G.C.A.2: Chords, Secants and Tangents 8

1. In the accompanying diagram, \( PA \) is tangent to circle \( O \) at \( A \), \( PBC \) is a secant, \( PB = 4 \), and \( BC = 8 \).

What is the length of \( PA \)?
1) \( 4\sqrt{6} \)
2) \( 4\sqrt{2} \)
3) \( 4\sqrt{3} \)
4) 4

2. In the diagram below, tangent \( PA \) and secant \( PBC \) are drawn to circle \( O \) from external point \( P \).

If \( PB = 4 \) and \( BC = 5 \), what is the length of \( PA \)?
1) 20
2) 9
3) 8
4) 6

3. In the diagram below, \( PS \) is a tangent to circle \( O \) at point \( S \), \( PQR \) is a secant, \( PS = x \), \( PQ = 3 \), and \( PR = x + 18 \).

What is the length of \( PS \)?
1) 6
2) 9
3) 3
4) 27
4 In the diagram shown below, \( \overline{PA} \) is tangent to circle \( T \) at \( A \), and secant \( PBC \) is drawn where point \( B \) is on circle \( T \).

If \( PB = 3 \) and \( BC = 15 \), what is the length of \( \overline{PA} \)?
1) \( 3\sqrt{5} \)
2) \( 3\sqrt{6} \)
3) 3
4) 9

5 In the accompanying diagram, cabins \( B \) and \( G \) are located on the shore of a circular lake, and cabin \( L \) is located near the lake. Point \( D \) is a dock on the lake shore and is collinear with cabins \( B \) and \( L \). The road between cabins \( G \) and \( L \) is 8 miles long and is tangent to the lake. The path between cabin \( L \) and dock \( D \) is 4 miles long.

What is the length, in miles, of \( \overline{BD} \)?
1) 24
2) 12
3) 8
4) 4

6 In the accompanying diagram, \( \overline{PA} \) is tangent to circle \( O \) at \( A \), secant \( PBC \) is drawn, \( PB = 4 \), and \( BC = 12 \). Find \( PA \).

7 In the accompanying diagram, \( \overline{AB} \) is tangent to circle \( O \) at \( B \). If \( AC = 16 \) and \( CD = 9 \), what is the length of \( \overline{AB} \)?

8 In the accompanying diagram of circle \( O \), \( \overline{PA} \) is a tangent and \( \overline{PBC} \) is a secant. If \( PB = 2 \) and \( BC = 6 \), find \( PA \).
9. In the accompanying figure, \( PA \) is tangent to circle \( O \) at \( A \), and \( PBC \) is a secant. If \( PC = 16 \) and \( BC = 12 \), find \( PA \).

10. In the accompanying diagram, \( PA \) is tangent to circle \( O \) at \( A \) and \( PBC \) is a secant. If \( CB = 9 \) and \( PB = 3 \), find the length of \( PA \).

11. In the diagram below of circle \( O \), secant \( ABC \) and tangent \( AD \) are drawn.

   If \( CA = 12.5 \) and \( CB = 4.5 \), determine and state the length of \( DA \).

12. In the accompanying diagram, tangent \( AB \) and secant \( ACD \) are drawn to circle \( O \) from point \( A \), \( AB = 6 \), and \( AC = 4 \). Find \( AD \).

13. In the accompanying diagram, \( AD \) is tangent to circle \( O \) at \( D \) and \( ABC \) is a secant. If \( AD = 4 \) and \( AC = 8 \), find \( AB \).

14. In the accompanying diagram, \( PA \) is tangent to circle \( O \) and \( PBC \) is a secant. If \( PA = 4 \) and \( BC = 6 \), find \( PB \).
15 In the accompanying diagram, $\overline{AB}$ is tangent to circle $O$ at $B$ and $\overline{ACD}$ is a secant. If $AB = 9$ and $AD = 27$, find $AC$.

16 In the accompanying diagram, $\overline{AD}$ is tangent to circle $O$ at $D$ and $\overline{ABC}$ is a secant. If $AD = 6$ and $AC = 9$, find $AB$.

17 In the accompanying diagram, tangent $\overline{PA}$ and secant $\overline{PBC}$ are drawn to circle $O$ from external point $P$. If $PA = 8$ and $PB = 4$, find the length of $BC$.

18 In the accompanying diagram, $\overrightarrow{PC}$ is tangent to circle $O$, $\overline{PBA}$ is a secant, $PC = 6$, and $PB = 3$. Find $AB$.

19 In the diagram below of circle $O$, chords $\overline{RT}$ and $\overline{QS}$ intersect at $M$. Secant $\overline{PTR}$ and tangent $\overline{PS}$ are drawn to circle $O$. The length of $\overline{RM}$ is two more than the length of $\overline{TM}$, $QM = 2$, $SM = 12$, and $PT = 8$.

Find the length of $\overline{RT}$. Find the length of $\overline{PS}$.
G.C.A.2: Chords, Secants and Tangents 8

Answer Section

1 ANS: 3
If a tangent and a secant intersect outside a circle, the tangent squared will equal the product of the secant and its external segment.

\[ x^2 = 4(8 + 4) \]

\[ x^2 = 48 \]

\[ x = 4\sqrt{3} \]

REF: 080719b

2 ANS: 4
\[ x^2 = (4 + 5) \times 4 \]

\[ x^2 = 36 \]

\[ x = 6 \]

REF: 011008ge

3 ANS: 2
\[ x^2 = 3(x + 18) \]

\[ x^2 - 3x - 54 = 0 \]

\[ (x - 9)(x + 6) = 0 \]

\[ x = 9 \]

REF: fall0817ge

4 ANS: 2
\[ x^2 = 3 \cdot 18 \]

\[ x = \sqrt{3 \cdot 3 \cdot 6} \]

\[ x = 3\sqrt{6} \]

REF: 081712geo

5 ANS: 2
If a tangent and a secant intersect outside a circle, the tangent squared will equal the product of the secant and its external segment.

\[ 4(x + 4) = 8^2 \]

\[ 4x + 16 = 64 \]

\[ x = 12 \]

REF: 080103b
6 ANS:
8. If a tangent and a secant intersect outside a circle, the tangent squared will equal the product of the secant and its external segment.

\[ x^2 = 4(12 + 4) \]

\[ x^2 = 64 \]

\[ x = 8 \]

REF: 010623b

7 ANS:
20. If a tangent and a secant intersect outside a circle, the tangent squared will equal the product of the secant and its external segment.

\[ x^2 = 16(16 + 9) \]

\[ x^2 = 400 \]

\[ x = 20 \]

REF: 010821b

8 ANS:
4

REF: 068805siii

9 ANS:
8

REF: 068914siii

10 ANS:
6

REF: 089011siii

11 ANS:

\[ x^2 = 8 \times 12.5 \]

\[ x = 10 \]

REF: 012028geo

12 ANS:
9

REF: 010416siii

13 ANS:
2

REF: 068607siii
14 ANS: 2
REF: 019408siii
15 ANS: 3
REF: 019701siii
16 ANS: 4
REF: 089715siii
17 ANS: 12
REF: 010314siii
18 ANS: 9
REF: 060314siii
19 ANS:
\[ x(x + 2) = 12 \cdot 2. \quad \overline{RT} = 6 + 4 = 10. \quad y \cdot y = 18 \cdot 8 \]
\[ x^2 + 2x - 24 = 0 \quad y^2 = 144 \]
\[ (x + 6)(x - 4) = 0 \quad y = 12 \]
\[ x = 4 \]

REF: 061237ge