Solutions 5

_____

CHAPTER 5: Trigonometry & Acute Angles

_____

1. Use a calculator to evaluate to four decimal places.
    (a) $\cos 11°$ (b) $\tan 83°$ (c) $\sin 39°$
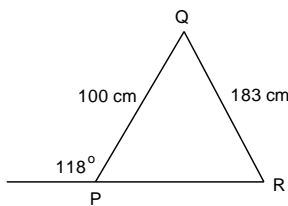   =0.9816   =8.1443   =0.6293

2. Use a calculator to find θ to the nearest degree.
    (a) $\cos \theta = 0.3862$ (b) $\tan \theta = 1.2375$
    $\theta = 67°$ $\theta = 51°$

3. Determine all the interior angles in $\triangle PQR$ correct to the nearest degree.

$\angle QPR = 62°(AST)$

$$\frac{\sin 62°}{183} = \frac{\sin R}{100}$$

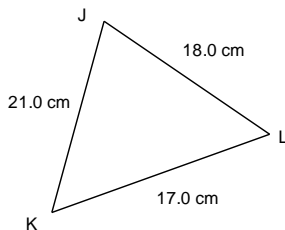$$\frac{100 \sin 62°}{183} = \sin R$$

$$0.4825 = \sin R$$

$$\angle R \doteq 29°$$

$$\therefore \angle Q = 180 - 29 - 62$$
$$= 89°$$

4. Solve $\triangle JKL$ where $j = 17.0 \ cm$, $k = 18.0 \ cm$, and $l = 21.0 \ cm$. Include a diagram.

Use the Cosine Law to find angle K
$$k^2 = j^2 + l^2 - 2jl \cos K$$
$$18^2 = 17^2 + 21^2 - 2(17)(21) \cos K$$
$$\frac{324 - 289 - 441}{-714} = \cos K$$
$$\frac{-406}{-714} = \cos K$$
$$0.5686 \doteq \cos K$$
$$\angle K = 55.3°$$

Now, use the Sine Law to get $\angle J$.
$$\frac{\sin J}{17} = \frac{\sin 55.3°}{18}$$
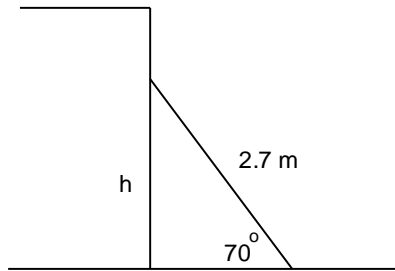$$\sin J = \frac{17 \sin 55.3°}{18}$$
$$\sin J = 0.7765$$
$$\angle J = 50.9°$$

$$\therefore \ \angle L = 180 - 55.3 - 50.9$$
$$= 73.9° \ (AST)$$

5. A $2.7\ m$ ladder can be used safely only at an angle of $70°$ with the horizontal. How high, to the nearest metre, can the ladder reach? Include a diagram.
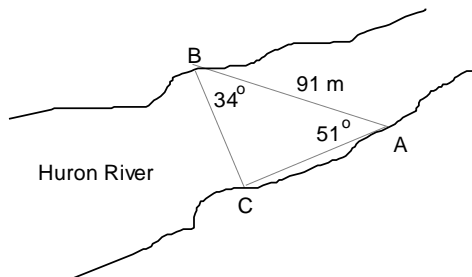

$$\sin 70° = \frac{h}{2.7}$$

$$2.7\sin 70° = h$$

$$2.54 = h$$

$$\therefore h \doteq 3m$$

$\therefore$ the ladder can reach about $2.5\ m$ up the wall.

6. A surveyor wants to calculate the distance BC across a river. He selects a position, A, so that BA is $91\ m$, and he measures $\angle ABC$ and $\angle BAC$ as $34°$ and $51°$, respectively. Calculate the distance BC to the nearest tenth of a metre.

$$\angle C = 180 - 51 - 34$$
$$= 95°$$

$$\therefore \frac{\sin 95°}{91} = \frac{\sin 51°}{a}$$

$$a = \frac{91\sin 51°}{\sin 95°}$$

$$a \doteq 70.99\ m$$

$$a \doteq 71 m$$

7. Two sides of a parallelogram measure $6.5\ cm$ and $8.0\ cm$. The longer diagonal is $11.3\ cm$ long. How long, to the nearest centimeter, is the other diagonal? (Include a diagram).

(see instructor for solution)

8. A temporary support cable for a radio antenna is $110\ m$ long and has an angle of elevation of $30°$. Two other support cables are already attached, each at an angle of elevation of $70°$. How long, to the nearest centimetre, is each of the shorter cables?
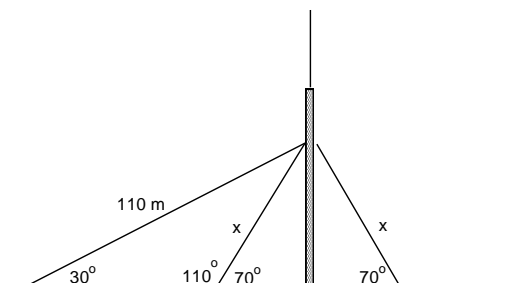
$$\frac{\sin 110°}{110} = \frac{\sin 30°}{x}$$

$$x = \frac{110\sin 30°}{\sin 110°}$$

$$x \doteq 58.5 m$$

Each of the shorter cables is approximately 58. 5 metres long.