

Trigonometry test

Add. Maths

Identities

$$\sin^2 A + \cos^2 A = 1$$

$$\sec^2 A = 1 + \tan^2 A$$

$$\operatorname{cosec}^2 A = 1 + \cot^2 A$$

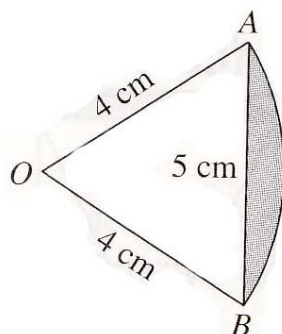
Formulae

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

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

$$\triangle = \frac{1}{2} ab \sin C$$

1. The diagram below shows a sector of a circle, centre O , radius 4 cm. The length of the chord AB is 5 cm.



Calculate,

- a) the angle AOB in radians, [3]
 b) the area of the shaded region. [3]

2. Sketch the graph of $y = \sin^2 x$ for the domain $0^\circ \leq x \leq 180^\circ$. [3]

3. Prove the identity,

$$\tan^2 \theta + \sin^2 \theta = \tan^2 \theta \sin^2 \theta \quad [5]$$

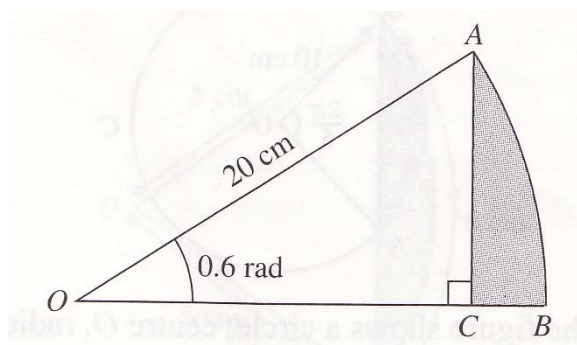
4. Find all the angles between 0° and 360° which satisfy the equation,

a) $1 + \tan\left(\frac{3x}{2}\right) = 0$

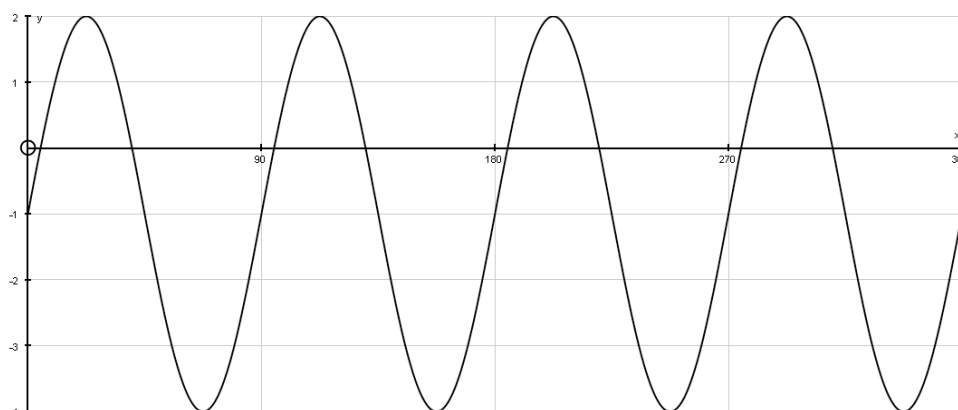
b) $2 \cot y = 3 \cos y$

c) $2 \sin^2 z = 3 \cos z \quad [10]$

5. In the diagram below, OAB , is a sector of a circle, centre O , of radius 20 cm and angle $AOB = 0.6$ radian. The line AD is the perpendicular from A to OB . The line AC is perpendicular to OA and meets OB produced at C .



- Find,
- the perimeter of the triangle AOC . [4]
 - the area of the region ABC , shaded in the diagram. [4]
6. Sketch the graph of $f(x) = 2 + 3\cos(2x)$ for the domain $0^\circ \leq x \leq 180^\circ$.
State clearly the range of the function. [5]
7. Prove the identity,
- $$\frac{1 + \sin x}{\cos x} + \frac{\cos x}{1 + \sin x} \equiv 2 \sec x$$
- [5]
8. The graph below shows $f(x) = a\sin(bx) + c$ for the domain $0^\circ \leq x \leq 360^\circ$.



