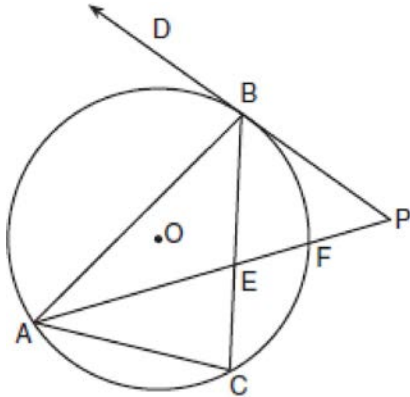


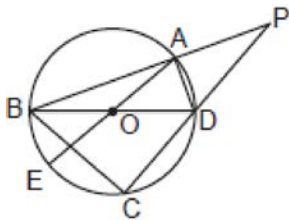
G.C.A.2: Chords, Secants and Tangents 20

- 1 In the accompanying diagram, $\triangle ABC$ is inscribed in circle O , \overline{AP} bisects $\angle BAC$, \overrightarrow{PBD} is tangent to circle O at B , and $m\angle ACB : m\angle CAB : m\angle ABC = 4 : 3 : 2$



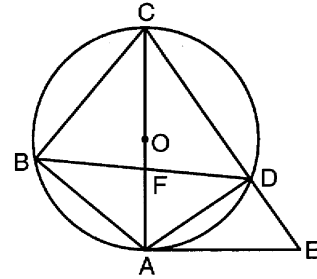
Find: $m\angle ABC$, $m\widehat{BF}$, $m\angle BEP$, $m\angle P$, $m\angle PBC$

- 2 In the accompanying diagram of circle O , diameters \overline{BD} and \overline{AE} , secants \overline{PAB} and \overline{PDC} , and chords \overline{BC} and \overline{AD} are drawn; $m\widehat{AD} = 40$; and $m\widehat{DC} = 80$.



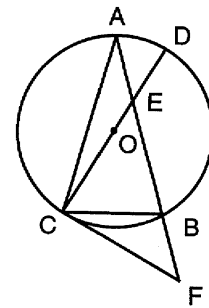
Find: $m\widehat{AB}$, $m\angle BCD$, $m\angle BOE$, $m\angle P$, $m\angle PAD$

- 3 In the accompanying diagram of circle O , diameter \overline{CA} intersects chord \overline{BD} at F ; \overline{AE} is a tangent; \overline{EDC} is a secant, \overline{CB} , \overline{BA} , and \overline{AD} are chords; $m\widehat{BC} = 100$; and $m\widehat{AD} = 70$.



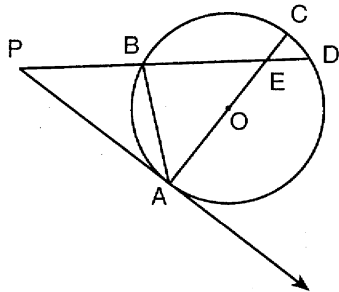
Find: $m\widehat{AB}$, $m\angle AEC$, $m\angle BCA$, $m\angle DFA$, $m\angle DAE$.

- 4 In the accompanying diagram of circle O with inscribed isosceles triangle ABC , $\overline{AB} \cong \overline{AC}$, $m\widehat{CB} = 60$, \overline{FC} is a tangent, and secant \overline{FBA} intersects diameter \overline{CD} at E .



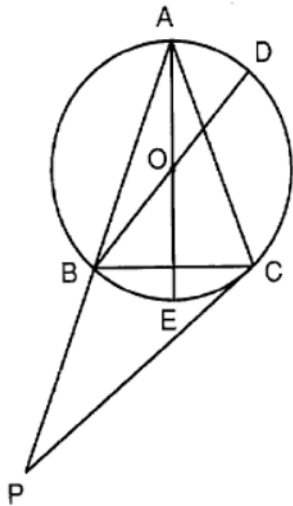
Find: $m\angle ADC$, $m\widehat{AD}$, $m\angle DEB$, $m\angle AFC$, $m\angle BCF$

- 5 In the accompanying diagram, \overrightarrow{PA} is tangent to circle O at point A , secant \overline{PBD} intersects diameter \overline{AC} at point E , chord \overline{AB} is drawn, $m\angle P = 40$, and $m\widehat{CD} : m\widehat{DA} = 1 : 8$.



