

Exercise walk-through

4.3.3

Exact Trig

AQA · GCSE · Mathematics

80. Circle parts and geometric definitions · Foundation

Circle parts and geometric definitions · Foundation

For centre O and radius 5 cm, every circumference point is 5 cm from O and the diameter is 10 cm. A chord 3 cm from O has half-length $\sqrt{(5^2-3^2)}=4$ cm, so its whole length is 8 cm. The perpendicular from O meets the chord at its midpoint. Joining the two chord endpoints to O creates a sector; the smaller region between chord and arc is a segment. At the rightmost circumference point, the vertical touching line is tangent and the horizontal radius is perpendicular to it. The circumference is a length, $2\pi r=10\pi$ cm, rather than an area.

118. Tangents, chords and the alternate segment · Higher

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At contact T, the radius OT is perpendicular to the tangent: a non-perpendicular line through T would have a smaller centre-to-line distance than the radius and cut the circle twice. For tangents PA and PB, $OA=OB$, OP is shared and both contact angles are 90° . RHS makes OAP and OBP congruent, so $PA=PB$. For a centre perpendicular OM to chord AB, $OA=OB$ and OM is shared; RHS gives $AM=MB$. If $OA=5$ and $OM=3$, $AM=4$, hence $AB=8$. For a chord AB with minor central angle ϕ , triangle OAB has base angle $(180-\phi)/2$.

158. Exact trigonometric values from special triangles · Foundation

Exact trigonometric values from special triangles · Foundation

For angles $0^\circ, 30^\circ, 45^\circ, 60^\circ, 90^\circ$, sine values are $0, 1/2, \sqrt{2}/2, \sqrt{3}/2, 1$; cosine values are $1, \sqrt{3}/2, \sqrt{2}/2, 1/2, 0$. For $0^\circ, 30^\circ, 45^\circ, 60^\circ$, tangent values are $0, 1/\sqrt{3}, 1, \sqrt{3}$. The side 1 opposite 30° in the bisected equilateral triangle gives $\sin 30^\circ = 1/2$; the adjacent $\sqrt{3}$ gives $\cos 30^\circ = \sqrt{3}/2$ and $\tan 30^\circ = 1/\sqrt{3}$. In the isosceles right triangle, $\sin 45^\circ = \cos 45^\circ = 1/\sqrt{2} = \sqrt{2}/2$. A right triangle with hypotenuse 10 and angle 30° has opposite side 5 and adjacent side $5\sqrt{3}$. Since $\sin 90^\circ = 1$ and $\cos 90^\circ = 0$, tangent at 90° would divide by zero.

Exercises 2.1·2.3

2.1 (Foundation) Find $\sin 30^\circ$.

2.2 (Foundation) Find $\tan 45^\circ$.

2.3 (Foundation) Find the opposite length for hypotenuse 10 and angle 30° .

3 Exam-style questions

Exercises 2.1·2.3

2.1 (Foundation) Find $\sin 30^\circ$.

2.1 Opposite 1 divided by hypotenuse 2.

2.2 (Foundation) Find $\tan 45^\circ$.

2.2 Equal opposite and adjacent sides give ratio 1.

2.3 (Foundation) Find the opposite length for hypotenuse 10 and angle 30° .

3 Exam-style questions

2.3 $10 \times \sin 30^\circ = 5$.

Exercise 3.1

3.1 Decide whether this claim is true. Justify with a concrete calculation or counterexample: All trigonometric functions have finite values at 90° .

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3.1 False. $\sin 90^\circ = 1$ and $\cos 90^\circ = 0$, but $\tan 90^\circ = \sin 90^\circ / \cos 90^\circ$ is undefined.

Local review guidance: show the chosen method; give the checked result; explain the condition or failed shortcut. This is authored classroom guidance.