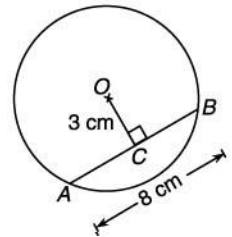# Basic Properties of Circles (I)
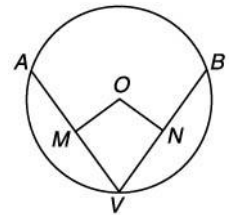
圓的基本特性 (一)

Exercises (練習)

1. In the figure, *ACB* is a chord of the circle and *OC* ⊥ *AB*. If *AB* = 8 cm and *OC* = 3 cm, find the radius of the circle.

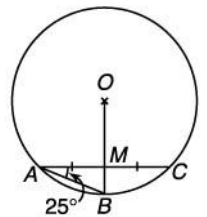在圖中，*ACB* 是圓上的一條弦，而 *OC* ⊥ *AB*。若 *AB* = 8 cm 及 *OC* = 3 cm，求圓的半徑。

2. In the figure, *AV* and *BV* are two equal chords of a circle. *M* and *N* are the mid-points of *AV* and *BV* respectively. Prove that *OM* = *ON*.

在圖中，*AV* 和 *BV* 是圓上的兩條等長的弦，而 *M* 和 *N* 分別是 *AV* 和 *BV* 的中點。證明 *OM* = *ON*。

3. In the figure, *M* is the mid-point of the chord *AC*. *OM* is produced to meet the circle at *B*. If ∠*BAM* = 25°, find ∠*ABM*.

在圖中，*M* 是弦 *AC* 的中點。*OM* 的延線與圓相交於 *B*。若 ∠*BAM* = 25°，求 ∠*ABM*。

4. In the figure, *OMB* is a radius of the circle, *AM* = *MC* = 5 cm and *MB* = 1 cm.
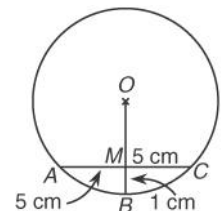
(a) Show that △ *OAM* is a right-angled triangle.

(b) Find the radius of the circle.

在圖中，*OMB* 是圓的一條半徑，*AM* = *MC* = 5 cm 及 *MB* = 1 cm。
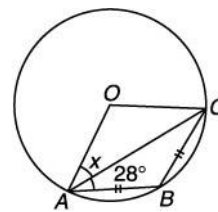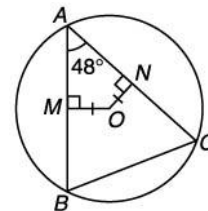
(a) 證明 △ *OAM* 是直角三角形。

(b) 求該圓的半徑。

5. In the figure, $AB = BC$ and $\angle BAC = 28°$. Find x.

在圖中，$AB = BC$ 及 $\angle BAC = 28°$。求 x 的值。
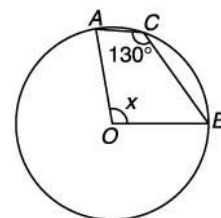
6. In the figure, $OM \perp AB$, $ON \perp AC$, $OM = ON$ and $\angle MAN = 48°$. Find $\angle ABC$.

在圖中，$OM \perp AB$，$ON \perp AC$，$OM = ON$ 及 $\angle MAN = 48°$。求 $\angle ABC$。
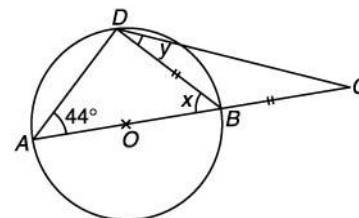
7. Find the unknown x in the figure.

求圖中 x 的值。

8. In the figure, $AOBC$ is a straight line, $BD = BC$ and $\angle BAD = 44°$.

Find x and y.

在圖中，$AOBC$ 是一條直線，$BD = BC$ 及 $\angle BAD = 44°$。求 x 和 y。

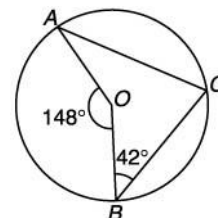**9.** In the figure, $\angle AOB = 148°$ and $\angle OBC = 42°$. Find

(a) $\angle OBA$,

(b) $\angle OAC$.

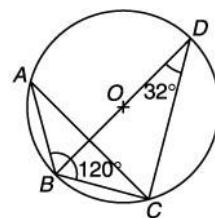在圖中，$\angle AOB = 148°$ 及 $\angle OBC = 42°$。求
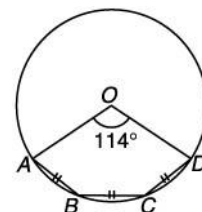
(a) $\angle OBA$；

(b) $\angle OAC$。

(c) Join AB.

10. In the figure, *BD* is a diameter of the circle, ∠*ABC* = 120° and ∠*BDC* = 32°.
Find ∠*ACD*.
在圖中，*BD* 是圓的一條直徑，∠*ABC* = 120° 及 ∠*BDC* = 32°。求 ∠*ACD*。

11. In the figure, *AB* = *BC* = *CD* and ∠*AOD* = 114°. Find ∠*ABC*.
在圖中，*AB* = *BC* = *CD* 及 ∠*AOD* = 114°。求 ∠*ABC*。

12. In the figure, chord *ED* and diameter *AB* of the circle are produced to meet at
C. If ∠*DCB* = 24° and ∠*EAD* = 50°, find *x*.
在圖中，弦 *ED* 與直徑 *AB* 的延線相交於 *C* 。若 ∠*DCB* = 24° 及
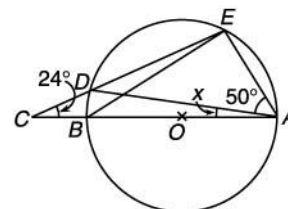
13. In the figure, $\overset{\frown}{AB}$ = 5 cm, $\overset{\frown}{BC}$ = 3 cm and $\overset{\frown}{CD}$ = 4 cm. If ∠*AOD* = 132°,
find ∠*BOC*.

在圖中，$\overset{\frown}{AB}$ = 5 cm，$\overset{\frown}{BC}$ = 3 cm 及 $\overset{\frown}{CD}$ = 4 cm。若 ∠*AOD* = 132°，求∠*BOC*.
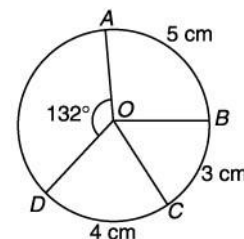
14. In the figure, $\overset{\frown}{AB}$ = $\overset{\frown}{BC}$ = $\overset{\frown}{CD}$. *AC* intersects *BD* at *K*. Prove that △ *KBC* is
an isosceles triangle.
在圖中，$\overset{\frown}{AB}$ = $\overset{\frown}{BC}$ = $\overset{\frown}{CD}$。*AC* 與 *BD* 相交於 *K*。證明 △ *KBC* 是等腰三
角形。

3
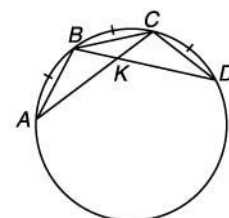
15. In the figure, *AB* is a diameter of the circle, *BC* = *CD* and ∠*DAC* = 28°. Find ∠*ADC*.

在圖中，*AB* 是圓的一條直徑，而 *BC* = *CD* 及 ∠*DAC* = 28°。求 ∠*ADC*。
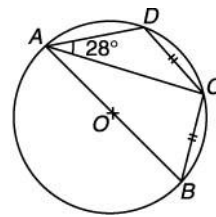
16. In the figure, *AC* intersects *BD* at *K*. If $\overset{\frown}{AB}$: $\overset{\frown}{CD}$ = 3 : 2 and ∠*AKD* = 105°, find *x*.

在圖中，*AC* 與 *BD* 相交於 *K*。若 $\overset{\frown}{AB}$: $\overset{\frown}{CD}$ = 3 : 2 及 ∠*AKD* = 105°，求 *x* 的值。
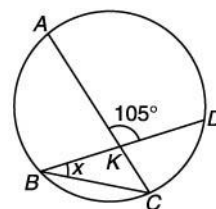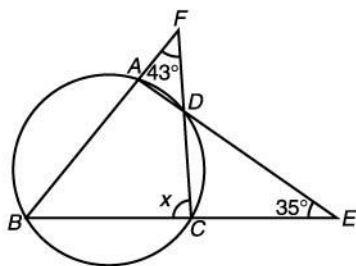

17. In the figure, *AB* and *CD* are two perpendicular chords intersecting at *K*. Prove that ∠*AOC* + ∠*BOD* = 180°.

在圖中，*AB* 和 *CD* 是兩條相交於 *K* 且互相垂直的弦。證明 ∠*AOC* + ∠*BOD* = 180°。
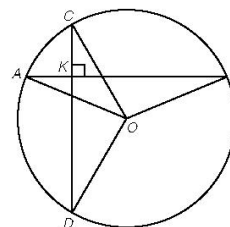
18. In the figure, *BCE*, *CDF*, *EDA* and *BAF* are straight lines. If ∠*AEB* = 35° and ∠*BFC* = 43°, find *x*.

在圖中，*BCE*、*CDF*、*EDA* 及 *BAF* 都是直線。若 ∠*AEB* = 35° 及 ∠*BFC* = 43°，求 *x* 的值。

19. In the figure, *AB* and *CD* are two chords of the circle. *OMN* is a straight line such that *OM* ⊥ *AB* and *ON* ⊥ *CD*. It is given that *AB* = 14 cm, *CD* = 10 cm, *MN* = 2 cm and *OM* = *x* cm.

(a) **(i)** By considering △ *OMB*, express OB^2 in terms of *x*.

(ii) By considering △*OND*, express OD^2 in terms of *x*.

(b) Hence, find *x* and the radius of the circle.
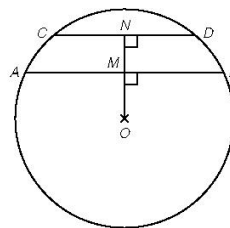
(Leave your answers in surd form if necessary.)