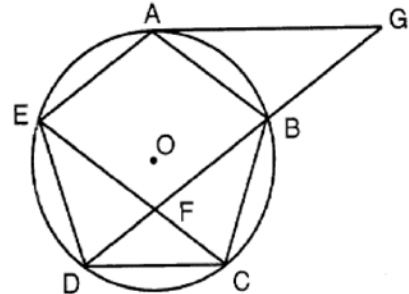
Find: $m\widehat{DA}$, $m\widehat{AB}$, $m\angle BEA$, $m\angle BAC$, $m\angle PBA$.

- 6 In the accompanying diagram, isosceles triangle ABC is inscribed in circle O , and vertex angle BAC measures 40° . Tangent \overline{PC} , secant \overline{PBA} , and diameters \overline{BD} and \overline{AE} are drawn.



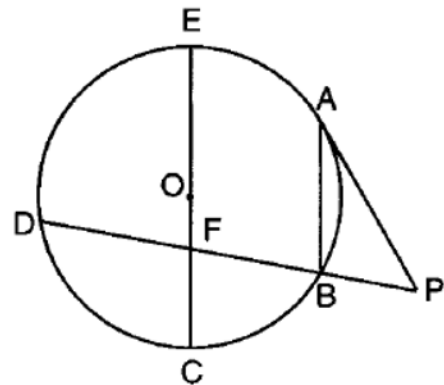
Find: $m\widehat{BC}$, $m\angle ABD$, $m\angle DOE$, $m\angle P$, $m\angle ACP$.

- 7 In the accompanying diagram, regular pentagon $ABCDE$ is inscribed in circle O , chords \overline{EC} and \overline{DB} intersect at F , chord \overline{DB} is extended to G , and tangent \overline{GA} is drawn.



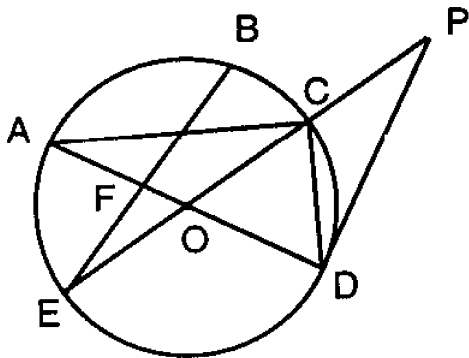
Find: $m\angle BDE$, $m\angle BFC$, $m\angle AGD$

- 8 In the accompanying diagram of circle O , chord \overline{AB} is parallel to diameter \overline{EC} , secant \overline{PBD} intersects \overline{EC} at F , tangent \overline{PA} is drawn, $m\widehat{AB} = m\widehat{BC}$, and $m\widehat{CD} = 80$.



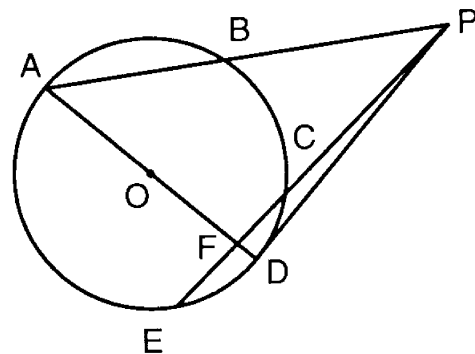
Find: $m\widehat{AE}$, $m\angle ABD$, $m\angle DFC$, $m\angle P$, $m\angle PAB$.

- 9 In the accompanying diagram of circle O , diameter \overline{EOC} is extended through C to point P ; diameter \overline{AFOD} , tangent \overline{PD} , and chords \overline{AC} , \overline{CD} , \overline{BFE} are drawn; $m\angle COD = 60$; and $m\angle AFB = 100$.



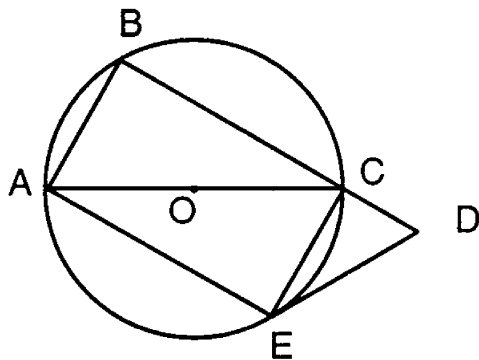
Find: $m\widehat{DE}$; $m\angle P$; $m\angle ACE$, $m\widehat{AB}$, $m\angle ACD$.

- 11 In the accompanying diagram of circle O , $m\widehat{AC} = 140$, $m\widehat{AE} = 130$, $m\widehat{AB} : m\widehat{BC} = 6 : 4$, \overline{PD} is a tangent, secant \overline{PCE} intersects diameter \overline{AD} at F , and secant \overline{PBA} is drawn.



