

CHAPTER 11

Name : _____ ()

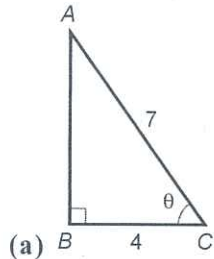
Class : _____ Date : _____

Marks : _____ /100

Introduction to Trigonometric Ratios

[Time allowed: 35 minutes]

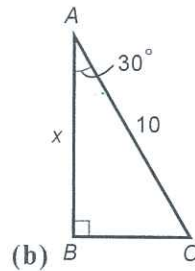
1. Find θ or x in the following. (Give your answers correct to 3 significant figures.)



$$\cos \theta = \frac{4}{7}$$

$$\theta = \cos^{-1}\left(\frac{4}{7}\right)$$

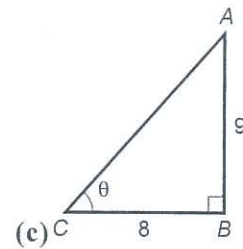
$$\theta = 55.2^\circ$$



$$\cos 30^\circ = \frac{x}{10}$$

$$x = 10 \cos 30^\circ$$

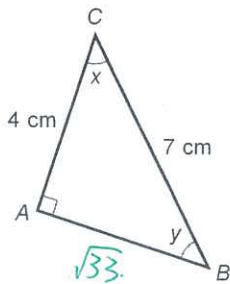
$$x = 8.66$$



$$\tan \theta = \frac{9}{8}$$

$$\theta = 48.4^\circ$$

2. The figure shows $\triangle ABC$.



- (a) Find the length of AB . (Leave your answer in surd form.)
 (b) Find the value of $\tan x$. (Leave your answer in surd form.)
 (c) Find x and y . (Give your answers correct to 3 significant figures.)

a) $AB = \sqrt{33}$

b) $\tan x = \frac{\sqrt{33}}{4}$

c) $\tan x = \frac{\sqrt{33}}{4}$
 $x = \tan^{-1}\left(\frac{\sqrt{33}}{4}\right)$

$$= 55.15^\circ$$

$$= 55.2^\circ$$

$$\tan y = \frac{4}{\sqrt{33}}$$

$$y = \tan^{-1}\left(\frac{4}{\sqrt{33}}\right)$$

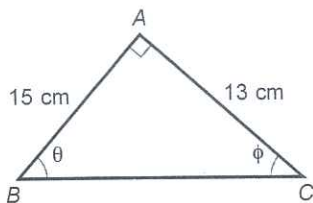
$$= 13.2^\circ$$

2. The figure shows $\triangle ABC$.

$$AB^2 = 49 - 16$$

$$AB^2 = 33$$

$$AB = \sqrt{33}$$



(a) Find the length of BC . (Give your answer correct to 3 significant figures.)

(b) Find the value of $\tan\theta + 2\cos\phi$. (Give your answer correct to 3 significant figures.)

$$\begin{aligned} \text{a). } BC^2 &= 15^2 + 13^2 \\ &= 394 \end{aligned}$$

$$\begin{aligned} BC &= \sqrt{394} \\ &= 19.8 \end{aligned}$$

$$\text{b). } \tan\theta = \frac{13}{15}$$

$$\cos\phi = \frac{13}{19.8}$$

$$\therefore \tan\theta + 2\cos\phi$$

$$= \frac{13}{15} + 2\left(\frac{13}{19.8}\right)$$

$$= 2.1798$$

$$= 2.18 \text{ ,,}$$

3. Find θ in the following. (Give your answers correct to 3 significant figures.)

(a) $2\tan\theta = 3$

(b) $\sin\theta = 3\tan 30^\circ - \cos 18^\circ$

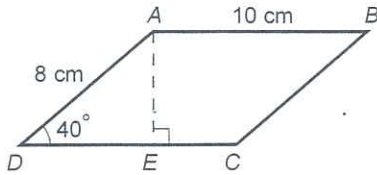
(c) $3\cos(\theta - 38^\circ) = 1$

$$\begin{aligned} \text{a) } \tan\theta &= \frac{3}{2} \\ \theta &= 56.3^\circ \end{aligned}$$

