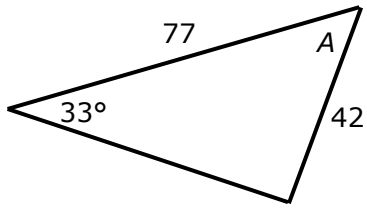
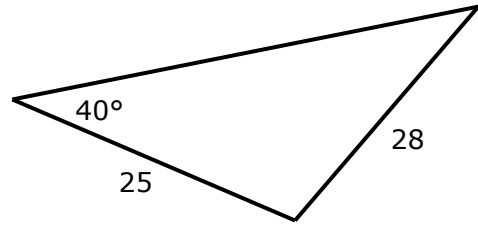


Level 2 Trigonometry Achieved + Merit #2

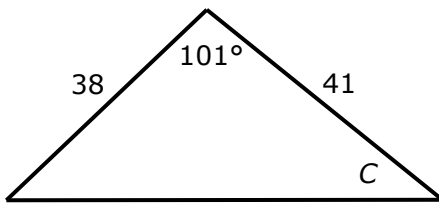
1. Calculate angle A



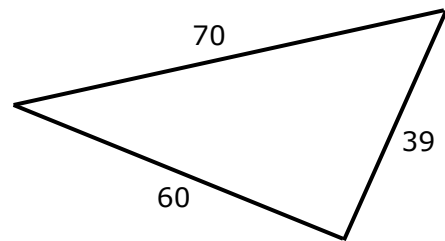
2. Calculate the area of this triangle.



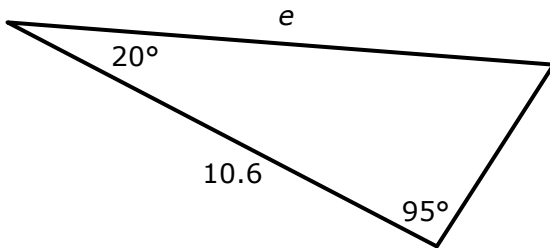
3. Calculate angle C



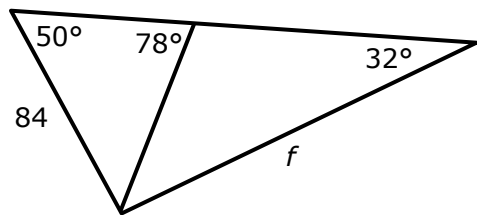
4. What is the area of this triangle?



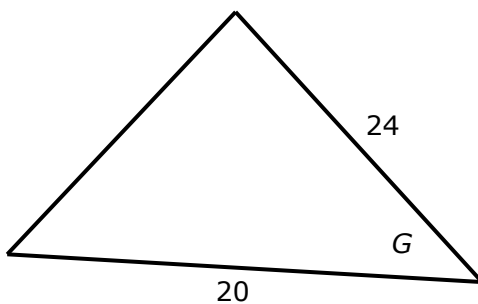
5. What is side length e ?



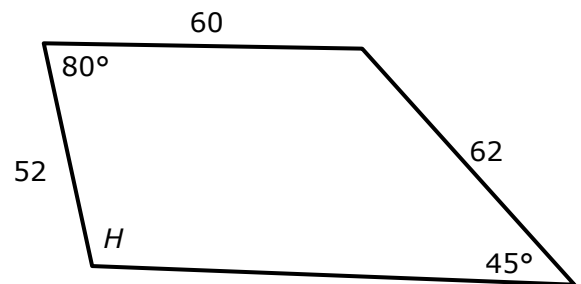
6. What is side length f ?



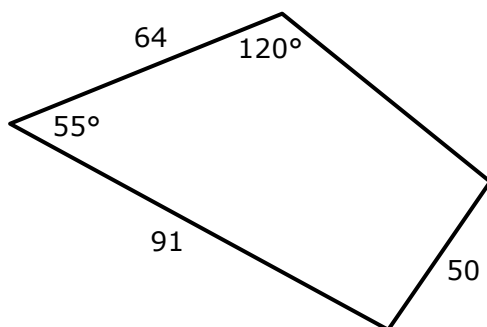
7. If the area of this triangle is 150, how big is angle G ?