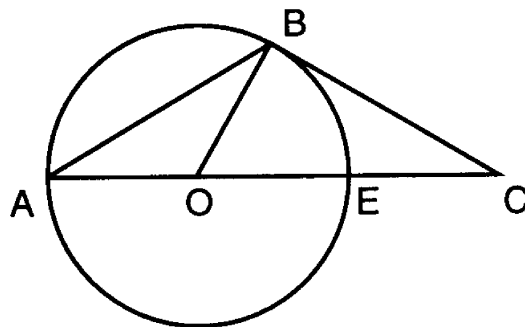
Find $m\widehat{ED}$, $m\widehat{AB}$, $m\angle BAD$, $m\angle APE$, $m\angle EFD$

- 10 In the accompanying diagram of circle O , $m\widehat{AB} : m\widehat{BC} = 1 : 2$; diameter \overline{CA} and chord \overline{AE} are drawn; chord \overline{EC} is parallel to chord \overline{AB} ; chord \overline{BC} is extended through C to D ; and tangent \overline{DE} is drawn.



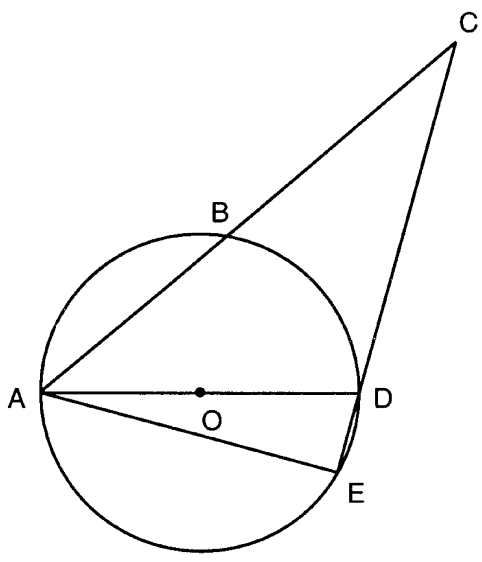
Find: $m\widehat{BC}$, $m\widehat{CE}$, $m\angle AEC$, $m\angle CED$, $m\angle BDE$.

- 12 In the accompanying diagram of circle O , diameter \overline{AE} is extended through E to C ; tangent \overline{CB} , chord \overline{AB} , and radius \overline{OB} are drawn; and $m\widehat{AB} : m\widehat{BE} = 2 : 1$.



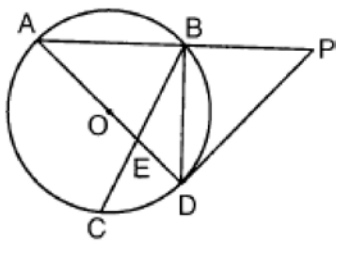
- a Find: $m\widehat{AB}$, $m\angle BAC$, $m\angle C$, $m\angle ABC$.
 b Is $\triangle OBC$ acute, right, obtuse or equiangular?
 Explain your answer.

- 13 In the accompanying diagram of circle O , diameter \overline{AD} , chord \overline{AE} , and secants \overline{CBA} and \overline{CDE} are drawn; $m\angle BAD = 40$; and $m\widehat{AE} = 5(m\widehat{ED})$.



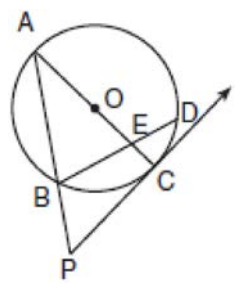
Find: $m\widehat{BD}$, $m\widehat{AE}$, $m\angle ACE$, $m\angle AED$, $m\angle ADC$.

- 14 In the accompanying diagram of circle O , \overline{AOED} is a diameter, \overline{PD} is a tangent, \overline{PBA} is a secant, chords \overline{BD} and \overline{BE} are drawn, $m\angle DAB = 43$, and $m\angle DEC = 72$.



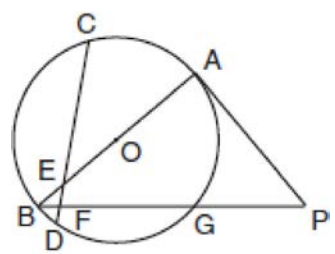
Find: $m\angle BDP$, $m\widehat{AB}$, $m\widehat{AC}$, $m\angle P$, $m\angle CBD$

- 15 In the accompanying diagram of circle O , \overline{AOEC} is a diameter, \overline{PC} is a tangent, \overline{PBA} is a secant, \overline{BED} is a chord, $AO = 8$, and $m\widehat{AB} : m\widehat{BC} : m\widehat{CD} : m\widehat{DA} = 3 : 2 : 1 : 4$.



