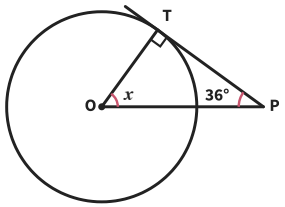
Circle theorems: tangents

ANSWERS

1

PT is a tangent to the circle at T, and O is the centre. Find angle x.



Angle OTP = 90 °

tangent meets radius at 90°

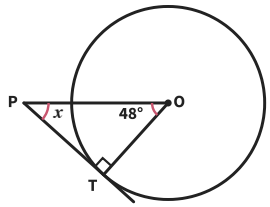
x = 180 − 90 − 36

angles in a triangle add up to 180°

x = 54°

2

PT is a tangent to the circle at T, and O is the centre. Find angle x.



Angle OTP = 90 °

tangent meets radius at 90°

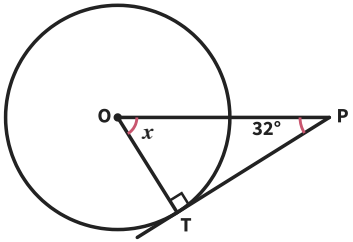
x = 180 − 90 − 48

angles in a triangle add up to 180°

x = 42°

3

PT is a tangent to the circle at T, and O is the centre. Find angle x. Give reasons.



Angle OTP = 90 °

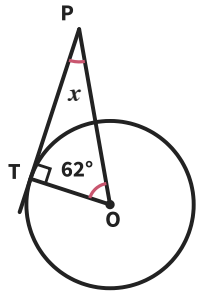
tangent meets radius at 90°

x = 180 − 90 − 32 (angles in a triangle)

x = 58°

4

PT is a tangent to the circle at T, and O is the centre. Find angle x. Give reasons.



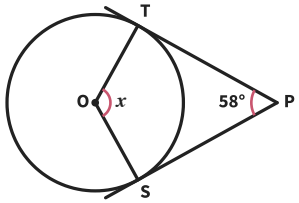
angle OTP = 90° (tangent meets radius at 90°)

x = 180 − 90 − 62 (angles in a triangle)

x = 28°

5 Notice the change!

PT and PS are tangents to the circle, centre O. Find angle x.



Angles at T and S = 90 °

tangent meets radius at 90°

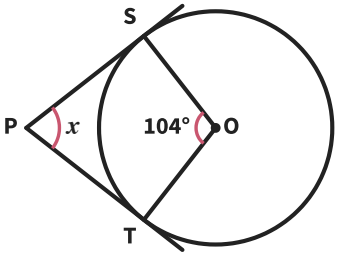
x = 360 − 90 − 90 − 58

angles in a quadrilateral add up to 360°

x = 122°

6

PT and PS are tangents to the circle, centre O. Find angle x. Give reasons.



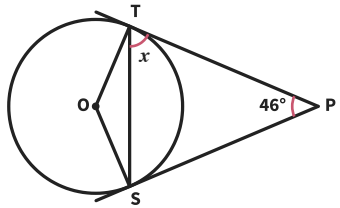
angles OTP and OSP = 90° (tangent meets radius)

x = 360 − 90 − 90 − 104 (quadrilateral)

x = 76°

7

PT and PS are tangents to the circle, centre O. Find angle x.



PT = PS

tangents from a point are equal

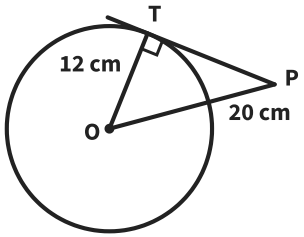
x = (180 − 46) ÷ 2

base angles of an isosceles triangle are equal

x = 67°

8

PT is a tangent to the circle at T, and O is the centre. OT = 12 cm and OP = 20 cm. Find the length of PT.



The hypotenuse is OP

$PT^2 = 20^2 - 12^2$

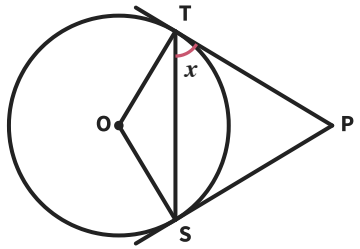
PT = 16 cm

Circle theorems: tangents *further practice*

ANSWERS

9

PT and PS are tangents to the circle, centre O. Angle TOS = 118°.
Find angle x. Give reasons.



