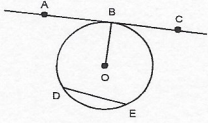


UNIT 8.1 – Practice Questions – TANGENTS – Pythagorean Theorem

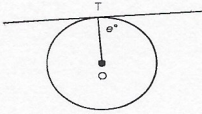
11. O is the centre of this circle.
Which line is a tangent?



Since ~~AB~~ is OUTSIDE THE CIRCLE, AND IT TOUCHES THE CIRCLE AT ONE SPOT,

AC = Tangent

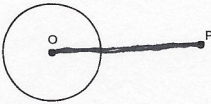
12. O is the centre of this circle. Point T is a point of tangency.
What is the value of e° ?



Since, at the point of tangency, the radius and the tangent are perpendicular to each other, there is always a right angle at the point of tangency. thus

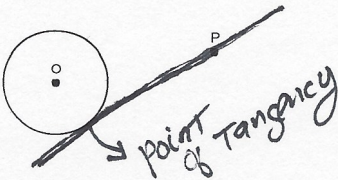
$e^\circ = 90^\circ$

13. Draw a line through point P that is NOT a tangent to the circle.



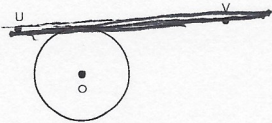
since tangents do NOT cross the interior of circles, an option is to draw a line as shown.

14. Draw a line through point P that is a tangent to the circle.
Label the point of tangency Q.



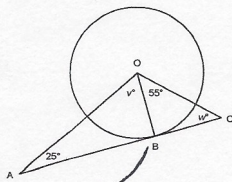
- Draw a line in the outside of the circle that only touches the circle at 1 spot.
- Have it go through P

15. Is the line that passes through points U and V a tangent to the circle?

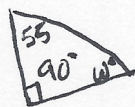


Yes: — IT IS a line outside of the circle.
— it touches the circle at only one spot (the point of tangency)

16. O is the centre of this circle and point B is a point of tangency.
Determine the values of v° and w° .

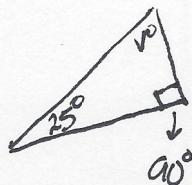


90° at point of tangency



$w^\circ = 180 - (90^\circ + 55^\circ)$

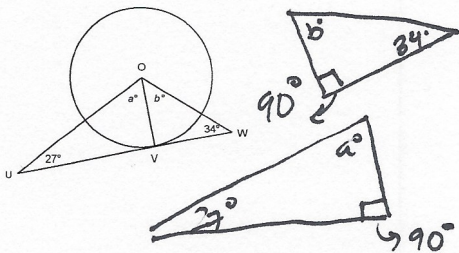
$w^\circ = 35^\circ$



$v^\circ = 180 - (90^\circ + 25^\circ)$

$v^\circ = 65^\circ$

17. O is the centre of this circle and point V is a point of tangency.
Determine the values of a° and b° .



$$b^\circ = 180 - (90^\circ + 34^\circ)$$

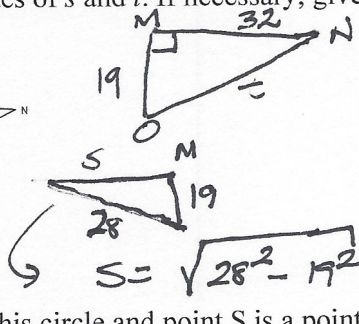
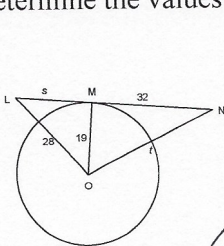
$$b^\circ = 56^\circ$$

$$a^\circ = 180 - (90^\circ + 27^\circ)$$

$$a^\circ = 63^\circ$$

18. O is the centre of this circle and point Q is a point of tangency.
Determine the values of s and t . If necessary, give your answers to the nearest tenth.

$t = 37.2$
 $s = 20.5$



t is the hypotenuse. It's across from the right angle.

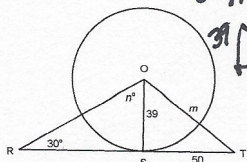
$$t = \sqrt{(32)^2 + (19)^2} = \sqrt{1024 + 361}$$

$$= \sqrt{1385} = 37.2$$

$$s = \sqrt{28^2 - 19^2} = \sqrt{784 - 361} = \sqrt{423} = 20.5$$

19. O is the centre of this circle and point S is a point of tangency.
Determine the values of m and n° . If necessary, give your answers to the nearest tenth.

$m = 63.4$
 $n^\circ = 60^\circ$



m is a length (hypotenuse)

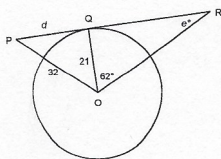
$$m = \sqrt{39^2 + 50^2} = \sqrt{1521 + 2500} = \sqrt{4021} = 63.4$$

n° is an angle

$$n^\circ = (180^\circ) - (30^\circ + 90^\circ) = 180^\circ - 120^\circ = 60^\circ$$

20. O is the centre of this circle and point Q is a point of tangency.
Determine the values of d and e° . If necessary, give your answers to the nearest tenth.