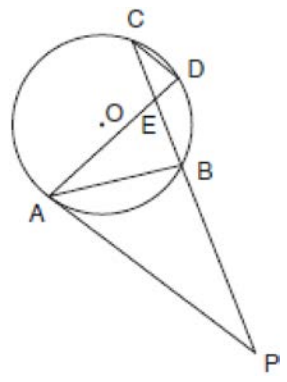
Find: $m\widehat{BC}$, $m\angle P$, $m\angle BEC$, AP to the nearest tenth

- 16 In the accompanying diagram of circle O , tangent \overline{PA} , secant \overline{PGFB} , diameter \overline{AOEB} , and chord \overline{CEFD} are drawn; $m\widehat{CA} = 70$; $m\widehat{DG} = 90$; and $m\angle CEA = 40$.



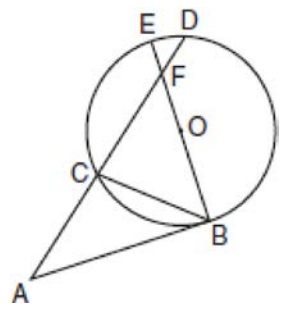
Find: $m\widehat{CB}$, $m\widehat{BD}$, $m\angle APB$, $m\angle PAB$, $m\angle ABG$

- 17 In the accompanying diagram of circle O , tangent \overline{PA} , secant \overline{PBEC} , and chords \overline{AB} , \overline{AD} , and \overline{CD} are drawn; $m\angle C = 30$, $m\widehat{AB} = 100$; $m\widehat{AC} : m\widehat{CD} = 4 : 1$.



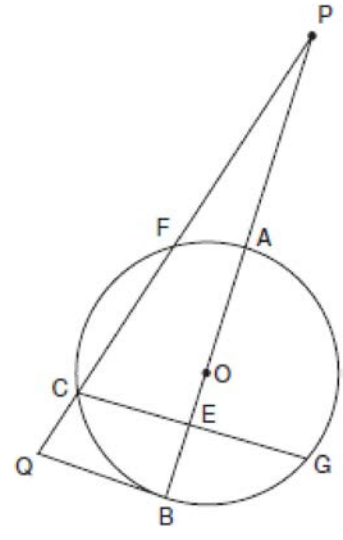
Find: $m\widehat{CD}$, $m\angle BAP$, $m\angle CDA$, $m\angle AEB$, $m\angle P$

- 18 In the accompanying diagram of circle O , tangent \overline{AB} and chord \overline{BC} are drawn, secant \overline{ACD} intersects diameter \overline{EB} at F , $m\widehat{BD} = 160$, and $m\widehat{BC} = 80$.



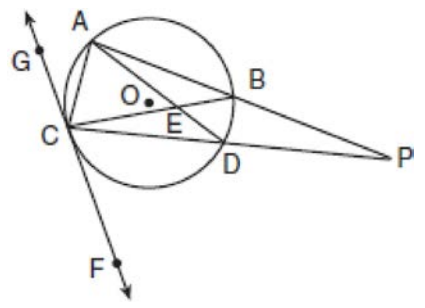
Find: $m\angle A$, $m\angle ABE$, $m\angle ABC$, $m\angle EFC$, $m\angle ACB$

- 19 In the accompanying diagram of circle O , secant \overline{PFCQ} , secant \overline{PAOEB} , tangent \overline{QB} , and chord \overline{CEG} are drawn; $m\widehat{BC} : m\widehat{CF} : m\widehat{FA} = 7 : 8 : 3$; and $m\angle AEG = 95$.



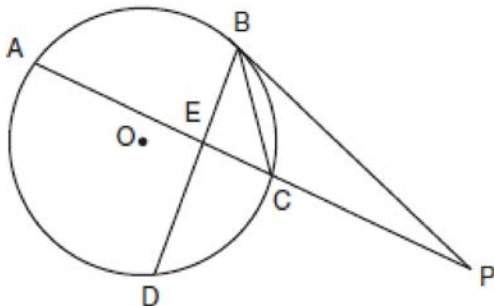
Find: $m\widehat{CF}$, $m\widehat{AG}$, $m\angle P$, $m\angle FCG$, $m\angle FQB$

- 20 In the accompanying diagram of circle O , secant \overline{ABP} , secant \overline{CDP} , and chord \overline{AC} are drawn; chords \overline{AD} and \overline{BD} intersect at E , tangent \overleftrightarrow{GCF} intersects circle O at C , and $m\widehat{AB} : m\widehat{BD} : m\widehat{DC} : m\widehat{CA} = 8 : 2 : 5 : 3$.



