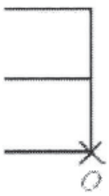
Rotation of Figures

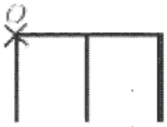
1.

If the plane figure above is rotated anticlockwise about the point O through 90°, which of the following is its image?

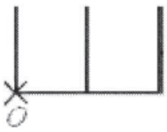
A.



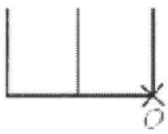
B.



C.

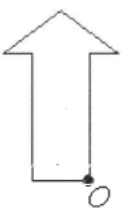


D.



[2006-CE-MATHS 2-25]

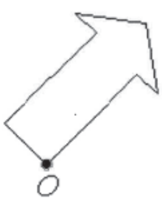
2.



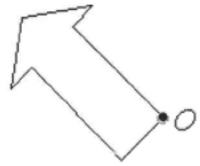
If the plane figure above is rotated anticlockwise about the point O through 135°, which of the following is its image?

A.

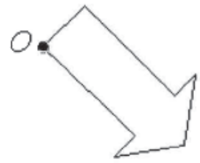
B.



C.



D.

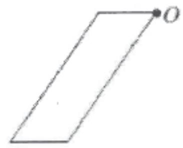


[2008-CE-MATHS 2-25]

3.

If the plane figure above is rotated anticlockwise about the point O through 270°, which of the following is its image?

A.



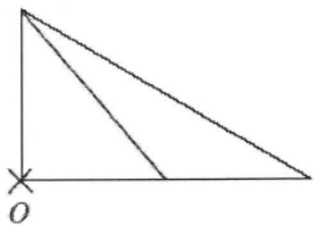
B.

C.

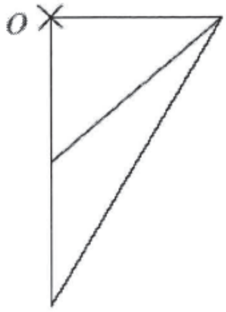
D.

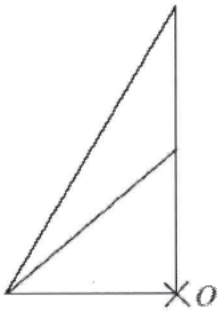
[2010-CE-MATHS 2-24]

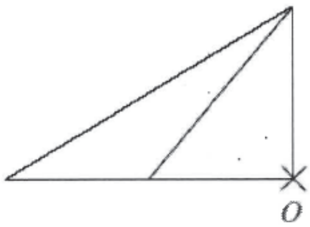
4.

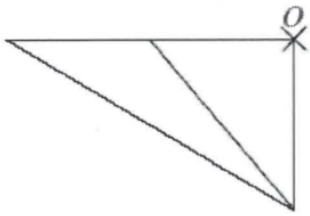


If the plane figure above is rotated anticlockwise about the point O through 270°, which of the following is its image?

A. 

B. 

C. 

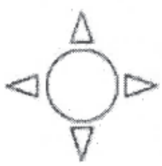
D. 

[2011-CE-MATHS 2-25]

Rotational Symmetry

5. Which of the following plane figures have rotational symmetry?

(1) 

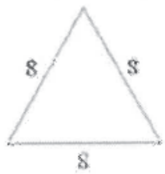
(2) 

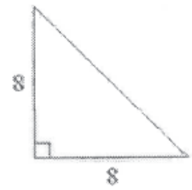
(3) 

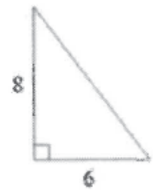
A. (1) and (2) only
B. (1) and (3) only
C. (2) and (3) only
D. (1), (2) and (3)

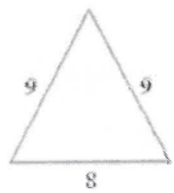
[2007-CE-MATHS 2-25]

6. Which of the following triangles have reflectional symmetry but do not have rotational symmetry?

(1) 

(2) 

(3) 

(4) 

A. (1) and (3) only
B. (1) and (4) only
C. (2) and (3) only
D. (2) and (4) only

[2008-CE-MATHS 2-26]

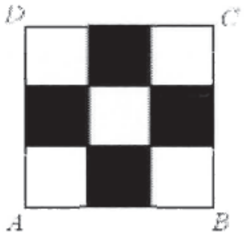
7. In the figure, the regular hexagon is divided into six equilateral triangles and two of them are shaded. The number of folds of rotational symmetry of the hexagon is

A. 2.
B. 3.
C. 4.
D. 6.

[2009-CE-MATHS 2-29]

Reflectional Symmetry

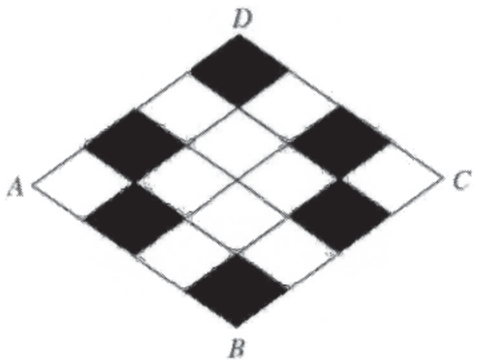
8. In the figure, the square *ABCD* is divided into nine identical squares and four of them are shaded. The number of axes of reflectional symmetry of the square *ABCD* is



A. 2.
B. 4.
C. 5.
D. 8.

[2007-CE-MATHS 2-26]

9. In the figure, the rhombus *ABCD* is divided into sixteen identical rhombuses and six of them are shaded. The number of axes of reflectional symmetry of the rhombus *ABCD* is



A. 2.
B. 3.
C. 4.
D. 6.

[2011-CE-MATHS 2-26]

Miscellaneous

10. Which of the following statements about a cube must be true?

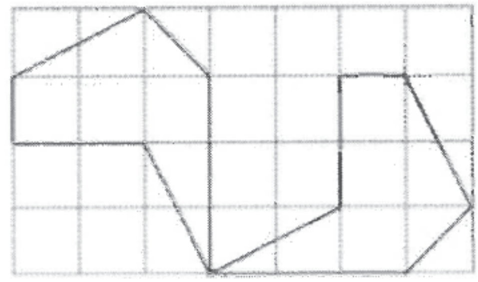
(1) The number of planes of reflection is 9.
(2) All the axes of rotational symmetry intersect at the same point.
(3) The angle between any two intersecting axes of rotational symmetry is 90°.

A. (1) and (2) only
B. (1) and (3) only
C. (2) and (3) only
D. (1), (2) and (3)

[2010-CE-MATHS 2-23]

HKDSE Problems

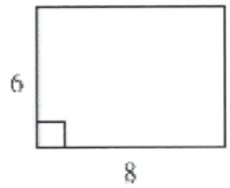
11. In the figure, the two 6-sided polygons show

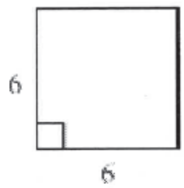


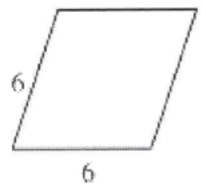
A. a rotation transformation.
B. a reflection transformation.
C. a translation transformation.
D. a dilation transformation.

[SP-DSE-MATHS 2-25]

12. Which of the following parallelograms have rotational symmetry and reflectional symmetry?

(1)


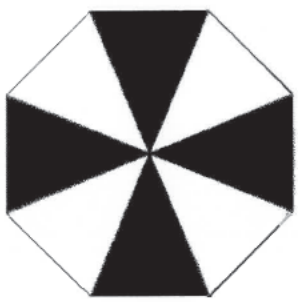
(2)


(3)


A. (1) and (2) only
B. (1) and (3) only
C. (2) and (3) only
D. (1), (2) and (3)

[PP-DSE-MATHS 2-24]

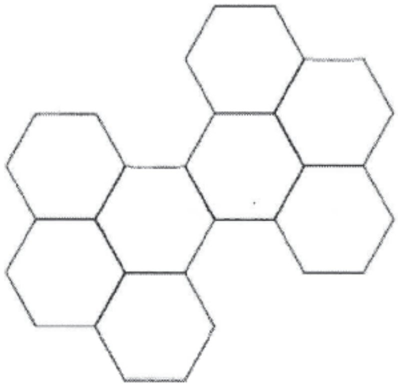
13. In the figure, the regular octagon is divided into eight identical isosceles triangles and four of them are shaded. The number of axes of reflectional symmetry of the octagon is



A. 2.
B. 4.
C. 8.
D. 16.

[2013-DSE-MATHS 2-15]

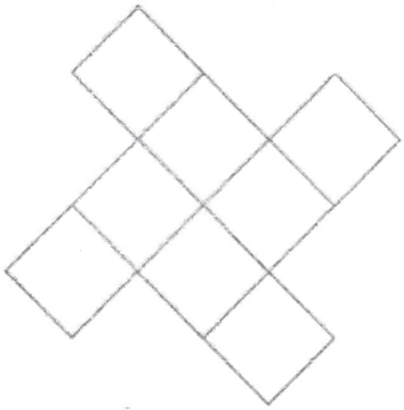
14. The figure below consists of eight identical regular hexagons. The number of axes of reflectional symmetry of the figure is



A. 2.
B. 4.
C. 6.
D. 8.

[2016-DSE-MATHS 2-23]

15. The figure below consists of eight identical squares. The number of folds of rotational symmetry of the figure is

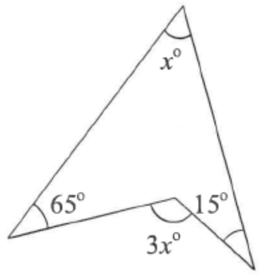


A. 2
B. 4
C. 6
D. 8

[2018-DSE-MATHS 2-23]

Angles in Plane Figures

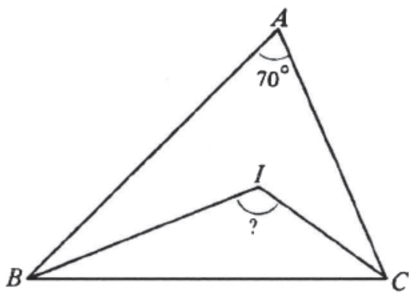
1. In the figure, $x =$



A. 50 .
B. 45 .
C. 40 .
D. 35 .
E. 20 .

[1977-CE-MATHS 2-28]

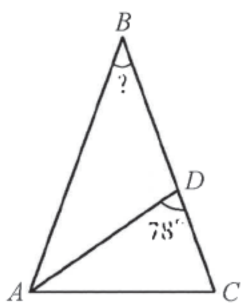
2. In ΔABC, IB and IC are bisectors of $\angle B$ and $\angle C$ respectively. $\angle A = 70°$. $\angle BIC =$



A. 100° .
B. 110° .
C. 120° .
D. 125° .
E. 135° .

[SP-CE-MATHS 2-21]

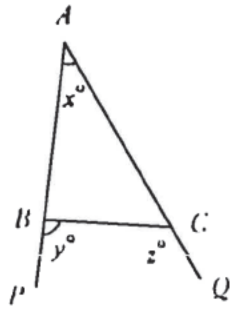
3. In ΔABC, $AB = BC$ and AD bisects $\angle BAC$. $\angle ABC =$



A. 51° .
B. 48° .
C. 46° .
D. 44° .
E. 39° .

[1978-CE-MATHS 2-19]

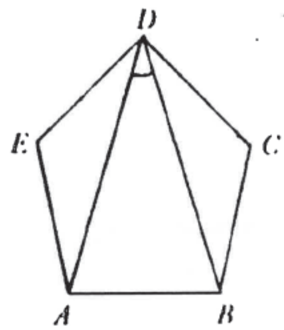
4. In ΔABC, AB and AC are produced as shown. Express x in terms of y and z.



