## G.C.A.2: Chords, Secants and Tangents 8
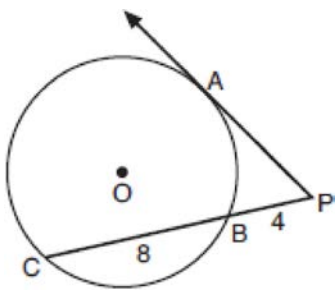
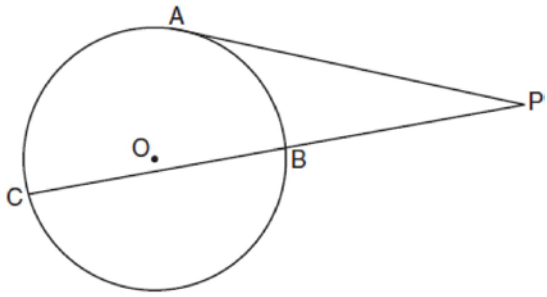1   In the accompanying diagram, $\overrightarrow{PA}$ is tangent to circle $O$ at $A$, $\overline{PBC}$ is a secant, $PB = 4$, and $BC = 8$.



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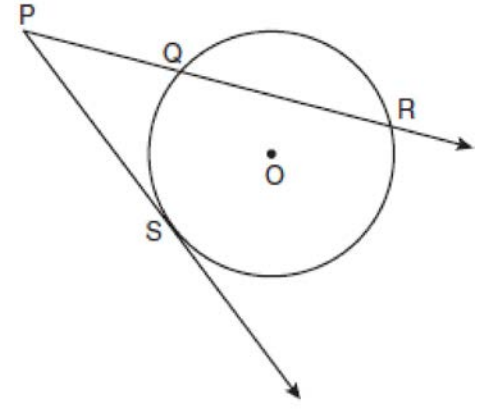1)   $4\sqrt{6}$
2)   $4\sqrt{2}$
3)   $4\sqrt{3}$
4)   $4$

2   In the diagram below, tangent $\overline{PA}$ and secant $\overline{PBC}$ are drawn to circle $O$ from external point $P$.



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

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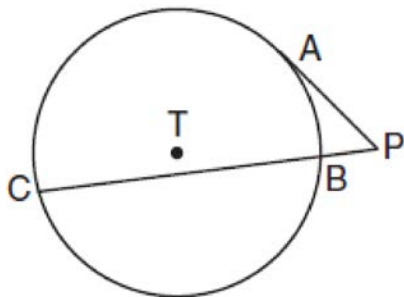


(Not drawn to scale)

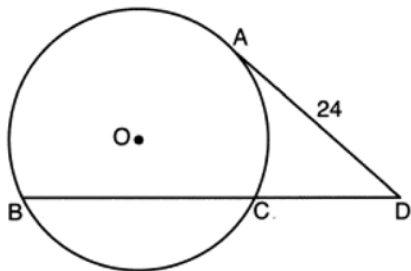What is the length of $\overline{PS}$?
1)   6
2)   9
3)   3
4)   27

4   In the diagram shown below, $\overline{PA}$ is tangent to circle $T$ at $A$, and secant $\overline{PBC}$ 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   Circle $O$ is drawn below with secant $\overline{BCD}$. The length of tangent $\overline{AD}$ is 24.



If the ratio of $DC:CB$ is 4:5, what is the length of $\overline{CB}$?
1)   36
2)   20
3)   16
4)   4

6   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.
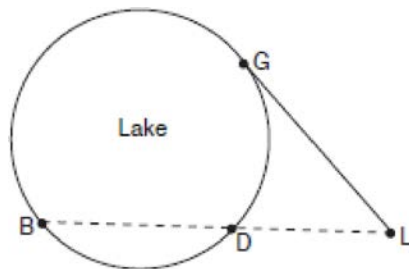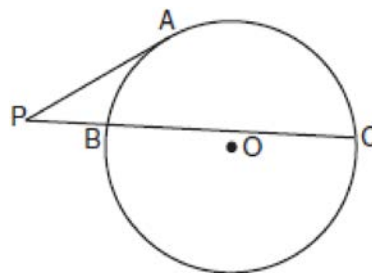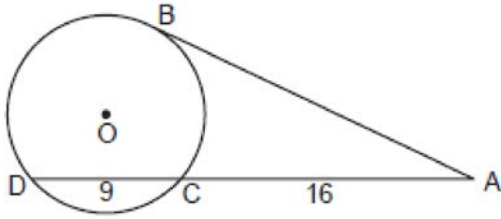


(Not drawn to scale)

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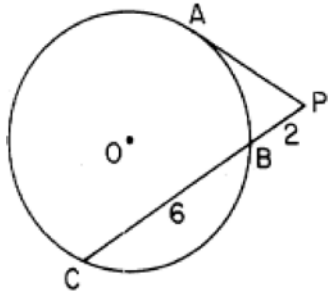4)   4