在圖中，*AB* 和 *CD* 是圓的兩條弦。*OMN* 是一條直線，使 *OM* ⊥ *AB* 及 *ON* ⊥ *CD*。已知 *AB* = 14 cm，*CD* = 10 cm，*MN* = 2 cm 及 *OM* = *x* cm。

(a) **(i)** 考慮 △ *OMB*，試以 *x* 表示 *OB*²。

(ii) 考慮 △*OND*，試以 *x* 表示 *OD*²。

(b) 由此，求 *x* 的值和該圓的半徑。

(如有需要，答案以根式表示。)

20. In the figure, the circles *PQBA* and *PQCD* intersect at *P* and *Q*. *AQC* and *BQD* are straight lines. If ∠*ABQ* = 126°, ∠*QCD* = 118° and ∠*APB* = 25°,

(a) find ∠*CPD*,

(b) hence, find ∠*BPC*.

在圖中，圓 *PQBA* 與 *PQCD* 相交於 *P* 和 *Q*。*AQC* 和 *BQD* 都是直線。若 ∠*ABQ* = 126°，∠*QCD* = 118° 及 ∠*APB* = 25°，

(a) 求 ∠*CPD*；

(b) 由此，求 ∠*BPC*。
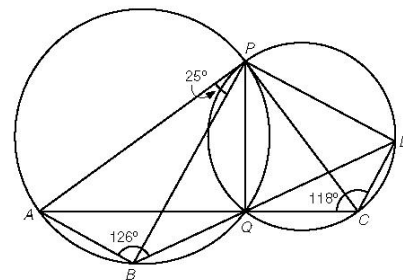
21. In the figure, *AC* intersects *OB* at *K*. If $\overset{\frown}{AB}$: $\overset{\frown}{CB}$ = 1 : 2,

(a) prove that ∠*AOB* = ∠*KAB*,

(b) hence, prove that △ *ABK* is an isosceles triangle.

在圖中，*AC* 與 *OB* 相交於 *K*。若 $\overset{\frown}{AB}$: $\overset{\frown}{CB}$ = 1 : 2，

(a) 證明 ∠*AOB* = ∠*KAB*；
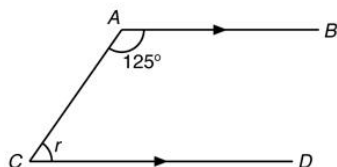
(b) 由此，證明 △ *ABK* 是一個等腰三角形。
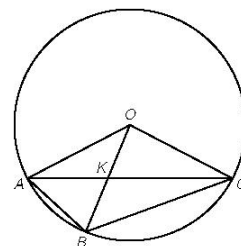
Pre-requisite Questions
預備測驗

1. Find the unknowns in the following figures.

求下列各圖中的未知量。

(a)

(b)

(c)

2. Find the unknowns in the following figures.

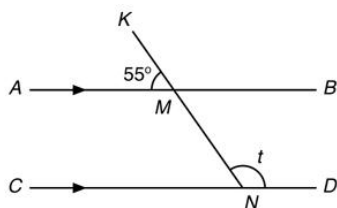求下列各圖中的未知量。

(a)

(b)

(c)

(d)

(e)

3. Find the unknowns in the following figures.

求下列各圖中的未知量。

(a)

(b)

(c)
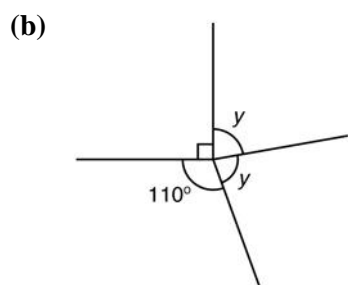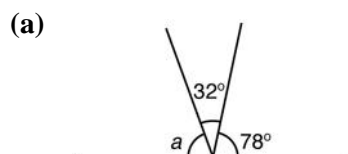
4. Find the unknowns in the following figures.

求下列各圖中的未知量。

(a)

(b)

(c)
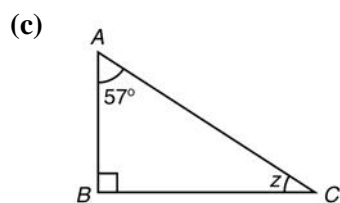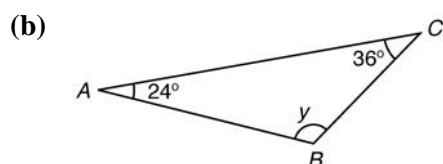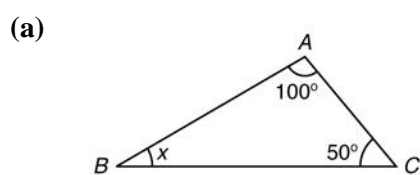
5. Find the unknowns in the following figures.

求下列各圖中的未知量。

(a)
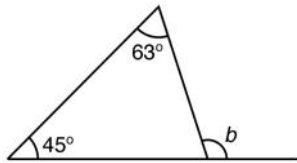
(b)
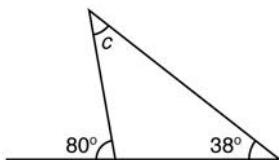
6. Find the unknowns in the following figures.
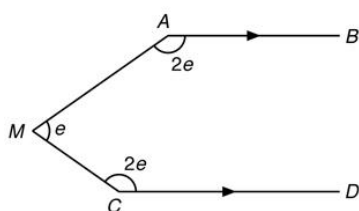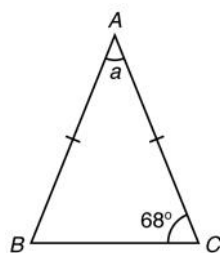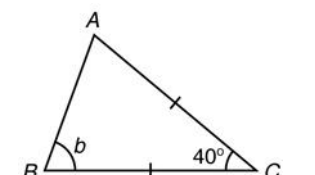
求下列各圖中的未知量。
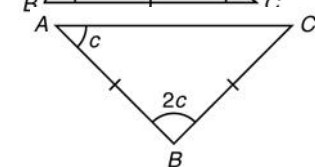
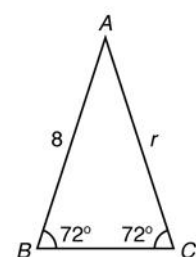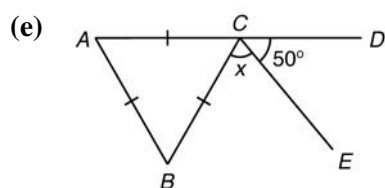**(a)**
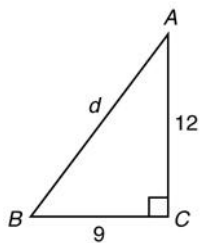
(b)
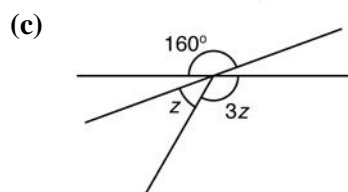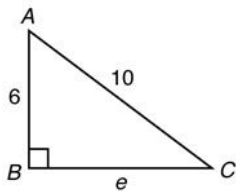

(c)
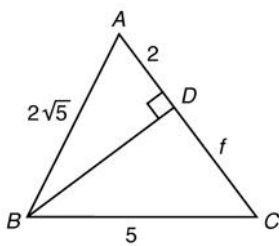
(d)
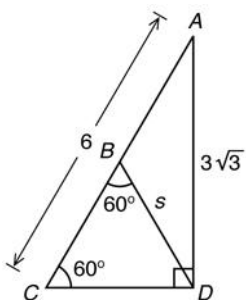
7. Find the unknowns in the following figures.

求下列各圖中的未知量。

(a)
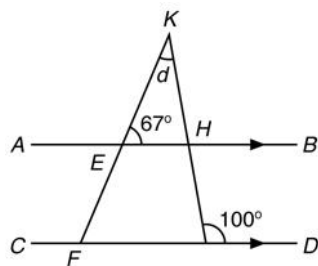
(b)
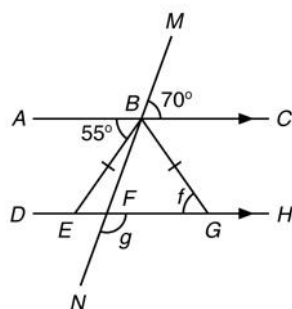
8.   The figure shows a parallelogram *ABCD*, prove that $\triangle ABC \cong \triangle CDA$.

圖中所示為平行四邊形 *ABCD*，證明 $\triangle ABC \cong \triangle CDA$。
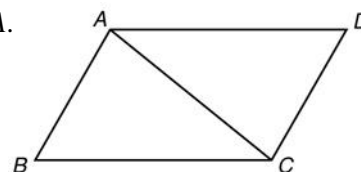
9.   In the figure, *AK* = 8 cm, *CK* = *BK*, *AB* // *CD* and *AKD* is a straight line.

   (a)   Prove that $\triangle AKB \cong \triangle DKC$.

   (b)   Find *DK*.

在圖中，*AK* = 8 cm，*CK* = *BK*，*AB* // *CD* 及 *AKD* 是一條直線。

   (a)   證明 $\triangle AKB \cong \triangle DKC$。

   (b)   求 *DK*。
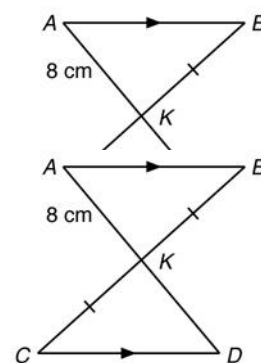
10. In the figure, $AB = DC$, $\angle ABC = 56°$, $\angle CAB = \angle BDC = 90°$.

    (a) Prove that $\triangle ABC \cong \triangle DCB$.

    (b) Find $\angle DCB$.