A. $x = \dfrac{y+z}{2}$
B. $x = \dfrac{y+z}{2} - 90$
C. $x = y + z - 180$
D. $x = 180 - y - z$
E. $x = 360 - y - z$

[1979-CE-MATHS 2-8]

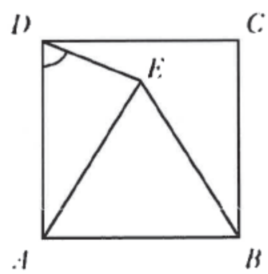
5. In the figure, $ABCDE$ is a regular pentagon. $\angle ADB =$



A. 35° .
B. 36° .
C. 40° .
D. 54° .
E. 72° .

[1980-CE-MATHS 2-21]

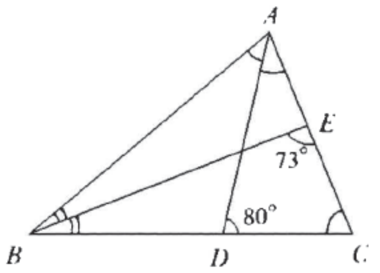
6. In the figure, $ABCD$ is a square and ABE is an equilateral triangle. $\angle ADE = ?$



A. 72°
B. 74°
C. 76°
D. 78°
E. None of the above

[1980-CE-MATHS 2-23]

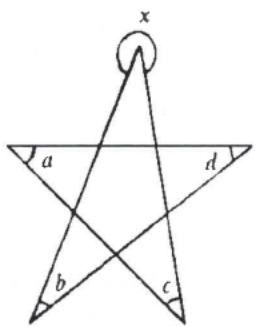
7. In the figure, AD and BE bisect $\angle A$ and $\angle B$ respectively. $\angle C =$



A. $50°$.
B. $68°$.
C. $74°$.
D. $78°$.
E. $80°$.

[1980-CE-MATHS 2-44]

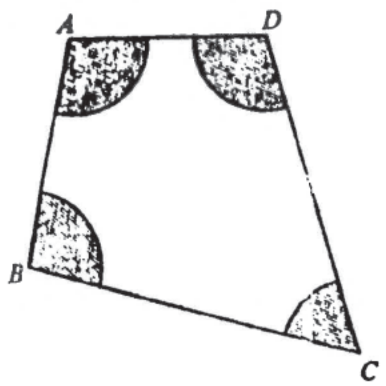
8. With the notation in the figure, express $a + b + c + d$ in terms of x.



A. $x - 180°$
B. x
C. $540° - x$
D. $360° - x$
E. $180° - x$

[1980-CE-MATHS 2-53]

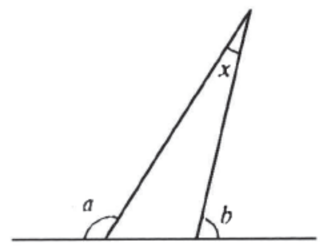
9. In the figure, $ABCD$ is a quadrilateral. The shaded portions are four sectors with centres at A, B, C and D. Their radii are all equal to a. What is the total area of the four sectors?



A. πa^2
B. $2\pi a^2$
C. $4\pi a^2$
D. $\sqrt{2}\pi a^2$
E. It cannot be determined

[1981-CE-MATHS 2-28]

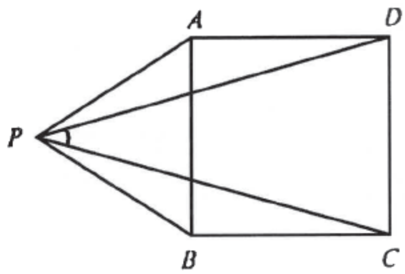
10. In the figure, $x =$



A. $a - b$.
B. $a + b - 180°$.
C. $a + b - 90°$.
D. $180° - a + b$.
E. $360° - a - b$.

[1982-CE-MATHS 2-24]

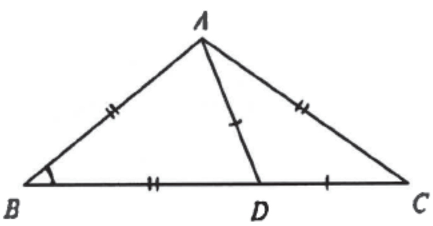
11. In the figure, $ABCD$ is a square and PAB is an equilateral triangle. $\angle CPD =$



A. $20°$.
B. $25°$.
C. $30°$.
D. $32°$.
E. $36°$.

[1982-CE-MATHS 2-25]

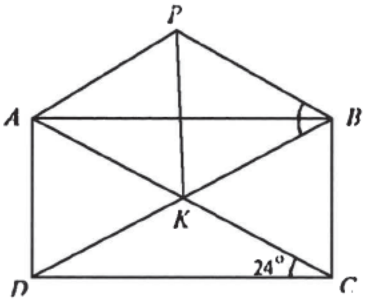
12. In the figure, D is a point on BC such that $AD = CD$ and $AB = AC = BD$. $\angle B =$



A. $22\frac{1}{2}°$.
B. $30°$.
C. $36°$.
D. $45°$.
E. $60°$.

[1982-CE-MATHS 2-26]

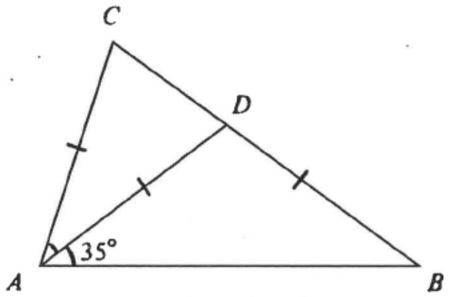
13. In the figure, $ABCD$ is a rectangle. AC and BC intersect at K. PAK is an equilateral triangle. $\angle PBK =$



A. 48°.
B. 50°.
C. 52°.
D. 54°.
E. 60°.

[1982-CE-MATHS 2-51]

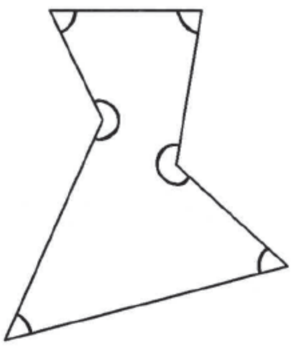
14. In the figure, D is a point on BC and $AC = AD = BD$. $\angle CAD =$



A. 20°.
B. 25°.
C. 30°.
D. 35°.
E. 40°.

[1983-CE-MATHS 2-22]

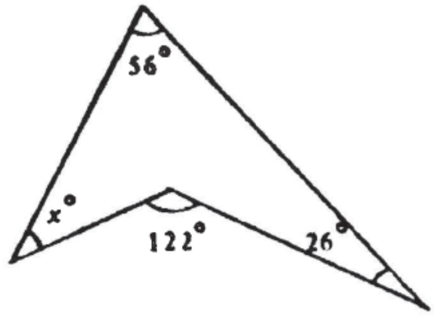
15. The sum of the six marked angles in the figure is



A. 360°.
B. 540°.
C. 600°.
D. 720°.
E. 900°.

[1983-CE-MATHS 2-23]

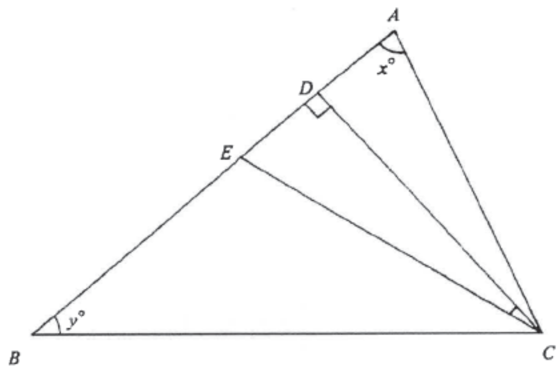
16. In the figure, $x = ?$



A. 31.
B. 34.
C. 40.
D. 48.
E. It cannot be determined.

[1984-CE-MATHS 2-23]

17. In the figure, A, D, E and B lie on a straight line. CE bisects $\angle ACB$ and $CD \perp AB$. $\angle DCE =$



A. $\frac{1}{2}(x^\circ - y^\circ)$.

B. $\frac{1}{2}(x^\circ + y^\circ)$.

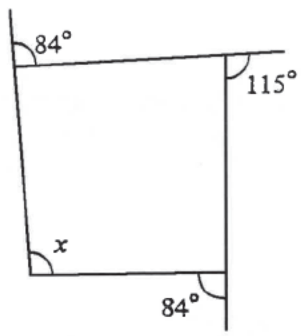
C. $x^\circ - y^\circ$.

D. $90^\circ - \frac{1}{2}(x^\circ + y^\circ)$.

E. $90^\circ - (x^\circ - y^\circ)$.

[1985-CE-MATHS 2-24]

18. In the figure, $x =$

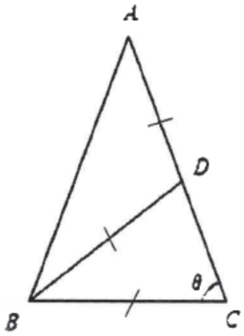


A. 77°.
B. 84°.
C. 96°.

D. 103°.
E. 115°.

[1986-CE-MATHS 2-23]

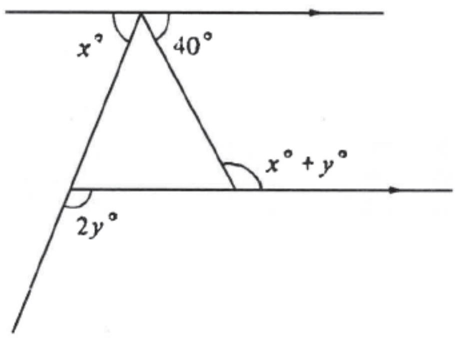
19. In the figure, if $AB = AC$ and $AD = BD = BC$, then $\angle ACB =$



A. 30°.
B. 32°.
C. 36°.
D. 40°.
E. 72°.

[1988-CE-MATHS 2-54]

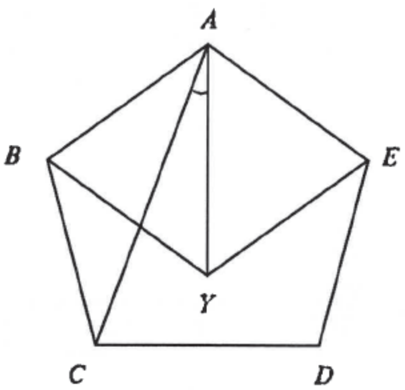
20. Referring to the figure, find y.



A. 20
B. 30
C. 40
D. 50
E. 80

[1989-CE-MATHS 2-20]

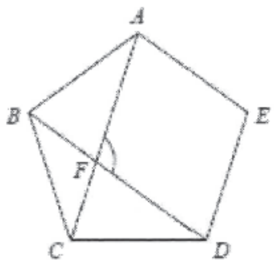
21. In the figure, $ABCDE$ is a regular pentagon and $ABYE$ is a rhombus. Find $\angle CAY$.



A. 27°
B. 24°
C. 21°
D. 18°
E. 15°

[1989-CE-MATHS 2-21]

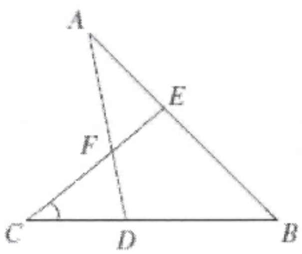
22. In the figure, $ABCDE$ is a regular pentagon. Find $\angle AFD$.



A. 120°
B. 112°
C. 110°
D. 108°
E. 100°

[1990-CE-MATHS 2-23]

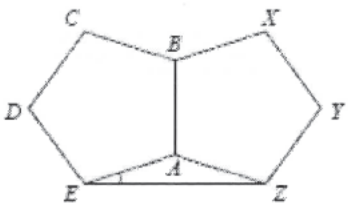
23. In the figure, if $CD = CF$, $CE = BE$ and $DA = DB$, then $\angle C =$



A. 30°
B. 36°
C. 40°
D. 45°
E. 60°

[1990-CE-MATHS 2-52]

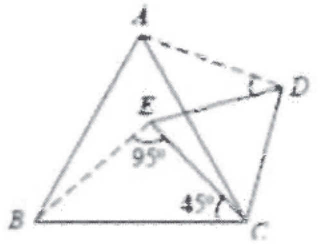
24. In the figure, $ABCDE$ and $ABXYZ$ are two identical regular pentagons. Find $\angle AEZ$.



A. 15°
B. 18°
C. 24°
D. 30°
E. 36°

[1991-CE-MATHS 2-23]

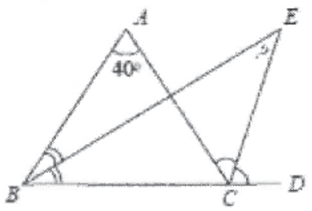
25. In the figure, ABC and CDE are equilateral triangles. Find $\angle ADE$.



A. 15°
B. 35°
C. 40°
D. 45°
E. 50°

[1991-CE-MATHS 2-51]

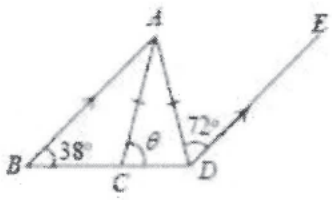
26. In the figure, EB and EC are the angle bisectors of $\angle ABC$ and $\angle ACD$ respectively. If $\angle A = 40°$, find $\angle E$.



A. 20°
B. 25°
C. 30°
D. 35°
E. 40°

[1992-CE-MATHS 2-51]

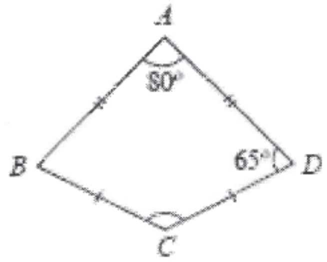
27. In the figure, BA // DE and $AC = AD$. Find θ.



