# C.E.M.TUITION

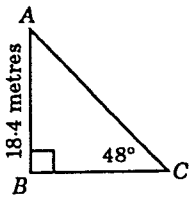
**Student Name :**_____

## Review Topic : Trigonometric Ratios

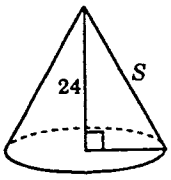
**(Preliminary - Paper 3)**

Year 11 - 2 Unit

**9.** A wire connected to the ground at $C$ is fixed to a mast at $A$ such that the wire makes an angle of 48° with the ground. Use trigonometry to calculate the length of wire used ($AC$) to the nearest tenth of a metre.

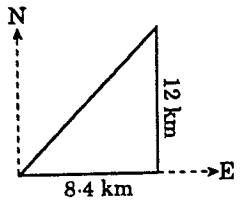



**10.**

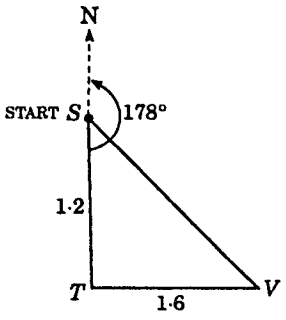



A cone 24 cm high has a semi-vertical angle of 21°. Use trigonometry to calculate the slant height, $S$, of the cone.

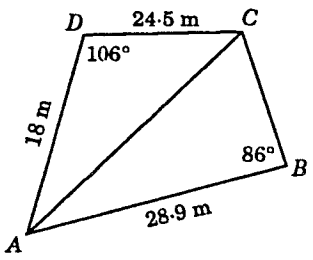
**11.** Boris leaves Belmont and sails due east for 8·4 km. He then changes direction and sails due north for 12 km. Find his bearing as calculated from Belmont.



**12.** Jillian, during an orienteering exercise, runs 1·2 km on a bearing of 178°, turns due east and runs a further 1·6 km. Calculate her distance from the starting point (*VS*) using the Cosine Rule.



**13.** In the figure below, $AD = 18$ m, $AB = 28{\cdot}9$ m, $CD = 24{\cdot}5$ m, $\angle ADC = 106°$, $\angle ABC = 86°$.

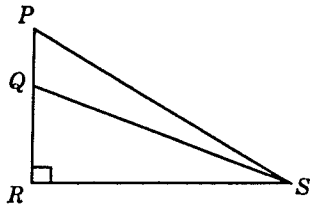



**(a)** In $\Delta ADC$ use the Cosine Rule to calculate $AC$ correct to one decimal place.

**(b)** In $\Delta ABC$ use the Sine Rule to calculate $\angle ACB$ to the nearest degree.

**(c)** Calculate the area of $ABCD$ to the nearest $m^2$.

**14.** From the top of a building ($P$) the angle of depression of a point $S$ (level with the base of the building) is found to be 32°. A second measurement is taken from a window ($Q$) 20 m lower down the building. The angle of depression at $Q$ is measured to be 27°.




**(a)** From $\Delta PQS$ use the Sine Rule to calculate the length of $QS$ (correct to one decimal place).

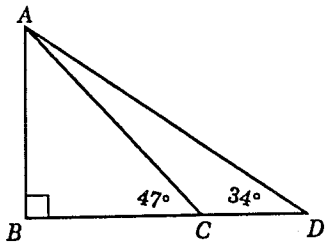
**(b)** Calculate the distance of $S$ from the foot of the building (nearest metre).

**15.** Angela measured the angle of elevation of the top of a tower ($AB$) from two positions $C$ and $D$ 32 metres apart and in a direct line from $B$, the base of the tower. The angles were 47° and 34°.

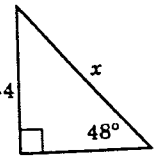
**(a)** Show that $\angle DAC = 13°$.

**(b)** Use the Sine Rule in $\Delta ACD$ to calculate $AC$ correct to one decimal place.

**(c)** Calculate the height of the tower, $AB$, correct to 3 significant figures.



**9.** $\dfrac{18{\cdot}4}{x} = \sin 48°$




$\therefore \dfrac{x}{18{\cdot}4} = \dfrac{1}{\sin 48°}$

(Taking reciprocals of both sides.)

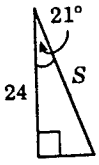
$\therefore \quad x = \dfrac{18{\cdot}4}{\sin 48°}$

$= 24{\cdot}759\,642$

$\approx 24{\cdot}8$ (1 dec. place)

Length of wire is 24·8 metres.

**10.** $\dfrac{24}{s} = \cos 21°$




$\therefore \dfrac{s}{24} = \dfrac{1}{\cos 21°}$

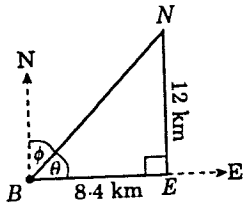
$\therefore \quad s = \dfrac{24}{\cos 21°}$

$= 25{\cdot}707\,48$

$\approx 25{\cdot}7$ (1 dec. pl.)

Slant height is 25·7 cm.

