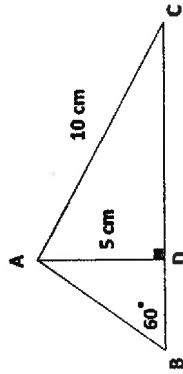


Calculator Free

3. [7 marks: 2, 2, 3]

In $\triangle ABC$, $\angle ABD = 60^\circ$, $AD = 5$ cm and $AC = 10$ cm. AD is perpendicular to BC .



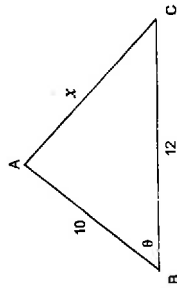
- (a) Find BD .
- (b) Find $\angle DAC$.
- (c) Find BC .

Calculator Free

3. [6 marks: 2, 2, 2]

In triangle ABC drawn below, find:

- (a) the exact value of x if $\cos \theta = \frac{1}{2}$.



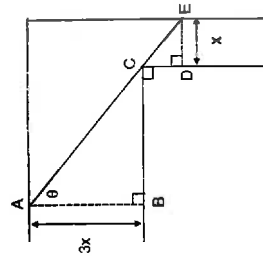
- (b) $\cos \theta$ in exact form if $x = 12$.

- (c) Find the area of $\triangle ABC$ if $\sin \theta = \frac{\sqrt{2}}{2}$.

4. [4 marks]

Triangles ABC and CDE are right-angled triangles with BC parallel to DE and AB parallel to CD . $DE = x$ and $AB = 3x$.

Prove that $AE = x \left[\frac{1}{\sin \theta} + \frac{3}{\cos \theta} \right]$.

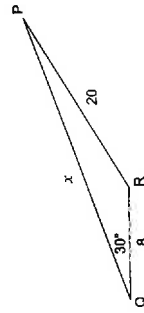


- (b) show that the length of the side PQ satisfies the equation $x^2 - 8\sqrt{3}x - 336 = 0$.

4. [5 marks: 2, 3]

In the accompanying $\triangle PQR$:

- (a) find the exact value of $\sin \angle QPR$.

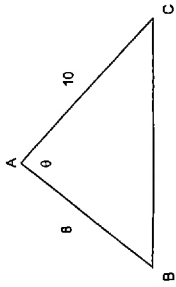


Calculator Assumed

9. [4 marks: 2, 2]

In triangle ABC shown, find:

(a) the length of BC in terms of θ .

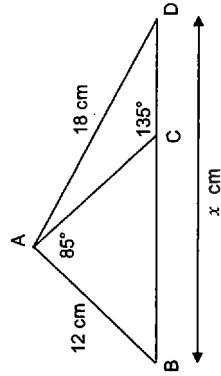


(b) the size of $\angle ACB$ if $\theta = 80^\circ$.

10. [11 marks: 3, 3, 3, 2]

In the accompanying diagram:

(a) find BC to 4 decimal places.



(b) find AC to 4 decimal places.

(c) find CD to 4 decimal places.

(d) hence, find x to 2 decimal places.

Calculator Assumed

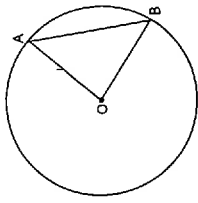
4. [8 marks: 2, 3 3]

In the circle of radius 2π cm with centre O

$$\angle AOB = \frac{\pi}{3}$$

Find the exact (as a multiple or fraction of π):

(a) area of triangle OAB



(b) perimeter of the *major* segment formed by the chord AB.

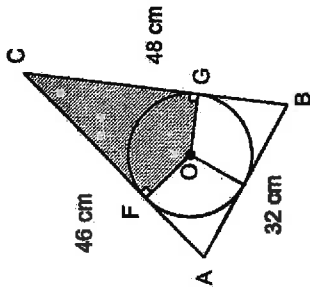
(c) area of the major segment formed by the chord AB.

Calculator Assumed

5. [11 marks: 3, 2, 2, 4]

The accompanying diagram shows a circle of radius 11 cm enclosed within triangle ABC. The circle touches all three sides of the triangle.

- (a) Find the size of $\angle ACB$.
Give your answer to the nearest degree.



- (b) Hence, find the obtuse $\angle FOG$. Give your answer to the nearest degree.

- (c) Find the area of the minor sector FOG.

- (d) Find the area of the shaded region.
Show clearly how you obtained your answer.