A. 34°
B. 54°
C. 70°
D. 72°
E. 76°

[1993-CE-MATHS 2-25]

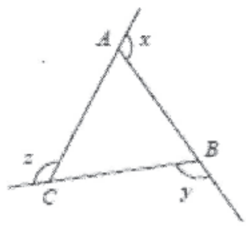
28. In the figure, $AB = AD$ and $BC = CD$. If $\angle BAD = 80°$ and $\angle ADC = 65°$, then $\angle BCD =$



A. 100° .
B. 130° .
C. 145° .
D. 150° .
E. 160° .

[1994-CE-MATHS 2-24]

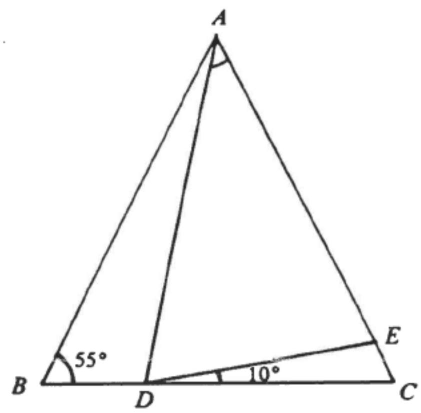
29. In the figure, x, y and z are the exterior angles of ΔABC. If $x : y : z = 4 : 5 : 6$, then $\angle BAC =$



A. 48° .
B. 84° .
C. 96° .
D. 120° .
E. 132° .

[1994-CE-MATHS 2-25]

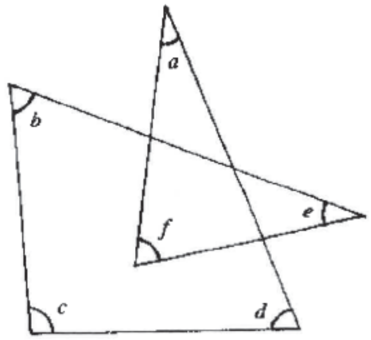
30. In the figure, $AB = AC$ and $AD = AE$. $\angle DAC =$



A. 45° .
B. 50° .
C. 55° .
D. 60° .
E. 65° .

[1995-CE-MATHS 2-25]

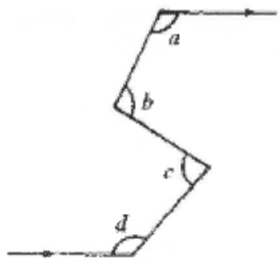
31. In the figure, $a+b+c+d+e+f=$



A. 270°.
B. 360°.
C. 450°.
D. 540°.
E. 720°.

[1995-CE-MATHS 2-53]

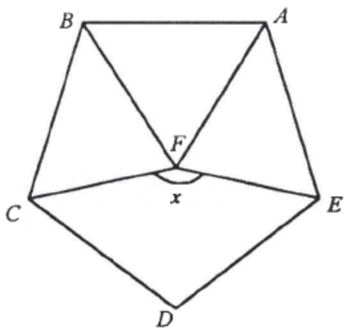
32. According to the figure, which of the following must be true?



A. $a+b=c+d$
B. $a+d=b+c$
C. $a+b+c+d=360^\circ$
D. $a+b+c+d=540^\circ$
E. $2a+2b-c-d=720^\circ$.

[1995-CE-MATHS 2-54]

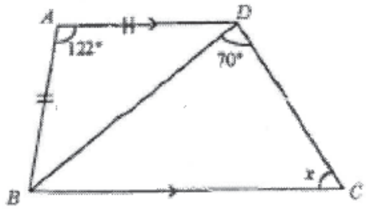
33. In the figure, $ABCDE$ is a regular pentagon and ABF is an equilateral triangle. Find x.



A. 120°
B. 126°
C. 144°
D. 156°
E. 168°

[1996-CE-MATHS 2-28]

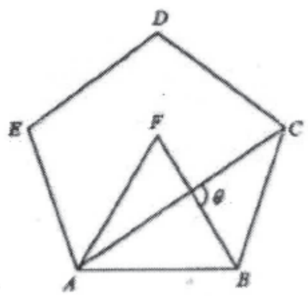
34. In the figure, find x.



A. 52°
B. 58°
C. 61°
D. 70°
E. 81°

[1997-CE-MATHS 2-17]

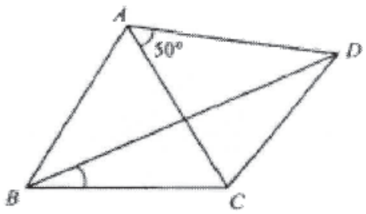
35. In the figure, $ABCDE$ is a regular pentagon and ABF is an equilateral triangle. Find θ.



A. 66°
B. 84°
C. 90°
D. 96°
E. 108°

[1997-CE-MATHS 2-19]

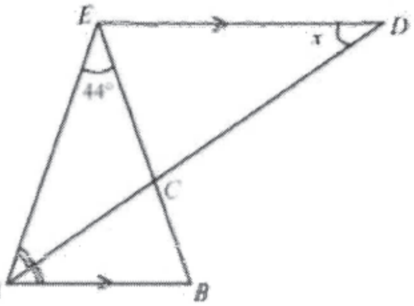
36. In the figure, $AB=BC=CA=CD$. Find $\angle CBD$.



A. 20°
B. 25°
C. 27.5°
D. 30°
E. 35°

[1998-CE-MATHS 2-30]

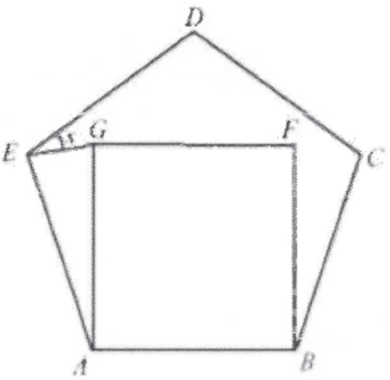
37. In the figure, ACD and ECB are straight lines. If $\angle EAC = \angle CAB$ and $EA = EB$, find x.



A. 22°
B. 34°
C. 44°
D. 46°
E. 68°

[1999-CE-MATHS 2-28]

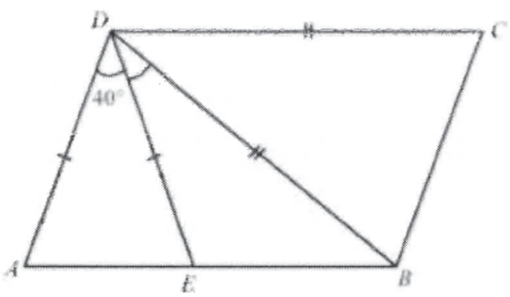
38. In the figure, $ABCDE$ is a regular pentagon and $ABFG$ is a square. Find x.



A. 18°
B. 27°
C. 30°
D. 36°
E. 45°

[1999-CE-MATHS 2-29]

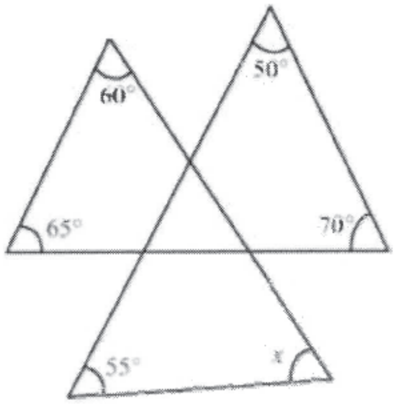
39. In the figure, $ABCD$ is a parallelogram. Find $\angle BDE$.



A. 30°
B. 35°
C. 40°
D. 50°
E. 55°

[2000-CE-MATHS 2-19]

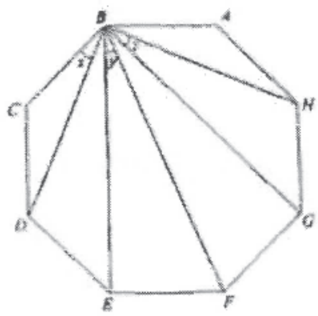
40. In the figure, $x =$



A. 50°.
B. 55°.
C. 60°.
D. 65°.
E. 70°.

[2001-CE-MATHS 2-20]

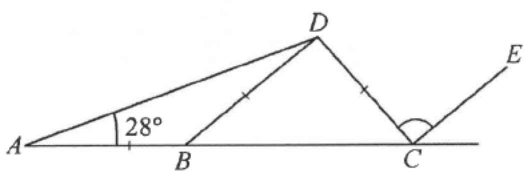
41. In the figure, $ABCDEFGH$ is a regular octagon. $x + y + z =$



A. 60°.
B. 67.5°.
C. 82.5°.
D. 90°.

[2002-CE-MATHS 2-27]

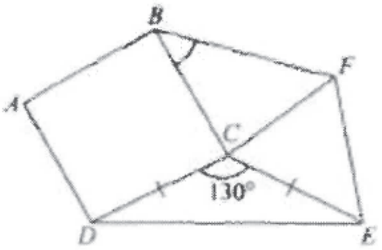
42. In the figure, ABC is a straight line. If $BD \parallel CE$, then $\angle DCE =$



A. 56°.
B. 68°.
C. 112°.
D. 124°.

[2004-CE-MATHS 2-27]

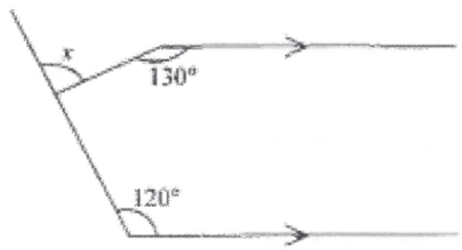
43. In the figure, $ABCD$ is a square. If CEF is an equilateral triangle, then $\angle CBF =$



A. 45°.
B. 50°.
C. 60°.
D. 80°.

[2005-CE-MATHS 2-27]

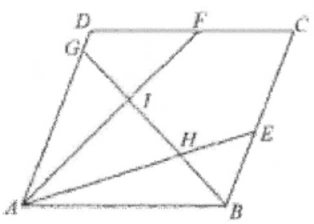
44. In the figure, $x =$



A. 50°.
B. 60°.
C. 70°.
D. 90°.

[2005-CE-MATHS 2-28]

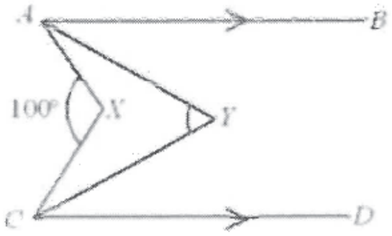
45. In the figure, $ABCD$ is a parallelogram. E, F and G are points lying on BC, CD and DA respectively. AE and AF divide $\angle BAD$ into three equal parts and BG bisects $\angle ABC$. If AE and AF intersect BG at H and I respectively, then $\angle GIF + \angle GHE =$



A. 120°.
B. 150°.
C. 180°.
D. 210°.

[2005-CE-MATHS 2-52]

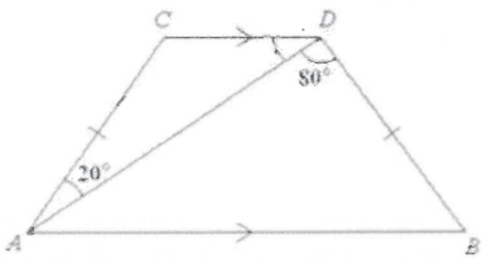
46. In the figure, AY and CY are the angle bisectors of $\angle BAX$ and $\angle DCX$ respectively. $\angle AXC = 100°$, then $\angle AYC =$



A. 40°.
B. 50°.
C. 60°.
D. 80°.

[2007-CE-MATHS 2-28]

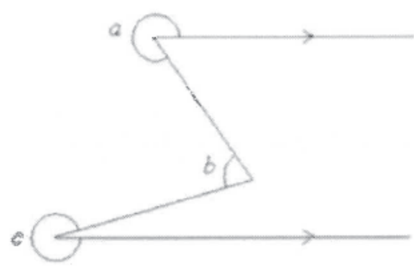
47. In the figure, $AB \mathbin{//} CD$ and $AC = BD$. If $\angle CAD = 20°$ and $\angle ADB = 80°$, then $\angle ADC =$



A. 30°.
B. 40°.
C. 50°.
D. 60°.

[2008-CE-MATHS 2-27]

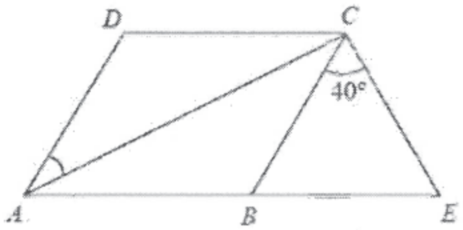
48. According to the figure, which of the following must be true?