在圖中，$AB = DC$，$\angle ABC = 56°$，$\angle CAB = \angle BDC = 90°$。

    (a) 證明 $\triangle ABC \cong \triangle DCB$。

    (b) 求 $\angle DCB$。
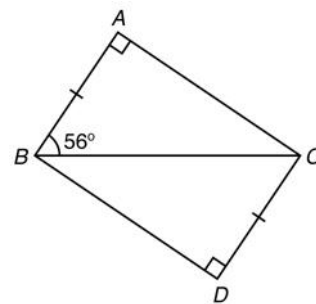
Level 1   Questions
程度 1 題目

1.   In the figure, $OM \perp AB$ and AMB is a straight line. If $OM = 3$ cm and
      $AB = 8$ cm, find the radius of the circle.
      在圖中，$OM \perp AB$ 及 AMB 是一條直線。若 $OM = 3$ cm 及 $AB = 8$ cm，求
      該圓的半徑。
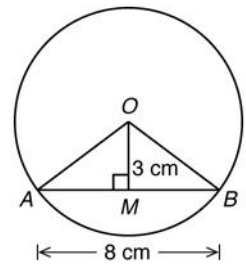
2.   In the figure, OMN is a straight line and M is the mid-point of chord AB.
      If $OA = 5$ cm, $MN = 2$ cm, find AB.
      在圖中，OMN 是一條直線而 M 是弦 AB 的中點。若 $OA = 5$ cm，$MN = 2$ cm，
      求 AB。
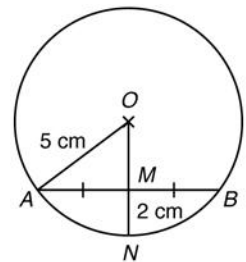
3.   In the figure, ONC is a straight line, $ON = 6$ cm, $NC = 4$ cm and $OC \perp AB$.
      Find AB.
      在圖中，ONC 是一條直線。已知 $ON = 6$ cm，$NC = 4$ cm 及 $OC \perp AB$，求
      AB。
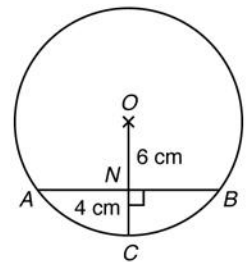
4.   In the figure, O is the centre of two concentric circles, $ON = 6$ cm,
      $CD = 16$ cm, $AM = 2$ cm, $ON \perp CD$, AMO and $ACNDB$ are straight lines.
      Find the radius of the larger circle.
      在圖中，O 是兩個圓的公共圓心。若 $ON = 6$ cm，$CD = 16$ cm，
      $AM = 2$ cm，$ON \perp CD$ 及 AMO 和 $ACNDB$ 都是直線，求大圓的半徑。
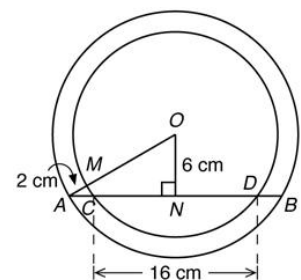
5.   In the figure, M is the mid-point of chord AB and COM is a straight line.
      If $\angle BCM = 30°$, find $\angle OBM$.
      在圖中，M 是弦 AB 的中點及 COM 是一條直線。若$\angle BCM = 30°$，求$\angle OBM$。
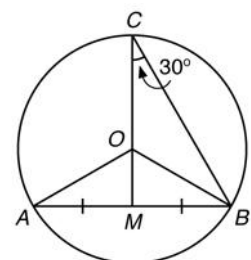
6. In the figure, $OA = 10$ cm, $AB = 12$ cm, M is a mid-point of AB and OMN is a straight line. Find MN.

在圖中，$OA = 10$ cm，$AB = 12$ cm，M 是 AB 的中點及 OMN 是一條直線。求 MN。
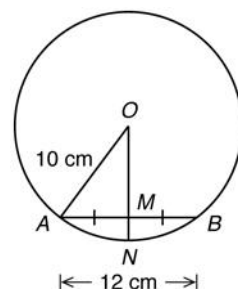
7. In the figure, O is the centre of two concentric circles, $ON = 4$ cm, $AC = 1$ cm, $CD = 6$ cm, $ON \perp CD$ and $ACNDB$ is a straight line. Find the radii of the two concentric circles respectively.

(Leave your answers in surd form if necessary.)

在圖中，O 是兩個圓的公共圓心，$ON = 4$ cm，$AC = 1$ cm，$CD = 6$ cm，$ON \perp CD$ 及 $ACNDB$ 是一條直線。求這兩個圓的半徑。

(如有需要，答案以根式表示。)
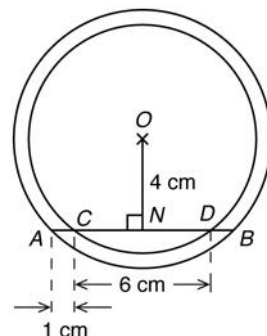
8. In the figure, $OM = ON = 2$ cm, $OM \perp AB$, $ON \perp BC$, AMB and BNC are straight lines. If $\angle CAB = 50°$, find $\angle BCA$.

在圖中，$OM = ON = 2$ cm，$OM \perp AB$，$ON \perp BC$，AMB 和 BNC 都是直線。若$\angle CAB = 50°$，求$\angle BCA$。
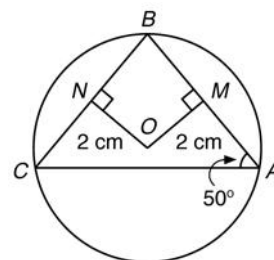
9. In the figure, $AB = DC$, $OM \perp AB$, $ON \perp CD$, $AMPB$ and $DNPC$ are straight lines. Prove that

(a) $MP = NP$,

(b) $\triangle ABC \cong \triangle DCB$.

在圖中，$AB = DC$，$OM \perp AB$，$ON \perp CD$，$AMPB$ 和 $DNPC$ 都是直線。

證明

(a) $MP = NP$，

(b) $\triangle ABC \cong \triangle DCB$。
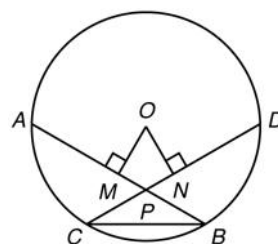
10. In the figure, *AD* is a diameter of the circle, *OM* ⊥ *AB*, *ON* ⊥ *CD*, *AMKB* and *CKND* are straight lines. Given that *AB* = *CD* and ∠*BKC* = 115°.

    (a) Prove that △ *OAM* ≅ △ *ODN*.

    (b) Find ∠*DAK*.

在圖中，*AD* 是圓的直徑，*OM* ⊥ *AB*，*ON* ⊥ *CD*，*AMKB* 和 *CKND* 都是直線。已知 *AB* = *CD* 及∠*BKC* = 115°。

    (a) 證明 △ *OAM* ≅ △ *ODN*。

    (b) 求∠*DAK*。
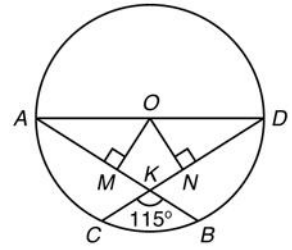
11. In the figure, *OT* ⊥ *CA*, *OR* ⊥ *AB*, *OS* ⊥ *BC*, *CTA*, *ARB* and *BSC* are straight lines. If *OT* = *OR* = *OS* = 6 cm, prove that △ *ABC* is an equilateral triangle.

在圖中，*OT* ⊥ *CA*，*OR* ⊥ *AB*，*OS* ⊥ *BC*，而 *CTA*、*ARB* 和 *BSC* 都是直線。若 *OT* = *OR* = *OS* = 6 cm，證明 △ *ABC* 是一個等邊三角形。
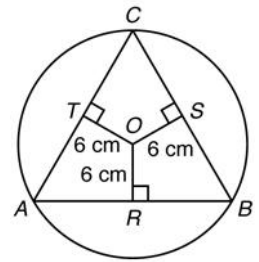
12. In the figure, *AB* = *AC*, *OM* ⊥ *AB*, *ON* ⊥ *AC*, *AMB* and *ANC* are straight lines. If ∠*ABC* = 70°, find ∠*OAM*.

在圖中，*AB* = *AC*，*OM* ⊥ *AB*，*ON* ⊥ *AC*，*AMB* 和 *ANC* 都是直線。若∠*ABC* = 70°，求∠*OAM*。
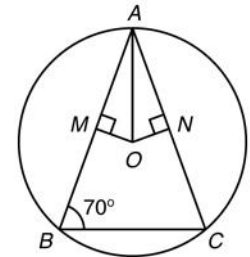
13. In the figure, *OM* ⊥ *AB*, *ON* ⊥ *CD*, *MON*, *AMB* and *CND* are straight lines. If *MN* = 6 cm, *AB* = *CD* = 8 cm, find the radius of the circle.

在圖中，*OM* ⊥ *AB*，*ON* ⊥ *CD*，而 *MON*、*AMB* 和 *CND* 都是直線。若 *MN* = 6 cm，*AB* = *CD* = 8 cm，求該圓的半徑。
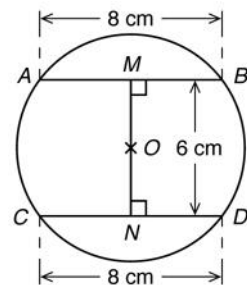
14. In the figure, *AB* is a diameter of the circle and ∠*BAP* = 60°. Find ∠*PBA*.

在圖中，*AB* 是圓的直徑及∠*BAP* = 60°。求∠*PBA*。
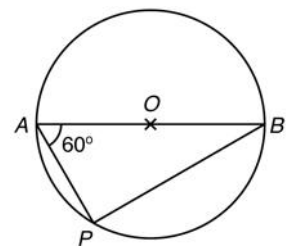
15. In the figure, reflex $\angle AOC = 280°$. Find x.

在圖中，優角$\angle AOC = 280°$。求 x 的值。
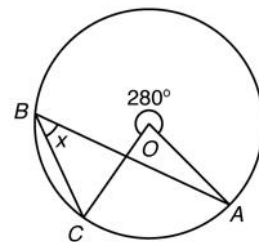
16. In the figure, $AP = AQ$, AB is a diameter of the circle and $\angle QBA = 50°$. Find x.

