

CLASS 10

MATHS

EXTRA QUESTIONS

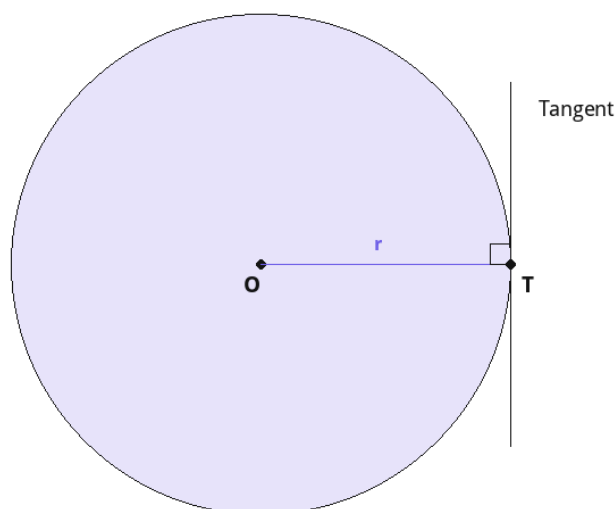
Class 10 Maths Chapter 10 Extra Questions – Circles (HOTS)

For complete step-by-step answers and a quick summary, check the Class 10 Mathematics Chapter 10 Solutions and Class 10 Mathematics Chapter 10 Revision Notes. These Class 10 Mathematics Chapter 10 important questions are handy for last-minute exam practice.

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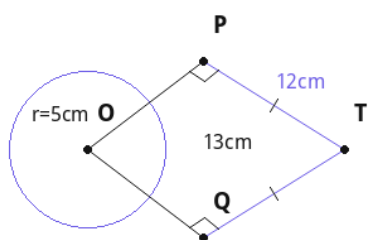
A tangent to a circle is perpendicular to the radius at the point of contact ($OT \perp$ tangent at T).

Reference figure — tangent to a circle

Class 10 Maths Chapter 10 Extra Questions (HOTS Level) – Circles

Q1 (Fresh-number application). From an external point 13 cm from the centre of a circle of radius 5 cm, two tangents are drawn. Find the length of each tangent and the area of the quadrilateral formed by the two tangents and the two radii to the points of contact.

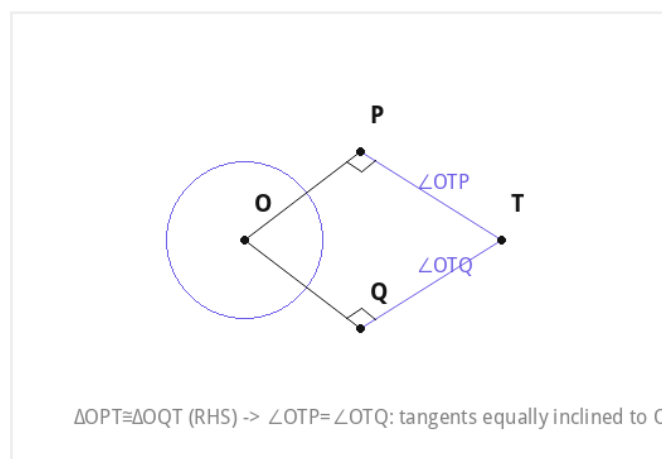
Answer: Tangent length = $\sqrt{(13^2 - 5^2)} = \sqrt{144} = 12$ cm. The quadrilateral (centre, external point, two points of contact) splits into 2 right triangles each with legs 5 and 12, area = $\frac{1}{2}(5)(12) = 30$ each, total area = **60 cm²**.



External point 13cm from centre, $r=5\text{cm} \rightarrow$ tangent=12cm; quadrilateral

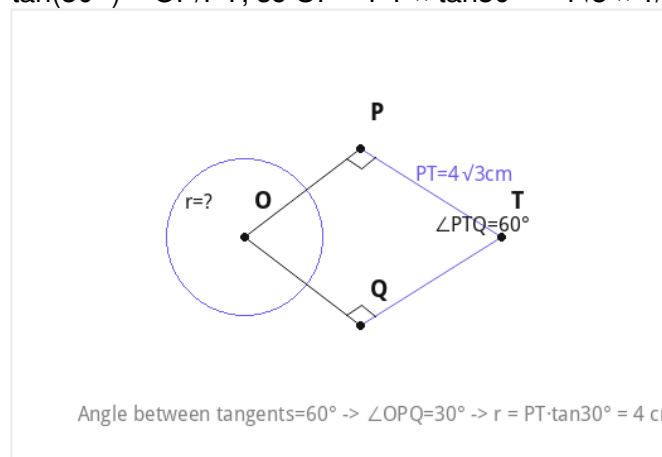
Q2 (General/abstract proof). Prove that if two tangents are drawn to a circle from an external point, they are equally inclined to the line segment joining the point to the centre.

