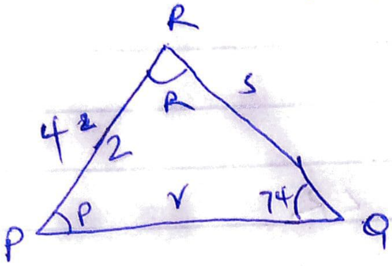
TRIGONOMETRIC.

Qn 1



let the third side be r and angle be R

Recall sin Rule to find Angle P.

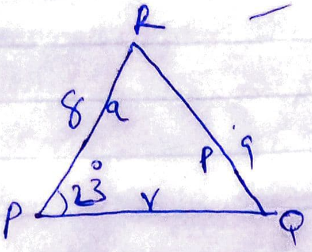
$$\frac{\sin Q}{2} = \frac{\sin P}{p}$$

$$P = \sin^{-1}\left(\frac{5 \times \sin 74^\circ}{4}\right) = \alpha$$

$$\text{Angle } R = 180 - (74 + P)$$

hence since angle P does not exist it is impossible to form a triangle with measurements $p = 5$, $q = 4$. $\angle Q = 74^\circ$

Qn2



let the third side r and angle ∠R

Using sine rule find Angle Q:

$$\frac{\sin Q}{q} = \frac{\sin P}{P}$$

$$\frac{\sin Q}{8} = \frac{\sin 23^\circ}{9}.$$

$$Q = \sin^{-1}\left(\frac{8 \times \sin 23^\circ}{9}\right) = 20.32^\circ.$$

$$R = 180 - (23 + \text{Angle } Q)$$

$$\therefore 180^\circ - 23^\circ - 20.32^\circ = 136.68^\circ$$

Sin Rule.

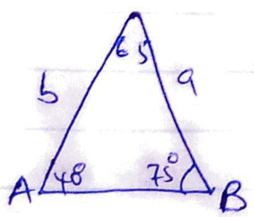
$$\frac{\sin Q}{q} = \frac{\sin R}{r} = r \sin Q = q \sin R.$$

$$\cancel{\frac{q \sin 136.68}{\sin}} = \cancel{\frac{8 \sin 136.68^\circ}{\sin 20.32}}$$

$$r = \frac{q \sin R}{\sin Q} = \frac{8 \sin 136.68^\circ}{\sin 20.32} =$$

$$R = \underline{15.81} \text{ units}$$

Qn 3



$40 + 75 = 115^\circ$

$180 - 115 = 65^\circ$

Using sin Rule to find sides a and b

$$\frac{a}{\sin 48} = \frac{b}{\sin 75^\circ} = 30/\sin 65$$

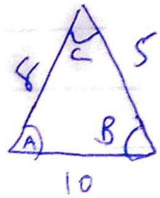
$$\frac{a}{\sin 40} = 30/\sin 65^\circ \quad = a = \frac{30 \times \sin 40\,km}{\sin 65^\circ} = 21.28 \text{ units}$$

$a =$

$$\frac{b}{\sin 75^\circ} = \frac{30}{\sin 65}$$

$$b = \frac{\sin 75 \times 30\,km}{\sin 65} = 31.97 \text{ units}$$

Qn 4.



Using Cosine rule to find angles

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

$$A = \cos^{-1}\left(\frac{8^2+10^2-5^2}{2\times 8\times 10}\right) = 0.86875$$

$$A = \cos^{-1}(0.86875) = 29.69^\circ$$

$$B = \cos^{-1}\left(\frac{a^2+c^2-b^2}{2ab}\right)$$

$$B = \cos^{-1}\left(\frac{5^2+10^2-8^2}{2\times 5\times 10}\right)$$

$$B = \cos^{-1}(0.61) = 52.41^\circ$$

$$C = \cos^{-1}\left(\frac{a^2+b^2-c^2}{2ab}\right)$$

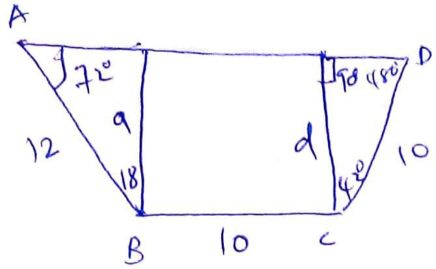
$$\cos^{-1}\left(\frac{5^2+8^2-10^2}{2\times 5\times 8}\right)$$