$$\begin{aligned} \text{b) } \sin\theta &= 0.78099 \\ \theta &= \sin^{-1} 0.78099 \\ &= 51.4^\circ \end{aligned}$$

$$\begin{aligned} \text{c) } \cos(\theta - 38^\circ) &= \frac{1}{3} \\ \theta - 38^\circ &= \cos^{-1} \frac{1}{3} \\ \theta &= 70.528 + 38 \\ &= 108.528 \\ &= 109^\circ \end{aligned}$$

4. In the figure, $ABCD$ is a parallelogram.



- (a) Find the length of AE . (Give your answer correct to 3 significant figures.)
 (b) Find the area of parallelogram $ABCD$. (Give your answer correct to 3 significant figures.)

$$a) \sin 40^\circ = \frac{AE}{8}$$

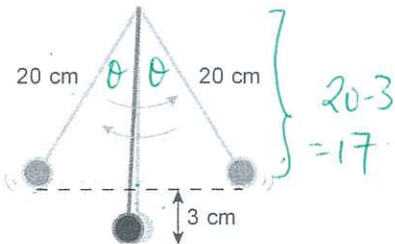
$$AE = 5.14$$

$$b) \text{Area} = b \times h$$

$$= 5.14 \times 10$$

$$= 51.4 \text{ cm}^2$$

5. The figure shows a pendulum of 20 cm long. When the pendulum swings, the distance between the highest point and the lowest point is 3 cm. What is the largest angle for each swing of the pendulum? (Give your answer correct to 3 significant figures.)



$$\cos \theta = \frac{17}{20}$$

$$\theta = \cos^{-1}\left(\frac{17}{20}\right)$$

$$= 31.79^\circ$$

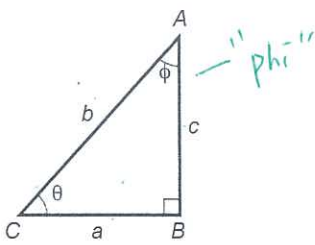
$$\therefore \text{Biggest angle: } 2 \times \theta$$

$$= 63.57$$

$$= 63.6^\circ$$

CHALLENGE

6. The figure shows $\triangle ABC$.



- (a) Express $\sin\theta$ and $\cos\theta$ in terms of a , b and c .
- (b) Express $\sin\phi$ and $\cos\phi$ in terms of a , b and c .
- (c) (i) Write down the relation between $a^2 + c^2$ and b^2 .
(ii) From the results of (a) and (c)(i), find the value of $\sin^2\theta + \cos^2\theta$.
- (d) (i) Find the value of $\theta + \phi$.
(ii) From the results of (a), (b) and (d)(i), find the relation between $\sin(90^\circ - \theta)$ and $\cos\theta$.

$$a) \sin\theta = \frac{c}{b} \qquad b) \sin\phi = \frac{a}{b}$$

$$\cos\theta = \frac{a}{b} \qquad \cos\phi = \frac{c}{b}$$

$$c) \text{ i). } b^2 = a^2 + c^2.$$

$$\begin{aligned} \text{ii). } \sin^2\theta + \cos^2\theta &= \left(\frac{c}{b}\right)^2 + \left(\frac{a}{b}\right)^2 \\ &= \frac{c^2 + a^2}{b^2} \\ &= \frac{b^2}{b^2} \\ &= 1 \end{aligned}$$

$$d) \text{ i) } \theta + \phi = 90^\circ$$

$$\text{ii) } \sin(90^\circ - \theta) = \sin\phi \qquad \therefore \frac{a}{b} = \cos\theta$$

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