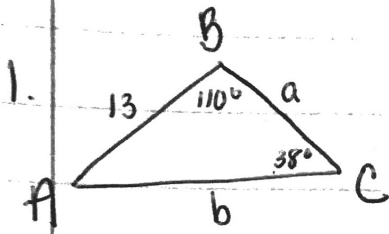


#1-5, 11-17, 19-23, 27-33 odds only



$$\angle A = 180 - 110 - 38 = 32^\circ$$

$$\frac{\sin 32}{a} = \frac{\sin 38}{13}$$

$$\frac{\sin 38}{13} = \frac{\sin 110}{b}$$

$$13 \sin 32 = a \sin 38$$

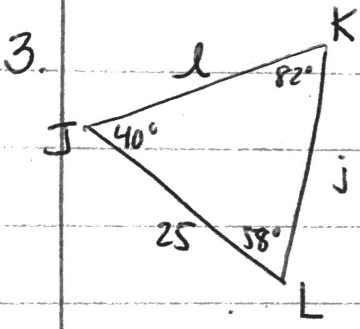
$$\frac{13 \sin 32}{\sin 38} = a$$

$$a = 11.2$$

$$13 \sin 110 = b \sin 38$$

$$\frac{13 \sin 110}{\sin 38} = b$$

$$19.8 = b$$



$$\angle L = 180 - 40 - 58 = 82^\circ$$

$$\frac{\sin 40}{j} = \frac{\sin 82}{25}$$

$$\frac{\sin 82}{25} = \frac{\sin 58}{l}$$

$$25 \sin 40 = j \sin 82$$

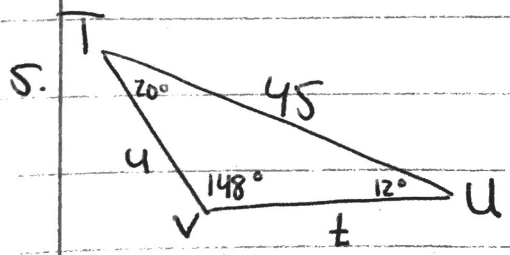
$$\frac{25 \sin 40}{\sin 82} = j$$

$$16.2 = j$$

$$25 \sin 58 = l \sin 82$$

$$\frac{25 \sin 58}{\sin 82} = l$$

$$21.4 = l$$



$$\angle U = 180 - 148 - 12 = 20^\circ$$

$$\frac{\sin 148}{45} = \frac{\sin 12}{u}$$

$$\frac{\sin 148}{45} = \frac{\sin 20}{t}$$

$$45 \sin 12 = u \sin 148$$

$$\frac{45 \sin 12}{\sin 148} = u$$

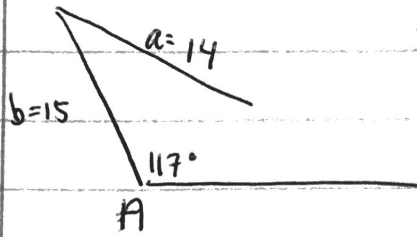
$$17.7 = u$$

$$t \sin 148 = 45 \sin 20$$

$$t = \frac{45 \sin 20}{\sin 148}$$

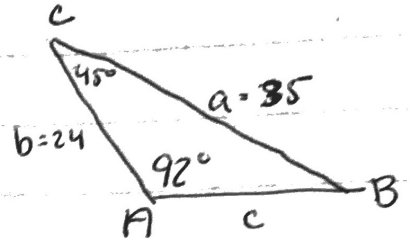
$$t = 29.0$$

11.



no solution
 $a < b$

13.



$$\frac{\sin 92}{35} = \frac{\sin B}{24}$$

$$24 \sin 92 = 35 \sin B$$

$$\frac{24 \sin 92}{35} = \sin B$$

$$0.685 = \sin B$$

$$B = \sin^{-1}(0.685) = 43^\circ$$

$$C = 180 - 92 - 43 = 45^\circ$$

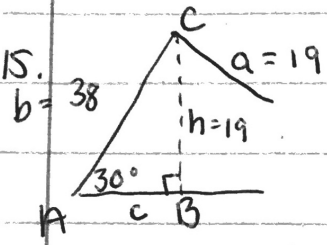
$$\frac{\sin 92}{35} = \frac{\sin 45}{c}$$

$$c \sin 92 = 35 \sin 45$$

$$c = \frac{35 \sin 45}{\sin 92}$$

$$c = 24.7$$

15.



$a < b, a = h$

1 solution

$$\sin 30 = \frac{h}{38}$$

$$38 \sin 30 = h$$

$$19 = h$$

$$B = 90^\circ$$

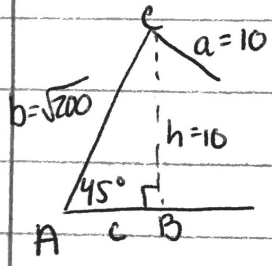
$$C = 60^\circ$$

$$\sin 60 = \frac{c}{38}$$

$$38 \sin 60 = c$$

$$32.9 = c$$

17.