7   In the accompanying diagram, $\overline{PA}$ is tangent to circle $O$ at $A$, secant $\overline{PBC}$ is drawn, $PB = 4$, and $BC = 12$. Find $PA$.
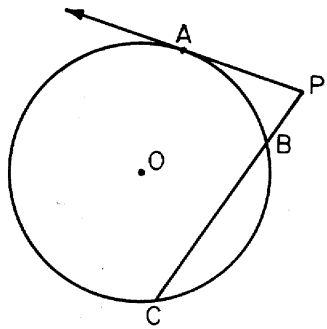
8   In the accompanying diagram, $\overline{AB}$ is tangent to circle $O$ at $B$. If $AC = 16$ and $CD = 9$, what is the length of $\overline{AB}$?
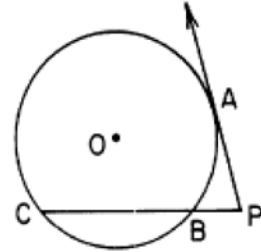
B

Ö

D    9    C    16    A

9   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 $PA$.
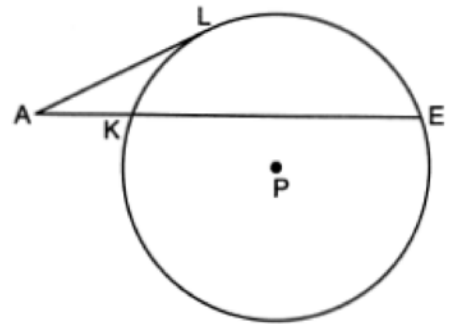
A

O•

P

B    2

6

C

10   In the accompanying figure, $\overrightarrow{PA}$ is tangent to circle $O$ at $A$, and $\overline{PBC}$ is a secant. If $PC = 16$ and $BC = 12$, find $PA$.

A

•O    P

B

C

11   In the accompanying diagram, $\overrightarrow{PA}$ is tangent to circle $O$ at $A$ and $\overline{PBC}$ is a secant. If $CB = 9$ and $PB = 3$, find the length of $\overline{PA}$.
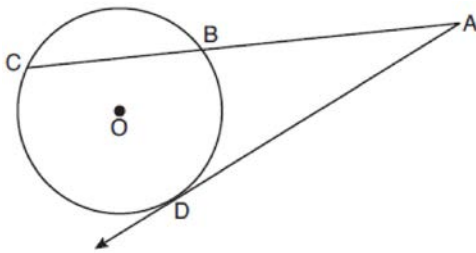
A

O•

C    B    P

12   In circle $P$ below, tangent $\overline{AL}$ and secant $\overline{AKE}$ are drawn.
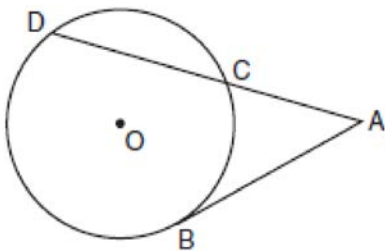
L

A    K    E

•P

If $AK = 12$ and $KE = 36$, determine and state the length of $\overline{AL}$.

3

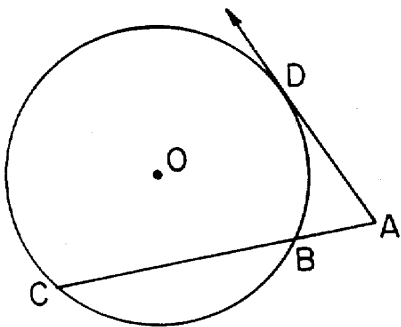13  In the diagram below of circle $O$, secant $\overline{ABC}$ and tangent $\overline{AD}$ are drawn.



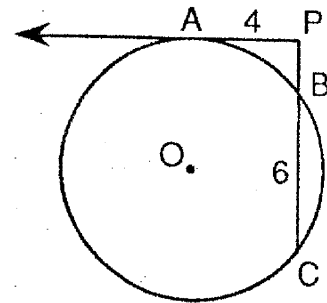If $CA = 12.5$ and $CB = 4.5$, determine and state the length of $\overline{DA}$.

14  In the accompanying diagram, tangent $\overline{AB}$ and secant $\overline{ACD}$ are drawn to circle $O$ from point $A$, $AB = 6$, and $AC = 4$.  Find $AD$.
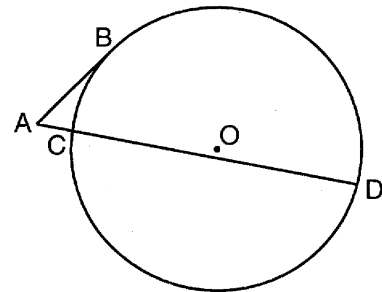


15  In the accompanying diagram, $\overrightarrow{AD}$ is tangent to circle $O$ at $D$ and $\overline{ABC}$ is a secant.  If $AD = 4$ and $AC = 8$, find $AB$.



16  In the accompanying diagram, $\overrightarrow{PA}$ is tangent to circle $O$ and $\overline{PBC}$ is a secant.  If $PA = 4$ and $BC = 6$, find $PB$.



17  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 $AC$.