Calculator Free

7. [17 marks: 4, 4, 4, 5]

- (a) Given that $\cos 66.4^\circ = 0.4$, solve for θ in $\cos(\theta + 30^\circ) = 0.4$ where $0^\circ \leq \theta \leq 360^\circ$.
- (b) Given that $\tan 26.6^\circ = 0.5$, solve for θ in $1 - 2 \tan(\theta + 6.6^\circ) = 0$ where $0 \leq \theta \leq 360^\circ$.

(c) $(\sin \theta - 2)(2 \sin \theta - 1) = 0$ where $0^\circ \leq \theta \leq 360^\circ$

(d) $2 \cos^2 \theta + 3 \cos \theta - 2 = 0$ where $0 \leq \theta \leq 2\pi$

16 Trigonometric Graphs

Calculator Free

1. [6 marks]

Complete the following table.

Function	Period	Amplitude (where applicable)
$y = 2 \sin(2x^\circ)$		
$y = -4 \cos(\frac{x}{2} + 30^\circ)$		
$v = 10 \tan(3t + \pi)$		
$Q = 5 \sin(\frac{\pi}{2} - t)$		
$y = \frac{\sqrt{2}}{2} \cos(\pi t) + 100$		
$T = 5 - \sin(\frac{\pi}{4} - \theta)$		

2. [5 marks]

Complete the table below.

Function	Minimum value of function	Maximum value of function
$y = 3 \sin t$		
$y = 20 \cos(\frac{2x}{3} - 45^\circ)$		
$v = 5 \tan \theta$		
$M = 2 \sin(\frac{\pi}{2} - 3t) + 4$		
$y = 5 - \cos(2\pi t)$		

Calculator Assumed

4. [13 marks: 2, 2, 3, 3, 3]

Given that $\sin P = \frac{5}{13}$ and $\cos Q = -\frac{15}{17}$, where P and Q are each obtuse angles,

find the exact value of:

(a) $\cos P$

(b) $\sin Q$

(c) $\sin(P - Q)$

(d) $\cos(P + Q)$

(e) $\tan(P - Q)$

18 Trigonometric Equations II

Calculator Free

1. [13 marks: 3, 5, 5]

Solve for x within the given domain:

(a) $\cos x + \sqrt{3} \sin x = 0$ $0 \leq x \leq 360^\circ$:

(b) $2 \sin^2 x - 3 \sin x - 2 = 0$

for $0 \leq x \leq 360^\circ$

(c) $\cos x - \frac{3}{\cos x} - 2 = 0$ for $0 \leq x \leq 2\pi$

Calculator Free

5. [5 marks: 1, 2, 2]

Amy has a collection of 18 fluoro pens in her pink box and 24 fluoro pens in her blue box. Write mathematical expressions for the number of ways Amy can pick:

(a) three pens from her pink box.

(b) three pens from the pink box and four pens from the blue box.

(c) a dozen pens from both boxes.

6. [10 marks: 1, 2, 2, 3, 2]

A committee of 9 people is to be selected from 10 Labor, 8 Liberal and 5 Green politicians. Write mathematical expressions for the number of different ways the committee can be selected if:

(a) there are no restrictions.

(b) all three political parties are equally represented.

(c) there are no Greens.

(d) the Liberal representatives are in the majority.

(e) the Labor husband and wife pair, Alex and Alice, cannot be in the same committee.

Calculator Assumed

2. [8 marks: 2, 2, 2, 2]

The Mathematics department at a school conducted a random survey involving 200 students.

- 38 students did not have any calculator (scientific or CAS) with them
- 142 students had a CAS calculator with them
- 52 students had a scientific calculator with them

Use a Venn Diagram or a two-way table to the answer the following questions.

- (a) Find the probability that a student chosen at random had only a CAS calculator.
- (b) Find the probability that a student chosen at random had both a CAS calculator as well as a scientific calculator.
- (c) Find the probability that a student chosen at random had either a CAS calculator or a scientific calculator.
- (d) Find the probability that a student selected from those who had at least one type of calculator had both types of calculator.

Calculator Free

3. [8 marks: 2, 2, 4]

It is known that $P(A) = 0.6$ and $P(B) = 0.3$. Find:

(a) $P(B | A)$ given that A and B are mutually exclusive.

(b) $P(A | B)$ given that A and B are independent.

(c) $P(B | A)$ given that $P(A | B) = 0.2$.