Trigonometry – Question Set

Exact Values & Conversions

Q1 Without a calculator, find: (a) $\sin 60^\circ$ (b) $\cos 30^\circ$

Q2 Convert: (a) 210° to radians (b) $-\dfrac{7\pi}{12}$ to degrees

Q3 Evaluate each, using π–shift identities where helpful: (a) $\sin\left(\frac{5\pi}{6} + \pi\right)$

Right-Triangle Applications

Q4 A ladder 4.8m long leans against a wall so that its foot is 1.4m from the wall. Find the angle between ladder and ground.

Q5 A watch-tower of height 38m is observed from point P at an angle of elevation of 27°. How far is P from the base of the tower?

Non-Right Triangles

Q6 In $\triangle ABC$, $A = 42^\circ$, $B = 67^\circ$ and $b = 8.2$cm. Find side a.

Q7 Sides of a triangle measure 6.4cm, 5.1cm and 4.7cm. Find the largest angle to the nearest degree.

Arc Length & Sector Area

Q8 A sector of radius 9.5cm has area 72cm^2. Determine its central angle in radians (2d.p.).

Q9 A wheel of radius 0.32m turns through 420°. Find the distance a point on the rim travels.

Trigonometric Identities & Simplification

Q10 Simplify using identities: $\sin(\pi - \theta)\cos\theta + \sin\theta\cos(\pi - \theta)$.

Q11 Show that $\dfrac{1 - \cos^2\theta}{\sin\theta} = \sin\theta$.

Q12 Prove $\tan(\theta + \pi) = \tan\theta$.

Trigonometric Equations

Q13 Solve for $0^\circ \le x < 360^\circ$: $2\sin x - \sqrt{3} = 0$.

Q14 Solve in radians, $0 \le \theta < 2\pi$: $4\cos^2\theta - 3 = 0$.

Q15 Find all solutions $0^\circ \le t < 360^\circ$ to $\sin 2t = \sin t$.

Bearings & Navigation

Q16 A ship sails 6km on bearing 120°, then 4km on bearing 210°. How far and on what bearing from the start is the ship now?

Mixed Practice

Q17 (a) Prove $\cot\theta = \tan(90^\circ - \theta)$ (b) Hence evaluate $\cot 30^\circ$

Q18 A radio mast is supported by a wire anchored 21m from its base. The wire makes an angle of 62° with the ground. Find the mast height.

Q19 A function has the form $y = A\sin(Bx + C) + D$. Its midline is $y = 2$, amplitude 3, period 180°, and it has a maximum at $(30^\circ, 5)$. Write one possible equation.

Challenge Question

Q20 Surveying a Gorge Standing at point A, the angle of elevation to the top of a cliff across a gorge is 18°. You move 75m directly toward point B at the base of the cliff; the new angle of elevation is 25°.

(a) Draw a labelled diagram.

(b) Find the height of the cliff.

(c) Determine the width of the gorge (distance AB).