Proof: In triangles OPT and OQT (O=centre, T=external point, P,Q=points of contact): $OP=OQ$ (radii), $OT=OT$ (common), $\angle OPT=\angle OQT=90^\circ$. By RHS congruence, triangle OPT $\cong$ triangle OQT, so $\angle OTP = \angle OTQ$ — the tangents are **equally inclined** to OT. Proved.



Q3 (Reverse-engineering). Two tangents from an external point to a circle include an angle of 60° between them. If the tangent length is $4\sqrt{3}$ cm, find the radius.

Answer: Since $\angle PTQ = 60^\circ$, using Q7's result from the Solutions post, $\angle OPQ = 30^\circ$. In right triangle OPT, $\tan(30^\circ) = OP/PT$, so $OP = PT \times \tan 30^\circ = 4\sqrt{3} \times 1/\sqrt{3} = 4$ cm.



Q4 (Assertion-Reason). Assertion (A): A parallelogram circumscribing a circle is always a rhombus.

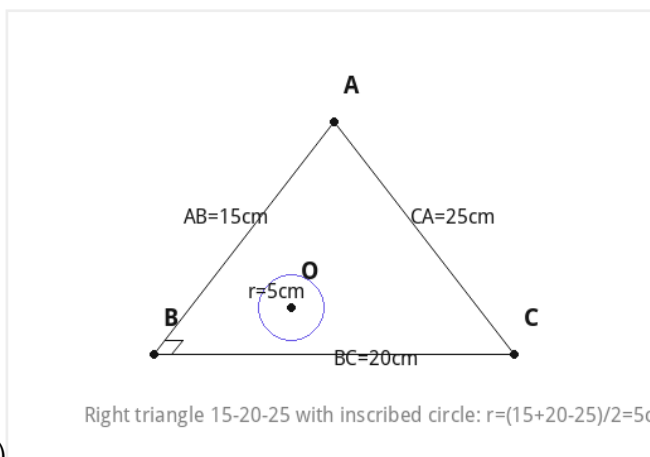
Reason (R): The lengths of tangents drawn from an external point to a circle are equal.

Options: (a) Both true, R explains A. (b) Both true, R does not explain A. (c) A true, R false. (d) A false, R true.

Answer: (a). R is the exact theorem used to derive A (see Solutions Q8) — R correctly explains A.

Q5 (Multi-step word problem, fresh numbers). A circle is inscribed in a triangle with sides 15 cm, 20 cm, and 25 cm (a right triangle since $15^2 + 20^2 = 25^2$), touching all three sides. Find the radius of the inscribed circle.

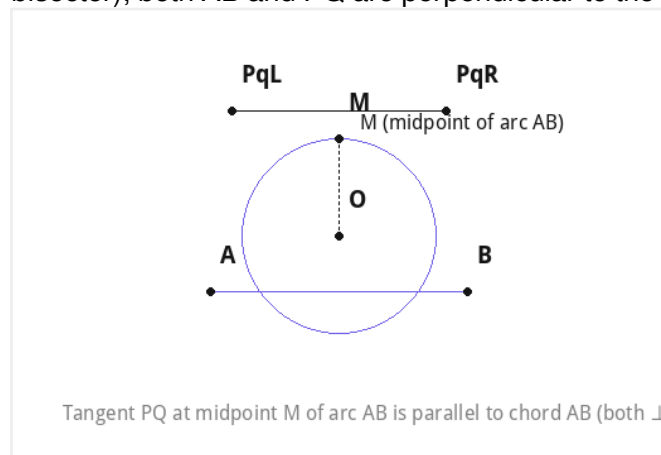
Answer: For a right triangle, inradius $r = (a+b-c)/2$ where c is the hypotenuse $= (15+20-25)/2 = 5$ cm. (This uses the same equal-tangent-length reasoning as Solutions Q9, applied to a right-angled triangle where the



two legs plus the tangent segments simplify neatly.)

Q6 (General/abstract proof). Prove that if AB is a chord of a circle and PQ is the tangent at the midpoint of the arc AB, then PQ is parallel to AB.

Proof: Let M be the midpoint of arc AB, so arc AM = arc MB, meaning chords AM = MB, so M lies on the perpendicular bisector of AB, which also passes through the centre O. The tangent PQ at M is perpendicular to OM (radius-tangent theorem). Since OM is also perpendicular to AB (as the perpendicular bisector), both AB and PQ are perpendicular to the same line OM, hence AB is **parallel** to PQ. Proved.



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