在圖中，$AP = AQ$，AB 是圓的直徑及$\angle QBA = 50°$。求 x 的值。
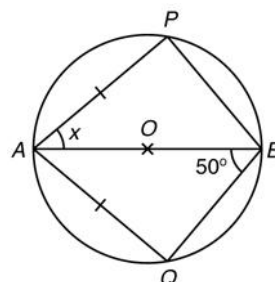
17 In the figure, $PA = PB$ and AB is a diameter of the circle. Find x.

在圖中，$PA = PB$ 及 AB 是圓的直徑。求 x 的值。
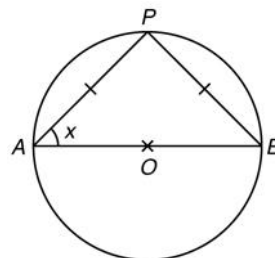
18. In the figure, $\angle BPA = 60°$. Find x and y.

在圖中，$\angle BPA = 60°$。求 x 和 y 的值。
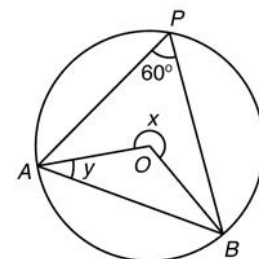
19. In the figure, $QA = PB$, AB is a diameter of the circle. If $\angle BAP = 38°$, find x and y.

在圖中，$QA = PB$，而 AB 是圓的直徑。若$\angle BAP = 38°$，求 x 和 y 的值。
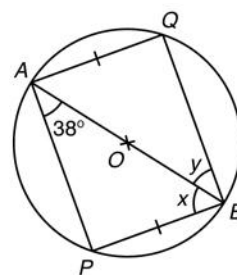
20. In the figure, $\angle BPA = 110°$. Find x and y.

在圖中，$\angle BPA = 110°$。求 x 和 y 的值。
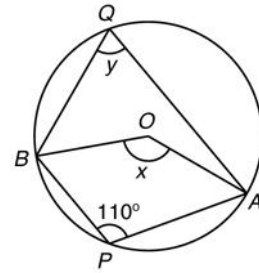
21. In the figure, DB is a diameter of the circle, $\angle DAC = 65°$ and $\angle ABD = 32°$.
Find x and y.

在圖中，DB 是圓的直徑，$\angle DAC = 65°$及$\angle ABD = 32°$。求 x 和 y 的值。
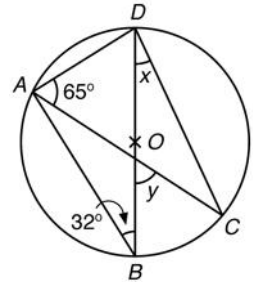
22. In the figure, $\overset{\frown}{AB} = \overset{\frown}{BC} = \overset{\frown}{CD} = \overset{\frown}{DE} = \overset{\frown}{EF}$. If $\angle AOF = 120°$, find x.

在圖中，$\overset{\frown}{AB} = \overset{\frown}{BC} = \overset{\frown}{CD} = \overset{\frown}{DE} = \overset{\frown}{EF}$。若$\angle AOF = 120°$，求 x。
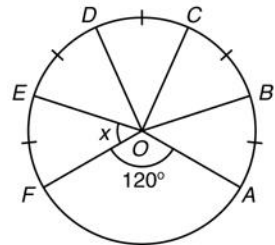
23. In the figure, BD is a diameter of the circle, $\angle BDA = 40°$ and $\angle DBC = 50°$.
Find x and y.

在圖中，BD 是圓的直徑，$\angle BDA = 40°$及$\angle DBC = 50°$。求 x 和 y 的值。
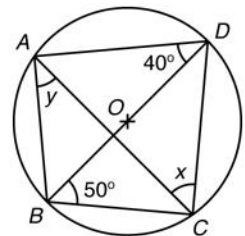
25. In the figure, DA is a diameter of the circle, $AB = BC = CD$. If $OA = 6$ cm,
find AB.

在圖中，DA 是圓的直徑，$AB = BC = CD$。若 $OA = 6$ cm，求 AB。
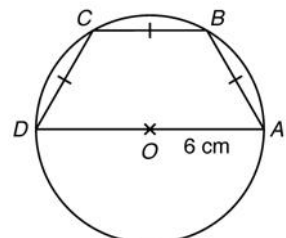
26. In the figure, AC is a diameter of the circle and $\overset{\frown}{AB} = \overset{\frown}{BC}$. Find x.

在圖中，AC 是圓的直徑及 $\overset{\frown}{AB} = \overset{\frown}{BC}$。求 x 的值。
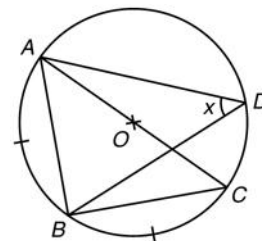
27. In the figure, $\angle AOB = \angle BOC = \angle COD = 38°$. If $\overset{\frown}{AB} = 5$ cm, find $\overset{\frown}{AD}$.

在圖中，$\angle AOB = \angle BOC = \angle COD = 38°$。若 $\overset{\frown}{AB} = 5$ cm，求 $\overset{\frown}{AD}$。
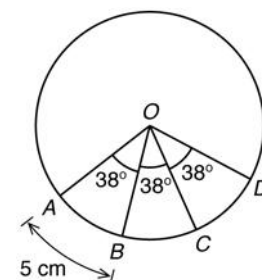
28. In the figure, $\angle ABD = \angle CDB = 50°$ and $AD = 10$ cm. Find BC.
在圖中，$\angle ABD = \angle CDB = 50°$及 $AD = 10$ cm。求 BC。
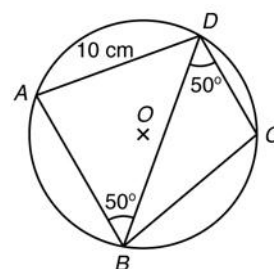
29. In the figure, $\overset{\frown}{AB} = 3$ cm, $\overset{\frown}{BC} = 9$ cm and $\overset{\frown}{CA} = 6$ cm. Find $\angle A$, $\angle B$ and $\angle C$.

在圖中，$\overset{\frown}{AB} = 3$ cm，$\overset{\frown}{BC} = 9$ cm 及 $\overset{\frown}{CA} = 6$ cm。求$\angle A$、$\angle B$ 和$\angle C$。
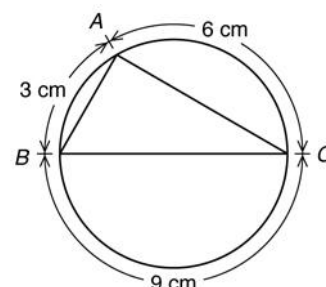
30. In the figure, $\angle AOB = 140°$, $\overset{\frown}{AB} = 28$ cm, $\overset{\frown}{BC} = 16$ cm, $\overset{\frown}{CD} = \overset{\frown}{DA}$.

Find x, y and $\overset{\frown}{CD}$.

在圖中，$\angle AOB = 140°$，$\overset{\frown}{AB} = 28$ cm，$\overset{\frown}{BC} = 16$ cm 及 $\overset{\frown}{CD} = \overset{\frown}{DA}$。求 x、y

和 $\overset{\frown}{CD}$。

16
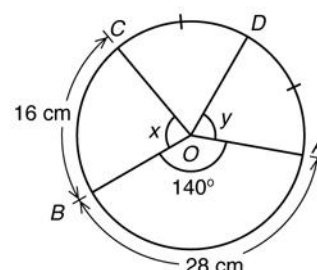
31. In the figure, $\angle DAB = 75°$, $\angle CED = 27°$, BC and AD are produced to meet at E. Find x.

在圖中，$\angle DAB = 75°$，$\angle CED = 27°$，BC 和 AD 的延線相交於 E。求 x 的值。
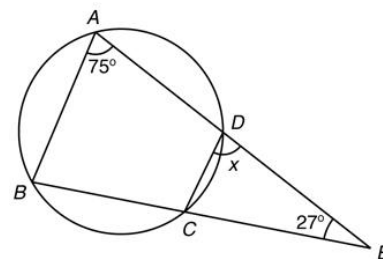
32. 在圖中，$AD /\!/ BC$，$\angle DKC = 80°$，$\overset{\frown}{CD} = 15$ cm，AC 和 BD 相交於 K。求 x 和 y 的值。
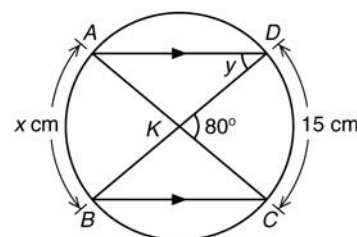
33. In the figure, $\angle BEC = 108°$ and $\angle CFA = 124°$. Find x.

在圖中，$\angle BEC = 108°$及$\angle CFA = 124°$。求 x 的值。
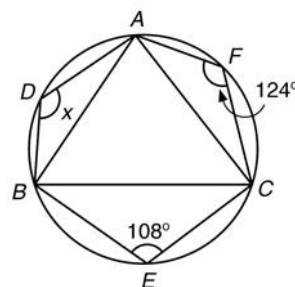
34. In the figure, BC is a diameter of the circle and $\angle DAB = 130°$. Find x.

在圖中，BC 是圓的直徑及$\angle DAB = 130°$。求 x 的值。
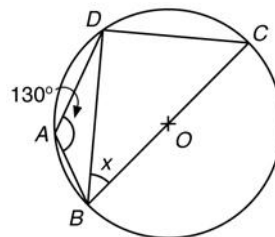
35. In the figure, $\angle ABC = 66°$, $\angle DEC = 30°$, $AE /\!/ BD$ and BCD is a straight line. Find x.

在圖中，$\angle ABC = 66°$，$\angle DEC = 30°$，$AE /\!/ BD$ 及 BCD 是一條直線。求 x 的值。
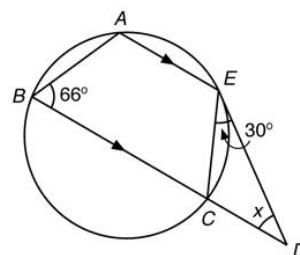
Level 2 Questions
程度 2 題目

1. In the figure, $AM = MB$, MON and AMB are straight lines. If $NM = AB = 32$ cm, find the radius of the circle.

在圖中，$AM = MB$，MON 和 AMB 都是直線。若 $NM = AB = 32$ cm，求該圓的半徑。
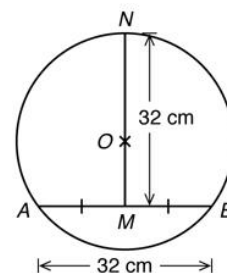
2. In the figure, $OM = MN$, $ON \perp AB$, OMN and AMB are straight lines.
    If $AB = 18$ cm, find the radius of the circle.
    (Leave your answer in surd form.)