$a < b, a = h$

1 solution

$$\sin(45) = \frac{h}{\sqrt{200}}$$

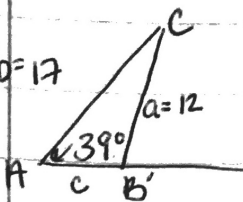
$$\sqrt{200} \sin(45) = h$$

$$10 = h$$

$$B = 90^\circ, C = 45^\circ$$

$$c = 10$$

19. $b=17$



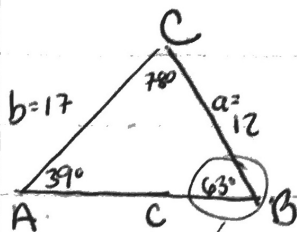
$B' = 180 - 63 = 117^\circ$
 $C = 180 - 39 - 117 = 24^\circ$

$$\frac{\sin 24}{c} = \frac{\sin 39}{12}$$

$$c \sin 39 = 12 \sin 24$$

$$c = \frac{12 \sin 24}{\sin 39}$$

$c = 7.8$



$$\frac{\sin 39}{12} = \frac{\sin B}{17}$$

$$17 \sin 39 = 12 \sin B$$

$$\frac{17 \sin 39}{12} = \sin B$$

$$0.8915 = \sin B$$

$$\sin^{-1}(0.8915) = B = 63^\circ$$

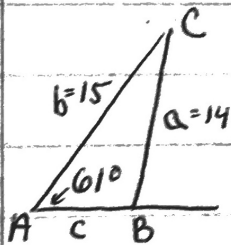
$$C = 180 - 39 - 63 = 78^\circ$$

$$\frac{\sin 39}{12} = \frac{\sin 78}{c}$$

$$\frac{c \sin 39}{\sin 39} = \frac{12 \sin 78}{\sin 39}$$

$c = 18.7$

21.



$B = 180 - 70 = 110^\circ$

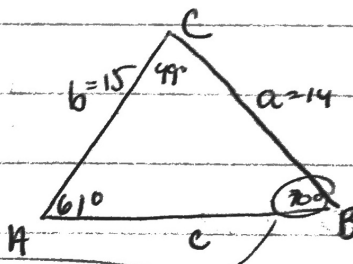
$C = 180 - 61 - 110 = 9^\circ$

$$\frac{\sin 61}{14} = \frac{\sin 9}{c}$$

$$14 \sin 9 = c \sin 61$$

$$\frac{14 \sin 9}{\sin 61} = c$$

$2.5 = c$



$$\frac{\sin 61}{14} = \frac{\sin B}{15}$$

$$15 \sin 61 = 14 \sin B$$

$$\frac{15 \sin 61}{14} = \sin B$$

$$0.937 = \sin B$$

$$\sin^{-1}(0.937) = B = 70^\circ$$

$$C = 180 - 61 - 70 = 49^\circ$$

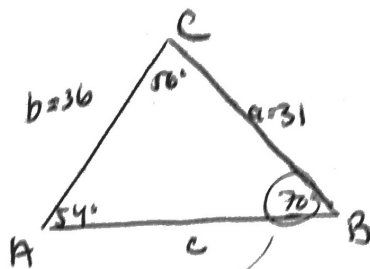
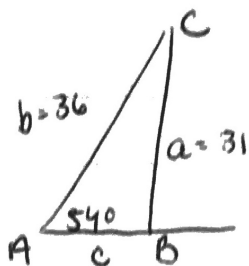
$$\frac{\sin 61}{14} = \frac{\sin 49}{c}$$

$$c \sin 61 = 14 \sin 49$$

$$c = \frac{14 \sin 49}{\sin 61}$$

$c = 12$

23.



$$B = 180 - 70 = 110^\circ$$

$$C = 180 - 54 - 110 = 16^\circ$$

$$\frac{\sin 54}{31} = \frac{\sin 16}{c}$$

$$\frac{c \sin 54}{\sin 54} = \frac{31 \sin 16}{\sin 54}$$

$$c = 10.6$$

$$\frac{\sin 54}{31} = \frac{\sin B}{36}$$

$$31 \sin B = 36 \sin 54$$

$$\sin B = \frac{36 \sin 54}{31}$$

$$\sin B = 0.9395$$

$$\sin^{-1}(0.9395) = B = 70^\circ$$

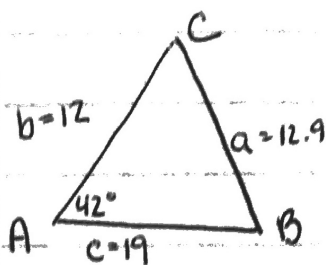
$$C = 180 - 54 - 70 = 56^\circ$$

$$\frac{\sin 54}{31} = \frac{\sin 56}{c}$$

$$\frac{31 \sin 56}{\sin 54} = \frac{c \sin 54}{\sin 54}$$

$$31.8 = c$$

27.