$d = 24.1$
 $e^\circ = 28^\circ$



d is a length (a leg)

$$d = \sqrt{(32)^2 - (21)^2} = \sqrt{1024 - 441} = \sqrt{583} = 24.1$$

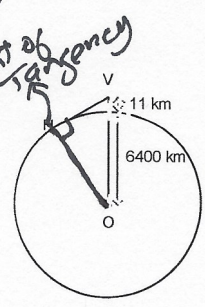
e° is an angle

$$e^\circ = 180^\circ - (90^\circ + 62^\circ) = 28^\circ$$

Problem

21. A Ruppell's Griffon Vulture holds the record for the bird with the highest documented flight altitude. It was spotted at a height of about 11 km above the Earth's surface. The radius of Earth is approximately 6400 km. How far was the vulture from the horizon, H? Calculate this distance to the nearest kilometre.

ALWAYS MAKE A TRIANGLE



What we have:

$\overline{VO} = \text{hypotenuse} = (6400 + 11) \text{ km} = 6411 \text{ km}$
 $\overline{OH} = \text{leg} = \text{radius} = 6400 \text{ km}$

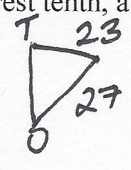
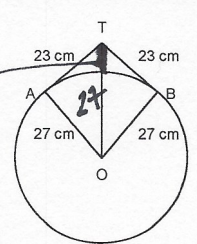
What we need:

\overline{HV} (leg)

$$\overline{HV} = \sqrt{(6411)^2 - (6400)^2} = \sqrt{41,100,921 - 40,960,000} = \sqrt{140,921} = 375.39 = \boxed{375.4} \text{ km}$$

22. A circular mirror with radius 27 cm hangs from a hook. The wire is 46 cm long and is a tangent to the circle at points A and B. How far, to the nearest tenth, above the top of the mirror is the hook?

this is what we have to find!



what we have

$\overline{TB} = \text{leg} = 23 \text{ cm}$
 $\overline{OB} = \text{leg} = 27 \text{ cm}$

what we need

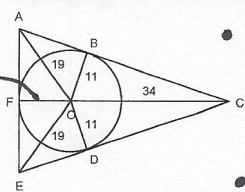
$\overline{TO} = \text{hypotenuse}$

$$\overline{TO} = \sqrt{(23)^2 + (27)^2} = \sqrt{529 + 729} = \sqrt{1258} = 35.46$$

BUT TO find the distance above mirror = $35.46 - 27 = \boxed{8.46} \text{ cm}$

23. AC, AE, and CE are tangents to this circle. The points of tangency are: B, F, and D. The circle has radius 11. The distance from the center of the circle to each vertex of the triangle is: OC = 34, OA = OE = 19. Determine the side lengths of $\triangle ACE$, to the nearest tenth.

$\overline{AC} = 47.7$
 $\overline{EC} = 47.7$
 $\overline{AE} = 31$



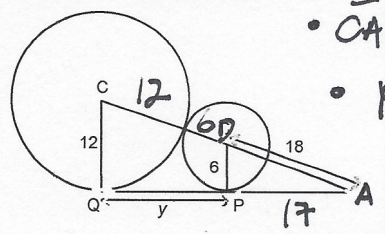
$\overline{AC} = \overline{BC} + \overline{AB} \rightarrow \begin{cases} \sqrt{34^2 - 11^2} = \sqrt{1156 - 121} = \sqrt{1035} = 32.17 \rightarrow \overline{BC} \\ \sqrt{19^2 - 11^2} = \sqrt{361 - 121} = \sqrt{240} = 15.5 \rightarrow \overline{AB} \end{cases}$
 $\overline{AC} = 32.2 + 15.5 = 47.7$

$\overline{AF} = \overline{FE} = \sqrt{19^2 - 11^2} = \sqrt{240} = 15.5$
 then $\overline{AE} = \overline{AF} + \overline{FE} = 15.5 + 15.5 = 31$

AC IS EQUAL TO EC SO EC = 47.7

24. AQ is a tangent to the circle with centre B and to the circle with centre C. The points of tangency are P and Q. Determine the value of y to the nearest tenth.

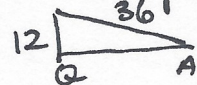
$y = 17$



$\overline{CA} = 18 + 12 + 6 = 18 + 18 = 36$

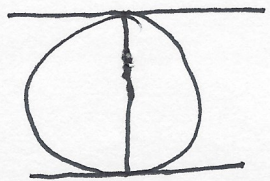
$P = \sqrt{18^2 - 6^2} = \sqrt{324 - 36} = \sqrt{288} = 16.97 = 17$

Since $p = 17$, then y is also = 17



$QA = \sqrt{36^2 - 12^2} = \sqrt{1296 - 144} = \sqrt{1152}$
 $\boxed{QA = 34}$

25. When are two tangent lines to a circle parallel? Draw a sketch to support your answer.



Tangent lines are parallel when their points of tangency are at each end of a diameter.

So $y = QA - 17 = 34 - 17$

$\boxed{y = 17}$