    在圖中，$OM = MN$，$ON \perp AB$，OMN 及 AMB 都是直線。若 $AB = 18$ cm，求該圓的半徑。
    (答案以根式表示。)
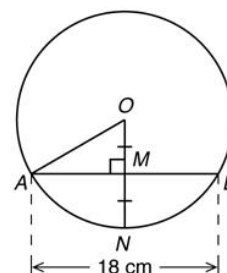
3. In the figure, O is the centre of two concentric circles with radii 26 cm and 30 cm respectively, $ON \perp CD$ and $ACNDB$ is a straight line. If $AB = 36$ cm, find

    (a) ON,

    (b) CD,

    (c) AC.

    在圖中，O 是兩個圓的公共圓心，而該兩個圓的半徑分別是 26 cm 和　30 cm，$ON \perp CD$ 及 $ACNDB$ 是一條直線。若 $AB = 36$ cm，求

    (a) ON，

    (b) CD，

    (c) AC。
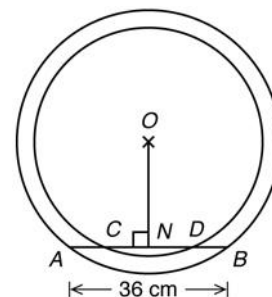
4. In the figure, $ON \perp AB$, ON and AB intersect at M. If $OM = 15$ cm and $OA = 25$ cm, find BN.
    (Leave your answer in surd form.)

    在圖中，$ON \perp AB$，ON 和 AB 相交於 M。若 $OM = 15$ cm 及 $OA = 25$ cm，求 BN。
    (答案以根式表示。)
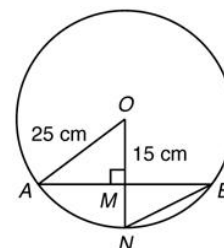
5. In the figure, O is the centre of two concentric circles, $MK = NK$, $OM \perp AB$, $ON \perp CD$, $AEKMFB$ and $CGKNHD$ are straight lines.
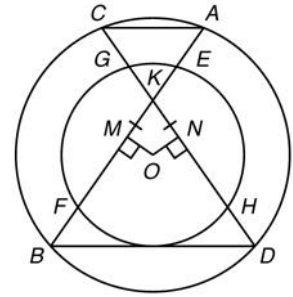
   (a) Prove that

   (i) $OM = ON$,

   (ii) $AK = CK$,

   (iii) $BF = DH$.

   (b) Prove that $CA \mathbin{/\mkern-5mu/} BD$.

   在圖中，O 是兩個圓的公共圓心，$MK = NK$，$OM \perp AB$，$ON \perp CD$，$AEKMFB$ 和 $CGKNHD$ 都是直線。

   (a) 證明

   (i) $OM = ON$，

   (ii) $AK = CK$，

   (iii) $BF = DH$。

   (b) 證明 $CA \mathbin{/\mkern-5mu/} BD$。

6. In the figure, $BA \mathbin{/\mkern-5mu/} CD$, $AD \mathbin{/\mkern-5mu/} BC$, APD and BQC are straight lines.
    If $\angle BAQ = 50°$ and $\angle PDC = 80°$, find x.

   在圖中，$BA \mathbin{/\mkern-5mu/} CD$，$AD \mathbin{/\mkern-5mu/} BC$，$APD$ 和 BQC 都是直線。若$\angle BAQ = 50°$ 及 $\angle PDC = 80°$，求 x。
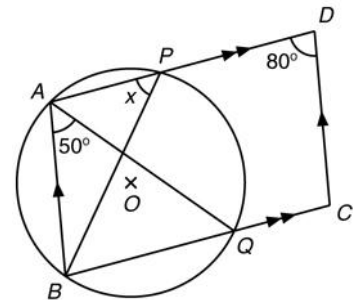
7. In the figure, $AO \mathbin{/\mkern-5mu/} PB$ and $PA \mathbin{/\mkern-5mu/} BO$. Find x.
   在圖中，$AO \mathbin{/\mkern-5mu/} PB$ 及 $PA \mathbin{/\mkern-5mu/} BO$。求 x 的值。
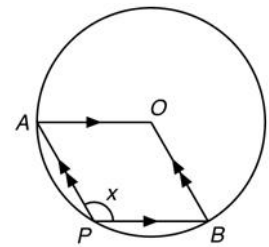
8. In the figure, CA and OB intersect at K. If $\angle AOB = \angle BOC = 50°$, prove that
   $\triangle BCK \cong \triangle BAK$.

   在圖中，CA 和 OB 相交於 K。若$\angle AOB = \angle BOC = 50°$，證明
   $\triangle BCK \cong \triangle BAK$。
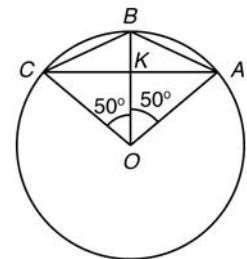
9. In the figure, $\angle BAC = 20°$, $\angle ACD = 30°$ and $\angle BDA = 50°$. Find x and y.

在圖中，$\angle BAC = 20°$，$\angle ACD = 30°$ 及 $\angle BDA = 50°$。求 x 和 y。
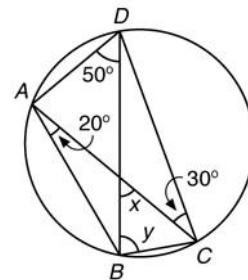
10. In the figure, $AB = AC$, $\angle BDA = 50°$ and $\angle ACD = 20°$. Find x and y.

在圖中，$AB = AC$，$\angle BDA = 50°$ 及 $\angle ACD = 20°$。求 x 和 y。
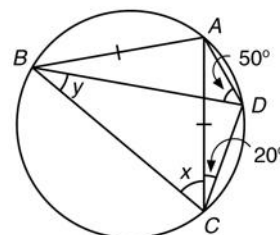
11. In the figure, $CP = DP$, AD and BC are produced to meet at P.

If $\angle BCA = 70°$ and $\angle DBC = 40°$, find x and y.

在圖中，$CP = DP$，AD 和 BC 的延線相交於 P。若 $\angle BCA = 70°$ 及 $\angle DBC = 40°$，求 x 和 y。
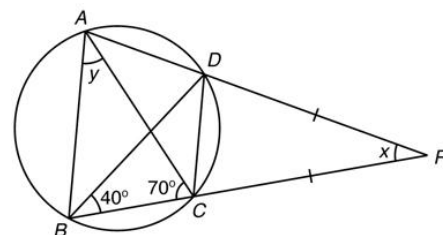
12. In the figure, $\overset{\frown}{AB} = \overset{\frown}{CA}$ and $\angle CAB = 70°$. Find x.

在圖中，$\overset{\frown}{AB} = \overset{\frown}{CA}$ 及 $\angle CAB = 70°$。求 x 的值。
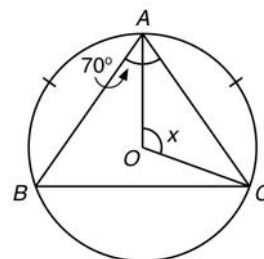
13. In the figure, $ABCDEFGH$ is a regular octagon. If the radius of the circle is 8 cm,

find $\overset{\frown}{AB}$.

(Leave your answer in terms of π.)

在圖中，$ABCDEFGH$ 是一個正八邊形。若圓的半徑是 8 cm，求 $\overset{\frown}{AB}$。(答案以 π 表示。)
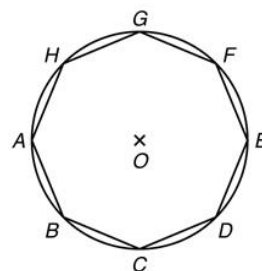
14. In the figure, DA is a diameter of the circle, $\overset{\frown}{CD}$ = 20 cm, $\angle CDB = 42°$,

$\angle DOC = 56°$. Find x and y.

在圖中，DA 是該圓的直徑，$\overset{\frown}{CD}$ = 20 cm，$\angle CDB = 42°$，$\angle DOC = 56°$。 求

x 和 y。
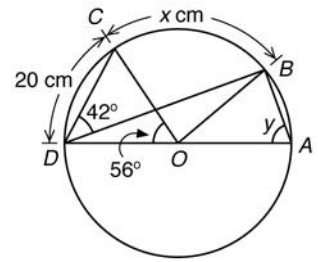
15. In the figure, $AB = BC$, $\overset{\frown}{BC}$ = 8 cm, $\overset{\frown}{CD}$ = 12 cm. If $\angle DBC = 45°$,

find x and y.

在圖中，$\overset{\frown}{AB}$ = $\overset{\frown}{CA}$ 及$\angle CAB = 70°$。求 x 的值。
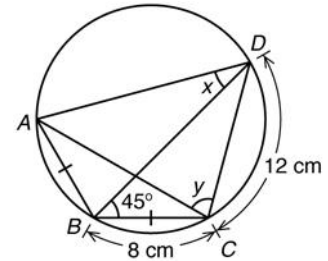
16. In the figure, $\overset{\frown}{AB}$ = $\overset{\frown}{BC}$ = $\overset{\frown}{CD}$ = $\overset{\frown}{DE}$ = $\overset{\frown}{EA}$, $AGHC$, $CIJE$, $EFGB$,

$BHID$ and $DJFA$ are straight lines. Find x and y.