A. $a + b = c$
B. $a + b = c + 90°$
C. $a + c = b + 540°$
D. $a + b + c = 720°$

[2008-CE-MATHS 2-28]

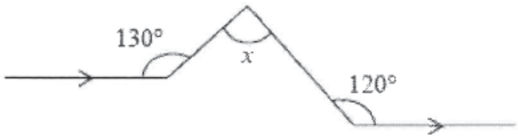
49. In the figure, $ABCD$ is a rhombus and ABE is a straight line. If $\angle BCE = 40°$ and $BC = CE$, then $\angle CAD =$



A. $35°$.
B. $40°$.
C. $45°$.
D. $50°$.

[2009-CE-MATHS 2-26]

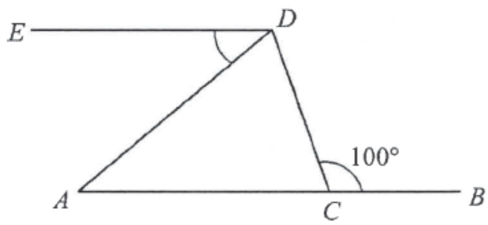
50. In the figure, $x =$



A. $50°$.
B. $60°$.
C. $70°$.
D. $80°$.

[2009-CE-MATHS 2-28]

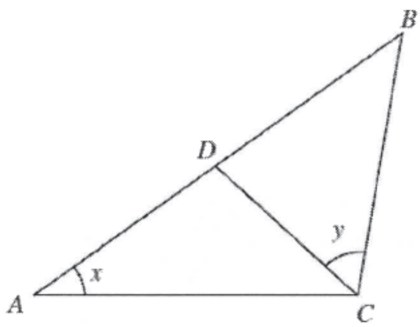
51. In the figure, C is a point lying on AB such that $AC = AD$. If $AB // ED$, find $\angle ADE$.



A. $20°$
B. $30°$
C. $40°$
D. $50°$

[2010-CE-MATHS 2-25]

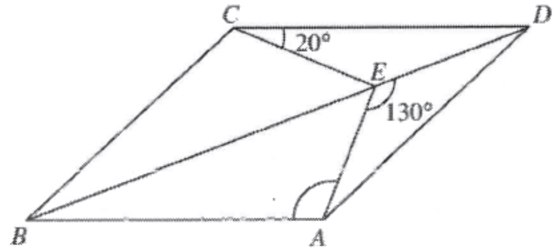
52. In the figure, D is a point lying on AB such that $AD = BD = CD$. Find $x + y$.



A. $75°$
B. $90°$
C. $95°$
D. $105°$

[2011-CE-MATHS 2-23]

53. In the figure, BED is a diagonal of the parallelogram $ABCD$. If $\angle DCE = 20°$, $\angle AED = 130°$ and $CE = DE$, then $\angle BAE =$



A. $100°$
B. $105°$
C. $110°$
D. $115°$

[2011-CE-MATHS 2-27]

Interior Angles of Polygons

54. The sum of the interior angles of a 10-sided polygon is

A. 10 right angles.
B. 12 right angles.
C. 16 right angles.
D. 20 right angles.
E. 24 right angles.

[1978-CE-MATHS 2-13]

55. The sum of the interior angles of a convex polygon is greater than the sum of the exterior angles by $360°$. How many sides has the polygon?

A. 3
B. 4
C. 5
D. 6
E. 8

[1984-CE-MATHS 2-22]

56. The exterior angles of a pentagon are $x°$, $2x°$, $3x°$, $4x°$ and $5x°$. The smallest interior angle of the pentagon is

A. $120°$.
B. $60°$.
C. $48°$.
D. $36°$.
E. $24°$.

[1985-CE-MATHS 2-23]

57. If the sum of the interior angles of a convex n-sided polygon is 4 times the sum of the exterior angles polygon, then $n =$

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

[2007-CE-MATHS 2-27]

58. If each interior angle of a regular n-sided polygon is 144°, then $n =$

A. 10 .
B. 12 .
C. 14 .
D. 16 .

[2009-CE-MATHS 2-27]

59. Each interior angle of a regular 24-sided polygon is

A. 144° .
B. 160° .
C. 165° .
D. 171° .

[2010-CE-MATHS 2-27]

60. If the sum of the exterior angles of a regular n-sided polygon is 3 times an interior angle of the polygon, then $n =$

A. 3 .
B. 4 .
C. 6 .
D. 12 .

[2011-CE-MATHS 2-28]

Properties of Quadrilaterals

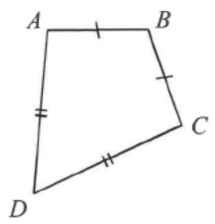
61. Which of the following are properties of a rhombus?

(1) All the four sides are equal in length.
(2) The diagonals are perpendicular to each other.
(3) The diagonals are equal in length.

A. (1) only
B. (1) and (2) only
C. (1) and (3) only
D. (2) and (3) only
E. (1), (2) and (3)

[1978-CE-MATHS 2-14]

62.



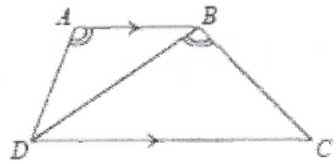
In the figure, $ABCD$ is a quadrilateral with $AB = BC$ and $AD = DC$. Which of the following is/are true?

(1) $\angle BAD = \angle BCD$
(2) $AC \perp BD$
(3) BD bisects AC

A. (1) only
B. (1) and (2) only
C. (1) and (3) only
D. (2) and (3) only
E. (1), (2) and (3)

[1983-CE-MATHS 2-51]

63.



In the figure, $AB // DC$ and $\angle DAB = \angle DBC$. Which of the following is/are true?

(1) $\dfrac{AB}{BD} = \dfrac{BD}{DC}$

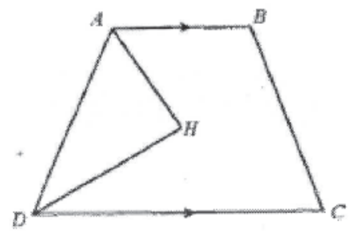
(2) $\dfrac{AB}{BD} = \dfrac{AD}{BC}$

(3) $\dfrac{AD}{BD} = \dfrac{BD}{CD}$

A. (1) only
B. (2) only
C. (3) only
D. (1) and (2) only
E. (2) and (3) only

[1994-CE-MATHS 2-53]

64.



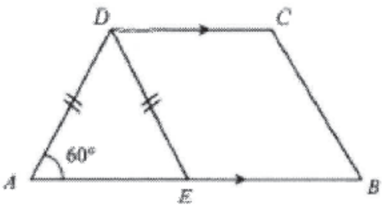
In the figure, $ABCD$ is a trapezium with $AB // DC$. AH bisects $\angle BAD$ and DH bisects $\angle ADC$. Which of the following must be true?

(1) $\angle AHD = 90°$
(2) $\angle ADC = \angle BCD$
(3) $\angle BAD + \angle BCD = 180°$

A. (1) only
B. (2) only
C. (3) only
D. (1) and (3) only
E. (2) and (3) only

[1996-CE-MATHS 2-51]

65.



In the figure, $ABCD$ is a trapezium. Which of the following must be true?

(1) AED is an equilateral triangle.
(2) $EBCD$ is a parallelogram.
(3) $AB = 2DC$.

A. (1) only
B. (2) only
C. (1) and (2) only
D. (1) and (3) only
E. (1), (2) and (3)

[1998-CE-MATHS 2-38]

Other Problems

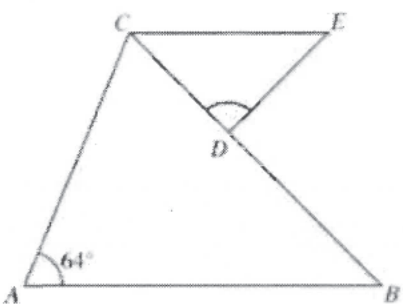
66. When the hour hand has turned through an angle of $x°$, what is the angle through which the minute hand has turned?

A. $6x°$
B. $12x°$
C. $60x°$
D. $360x°$
E. $3600x°$

[1980-CE-MATHS 2-10]

HKDSE Problems

67. In the figure, $AB = BC$ and D is a point lying on BC such that $CD = DE$. If $AB // CE$, find $\angle CDE$.



A. 52°
B. 58°
C. 64°
D. 76°

[PP-DSE-MATHS 2-19]

68. Which of the following statements about a regular 12-sided polygon are true?

(1) Each exterior angle is 30°.
(2) Each interior angle is 150°.
(3) The number of axes of reflectional symmetry is 6.

A. (1) and (2) only
B. (1) and (3) only
C. (2) and (3) only
D. (1), (2) and (3)

[2012-DSE-MATHS 2-22]

69. If an interior angle of a regular n-sided polygon is 4 times an exterior angle of the polygon, which of the following is/are true?

(1) The value of n is 10.
(2) The number of diagonals of the polygon is 10.
(3) The number of folds of rotational symmetry of the polygon is 10.

A. (1) only
B. (2) only
C. (1) and (3) only
D. (2) and (3) only

[2013-DSE-MATHS 2-21]

70. If an interior angle of a regular n-sided polygon is greater than an exterior angle by 100°, which of the following are true?

(1) The value of n is 10.
(2) Each exterior angle of the polygon is 40°.
(3) The number of axes of reflectional symmetry of the polygon is 9.

A. (1) and (2) only
B. (1) and (3) only
C. (2) and (3) only
D. (1), (2) and (3)

[2014-DSE-MATHS 2-22]

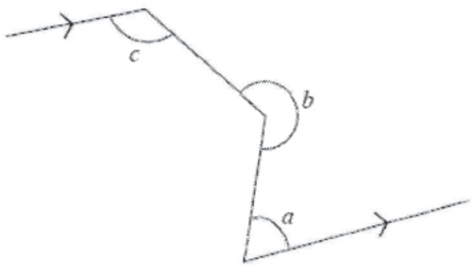
71. If an interior angle of a regular polygon is 5 times an exterior angle of the polygon, which of the following is/are true?

(1) Each interior angle of the polygon is 150°.
(2) The number of diagonals of the polygon is 6.
(3) The number of folds of rotational symmetry of the polygon is 6.

A. (1) only
B. (2) only
C. (1) and (3) only
D. (2) and (3) only

[2015-DSE-MATHS 2-22]

72.



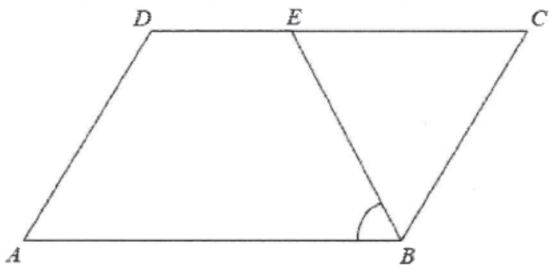
According to the figure, which of the following must be true?

(1) $a + c = 180°$
(2) $a + b - c = 180°$
(3) $b + c = 360°$

A. (1) only
B. (2) only
C. (1) and (3) only
D. (2) and (3) only

[2016-DSE-MATHS 2-15]

73. In the figure, $ABCD$ is a parallelogram. E is a point lying on CD such that $BE = CE$. If $\angle ADC = 114°$, then $\angle ABE =$



A. 48°
B. 57°
C. 62°
D. 66°

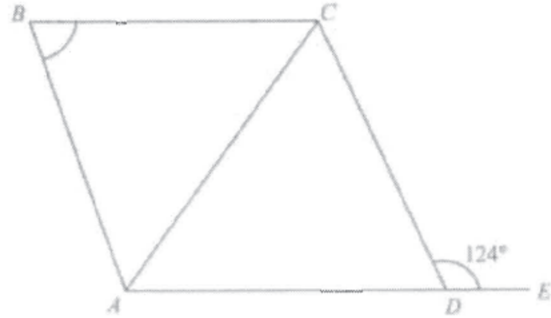
[2016-DSE-MATHS 2-17]

74. If the sum of the interior angles of a regular n-sided polygon is 3240°, which of the following is true?

A. The value of n is 16.
B. Each exterior angle of the polygon is 18°.
C. The number of diagonals of the polygon is 20.
D. Each interior angle of the polygon is 160°.