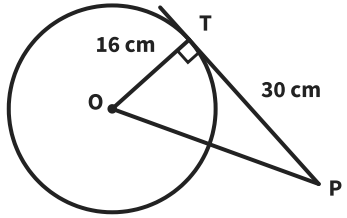
angle TPS = 360 − 90 − 90 − 118 = 62°

x = (180 − 62) ÷ 2 (PT = PS)

x = 59°

10

PT is a tangent to the circle at T, and O is the centre. OT = 16 cm and PT = 30 cm. Find OP.



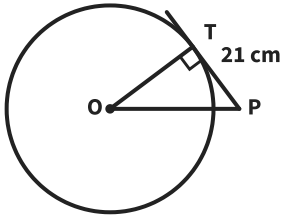
angle OTP = 90°, OP is the hypotenuse

$OP^2 = 16^2 + 30^2 = 1156$

OP = 34 cm

11

PT is a tangent to the circle at T, and O is the centre. PT = 21 cm and OP = 35 cm.
Find the radius of the circle.



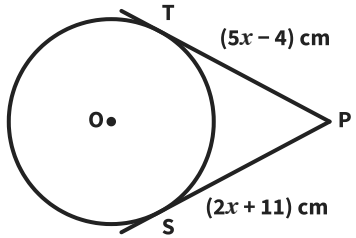
angle OTP = 90°, OP is the hypotenuse

$OT^2 = 35^2 - 21^2 = 784$

Radius = 28 cm

12

PT and PS are tangents to the circle.
Find the length of PT.



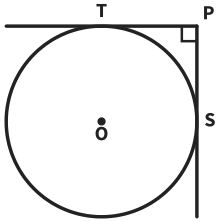
5x − 4 = 2x + 11 (tangents from a point are equal)

3x = 15, so x = 5

PT = 21 cm

13

A round rug of radius 80 cm lies in the corner of a room. It touches both walls, which meet at right angles at P. How far is P from the centre O of the rug?



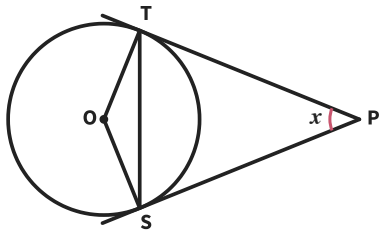
OTPS has four right angles and OT = OS, so it is a square

$OP^2 = 80^2 + 80^2 = 12800$

OP = 113.1 cm

14

PT and PS are tangents to the circle, centre O. Angle OTS = 22°.
Find angle x. Give reasons.



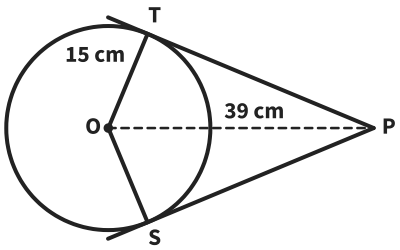
angle PTS = 90 − 22 = 68° (tangent meets radius)

x = 180 − 68 − 68 (PT = PS, isosceles)

x = 44°

15

PT and PS are tangents to the circle, centre O. OT = 15 cm and OP = 39 cm.
Find the perimeter of the kite OTPS.



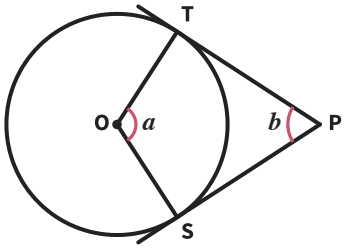
$PT^2 = 39^2 - 15^2 = 1296$, so PT = 36 cm

PS = PT = 36 cm, OS = OT = 15 cm

Perimeter = 102 cm

16

PT and PS are tangents to the circle, centre O. Zainab says angle a + angle b is always 180°. Is she right? Explain.



Yes. The angles at T and S are 90° each,

so a + b = 360 − 90 − 90 = 180°