TRIGONOMETRY
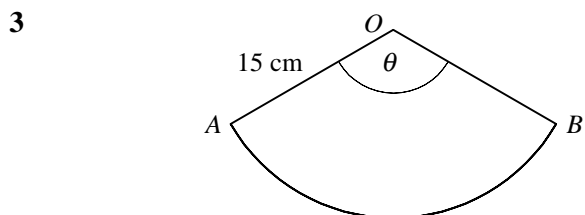
1 Find, to 1 decimal place, the values of x in the interval $-180° \le x \le 180°$ for which

   a $\cos(x + 40°) = 0.3$,   **(3)**

   b $2 + \tan 2x = 0$.   **(5)**

2 Find, to 1 decimal place, the values of x in the interval $0 \le x \le 360$ for which
$$2\tan^2 x° - 4\tan x° + 1 = 0.$$ **(6)**

3

The diagram shows sector OAB of a circle, centre O, radius 15 cm.

Given that $\angle AOB = \theta$ radians and that the length of the arc AB is 32.1 cm,

   a   find the value of θ,   **(2)**

   **b**   find the area of sector OAB.   **(2)**

4 Solve, for x in the interval $0 \le x \le \pi$, the equation
$$\sin\left(2x - \tfrac{\pi}{3}\right) = \tfrac{1}{2},$$

giving your answers in terms of π.   **(6)**

5   **a**   Given that $\sin A = 1 - \sqrt{2}$, show that $\cos^2 A + 2\sin A = 0$.   **(4)**

   b   Sketch the curve $y = \sin\left(x + \tfrac{\pi}{3}\right)$ for x in the interval $0 \le x \le 2\pi$.

       Label on your sketch

      i   the value of x at each point where the curve intersects the x-axis,

      ii   the coordinates of the maximum and minimum points of the curve.   **(5)**

6 Find the values of x in the interval $0 \le x \le 360°$ for which
$$2\sin^2 x + \sin x + 1 = \cos^2 x.$$ **(8)**

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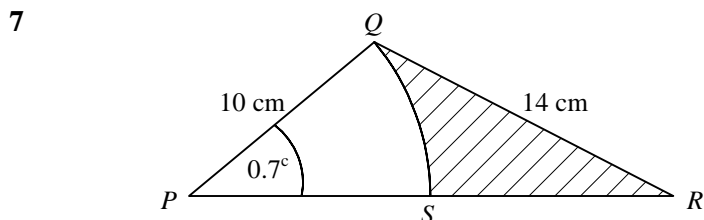
The diagram shows triangle PQR in which $PQ = 10$ cm, $QR = 14$ cm and $\angle QPR = 0.7$ radians.

   a   Find the size of $\angle PRQ$ in radians to 2 decimal places.   **(3)**

The point S lies on PR such that $PS = 10$ cm. The shaded region is bounded by the straight lines QR and RS and the arc QS of a circle, centre P.

   b   Find the area of the shaded region.   **(6)**

| **TRIGONOMETRY** | *continued* |

8   **a**   Given that $0 < A < 90°$, and that $\sin A = \dfrac{\sqrt{5}}{3}$,

       i   show that $\cos A = \frac{2}{3}$,

       ii   find the exact value of tan A.   **(5)**

   b   Find the values of x in the interval $0 \le x \le 360°$ for which

$$5 \sin x \cos x + \cos x = 0. \qquad \textbf{(6)}$$

9   Find the values of θ in the interval $0 \le \theta \le 180$ for which

$$\cos (2\theta + 30)° = -\tfrac{1}{2}. \qquad \textbf{(6)}$$

10   **a**   Sketch the curve $y = \cos (x - 30)°$ for x in the interval $-180 \le x \le 180$, showing the coordinates of any maximum or minimum points on the curve.   **(4)**

   b   Find the x-coordinates of the points where the curve intersects the line $y = 0.2$ in this interval, giving your answers to 1 decimal place.   **(3)**

11   Find the values of x in the interval $0 \le x \le 360°$ for which

$$4 \cos^2 x - \cos x - 2 \sin^2 x = 0. \qquad \textbf{(8)}$$

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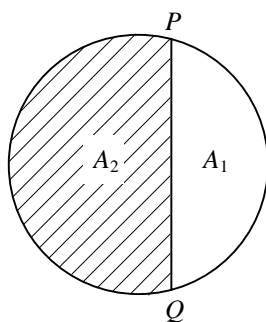
The diagram shows a circle of radius r cm. The chord PQ divides the circle into the unshaded minor segment of area A_1 and the shaded major segment of area A_2.

Given that PQ subtends an angle of θ radians at the centre of the circle,

   a   find an expression for A_1 in terms of r and θ.   **(3)**

Given also that $\theta = \frac{5\pi}{6}$,

   b   show that $A_1 : A_2 = (5\pi - 3) : (7\pi + 3)$.   **(6)**

13   Find, in terms of π, the values of x in the interval $0 \le x \le 2\pi$ for which

$$3 \tan x - 2 \cos x = 0. \qquad \textbf{(7)}$$

14   In triangle ABC, $AB = 5$ cm, $AC = 7$ cm and $BC = 8$ cm.

   a   Find the value of $\cos (\angle ABC)$.   **(3)**

   b   Show that the area of triangle ABC is $10\sqrt{3}$ cm^2.   **(5)**

15   **a**   Show that

$$(2 + \cos^2 \theta)(1 + \tan^2 \theta) \equiv 3 + 2 \tan^2 \theta. \qquad \textbf{(3)}$$

   b   Hence find the values of θ in the interval $0 \le \theta \le 360°$ for which

$$(2 + \cos^2 \theta)(1 + \tan^2 \theta) = 7. \qquad \textbf{(5)}$$