$$C = \cos^{-1}(-0.1375) = 97.90^\circ$$

The largest angle is $C = \underline{\underline{97.90^\circ}}$

Ank

Qns



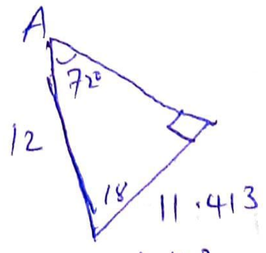
Sin Rule

$$\frac{\sin 90^\circ}{12} = \frac{\sin 72^\circ}{9}$$

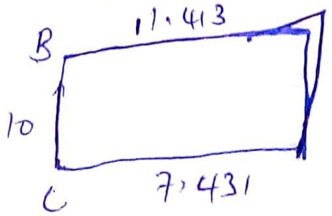
$$9 = \frac{12 \times \sin 72^\circ}{\sin 90^\circ} = 11.413 \text{ units}$$

$$\frac{\sin 90^\circ}{10} = \frac{\sin \sin 48^\circ}{d}$$

$$d = \frac{10 \times \sin 48^\circ}{\sin 90} = 7.431 \text{ units}$$

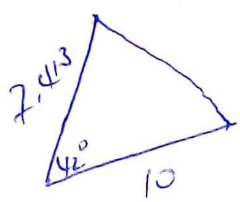


Area $= \frac{1}{2} \times 12 \times 11.413 \sin 18^\circ = 21.161$



$=$ Area $= \frac{1}{2} \times h \times (a+b)$

$\frac{1}{2} \times 10 \times (11.413 + 7.431) = 94.22$ square units

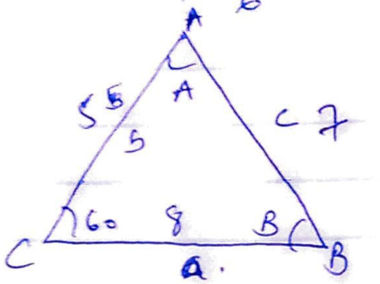


Area $= \frac{1}{2} ab \sin c$

$\frac{1}{2} \times 10 \times 7.431 \sin 42^\circ = 24.862$

Total area $= 21.161 + 94.22 + 24.862 = 140$ square units

Qn 6.



Cosine rule to find length c

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

$c = \sqrt{89 - 80 \cos 60^\circ} = 7$ units.

Sin Rule to find angles.

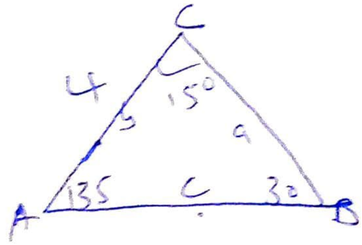
$\frac{\sin C}{c} = \frac{\sin B}{b} = \frac{\sin A}{8}$

$\frac{\sin 60}{c} = \frac{\sin B}{b} = \frac{\sin A}{8}$

$B = \sin^{-1}\left(\frac{5 \times \sin 60}{c}\right) = \left(\frac{5 \times \sin 60}{7}\right) = 38.21^\circ$

$A = \sin^{-1}\left(\frac{8 \times \sin 60}{7}\right) = 81.79^\circ$

Qn 7



angle C is calculated as

$180^\circ - 135^\circ - 30^\circ = 15^\circ$

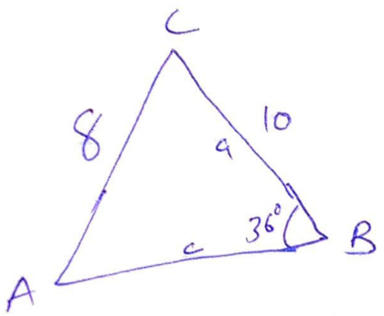
using Sine rule

$$\frac{a}{\sin 135^\circ} = \frac{4}{\sin 30^\circ} = \frac{c}{\sin 15^\circ}$$

$$a = \frac{4 \times \sin 135}{\sin 30^\circ} = 5.66 \text{ units.}$$

$$c = \frac{4 \times \sin 15^\circ}{\sin 30^\circ} = 2.07 \text{ units}$$

Qn 8.



Using sine rule to find angle A

$$\frac{\sin A}{a} = \frac{\sin B}{b}$$

$$\frac{\sin A}{10} = \frac{\sin 36^\circ}{8}.$$

$$\text{Angle } A = \sin^{-1}\left(\frac{10 \times \sin 36^\circ}{8}\right)$$

Angle $C = 180^\circ - 36^\circ$ - Angle ~~B~~

$$c = \frac{8 \times \sin C}{\sin 36} = \therefore$$ The triangle cannot be constructed.