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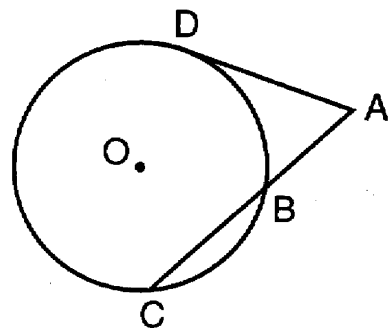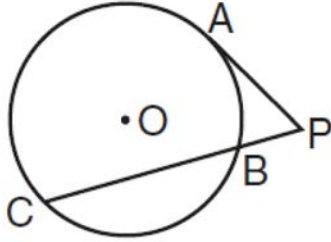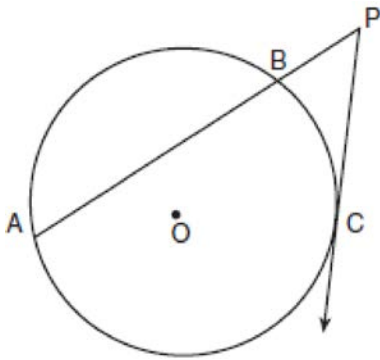
19  In the accompanying diagram, tangent $\overline{PA}$ and secant $\overline{PBC}$ are drawn to circle $O$ from external point $P$. If $PA = 8$ and $PB = 4$, find the length of $\overline{BC}$.



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



21  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 $PT = 8$.
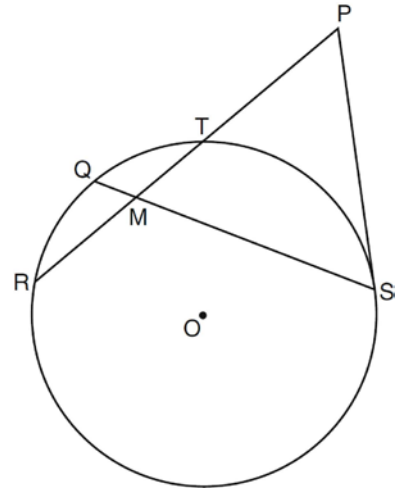


Find the length of $\overline{RT}$. Find the length of $\overline{PS}$.

## 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
    $$x^2 = 4(8+4)$$
    external segment.  $x^2 = 48$     .
    $$x = 4\sqrt{3}$$

    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
    $24^2 = 4x \cdot 9x$  $5 \cdot 4 = 20$
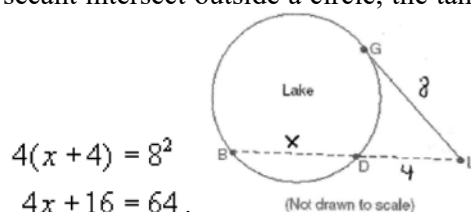    $$576 = 36x^2$$
    $$16 = x^2$$
    $$4 = x$$

    REF: 012312geo

6 ANS: 2
If a tangent and a secant intersect outside a circle, the tangent squared will equal the product of the secant and its
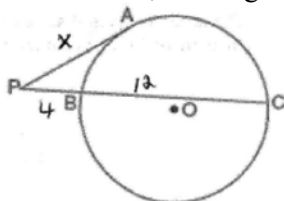
$4(x+4) = 8^2$

external segment. $4x + 16 = 64$.

$x = 12$

REF: 080103b

7 ANS:
8. If a tangent and a secant intersect outside a circle, the tangent squared will equal the product of the secant and

$x^2 = 4(12+4)$

its external segment. $x^2 = 64$ .

$x = 8$

REF: 010623b

8 ANS:
20. If a tangent and a secant intersect outside a circle, the tangent squared will equal the product of the secant and

$x^2 = 16(16+9)$

its external segment. $x^2 = 400$ .

$x = 20$

REF: 010821b

9 ANS:
4

REF: 068805siii

10 ANS:
8

REF: 068914siii

11 ANS:
6

REF: 089011siii

12 ANS:
$x^2 = 12 \cdot 48$

$x = 24$

REF: 062428geo

13 ANS:
$x^2 = 8 \times 12.5$

$x = 10$

REF: 012028geo

14 ANS:
9

REF: 010416siii

15 ANS:
2

REF: 068607siii

16 ANS:
2

REF: 019408siii

17 ANS:
3

REF: 019701siii

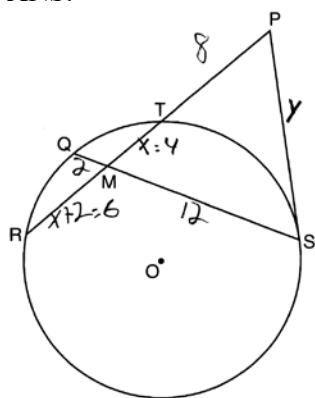18 ANS:
4

REF: 089715siii

19 ANS:
12

REF: 010314siii

20 ANS:
9

REF: 060314siii

21   ANS:



$$x(x+2) = 12 \cdot 2. \quad \overline{RT} = 6+4 = 10. \quad y \cdot y = 18 \cdot 8$$

$$x^2 + 2x - 24 = 0 \qquad\qquad\qquad y^2 = 144$$

$$(x+6)(x-4) = 0 \qquad\qquad\qquad y = 12$$

$$x = 4$$

REF:   061237ge