在圖中，$\overset{\frown}{AB}$ = $\overset{\frown}{BC}$ = $\overset{\frown}{CD}$ = $\overset{\frown}{DE}$ = $\overset{\frown}{EA}$，而 $AGHC$、$CIJE$、$EFGB$、$BHID$

和 $DJFA$ 都是直線。求 x 和 y。
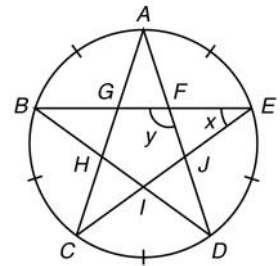
17. In the figure, AC is a diameter of the circle, $\overset{\frown}{BC}$ = 6 cm, $\overset{\frown}{CD}$ = 18 cm and

$\angle DAB = 60°$. Find x and y.

在圖中，AC 是該圓的直徑，$\overset{\frown}{BC}$ = 6 cm，$\overset{\frown}{CD}$ = 18 cm 及$\angle DAB = 60°$。 求

x 及 y。
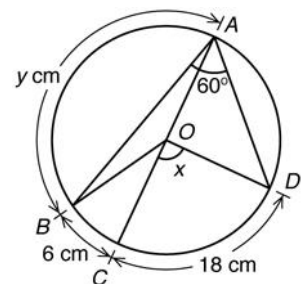
18. In the figure, $AB = AD$, $BC = DC$. If $\angle BCD = 70°$, find x and y.

在圖中，$AB = AD$，$BC = DC$。若$\angle BCD = 70°$，求 x 和 y。
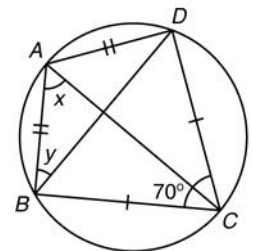
19. In the figure, $\angle ABC = 35°$, $\overset{\frown}{DA} = 22$ cm, $BA \mathbin{/\mkern-5mu/} CO$, $CB \mathbin{/\mkern-5mu/} OA$ and

 BAD is a straight line. Find x and y.

在圖中，$\angle ABC = 35°$，$\overset{\frown}{DA} = 22$ cm，$BA \mathbin{/\mkern-5mu/} CO$，$CB \mathbin{/\mkern-5mu/} OA$ 及 BAD 是一

條直線。求 x 和 y。
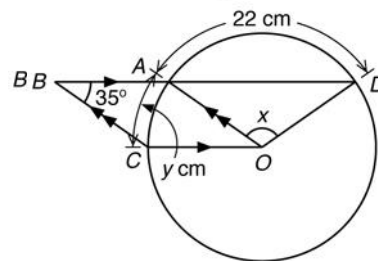
20. In the figure, $\angle COB = 100°$ and $\overset{\frown}{AB} = \overset{\frown}{BC}$. Find x.

 在圖中，$\angle COB = 100°$ 及 $\overset{\frown}{AB} = \overset{\frown}{BC}$。求 x。
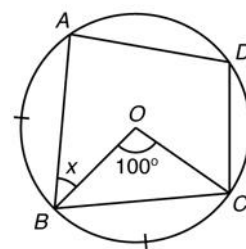
21. In the figure, $\angle BEA = 54°$, $\angle DEC = 60°$, $AE = CE$, AE and BC are
 produced to meet at D. Find x and y.

在圖中，$\angle BEA = 54°$，$\angle DEC = 60°$，$AE = CE$，AE 和 BC 的延線相
交於 D。求 x 和 y。
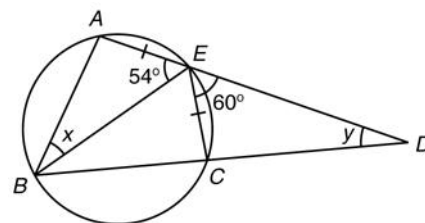
22. In the figure, $\overset{\frown}{AD} : \overset{\frown}{BC} = 1 : 2$, $AB = CD$ and $\angle CPD = 150°$. Find x and y.

在圖中，$\overset{\frown}{AD} : \overset{\frown}{BC} = 1 : 2$，$AB = CD$ 及 $\angle CPD = 150°$。求 x 和 y。
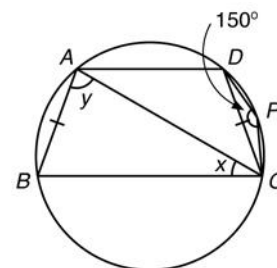
23. In the figure, BD is a diameter of the circle, $DE = 5\sqrt{3}$ cm,
 $CD = 10\sqrt{3}$ cm, $AB = BE$, ADC and BEC are straight lines.
 (a) Prove that $\triangle ABD \cong \triangle EBD$.
 (b) Prove that $\triangle ABC \sim \triangle EDC$.
 (c) Find EC and AB.
在圖中，BD 是圓的直徑，$DE = 5\sqrt{3}$ cm，$CD = 10\sqrt{3}$ cm，$AB = BE$，
 ADC 和 BEC 都是直線。
 (a) 證明 $\triangle ABD \cong \triangle EBD$。
 (b) 證明 $\triangle ABC \sim \triangle EDC$。
 (c) 求 EC 和 AB。
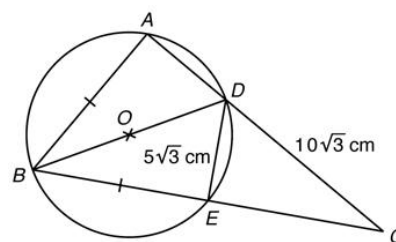
24. In the figure, ∠*BCD* = 57°, *CB* and *DF* are produced to meet at *A*, *BF* and *CD* are produced to meet at *E* such that ∠*DEF* = 31°. Find *x* and *y*.

在圖中，∠*BCD* = 57°，*CB* 和 *DF* 的延線相交於 *A*，*BF* 和 *CD* 的延線相交於 *E*，使∠*DEF* = 31°。求 *x* 和 *y*。
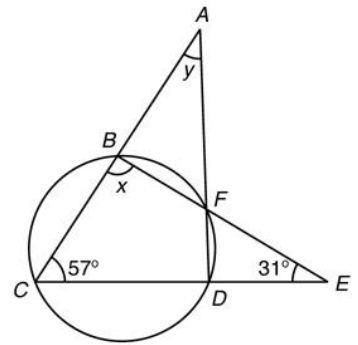
25.   In the figure, *CDA* and *CEB* are straight lines, *DA* = *EB* = *k*, where

k is a constant. In the smaller circle, $\overset{\frown}{DE}$: $\overset{\frown}{CD}$ = 1 : 2.

   (a)   Prove that △ *CAB* ~ △ *CED*.

   (b)   Prove that *CD* = *CE*.

   (c)   Find *x* and *y*.
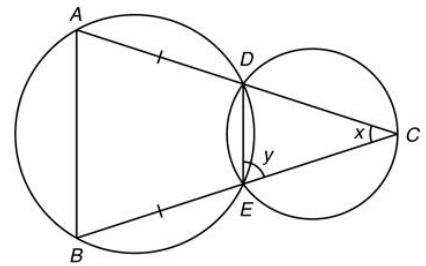
   (d)   Prove that *AB* // *DE*.

在圖中，*CDA* 和 *CEB* 都是直線，*DA* = *EB* = *k*，而 *k* 是一個常數。在小圓中，$\overset{\frown}{DE}$: $\overset{\frown}{CD}$ = 1 : 2。

   (a)   證明△ *CAB* ~ △ *CED*。

   (b)   證明 *CD* = *CE*。

   (c)   求 *x* 和 *y*。

   (d)   證明 *AB* // *DE*。

Level 2+ Questions
程度 2+ 題目

1. In the figure, $\angle ABC = 105°$, $\angle CFD = 45°$, $FD = 6$ cm, $EF = ED$, *AD* and *CF* intersect at *K*, *AF* and *CD* are produced to meet at *E*.

    (a) Find *x*, *y* and *z*.

    (b) Find *DE*.

    (c) Prove that $\triangle ADF \cong \triangle CFD$.
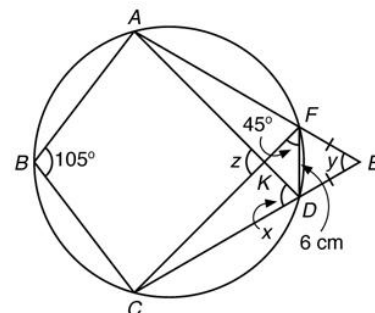
在圖中，$\angle ABC = 105°$，$\angle CFD = 45°$，$FD = 6$ cm，$EF = ED$，
AD 和 *CF* 相交於 *K*，而 *AF* 和 *CD* 的線相交於 *E*。

    (a) 求 *x*、*y* 和 *z*。

    (b) 求 *DE*。

    (c) 證明 $\triangle ADF \cong \triangle CFD$。

2. In the figure, $\angle COB = 140°$, $\overset{\frown}{AD} : \overset{\frown}{BC} = 1 : 2$, *AD* // *BC*, *AC* and *BD* intersect at *M*. Find *x*, *y* and *z*.
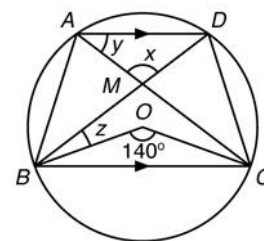
在圖中，$\angle COB = 140°$，$\overset{\frown}{AD} : \overset{\frown}{BC} = 1 : 2$，*AD* // *BC*，*AC* 和 *BD* 相交於
M。求 *x*、*y* 和 *z*。

3. In the figure, $\angle AON = 80°$, $\overset{\frown}{MA} : \overset{\frown}{AN} : \overset{\frown}{NC} = 1 : 2 : 2$, *BN* is a diameter of the circle and *AKC* is a straight line. Find

    (a) *x*, *y* and *z*,

    (b) $\overset{\frown}{AB} : \overset{\frown}{BC} : \overset{\frown}{CA}$,

    (c) $\angle OAK$.
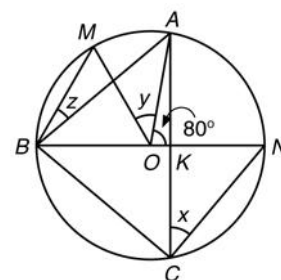
在圖中，$\angle AON = 80°$，$\overset{\frown}{MA} : \overset{\frown}{AN} : \overset{\frown}{NC} = 1 : 2 : 2$，*BN* 是圓的直徑及 *AKC* 是一條直線。求

    (a) *x*、*y* 和 *z*，

    (b) $\overset{\frown}{AB} : \overset{\frown}{BC} : \overset{\frown}{CA}$，

    (c) $\angle OAK$。

4. In the figure, *ABNM* and *MNC* are two equal circles, ∠*O'CN* = 18°, *AB* = *AM*, *MC* = *NC* and *BNC* is a straight line.
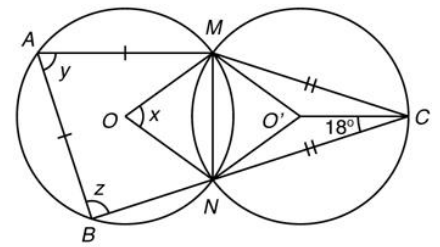
   (a) Prove that △ *O'CM* ≅ △ *O'CN*. Hence, or otherwise, find ∠*O'MC*.