**11.** Bearing is $\phi°$.
Find $\theta°$ from $\Delta BEN$.




$\tan\theta = \dfrac{12}{8{\cdot}4}$

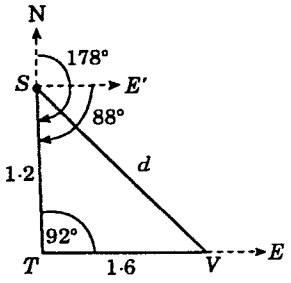
$\therefore \quad \theta = 56°53'$

$\therefore \quad \phi = 90° - 56°53'$

$= 33°7'$

Bearing is 033°7'.

**12.**




$\angle STV = 92°$

As $\angle NSE' = 90°$ ($\angle$ between N and E)

$\therefore \angle E'ST = 88°$ (178 − 90)

$\therefore \quad \angle STE = 92°$ (cointerior $\angle$'s, $SE' \| TE$)

Using Cosine Rule,

$d^2 = 1{\cdot}2^2 + 1{\cdot}6^2 - 2(1{\cdot}2)(1{\cdot}6)\cos 92°$

$= 4{\cdot}134\,014\,1$

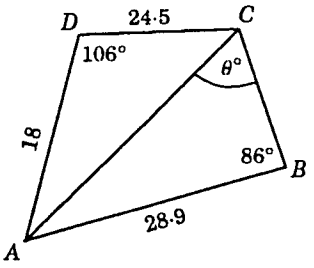
$d = \sqrt{4{\cdot}134\,014\,1}$

$= 2{\cdot}033\,227\,5$

$\approx 2{\cdot}0$ (1 dec. pl.)

Distance from start is 2·0 km.

**13.**




**(a)** In $\Delta ADC$,

$AC^2 = 18^2 + 24{\cdot}5^2 - 2(18)(24{\cdot}5)\cos 106°$

$= 1167{\cdot}3621$

$AC = \sqrt{1167{\cdot}3621}$

$= 34{\cdot}166\,668\,2$

$\approx 34{\cdot}2$ (1 dec. pl.)

$\therefore$ $AC$ is 34·2 metres.

**(b)** In $\Delta ABC$, let $\angle ACB = \theta°$

$\dfrac{28{\cdot}9}{\sin\theta} = \dfrac{34{\cdot}166\,668\,2}{\sin 86°}$

$\therefore \quad \sin\theta = \dfrac{28{\cdot}9\sin 86°}{34{\cdot}166\,668\,2}$

$= 0{\cdot}843\,793\,1$

$\therefore \quad \theta = 57°33'$

**(c)** $\angle CAB$

$= 180° - (86° + 57°33')$

$= 36°27'$

Then area of $ABCD$

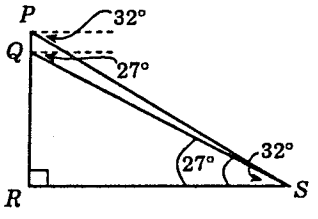
= area $\Delta ACD$ + area $\Delta ABC$

$= \dfrac{1}{2} \times 18 \times 24{\cdot}5 \sin 106° + \dfrac{1}{2} \times 28{\cdot}9 \times AC \times \sin 36°27'$

$= 505{\cdot}280\,74$

$\approx 505$ (nearest whole number)

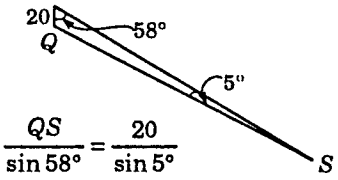
**14.**




$\angle PSR = 32°$, $\angle QSR = 27°$

**(a)** $\angle PSQ = 32° - 27° = 5°$

$\angle SPQ = 90° - 32° = 58°$




$\dfrac{QS}{\sin 58°} = \dfrac{20}{\sin 5°}$

$\therefore \quad QS = \dfrac{20\sin 58°}{\sin 5°}$

$= 194{\cdot}605\,21$

$\approx 194{\cdot}6$ (1 dec. point)

**(b)** $\dfrac{RS}{QS} = \cos 27°$

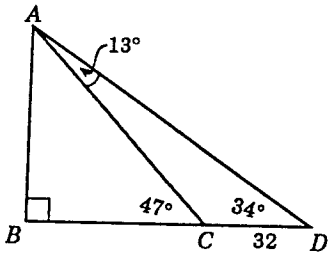
$RS = 194{\cdot}605\,21 \times \cos 27°$

$= 173{\cdot}394\,51$

$\approx 173$ (nearest whole number)

$S$ is 173 metres from the foot of the building.

**15.**




**(a)** $\angle DAC = 47° - 34° = 130°$
(external angle of $\Delta ACD$)

**(b)** $\dfrac{AC}{\sin 34°} = \dfrac{32}{\sin 13°}$

$\therefore \quad AC = \dfrac{32\sin 34°}{\sin 13°}$

$= 79{\cdot}546\,962$

$\approx 79{\cdot}5$ (1 dec. pl.)

$AC$ is 79·5 metres.

**(c)** In $\Delta ABC$,

$\dfrac{AB}{AC} = \sin 47°$

$\therefore \quad AB = AC\sin 47°$

$= 79{\cdot}546\,962\sin 47°$

$= 58{\cdot}176\,965$

$\approx 58{\cdot}2$ (3 sig. figs.)

Height of tower is 58·2 m.

$\angle ANB = 164° - 49°$

$= 115°$