[2016-DSE-MATHS 2-24]

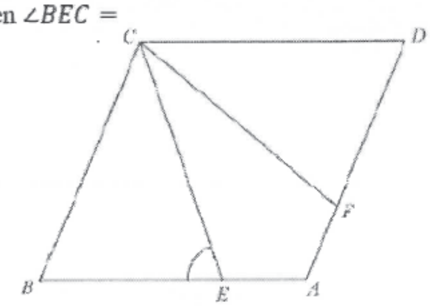
75. In the figure, $AB = BC$ and D is a point lying on AE such that $AC = AD$. If $AE \parallel BC$, then $\angle ABC =$



A. 44°
B. 56°
C. 62°
D. 68°

[2017-DSE-MATHS 2-18]

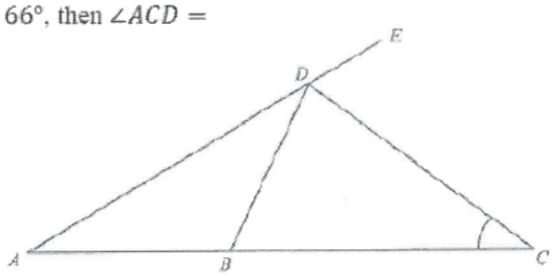
76. In the figure, $ABCD$ is a rhombus. E and F are points lying on AB and AD respectively such that $AE = AF$ and $\angle ECF = 42°$. If $\angle BAD = 110°$, then $\angle BEC =$



A. 70°
B. 76°
C. 80°
D. 84°

[2018-DSE-MATHS 2-18]

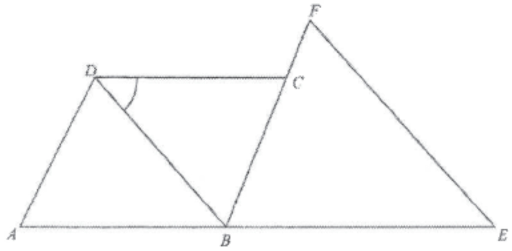
77. In the figure, ABC and ADE are straight lines. It is given that $AB = BD$ and $BC = CD$. If $\angle CDE = 66°$, then $\angle ACD =$



A. 28°
B. 33°
C. 36°
D. 38°

[2019-DSE-MATHS 2-17]

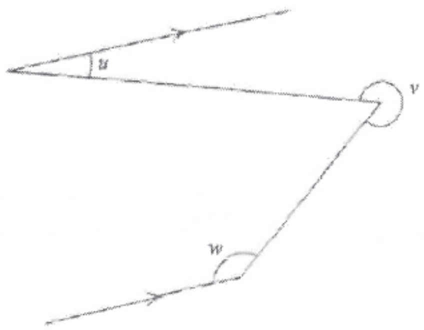
78. In the figure, $ABCD$ is a rhombus. ABE and BCF are straight lines such that $BE = EF$. If $\angle BEF = 56°$, then $\angle BDC =$



A. 48°
B. 56°
C. 59°
D. 62°

[2019-DSE-MATHS 2-20]

79. According to the figure, which of the following must be true?

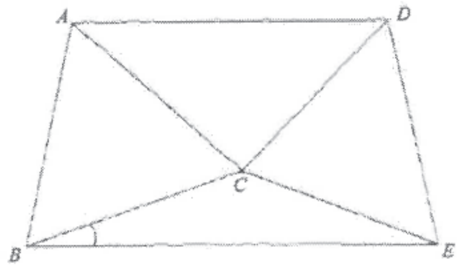


I. $u - v + w = 0°$
II. $u + v - w = 180°$
III. $u + v + w = 450°$

A. I only
B. II only
C. I and III only
D. II and III only

[2020-DSE-MATHS 2-23]

80. In the figure, ABC is an equilateral triangle and CDE is an isosceles triangle with $CD = CE$. If $\angle DCE = 78°$ and $\angle ADC = \angle CAD = 40°$, then $\angle CBE =$



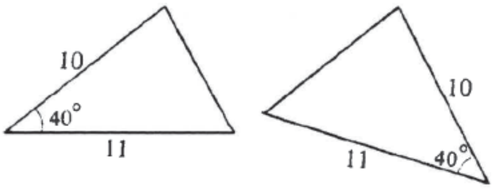
A. 14°
B. 19°
C. 24°
D. 29°

[2020-DSE-MATHS 2-20]

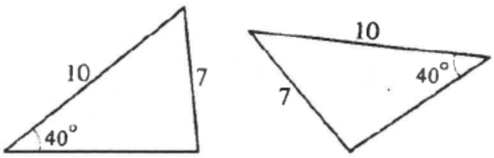
Congruent Triangles

1. In which of the following 3 cases are the given data sufficient for the triangles to be congruent? **The figures are not necessarily drawn to scale.**

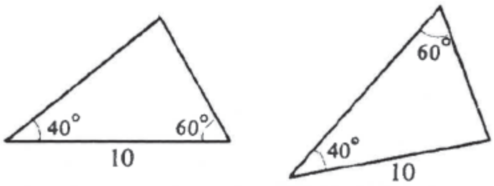
(1)



(2)



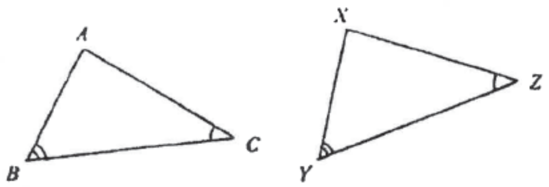
(3)



A. (1) only
B. (1) and (2) only
C. (1) and (3) only
D. (2) and (3) only
E. (1), (2) and (3)

[SP-CE-MATHS 2-22]

2.



In ΔABC and ΔXYZ, it is given that

$\angle B = \angle Y$ and $\angle C = \angle Z$.

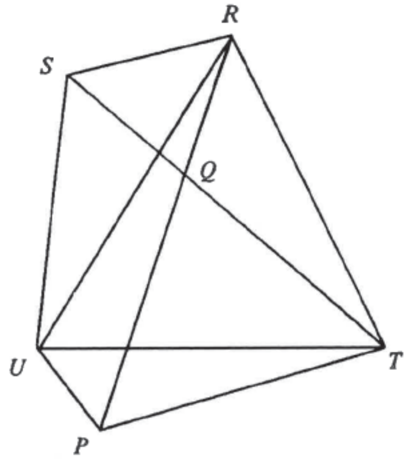
If it is also given that

(1) $\angle A = \angle X$, is there sufficient information to prove that $\Delta ABC \cong \Delta XYZ$?
(2) $AB = XY$, is there sufficient information to prove that $\Delta ABC \cong \Delta XYZ$?
(3) $BC = YZ$, is there sufficient information to prove that $\Delta ABC \cong \Delta XYZ$?

	(1)	(2)	(3)
A.	not sufficient	not sufficient	sufficient
B.	not sufficient	sufficient	not sufficient
C.	sufficient	not sufficient	sufficient
D.	not sufficient	sufficient	sufficient
E.	sufficient	sufficient	sufficient

[1979-CE-MATHS 2-47]

3.



In the figure, ΔPTQ, ΔSQR and ΔRUT are equilateral triangles. Which of the following is /are true?

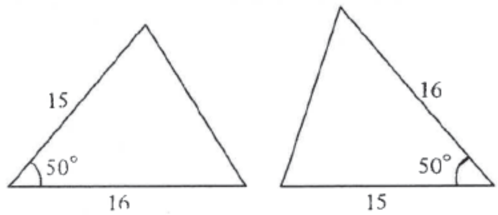
(1) $\Delta UPT \cong \Delta RQT$
(2) $PU = QS$
(3) $PQSU$ is a parallelogram

A. All of them
B. None of them
C. (1) and (2) only
D. (1) and (3) only
E. (2) and (3) only

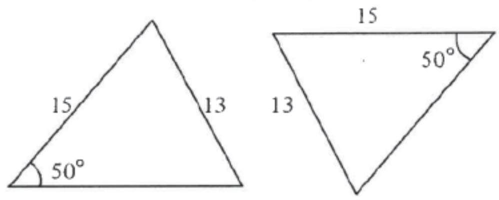
[1990-CE-MATHS 2-54]

4. In the figure, which of the pairs of triangles **must** be congruent?

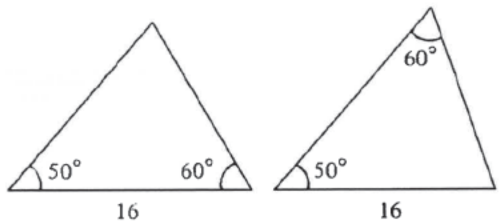
(1)



(2)



(3)

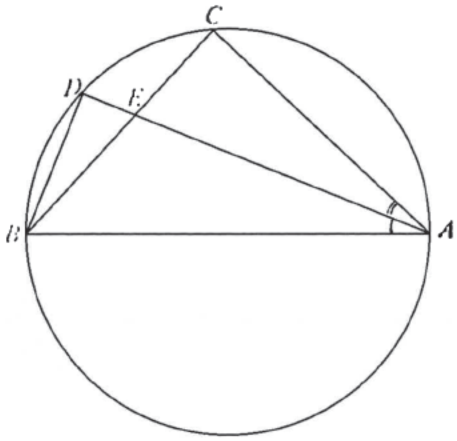


A. (1) only
B. (2) only
C. (1) and (3) only
D. (2) and (3) only
E. (1), (2) and (3)

[1991-CE-MATHS 2-54]

Similar Triangles

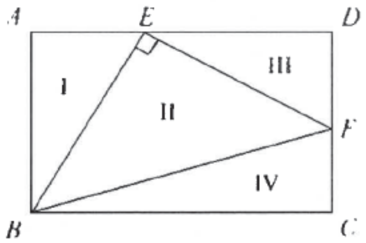
5. In the figure, AD bisects $\angle BAC$, and cuts BC at E. Which of the triangles ACE, ABD and BDE are similar?



A. ΔACE and ΔABD only
B. ΔACE and ΔBDE only
C. ΔABD and ΔBDE only
D. The three triangles are similar
E. No two of them are similar

[1978-CE-MATHS 2-41]

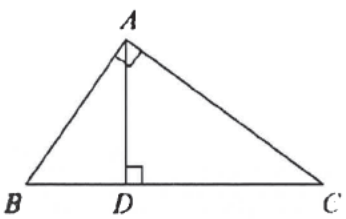
6. In the figure, $ABCD$ is a rectangle $\angle BEF = 90°$. Which two of the triangles I, II, III, and IV must be similar?



A. I and II
B. I and III
C. II and III
D. II and IV
E. III and IV

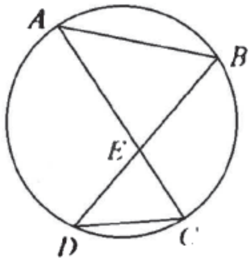
[1980-CE-MATHS 2-26]

7. (1)



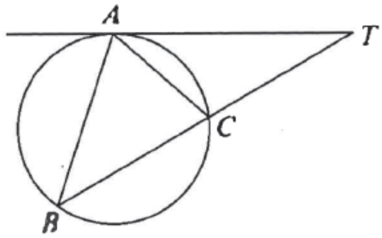
$\angle BAC = 90°$, $AD \perp BC$.

(2)



AC and BC intersect at E.

(3)



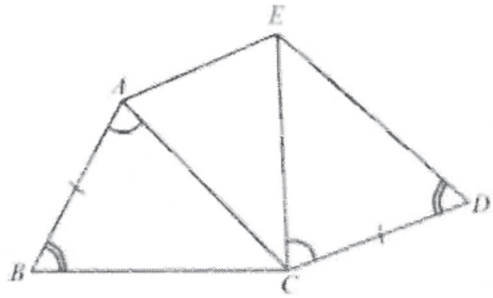
BC produced meets the tangent AT at T.

Which of the above figures contains one or more pairs of similar triangles?

A. (1) only
B. (1) and (2) only
C. (1) and (3) only
D. (2) and (3) only
E. (1), (2) and (3)

[1981-CE-MATHS 2-52]

8.



In the figure, $AB = CD$, $\angle CAB = \angle ECD$ and $\angle ABC = \angle CDE$. Which of the following **must** be true?

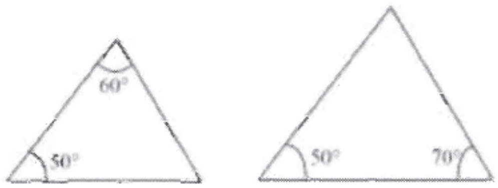
(1) $\Delta ABC \cong \Delta CDE$
(2) $\Delta ABC \sim \Delta EAC$
(3) EAC is an isosceles triangle

A. (1) only
B. (3) only
C. (1) and (2) only
D. (1) and (3) only
E. (1), (2) and (3)

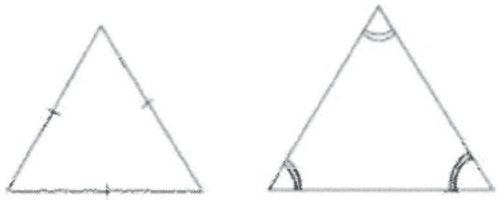
[2000-CE-MATHS 2-24]

9. Which of the following pairs of triangles is/are similar?

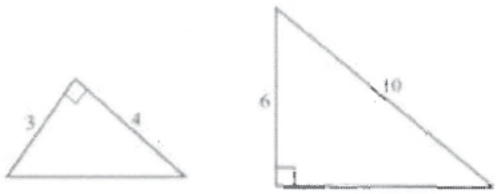
(1)



(2)



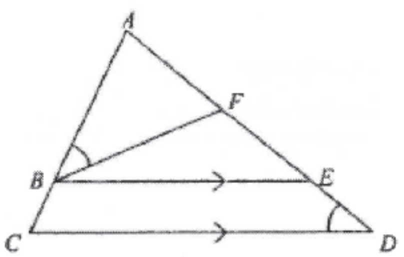
(3)



A. (2) only
B. (3) only
C. (1) and (2) only
D. (1) and (3) only
E. (1), (2) and (3)

[2001-CE-MATHS 2-19]

10.