   (b) Find *x*, *y* and *z*.

   (c) Prove that *BN* = *MN*.

在圖中，*ABNM* 和 *MNC* 是兩個相等的圓形，∠*O'CN* = 18°，*AB* = *AM*，*MC* = *NC* 及 *BNC* 是一條直線。

   (a) 證明△ *O'CM* ≅ △ *O'CN*。由此，或用其他方法，求∠*O'MC*。

   (b) 求 *x*、*y* 和 *z*。

   (c) 證明 *BN* = *MN*。

5. In the figure, *MK* = 4 cm, *BM* = *CM* = 8 cm and *AK* is a diameter of the circle.
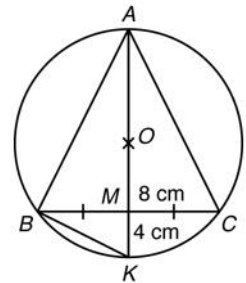
   (a) Prove that △ *ABC* is an isosceles triangle.

   (b) Find the radius of the circle. Hence, find the area of △ *ABK*.

   (c) Find *BK* and *AC*.

   (Leave your answers in surd form.)

在圖中，*MK* = 4 cm，*BM* = *CM* = 8 cm，而 *AK* 是圓的直徑。

   (a) 證明△ *ABC* 是一個等腰三角形。

   (b) 求該圓的半徑。由此，求△ *ABK* 的面積。

   (c) 求 *BK* 和 *AC*。

   (答案以根式表示。)

6. In the figure, *OX* = *OY* = *OZ*, *OX* ⊥ *AB*, *OY* ⊥ *BC*, *OZ* ⊥ *CD*, *CO* is produced to meet *AD* at *Q*. Let ∠*OBA* = *θ*.
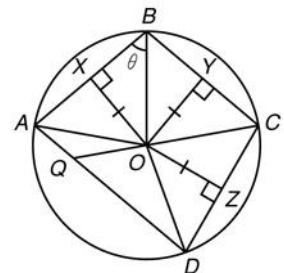
   (a) Prove that $\overset{\frown}{AB} = \overset{\frown}{BC} = \overset{\frown}{CD}$.

   (b) Prove that △ *OBX* ≅ △ *OBY*.

   (c) Prove that *BC* // *AD*.

   (d) Prove that ∠*OQD* = *θ*.

   (e) If ∠*AOQ* = 20°, find *θ*.

在圖中，*OX* = *OY* = *OZ*，*OX* ⊥ *AB*，*OY* ⊥ *BC*，*OZ* ⊥ *CD*，*CO* 的延線與 *AD* 相交於 *Q*。設 ∠*OBA* = *θ*。

   (a) 證明 $\overset{\frown}{AB} = \overset{\frown}{BC} = \overset{\frown}{CD}$ 。

   (b) 證明△ *OBX* ≅ △ *OBY*。

   (c) 證明 *BC* // *AD*。

   (d) 證明∠*OQD* = *θ*。

   (e) 若∠*AOQ* = 20°，求 *θ*。

Multiple Choice Questions
多項選擇題

1. In the figure, *AMB* and *OMN* are straight lines. *ON* ⊥ *AB* and *MN* = 2 cm. Find the radius of the circle.

   在圖中，*AMB* 和 *OMN* 都是直線。 *ON* ⊥ *AB* 及 *MN* = 2 cm。求該圓的半徑。
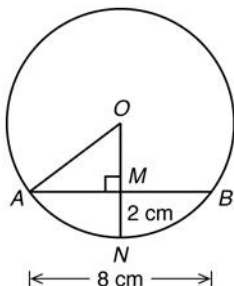
   A. 5 cm
   B. 6 cm
   C. 15 cm
   D. 17 cm

2. In the figure, *BM* = *MC*, *AOM* and *BMC* are straight lines. *OM* = 12 cm and *OC* = 20 cm. Find *AC*.

   在圖中，*BM* = *MC*，*AOM* 和 *BMC* 都是直線。*OM* = 12 cm 及 *OC* = 20 cm。求 *AC*。

   A. 16 cm
   B. $16\sqrt{3}$ cm
   C. $16\sqrt{5}$ cm
   D. $16\sqrt{7}$ cm

3. In the figure, *AMB* is a straight line. *OM* ⊥ *AB*, *OA* = 25 cm and *AB* = 30 cm. Find *OM*.

   在圖中，*AMB* 是一條直線。*OM* ⊥ *AB*，*OA* = 25 cm 及 *AB* = 30 cm。

   求 *OM*。
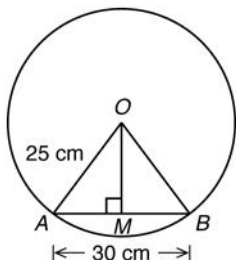
   A. 5 cm
   B. 10 cm

C. 15 cm
D. 20 cm

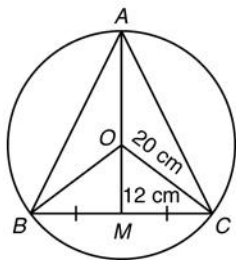4. In the figure, *OM* = *ON*, *AMB* and *CND* are straight lines. *OM* ⊥ *AB*, *ON* ⊥ *CD*, *OD* = 5 cm and *AB* = 8 cm. Find the area of Δ *ODC*.

   在圖中，*OM* = *ON*，*AMB* 和 *CND* 都是直線。 *OM* ⊥ *AB*，*ON* ⊥ *CD*，*OD* = 5 cm 及 *AB* = 8 cm。求 Δ *ODC* 的面積。
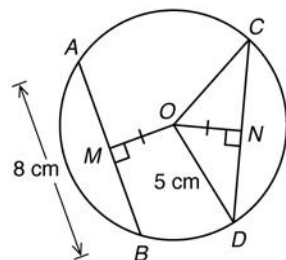
   A. 12 cm^2
   B. 20 cm^2
   C. 24 cm^2
   D. 40 cm^2

5. In the figure, *AB* = *CD*, *AMKB* and *CNKD* are straight lines. If *ON* = 6 cm, find *OK*.

   在圖中，*AB* = *CD*，*AMKB* 和 *CNKD* 都是直線。若 *ON* = 6 cm，求 *OK*。

   A. $6\sqrt{2}$ cm
   B. $8\sqrt{2}$ cm
   C. 6 cm
   D. 10 cm

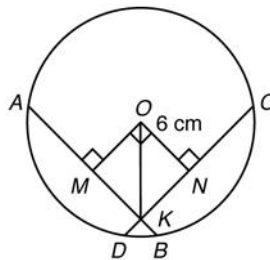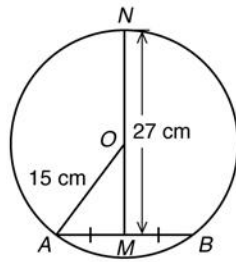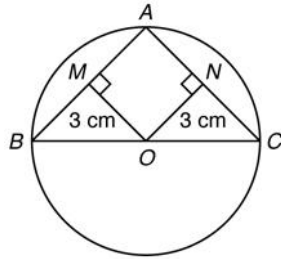**6.** In the figure, *M* is the mid-point of *AB*, *NOM* is a straight line, *OA* = 15 cm and *NM* = 27 cm. Find *AB*.

在圖中，*M* 是 *AB* 的中點，*NOM* 是一條直線，*OA* = 15 cm 及 *NM* = 27 cm。求 *AB*。

- **A.** 6 cm
- **B.** 9 cm
- **C.** 12 cm
- **D.** 18 cm

7 In the figure, *BC* is a diameter of the circle, *AMB* and *ANC* are straight lines. *OM* ⊥ *AB*, *ON* ⊥ *CD* and *OM* = *ON* = 3 cm. Find ∠*ABC*.

在圖中，*BC* 是圓的直徑，*AMB* 及 *ANC* 都是直線。*OM* ⊥ *AB*，*ON* ⊥ *CD* 及 *OM* = *ON* = 3 cm。求∠*ABC*。

- **A.** 40°
- **B.** 45°
- **C.** 50°
- **D.** 55°

8 In the figure, *AD* is a diameter of the circle, *AB* = *AC*, *AMB* and *ANC* are straight lines. *OM* ⊥ *AB*, *ON* ⊥ *AC* and ∠*OAN* = 32°. Find *x*.

在圖中，*AD* 是圓的直徑，*AB* = *AC*，*AMB* 和 *ANC* 都是直線。*OM* ⊥ *AB*，*ON* ⊥ *AC* 及 ∠*OAN* = 32°。求 *x* 的值。
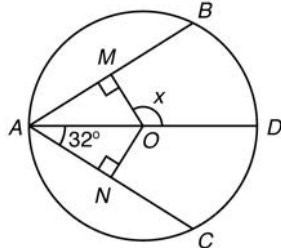
- **A.** 112°
- **B.** 122°

- **C.** 144°
- **D.** 154°

9. In the figure, *OC* // *AB* and ∠*OBA* = 50°, find *x*.

在圖中，*OC* // *AB* 及 ∠*OBA* = 50°，求 *x* 的值。

- **A.** 25°
- **B.** 50°
- **C.** 75°
- **D.** 100°
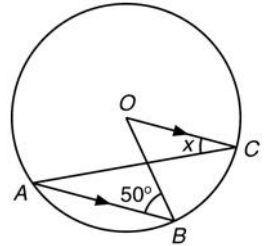
10. In the figure, *AD* is a diameter of the circle, *DB* = *DC*, ∠*DCB* = 25° and *ADC* is a straight line. Find *x*.