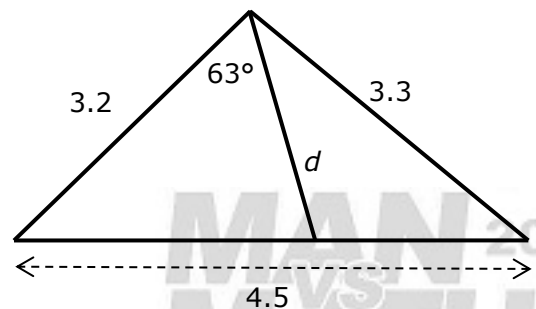
8. Calculate the size of angle H .



9. What is the area of this quadrilateral?



10. Calculate length d



Answers: Level 2 Trigonometry Achieved + Merit #2

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. Call the bottom angle in the triangle x .

$$\sin x = \frac{\sin 33}{42} \times 77 = 0.99850 \qquad x = \sin^{-1}(0.99850) = 86.867^\circ$$

$$A = 180 - 33 - 86.867 = 60.133^\circ$$

2. Let right hand angle = x and bottom angle = y .

$$\sin x = \frac{\sin 40}{28} \times 25 = 0.57392 \qquad x = \sin^{-1}(0.57392) = 35.024^\circ$$

$$y = 180 - 40 - 35.024 = 104.976^\circ$$

$$\text{Area} = \frac{1}{2} \times 28 \times 25 \times \sin 104.976 = 338.11$$

3. Bottom side length = d

$$d^2 = 38^2 + 41^2 - 2 \times 38 \times 41 \times \cos 101 = 3719.56 \qquad d = \sqrt{3719.56} = 60.9882$$

$$\cos C = \frac{41^2 + 60.9882^2 - 38^2}{2 \times 41 \times 60.9882} = \frac{3956.56}{5001.03} \qquad C^\circ = \cos^{-1}\left(\frac{3956.56}{5001.03}\right) = 37.71^\circ$$

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

$$\cos x = \frac{39^2 + 70^2 - 60^2}{2 \times 39 \times 70} = \frac{2821}{5460} \qquad x^\circ = \cos^{-1}\left(\frac{2821}{5460}\right) = 58.891^\circ$$

$$\text{Area} = \frac{1}{2} \times 70 \times 39 \times \sin 58.891 = 1168.7$$

$$(y = \cos^{-1}\left(\frac{6979}{8400}\right) = 33.816^\circ \text{ and } z = \cos^{-1}\left(\frac{221}{4860}\right) = 87.293^\circ \text{ if you used them instead})$$

5. Top angle is $180 - 20 - 95 = 65^\circ$ $e = \frac{10.6}{\sin 65} \times \sin(95) = 11.651$

6. Only the left hand triangle has enough information.

Let the length of the line in the middle be d . $d = \frac{84}{\sin 78} \times \sin(50) = 65.785$

The angle opposite f is $180 - 78 = 102^\circ$ Now have two angles and a side for the right hand triangle.

$$f = \frac{65.785}{\sin 32} \times \sin(102) = 121.43$$

7. Area = $\frac{1}{2} \times 24 \times 20 \times \sin G = 150$

$$\Rightarrow 240 \sin G = 150$$

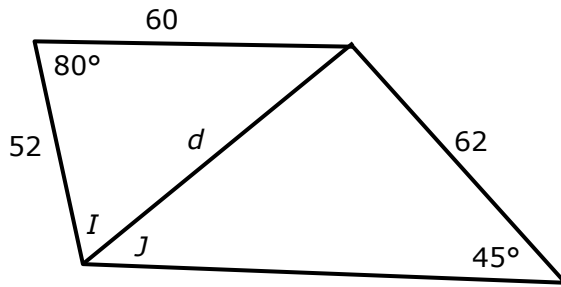
$$\Rightarrow \sin G = \frac{150}{240}$$

$$\Rightarrow G = \sin^{-1}\left(\frac{150}{240}\right) = 38.682^\circ$$

You need this equation

but you can solve by guess and check

8.