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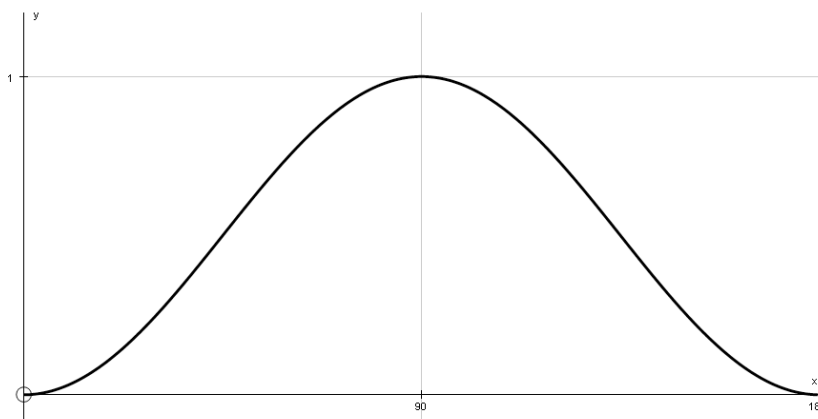
Find the values of a , b , and c .

[4]

Answers

1. a) 1.35 radians b) 3

2.



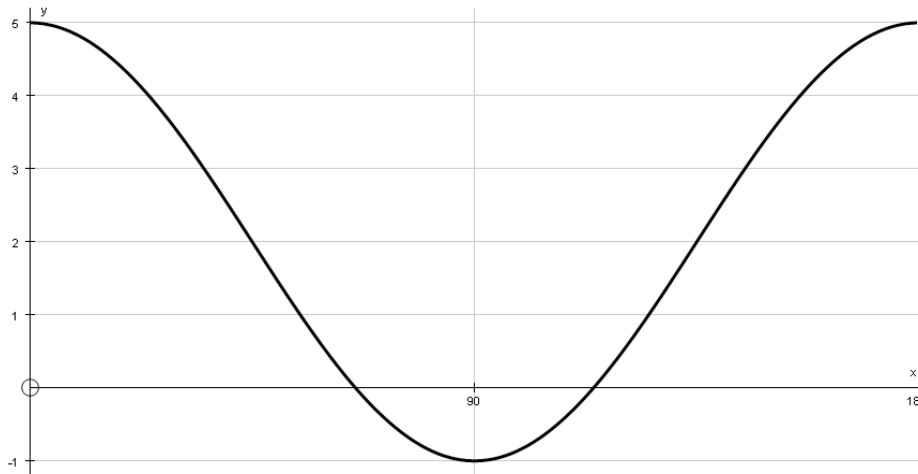
3.

$$\begin{aligned} & \tan^2 \theta - \sin^2 \theta \\ & (\sec^2 \theta - 1) - \sin^2 \theta \\ & \frac{1}{\cos^2 \theta} - 1 - \sin^2 \theta \\ & \frac{1}{\cos^2 \theta} - \frac{\cos^2 \theta}{\cos^2 \theta} - \frac{\cos^2 \theta \sin^2 \theta}{\cos^2 \theta} \\ & \frac{1 - \cos^2 \theta - \cos^2 \theta \sin^2 \theta}{\cos^2 \theta} \\ & \frac{\sin^2 \theta - \cos^2 \theta \sin^2 \theta}{\cos^2 \theta} \\ & \frac{\sin^2 \theta - (1 - \cos^2 \theta)}{\cos^2 \theta} \\ & \frac{\sin^2 \theta}{\cos^2 \theta} \times \sin^2 \theta \\ & \tan^2 \theta \sin^2 \theta \end{aligned}$$

4. a) $90^\circ, 210^\circ$ b) $41.8^\circ, 138.2^\circ$ c) $60^\circ, 300^\circ$

5. a) 47.8 cm b) 26.8 cm^2

6.



Range -1 to 5

7.

$$\begin{aligned} & \frac{1 + \sin x}{\cos x} + \frac{\cos x}{1 + \sin x} \\ & \frac{1}{\cos x} + \frac{\sin x}{\cos x} + \frac{\cos x}{1 + \sin x} \\ & \frac{(1 + \sin x)(1 + \sin x) + \cos^2 x}{\cos x + \cos x \sin x} \\ & \frac{\sin^2 x + 1 + 2 \sin x + \cos^2 x}{\cos x(1 + \sin x)} \\ & \frac{2(1 + \sin x)}{\cos x(1 + \sin x)} \\ & \frac{2}{\cos x} \\ & 2 \sec x \end{aligned}$$

8. $a=3, b=4, c=-1$