SAS = 1 solution

$$\frac{\sin 42}{12.9} = \frac{\sin B}{12} = \frac{\sin C}{19} \leftarrow \text{too many variables} \rightarrow \text{use law of cosines}$$

$$\frac{\sin 42}{12.9} = \frac{\sin B}{12}$$

$$12.9 \sin B = 12 \sin 42$$

$$\sin B = 0.622$$

$$B = 39^\circ$$

$$C = 180 - 42 - 39 = 99^\circ$$

$$c^2 = a^2 + b^2 - 2ab \cos C$$

$$19^2 = a^2 + 12^2 - 2a(12) \cos C \quad \text{2 unknowns}$$

$$b^2 = a^2 + c^2 - 2ac \cos B$$

$$12^2 = a^2 + 19^2 - 2a(19) \cos B \quad \text{2 unknowns}$$

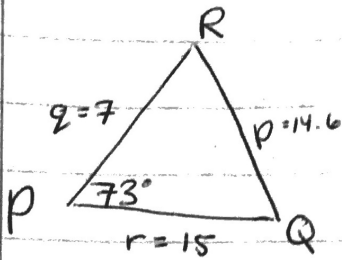
$$a^2 = b^2 + c^2 - 2bc \cos A$$

$$a^2 = 12^2 + 19^2 - 2(12)(19) \cos(42) \quad \checkmark$$

$$a^2 = 144 + 361 - 338.874 = 166.126$$

$$a = 12.9$$

29

SAS \rightarrow law of cosines

$$p^2 = q^2 + r^2 - 2qr \cos P$$

$$p^2 = 7^2 + 15^2 - 2(7)(15)(\cos(73))$$

$$p^2 = 212.60$$

$$p = 14.6$$

$$\frac{\sin 73}{14.6} = \frac{\sin Q}{7}$$

$$14.6 \sin Q = 7 \sin 73$$

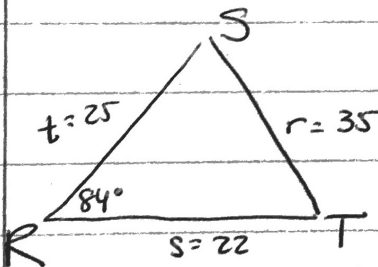
$$\sin Q = 0.4585$$

$$Q = 27^\circ$$

$$R = 180 - 73 - 27 = 80^\circ$$

~~$$\frac{\sin 73}{14.6} =$$~~

31.

SSS \rightarrow law of cosines

$$r^2 = s^2 + t^2 - 2st \cos(R)$$

$$35^2 = 22^2 + 25^2 - 2(22)(25)(\cos(R))$$

$$1225 = 484 + 625 - 1100 \cos R$$

$$1225 = 1109 - 1100 \cos R$$

$$116 = -1100 \cos R$$

$$-0.10545 = \cos R$$

$$84^\circ = R$$

$$t^2 = s^2 + r^2 - 2sr \cos T$$

$$25^2 = 22^2 + 35^2 - 2(22)(35) \cos T$$

$$625 = 484 + 1225 - 1540 \cos T$$

$$625 = 1609 - 1540 \cos T$$

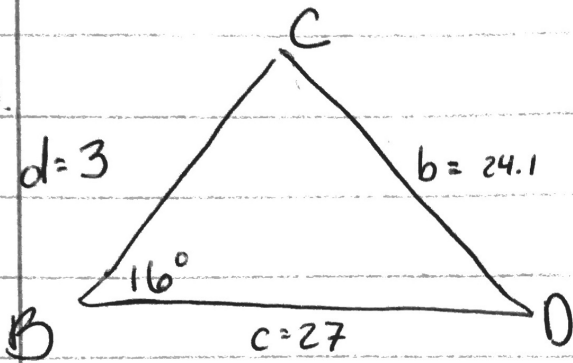
$$-984 = -1540 \cos T$$

$$0.63896 = \cos T$$

$$50^\circ = T$$

$$S = 180 - 84 - 50 = 46^\circ$$

33.



$$b^2 = d^2 + c^2 - 2dc \cos B$$

$$b^2 = 3^2 + 27^2 - 2(3)(27) \cos(16)$$

$$b^2 = 587.276$$

$$b = 24.1$$

$$\frac{\sin 16}{24.1} = \frac{\sin C}{27}$$

$$24.1 \sin C = 27 \sin 16$$

$$\sin C = 0.3088$$

$$C = 18^\circ$$

$$D = 180 - 16 - 18 = 146^\circ$$

This cannot be because this

would make D obtuse, but it's matching side is smallest

$$\text{so } C = 180 - 18 = 162^\circ \checkmark$$

$$\text{and } D = 180 - 16 - 162 = 2^\circ \checkmark$$