$$d^2 = 60^2 + 52^2 - 2 \times 60 \times 52 \times \cos 80 = 5220.44$$

$$d = \sqrt{5220.44} = 72.253$$

$$\sin I = \frac{\sin 80}{72.253} \times 60 = 0.8178$$

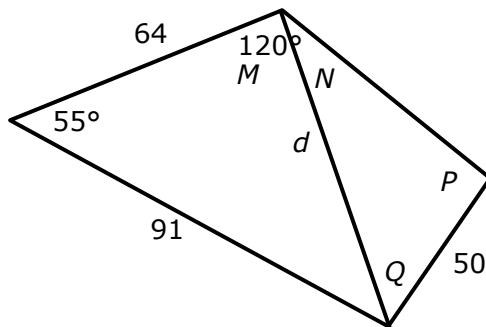
$$I = \sin^{-1}(0.8178) = 54.865^\circ$$

$$\sin J = \frac{\sin 45}{72.253} \times 62 = 0.60677$$

$$J = \sin^{-1}(0.60677) = 37.356^\circ$$

$$H = I + J = 54.865 + 37.356 = 92.221^\circ$$

9.



$$d^2 = 64^2 + 91^2 - 2 \times 64 \times 91 \times \cos 55 = 5695.98$$

$$d = \sqrt{5695.98} = 75.472$$

$$\sin M = \frac{\sin 55}{75.472} \times 91 = 0.98769$$

$$M = \sin^{-1}(0.98769) = 81.000^\circ$$

$$N = 120 - M = 39^\circ$$

$$\sin P = \frac{\sin 39}{50} \times 75.472 = 0.94992$$

$$P = \sin^{-1}(0.94992) = 71.791^\circ$$

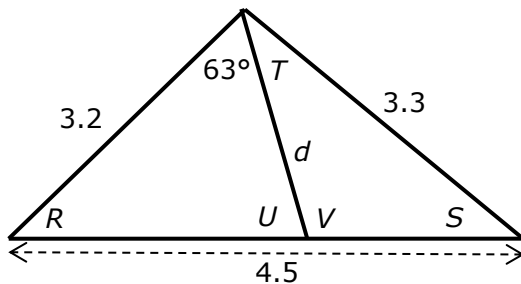
$$Q = 180 - 71.791 - 39 = 69.209^\circ$$

$$\text{Area left triangle} = \frac{1}{2} \times 64 \times 91 \times \sin 55 = 2385.4$$

$$\text{Area right triangle} = \frac{1}{2} \times 50 \times 75.472 \times \sin 69.209 = 1763.9$$

$$\text{Total area} = 2385.4 + 1763.9 = 4149$$

10.



Neither the right nor the left triangle have three pieces of information.

But the outside triangle does. We **must** start there.

We can find angles R , S or $(63 + T)$ using Cos Rule

It makes sense to find R , as that is on the triangle with the most information already given.

$$\cos R = \frac{3.2^2 + 4.5^2 - 3.3^2}{2 \times 3.2 \times 4.5} = \frac{19.6}{28.8}$$

$$R = \cos^{-1}\left(\frac{19.6}{28.8}\right) = 47.113^\circ$$

$$U = 180 - 63 - 47.113 = 69.887^\circ$$

$$d = \frac{3.2}{\sin 69.887} \times \sin(47.113) = 2.497$$

$$\text{If you did it the other way: } S = \cos^{-1}\left(\frac{20.9}{29.7}\right) = 45.275^\circ,$$

$$63 + T = \cos^{-1}\left(\frac{0.88}{21.12}\right) = 87.612^\circ \text{ so } T = 24.612$$

$$V = 180 - 45.275 - 24.612 = 110.563$$

$$d = \frac{3.3}{\sin 110.563} \times \sin(45.275) = 2.504$$

(same to 3 figures as 2.497)