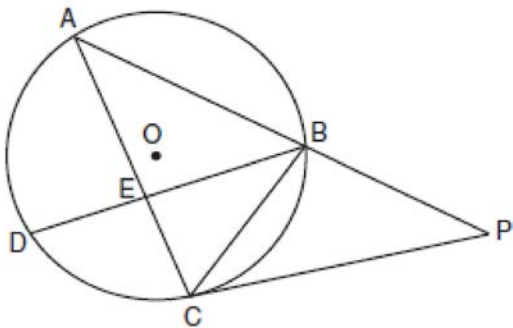
Find: $m\widehat{CA}$, $m\angle ACB$, $m\angle P$, $m\angle AEB$, $m\angle DCF$

- 21 In the accompanying diagram of circle O , tangent \overline{PB} , secant $\overline{AEC P}$, chord \overline{DEB} , and chord \overline{CB} are drawn; $m\widehat{DC} = 90$; $m\angle DEC = 85$; $BP = 15$; and $CB = 8$.



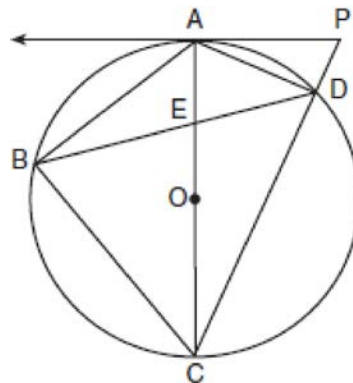
Find: $m\widehat{AB}$; $m\angle ACB$; $m\angle P$ to the nearest degree.

- 22 In the accompanying diagram of circle O , chords \overline{BD} , \overline{BC} , and \overline{AC} , tangent \overline{PC} , and secant \overline{ABP} are drawn; $m\angle DBC = 40$, $m\angle AEB = 110$; and $m\widehat{AD} : m\widehat{CB} = 9 : 5$.



Find: $m\widehat{AB}$, $m\widehat{AD}$, $m\angle P$, $m\angle BCP$, $m\angle ACP$

- 23 In the accompanying diagram of circle O , \overrightarrow{PA} is tangent to the circle at A ; \overline{PDC} is a secant; diameter \overline{AEOC} intersects chord \overline{BD} at E ; chords \overline{AB} , \overline{BC} , and \overline{DA} are drawn; $m\widehat{DA} = 46$; and $m\widehat{BC}$ is 32 more than $m\widehat{AB}$.



Find: $m\widehat{AB}$; $m\angle BAC$; $m\angle P$; $m\angle DEC$; $m\angle PDA$

G.C.A.2: Chords, Secants and Tangents 20
Answer Section

- 1 ANS:
40, 60, 70, 50, 60

REF: 010436siii
- 2 ANS:
140, 90, 40, 30, 90

REF: 080036siii
- 3 ANS:
80, 55, 40, 85, 35

REF: 019639siii
- 4 ANS:
75, 30, 135, 45, 30

REF: 069636siii
- 5 ANS:
160, 80, 50, 50, 100

REF: 089636siii
- 6 ANS:
80, 20, 140, 30, 110

REF: 069737siii
- 7 ANS:
72, 72, 36

REF: 089738siii
- 8 ANS:
60, 80, 100, 50, 30

REF: 019839siii
- 9 ANS:
120, 30, 30, 80, 90

REF: 069837siii
- 10 ANS:
120, 60, 90, 30, 60

REF: 089842siii
- 11 ANS:
50, 84, 48, 37, 95

REF: 019937siii

12 ANS:
120, 30, 30, 120, right because $m\angle OBC = 90$

REF: 069939siii

13 ANS:
80, 150, 35, 90, 105

REF: 089937siii

14 ANS:
43, 94, 130, 47, 25

REF: 010036siii

15 ANS:
72, 54, 108, 19.8

REF: 010136siii

16 ANS:
110, 10, 50, 90, 40

REF: 060136siii

17 ANS:
40, 50, 80, 70, 30

REF: 080140siii

18 ANS:
40, 90, 40, 130, 100

REF: 010239siii

19 ANS:
80, 120, 20, 75, 70

REF: 060240siii

20 ANS:
60, 80, 10, 130, 50

REF: 080242siii

21 ANS:
80, 40, 20

REF: 010336siii

22 ANS:
140, 90, 60, 25, 95

REF: 060336siii

23 ANS:
74, 53, 67, 104, 90

REF: 080338siii