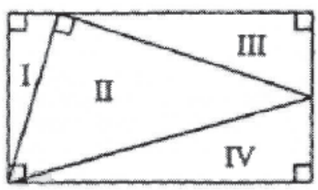
In the figure, ABC and $AFED$ are straight lines. $\angle ABF = \angle CDE$ and $BE \,//\, CD$. Which of the following triangles are similar?

(1) ΔABF
(2) ΔAEB
(3) ΔADC

A. (1) and (2) only
B. (1) and (3) only
C. (2) and (3) only
D. (1), (2) and (3)

[2002-CE-MATHS 2-26]

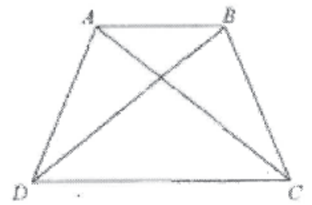
11. Which of the following statements about the triangles in the figure must be true?



A. I and III are similar.
B. I and IV are similar.
C. II and III are similar.
D. II and IV are similar.

[2003-CE-MATHS 2-27]

12. If $AC = BD$ and $AB \,//\, DC$, how many pairs of similar triangles are there in the figure?

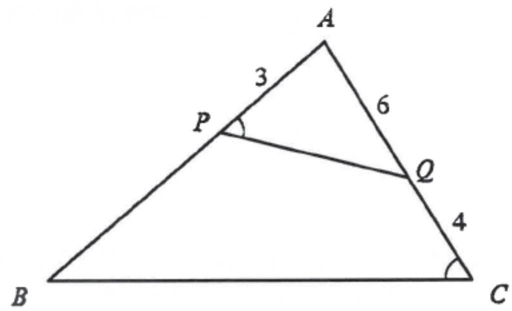


A. 2 pairs
B. 3 pairs
C. 4 pairs
D. 5 pairs

[2005-CE-MATHS 2-26]

Applications

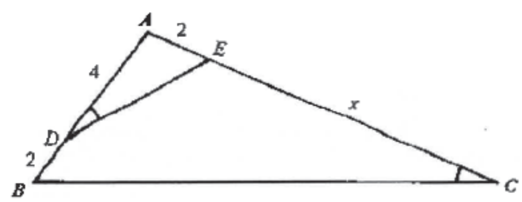
13. In ΔABC, $AP = 3$, $AQ = 6$ and $QC = 4$. If $\angle APQ = \angle ACB$, then $PB =$



A. 7 .
B. 8 .
C. 10 .
D. 17 .
E. 20 .

[1986-CE-MATHS 2-51]

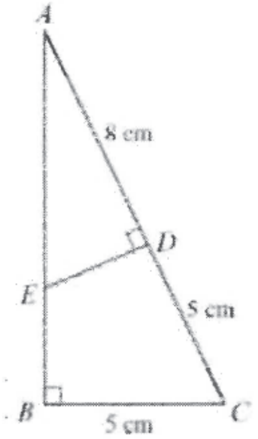
14. In the figure, $\angle ADE = \angle ACB$. Find x.



A. 4
B. 8
C. 10
D. 12
E. 16

[1995-CE-MATHS 2-26]

15. In the figure, AEB and ADC are straight lines. Find ED.

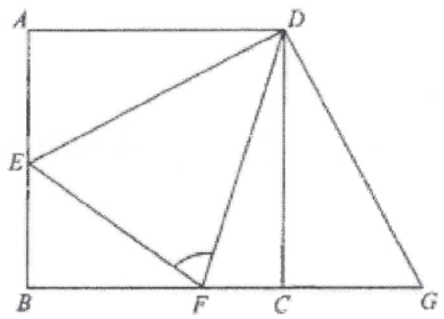


A. $\frac{10}{3}$ cm
B. $\frac{40}{13}$ cm
C. 3 cm
D. $\sqrt{40}$ cm
E. $\sqrt{80}$ cm

[1999-CE-MATHS 2-30]

HKDSE Problems

16. In the figure, $ABCD$ is a square. BC is produced to G such that $\angle CDG = 25°$. E is a point lying on AB such that $AE = CG$. If F is a point lying on BC such that $\angle CDF = 20°$, then $\angle DFE =$



A. 60°.
B. 65°.
C. 70°.
D. 73°.

[2014-DSE-MATHS 2-16]

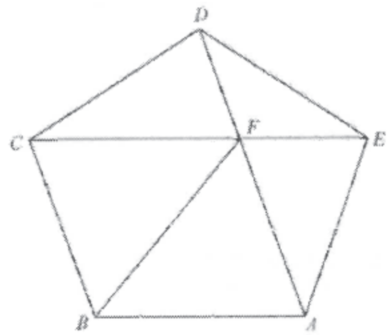
17. $ABCD$ is a parallelogram. Let E be the mid-point of AD. If $\angle ABE = \angle CBD = \angle DBE$, which of the following are true?

(1) $AB = BD$
(2) $\angle ABC = 135°$
(3) $\Delta ABE \cong \Delta DBE$

A. (1) and (2) only
B. (1) and (3) only
C. (2) and (3) only
D. (1), (2) and (3)

[2017-DSE-MATHS 2-20]

18. In the figure, $ABCDE$ is a regular pentagon. AD and CE intersect at the point F. Which of the following are true?

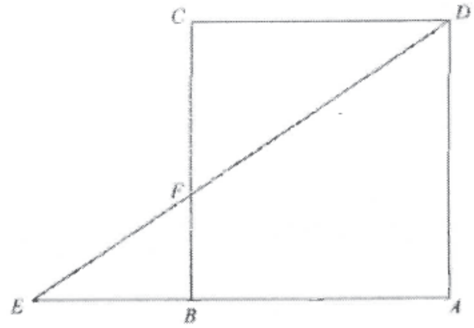


I. $CD = CF$
II. $\Delta ABF \cong CBF$
III. $\angle AFB + \angle EAF = 90°$

A. I and II only
B. I and III only
C. II and III only
D. I, II and III

[2018-DSE-MATHS 2-19]

19. In the figure, $ABCD$ is a square. E is a point lying on AB produced such that $BE = 4\ cm$. BC and DE intersect at the point F. If $EF = 5cm$, then $DF =$

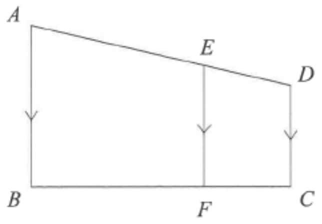


A. 12 cm
B. 15 cm
C. 16 cm
D. 20 cm

[2018-DSE-MATHS 2-20]

Mid-point & Intercept Theorems

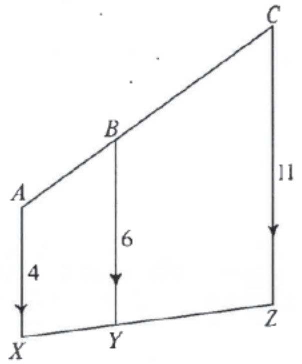
1. In the figure, $ABCD$ is a trapezium and EF // AB // DC. $AE = 2\,ED$. If $AB = 21$ cm, $CD = 15$ cm, then $EF =$



A. 17 cm.
B. 17.5 cm.
C. 18 cm.
D. 18.5 cm.
E. 19 cm.

[1977-CE-MATHS 2-31]

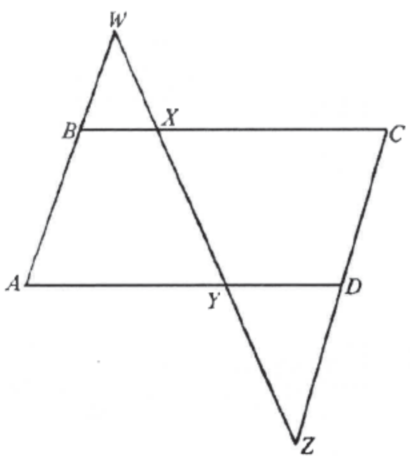
2. In the figure, AX // BY // CZ. ABC and XYZ are straight lines. $AX = 4$; $BY = 6$; $CZ = 11$. $AB : BC =$



A. $2:3$.
B. $2:5$.
C. $2:7$.
D. $4:11$.
E. $6:11$.

[SP-CE-MATHS 2-24]

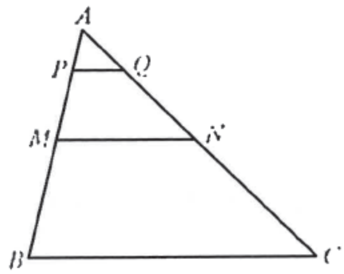
3. In the figure, $ABCD$ is a parallelogram. ABW, $WXYZ$ and CDZ are straight lines. If $BC = 5$, $BX = 1$ and $AY = 3$, then $WX : XY : YZ =$



A. $1:2:3$.
B. $1:2:2$.
C. $1:3:5$.
D. $2:3:5$.
E. $2:4:5$.

[SP-CE-MATHS A2-53]

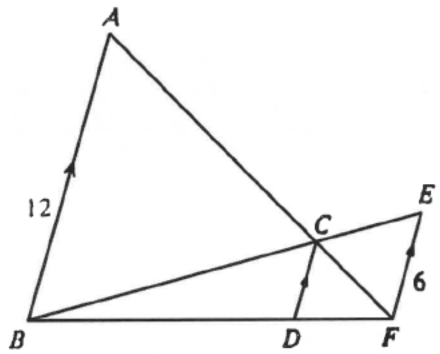
4. In ΔABC, PQ // MN // BC. If $AP : PM : MB = 1:3:6$, then $PQ : MN : BC =$



A. $1:2:3$.
B. $1:2:5$.
C. $1:3:6$.
D. $1:4:9$.
E. $1:4:10$.

[1978-CE-MATHS 2-25]

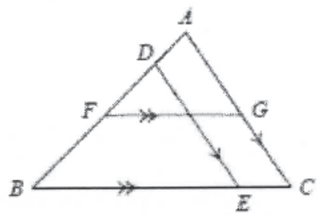
5. In the figure, AB // CD // EF. ACF, BCE and BDF are straight lines. $AB = 12$, $EF = 6$. $CD = ?$



A. 4.5
B. 4
C. 3.6
D. 3
E. 2

[1981-CE-MATHS 2-54]

6. In the figure, AC // DE, FG // BC and $AD : DF : FB = 1:2:3$. If $BE = 10$, find FG.

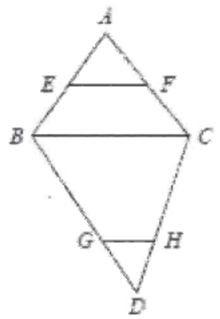


A. 5
B. 6

C. 8
D. 9
E. 10

[1990-CE-MATHS 2-22]

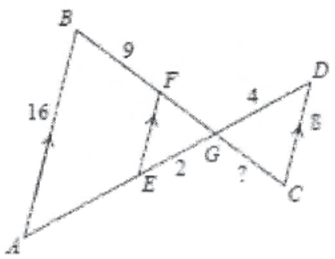
7. In the figure, E and F are the mid-points of AB and AC respectively. G and H divide DB and DC respectively in the ratio $1:3$. If $EF = 12$, find GH.



A. 3
B. 4
C. 6
D. 8
E. 12

[1991-CE-MATHS 2-25]

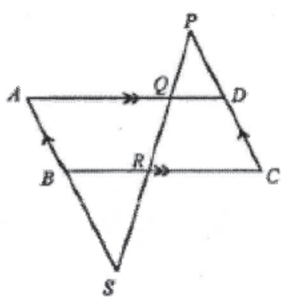
8. In the figure, $AB = 16$, $CD = 8$, $BF = 9$, $GD = 4$, $EG = 2$. Find GC.



