2 - 2 \times 42 \times 60 \times \cos 70$

$= 3640.22 \qquad d = \sqrt{3640.22} = 60.334$

$\sin K = \frac{\sin 70}{60.334} \times 60 = 0.934487$

$K = \sin^{-1}(0.934487) = 69.145°$

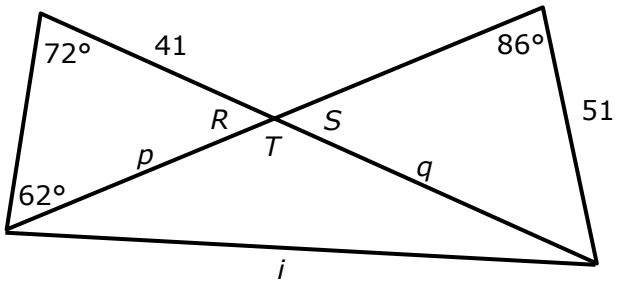
(K can also be found from Cosine Rule)

$\sin J = \frac{\sin 83}{60.334} \times 28 = 0.46062$

$J = \sin^{-1}(0.46062) = 27.427°$

$H = K + J = 69.145° + 27.427° = 96.57°$

9.



$p = \frac{41}{\sin 62} \times \sin(72) = 44.163$

$R = 180 - 62 - 72 = 46°$

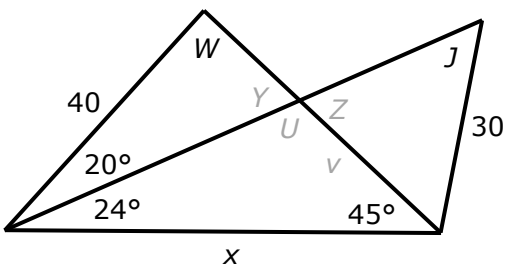
$S = 46° \qquad T = 180 - 46 = 134°$

$q = \frac{50}{\sin 46} \times \sin(86) = 70.726$

$i^2 = 44.163^2 + 70.726^2 - 2 \times 44.163 \times 70.726 \times \cos 134 = 11292.03$

$i = \sqrt{11292.03} = 106.26$

10.



$W = 180 - 20 - 24 - 45 = 91°$

$x = \frac{40}{\sin 45} \times \sin(91) = 56.5599$

$\sin J = \frac{\sin 24}{30} \times 56.5599 = 0.766833$

$J = \sin^{-1}(0.\ 766833) = 50.07°$

You can also work via $Z = Y = 180 - 20 - 91 = 69°$ $\qquad U = 180 - 24 - 45 = 111°$

$v = \frac{56.5599}{\sin 111} \times \sin(24) = 24.642$ (this is the bottom triangle with x opposite U)

$\sin J = \frac{\sin 69}{30} \times 24.642 = 0.766833 \qquad J = \sin^{-1}(0.\ 766833) = 50.07°$