在圖中，*AD* 是圓的直徑，*DB* = *DC*，∠*DCB* = 25°及 *ADC* 是一條直線。求 *x* 的值。

- **A.** 25°
- **B.** 35°
- **C.** 40°
- **D.** 50°
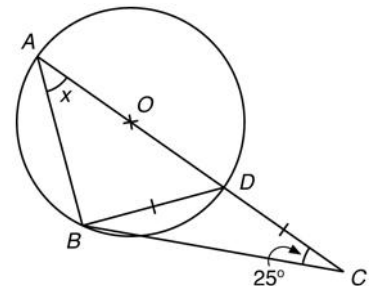
11. In the figure, *AC* = *DC* and ∠*DAC* = 46°, find *x*.

在圖中，*AC* = *DC* 及 ∠*DAC* = 46°，求 *x*。

- **A.** 44°
- **B.** 46°
- **C.** 88°
- **D.** 92°
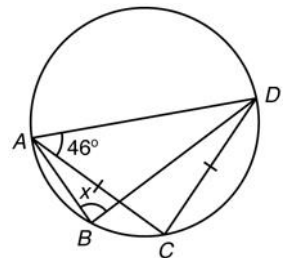
12. In the figure, $AB = BC$ and $\angle AOC = 160°$, find x.

在圖中，$AB = BC$ 及 $\angle AOC = 160°$，求 x。

- **A.** 20°
- **B.** 30°
- **C.** 40°
- **D.** 50°
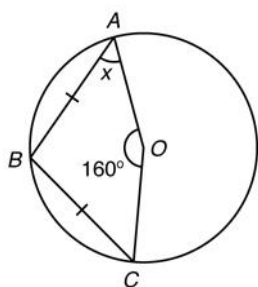
13. In the figure, AC and BD intersect at K. $\angle DAC = 32°$ and $\angle DKC = 70°$. Find x.

在圖中，AC 和 BD 相交於 K。$\angle DAC =$ 32° 及 $\angle DKC =$ 70°。求 x 的值。

- **A.** 32°
- **B.** 34°
- **C.** 36°
- **D.** 38°
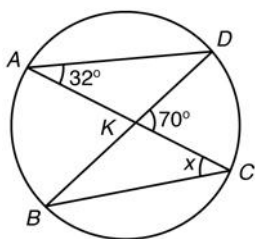
14. In the figure, AB is a diameter of the circle. Find $\angle ABC$.

在圖中，AB 是圓的直徑。求 $\angle ABC$。

- **A.** 30°
- **B.** 40°
- **C.** 50°
- **D.** 60°
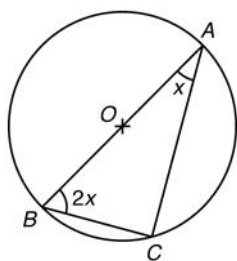
15. In the figure, $AD \; // \; BC$, AC and BD intersect at K. If $KC = KD$ and $\angle ABD = 35°$, find x.

在圖中，$AD \; // \; BC$，AC 和 BD 相交於 K。若 $KC = KD$ 及 $\angle ABD = 35°$，求 x。

- **A.** 35°
- **B.** 40°
- **C.** 55°
- **D.** 65°
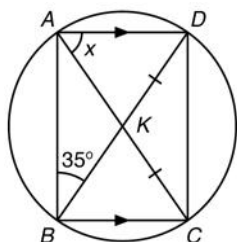
16. In the figure, EA is a diameter of the circle and $\overset{\frown}{BC} = \overset{\frown}{CD} = \overset{\frown}{DE}$. Find x.

在圖中，EA 是圓的直徑及 $\overset{\frown}{BC} = \overset{\frown}{CD} = \overset{\frown}{DE}$。求 x 的值。

- **A.** 39°
- **B.** 43°
- **C.** 47°
- **D.** 51°
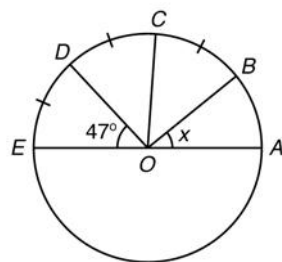
17. In the figure, $BA \; // \; CD$ and $\angle KDC = 48°$. Find x.

在圖中，$BA \; // \; CD$ 及 $\angle KDC = 48°$。求 x 的值。

- **A.** 84°
- **B.** 90°
- **C.** 96°
- **D.** 102°
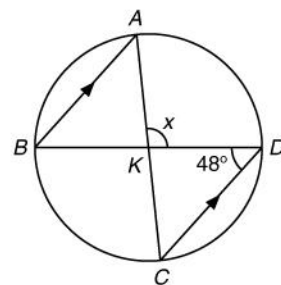
18. In the figure, $AB = CD$ and $\angle ABO = 54°$. Find x.

在圖中，$AB = CD$ 及 $\angle ABO = 54°$。求 x 的值。

- **A.** 27°
- **B.** 36°
- **C.** 54°
- **D.** 72°
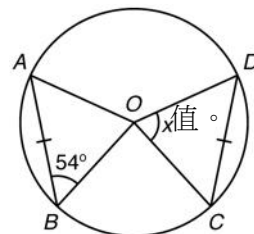
19. In the figure, $AB = AC$, $\angle BAC = 100°$ and

    $\overset{\frown}{BC} = 20$ cm. Find $\overset{\frown}{AB}$.

    在圖中，$AB = AC$，$\angle BAC = 100°$及

    $\overset{\frown}{BC} = 20$ cm。求 $\overset{\frown}{AB}$。

    A.   8 cm
    B.   10 cm
    C.   12 cm
    D.   14 cm
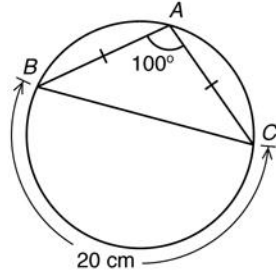
20. If $\overset{\frown}{AB} : \overset{\frown}{BC} : \overset{\frown}{CD} = 4 : 2 : 1$ and

    $\angle DOA = 108°$. Find $\angle AOB$.

    若 $\overset{\frown}{AB} : \overset{\frown}{BC} : \overset{\frown}{CD} = $

    $4 : 2 : 1$ 及 $\angle DOA = $

    $108°$。求 $\angle AOB$。

    A.   36°
    B.   72°
    C.   108°
    D.   144°
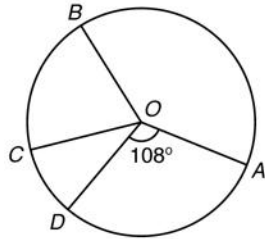
21. In the figure, $\overset{\frown}{CD} = \overset{\frown}{DE}$, $\angle BAC = \angle DOE$

    $= 36°$ and $\overset{\frown}{BC} = 12$ cm. Find $\overset{\frown}{CD}$.

    在圖中，$\overset{\frown}{CD} = \overset{\frown}{DE}$，$\angle BAC = \angle DOE = 36°$

    及 $\overset{\frown}{BC} = 12$ cm。求 $\overset{\frown}{CD}$。

    A.   4 cm
    B.   6 cm
    C.   8 cm
    D.   10 cm

22. In the figure, $\angle BAC = 15°$, $\angle BED = 60°$

    and $\overset{\frown}{CD} = 24$ cm. Find $\overset{\frown}{BD}$.

    在圖中，$\angle BAC = 15°$，$\angle BED = 60°$及

    $\overset{\frown}{CD} = 24$ cm。求 $\overset{\frown}{BD}$。

    A.   8 cm
    B.   16 cm
    C.   32 cm
    D.   40 cm

23. In the figure, BA // CE, AE and BC are
    produced to meet at D. $\angle BAD = 65°$. Find x.
    在圖中，BA // CE，AE 和 BC 的延線相交於
    D，$\angle BAD = 65°$。求 x 的值。

    A.   25°
    B.   50°
    C.   65°
    D.   It cannot be determined.
         不可能求得

24 In the figure, $\overset{\frown}{AB} : \overset{\frown}{BC} : \overset{\frown}{CD} = 1 : 2 : 1$ and

    $\angle CAD = 40°$. Find x.

    在圖中，$\overset{\frown}{AB} : \overset{\frown}{BC} : \overset{\frown}{CD} = 1 : 2 : 1$ 及
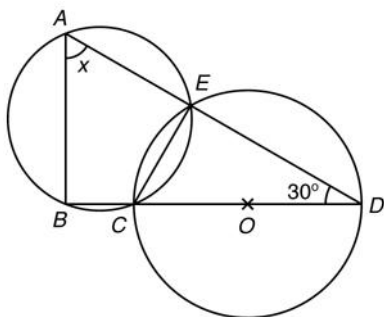
    $\angle CAD = 40°$。求 x 的值。

    A.   20°
    B.   40°
    C.   50°
    D.   60°

25. In the figure, *CD* is a diameter of circle *CDE*,
    AED and *BCD* are straight lines and ∠*ADB*
    = 30°. Find *x*.
    在圖中，*CD* 是圓 *CDE* 的直徑，*AED* 及 *BCD*
    都是直線，∠*ADB* = 30°。求 *x* 的值。

    A. 30°

    B. 45°

    C. 60°

    D. 90°

26. In the figure, *AC* and *BD* intersect at *K*,
    AK = *BK*, ∠*ADB* = 36° and ∠*DBC* = 34°.
    Find *x*.
    在圖中，*AC* 和 *BD*
    的延線相交於 *K*，
    AK = *BK*，∠*ADB* =
    36°及 ∠*DBC* =
    34°。求 *x* 的值。

    A. 53°

    B. 54°

    C. 55°

    D. 56°