A. 4.5
B. 5
C. 6
D. 8
E. 10

[1992-CE-MATHS 2-53]

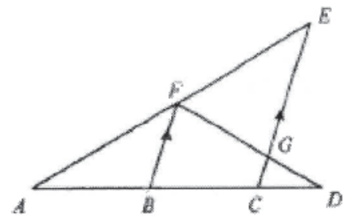
9. In the figure, $ABCD$ is a parallelogram. PDC, $PQRS$ and ABS are straight lines. If $AQ = 4$, $QD = 2$ and $BR = RC = 3$, then $PQ : QR : RS =$



A. $1:1:1$.
B. $1:2:6$.
C. $2:1:3$.
D. $2:3:4$.
E. $8:12:9$.

[1997-CE-MATHS 2-52]

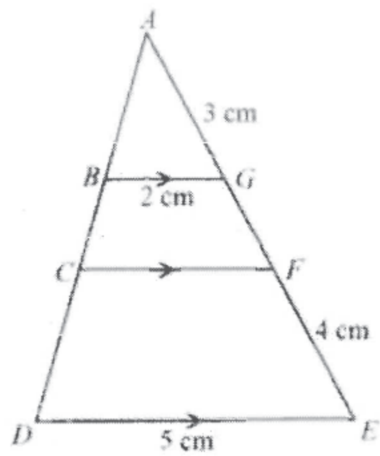
10. In the figure, $ABCD$, AFE, CGE and FGD are straight lines. If $AB = BC = 2CD$, then $CG : GE =$



A. $1:2$.
B. $1:3$.
C. $1:4$.
D. $1:5$.
E. $1:6$.

[1998-CE-MATHS 2-50]

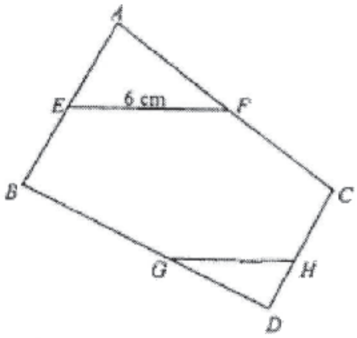
11. In the figure, $ABCD$ and $AGFE$ are straight lines. Find CF.



A. 4 cm
B. 3 cm
C. $\frac{7}{2}$ cm
D. $\frac{5}{2}$ cm
E. $\frac{7}{3}$ cm

[2001-CE-MATHS 2-52]

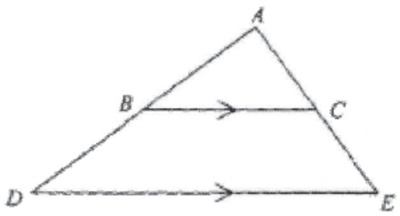
12. In the figure, E and F are the mid-points of AB and AC respectively. G and H are points on BD and CD respectively such that $\frac{DG}{GB} = \frac{DH}{HC} = \frac{3}{5}$. If $EF = 6$ cm, then $GH =$



A. 3.6 cm
B. 4.5 cm
C. 7.2 cm
D. 7.5 cm

[2002-CE-MATHS 2-50]

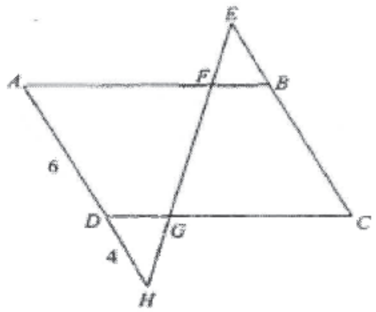
13. In the figure, ABD and ACE are straight lines. If $AC : CE = 3 : 4$, then $BC : DE =$



A. 1 : 2 .
B. 3 : 4 .
C. 3 : 7 .
D. 4 : 7 .

[2003-CE-MATHS 2-28]

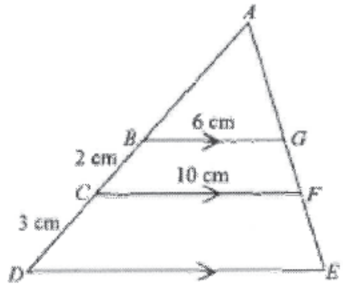
14. In the figure, $ABCD$ is a parallelogram and ADH, EBC and $EFGH$ are straight lines. If $AD = 6$, $DH = 4$ and $EB : BC = 3 : 4$, then $EF : GH =$



A. 1 : 1 .
B. 3 : 4 .
C. 5 : 4 .
D. 9 : 8 .

[2003-CE-MATHS 2-53]

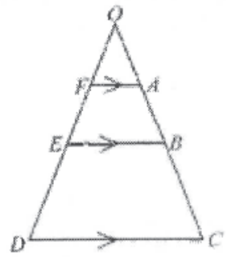
15. In the figure, $ABCD$ and $AGFE$ are straight lines. If $BC = 2$ cm, $CD = 3$ cm, $BG = 6$ cm and $CF = 10$ cm, then $DE =$



A. 12 cm .
B. 14 cm .
C. 15 cm .
D. 16 cm .

[2004-CE-MATHS 2-28]

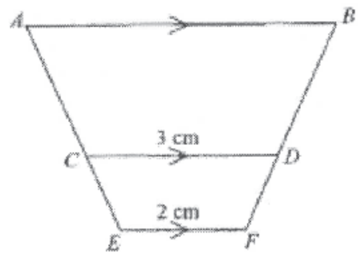
16. In the figure, $OABC$ and $OFED$ are straight lines. If $AB : BC = 2 : 3$ and $FA : DC = 1 : 5$, then $OA : AB =$



A. 1 : 1 .
B. 1 : 2 .
C. 5 : 8 .
D. 5 : 13 .

[2005-CE-MATHS 2-29]

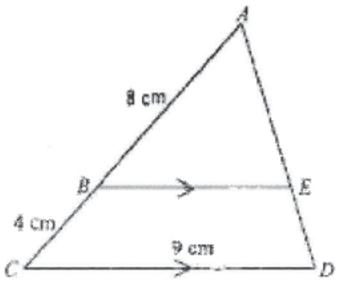
17. In the figure, ACE and BDF are straight lines. If the areas of the quadrilaterals $ABDC$ and $CDFE$ are 16 cm^2 and 5 cm^2 respectively, then the length of AB is



A. 4.5 cm .
B. 5 cm .
C. 5.5 cm .
D. 6 cm .

[2005-CE-MATHS 2-43]

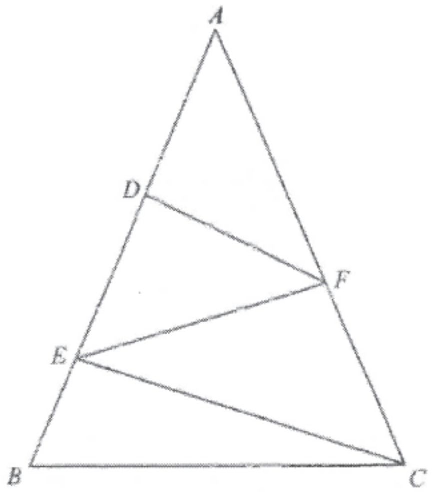
18. In the figure, ABC and AED are straight lines. If $AB = 8$ cm, $BC = 4$ cm and $CD = 9$ cm, then $BE =$



A. $\frac{32}{9}$ cm .
B. $\frac{9}{2}$ cm .
C. 5 cm .
D. 6 cm .

[2006-CE-MATHS 2-26]

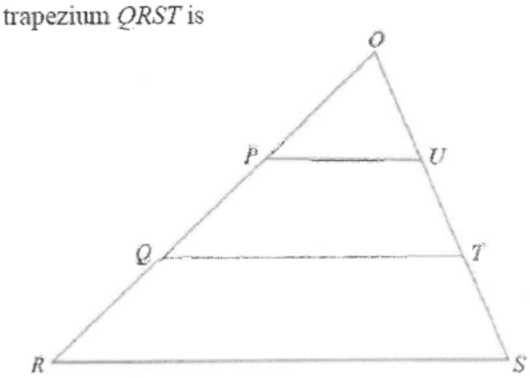
19. In the figure, ABC is an isosceles triangle with $AB = AC$. D and E are points lying on AB such that $AD = DE = 2EB$ while F is a point lying on AC such that $DF//EC$. If $\angle ADF = 90°$ and $CE = 60$ cm, then $EF =$



A. 40 cm
B. 45 cm
C. 48 cm
D. 50 cm

[2019-DSE-MATHS 2-18]

20. In the figure, P and Q are points lying on OR while U and T are points lying on OS such that $OP = PQ = QR$ and $PU//QT//RS$. The ratio of the area of trapezium $PQTU$ to the area of the trapezium $QRST$ is

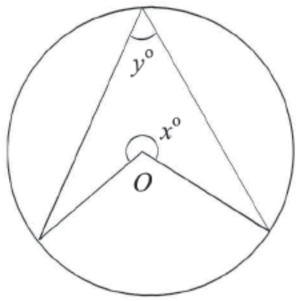


A. 1 : 2
B. 2 : 3
C. 3 : 5
D. 4 : 9

[2020-DSE-MATHS 2-17]

Basic Properties in Circles

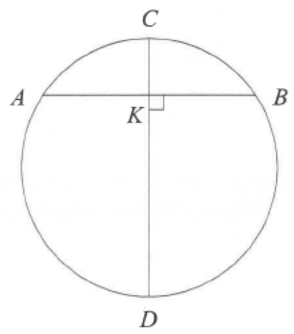
1. In the figure, O is the centre of the circle. $y =$



A. $\frac{x}{2}$.
B. $180 - \frac{x}{2}$.
C. $180 - x$.
D. $360 - x$.
E. $360 - 2x$.

[1977-CE-MATHS 2-29]

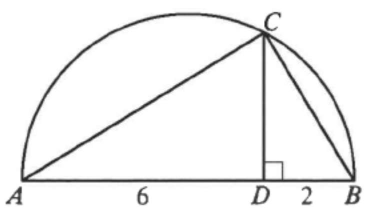
2. In the figure, CD is a diameter of the circle. $AB \perp CD$. If $AB = 8$ cm and $CK = 1$ cm, the length of the diameter is



A. 7.5 cm.
B. 8.5 cm.
C. 15 cm.
D. 17 cm.
E. 19 cm.

[1977-CE-MATHS 2-30]

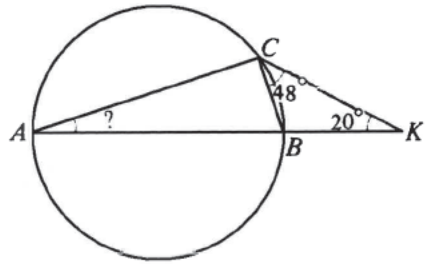
3. In the figure, ACB is a semi-circle. $CD \perp AB$. $AD = 6$; $DB = 2$. $CD =$



A. 2.
B. 4.
C. $\sqrt{3}$.
D. $2\sqrt{3}$.
E. $\sqrt{6}$.

[SP-CE-MATHS 2-27]

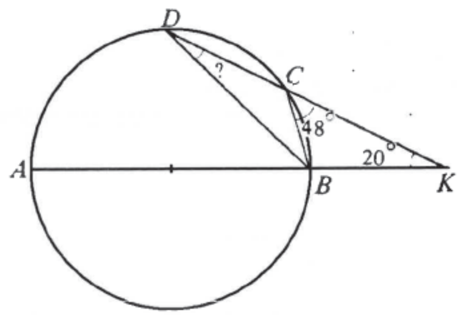
4. In the figure, diameter AB is produced to K. $\angle K = 20°$; $\angle BCK = 48°$. $\angle BAC =$



A. 20°.
B. 22°.
C. 24°.
D. 28°.
E. 48°.

[SP-CE-MATHS 2-45]

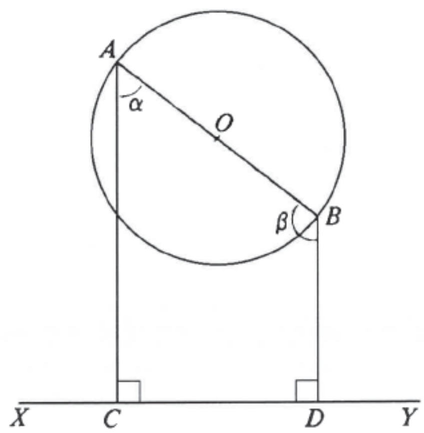
5. In the figure, diameter AB and chord DC when produced meet at K. $\angle K = 20°$; $\angle BCK = 48°$. $\angle BDC =$



A. 20°.
B. 22°.
C. 24°.
D. 28°.
E. 32°.

[SP-CE-MATHS A2-48]

6.



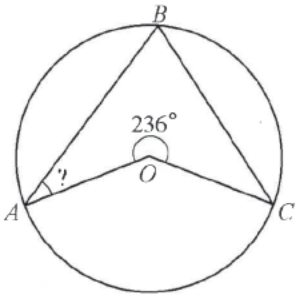
In the figure, circle O is a fixed circle and XY is a fixed straight line. AOB is a variable diameter. $AC \perp XY$; $BD \perp XY$. As AOB varies, which of the following is/are constant?

(1) $AC + BD$
(2) $AC - BD$
(3) $\alpha + \beta$

A. (1) only
B. (2) only
C. (3) only
D. (1) and (2) only
E. (1) and (3) only

[SP-CE-MATHS A2-55]

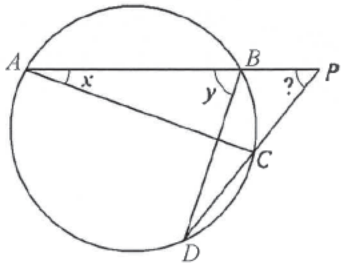
7. In the figure, AB and BC are two equal chords of the circle, centre O. $\angle OAB =$



A. $30°$.
B. $31°$.
C. $35°$.
D. $59°$.
E. $62°$.

[1978-CE-MATHS 2-8]

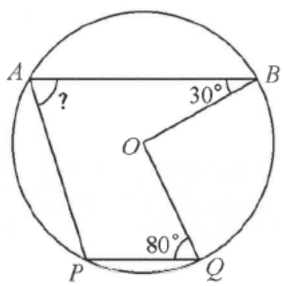
8. In the figure, the chords AB and DC, when produced, and meet at P. Express $\angle APD$ in terms of x and y.



A. $y - x$
B. $2y - x$
C. $2(y - x)$
D. $\frac{1}{2}(y + x)$
E. $x + \frac{1}{2}y$

[1978-CE-MATHS A2-47]

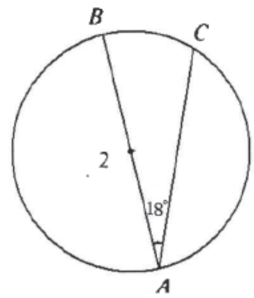
9. In the figure, AB and PQ are two parallel chords in the circle. O is the centre. $\angle PAB =$



A. $70°$.
B. $65°$.
C. $60°$.
D. $55°$.
E. $50°$.

[1978-CE-MATHS A2-48]

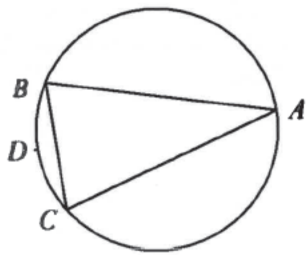
10. In the figure, diameter $AB = 2$. $\angle CAB = 18°$. Minor arc $BC =$



A. $\frac{\pi}{10}$.
B. $\frac{\pi}{5}$.
C. $\frac{3\pi}{10}$.
D. $\frac{4\pi}{5}$.
E. $\frac{9\pi}{10}$.

[1980-CE-MATHS 2-42*]

11.



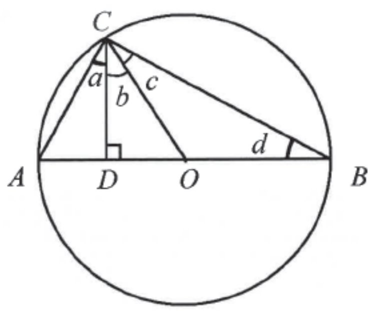
In the figure, $AB = AC$. D is the mid-point of arc BC. Which of the following is/are true?

(1) AD bisects $\angle BAC$
(2) $BC \perp AD$
(3) AD is a diameter of the circle

A. (1) only
B. (1) and (2) only
C. (1) and (3) only
D. (2) and (3) only
E. (1), (2) and (3)

[1980-CE-MATHS 2-49]

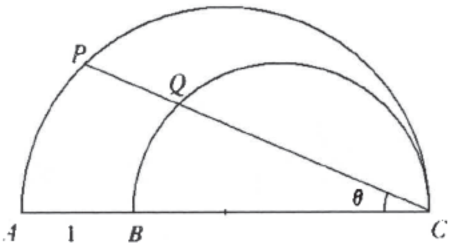
12. In the figure, AOB is a diameter of the circle, centre O. CD is the perpendicular bisector of OA. Which of the angles a, b, c, d is/are equal $30°$?



A. a only
B. a and b only
C. a, b and c only
D. a, b, c and d
E. None of them

[1980-CE-MATHS 2-50]

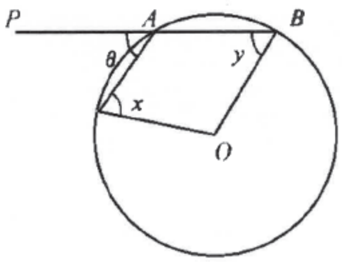
13. In the figure, AC and BC are diameters of two semi-circles touching each other internally at C. PQC is a straight line. If $AB = 1$, then $PQ =$



A. $\cos\theta$.
B. $\sin\theta$.
C. $\tan\theta$.
D. $\frac{1}{\sin\theta}$.
E. $\frac{1}{\cos\theta}$.

[1980-CE-MATHS 2-52]

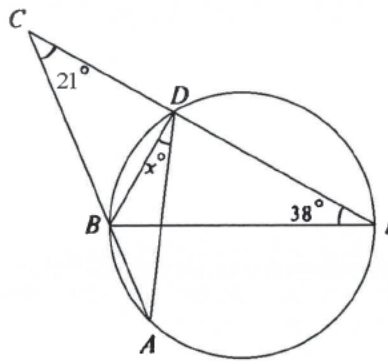
14. In the figure, O is the centre of the circle. PAB is a straight line. $x + y =$



A. 2θ.
B. $90° + \theta$.
C. $180° - \theta$.
D. $180° - 2\theta$.
E. $180°$.

[1980-CE-MATHS 2-54]

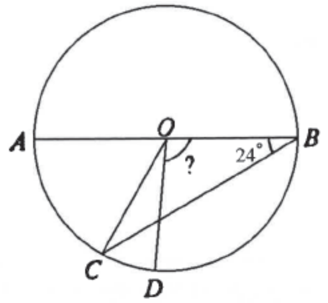
15. In the figure, BE is a diameter of the circle. ABC and EDC are straight lines. $x° =$



A. $21°$.
B. $31°$.
C. $38°$.
D. $52°$.
E. $59°$.

[1981-CE-MATHS 2-24]

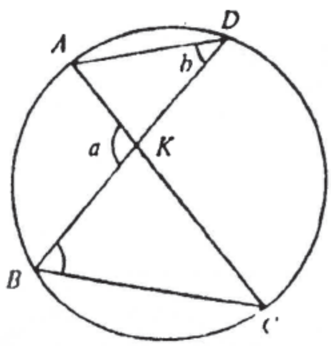
16. In the figure, AB is a diameter of the circle with centre at O. The length of the minor arc AC is twice the length of the minor arc CD. $\angle BOD =$



A. $72°$.
B. $90°$.
C. $108°$.
D. $132°$.
E. $144°$.

[1981-CE-MATHS 2-26]

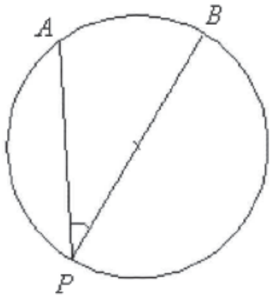
17. In the figure, AKC and BKD are two chords of the circle. $\angle CBD =$



A. $a - b$.
B. $a + b$.
C. $a + b - 90°$.
D. $\frac{1}{2}a$.
E. $\frac{1}{2}a + b$.

[1982-CE-MATHS 2-27]

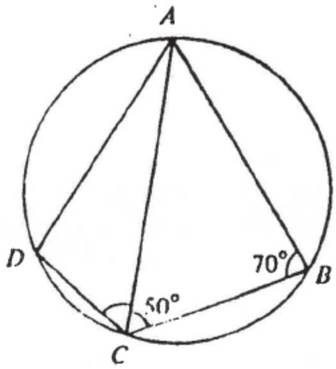
18. In the figure, BP is a diameter of the circle. The minor arc AB and the radius are of equal length. $\angle APB =$



A. $\dfrac{90^\circ}{\pi}$.
B. $\dfrac{180^\circ}{\pi}$.
C. 30°.
D. 45°.
E. 60°.

[1982-CE-MATHS 2-47*]

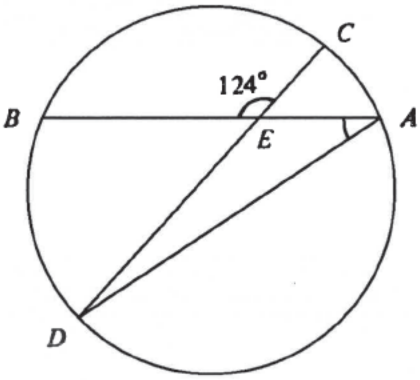
19. In the figure, the length of the minor arc CD is half the length of the minor arc BC. $\angle ACD =$



A. 30°.
B. 35°.
C. 40°.
D. 45°.
E. 50°.

[1982-CE-MATHS 2-53]

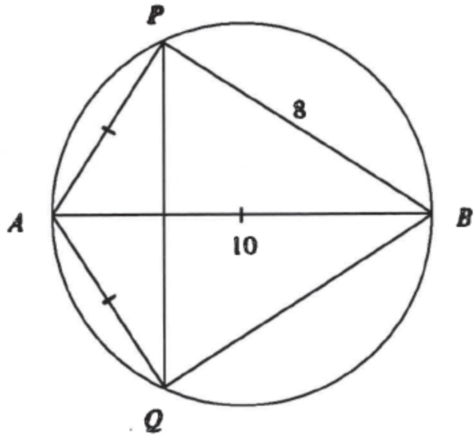
20. In the figure, chords AB and CD intersect at E. The length of the minor arc BD is three times the length of the minor arc AC. $\angle BAD =$



A. 31°.
B. 35°.
C. 42°.
D. 45°.
E. 56°.

[1983-CE-MATHS 2-53]

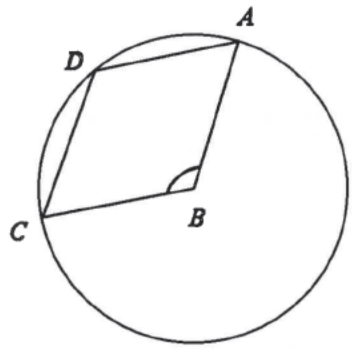
21. In the figure, AB is a diameter of the circle. $AP = AQ$, $AB = 10$ and $BP = 8$, $PQ =$



A. 5.
B. 6.
C. 6.4.
D. 8.
E. 9.6.

[1984-CE-MATHS 2-53]

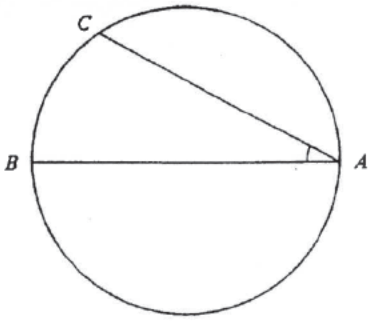
22. In the figure, $ABCD$ is a rhombus. B is the centre of the circle. $\angle ABC =$



A. 105°.
B. 120°.
C. 130°.
D. 135°.
E. 150°.

[1985-CE-MATHS 2-25]

23. In the figure, AB is a diameter of the circle ABC. If arc AC has the same length as AB, then $\angle CAB =$



A. $90°$.

B. $(90-\frac{90}{\pi})°$.

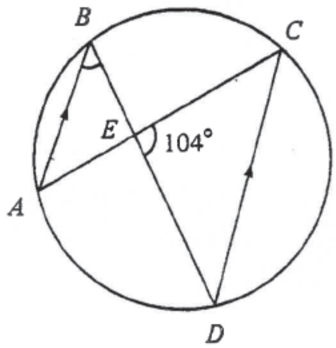
C.* $(90-\frac{180}{\pi})°$.

D. $(90-\frac{360}{\pi})°$.

E. $(180-\frac{90}{\pi})°$ radians.

[1985-CE-MATHS 2-48*]

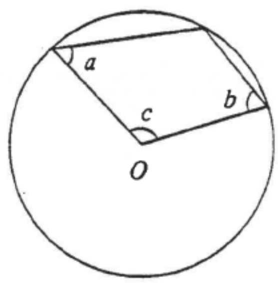
24. In the figure, chords AC and BD meet at E and $AB \parallel DC$. If $\angle CED = 104°$, find $\angle ABD$.



A. 76°
B. 52°
C. 38°
D. 14°
E. It cannot be determined.

[1987-CE-MATHS 2-20]

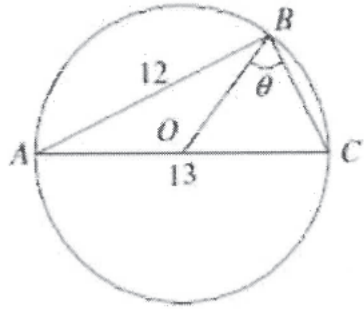
25. In the figure, O is the centre of the circle. $a+b=$



A. $180°$.
B. c.
C. $\frac{c}{2}$.
D. $180°-c$.
E. $180°-\frac{c}{2}$.

[1987-CE-MATHS 2-45]

26. In the figure, O is the centre of the circle. If $AB = 12$ and $AC = 13$, then $\cos\theta =$



A. $\frac{5}{12}$.

B. $\frac{5}{13}$.

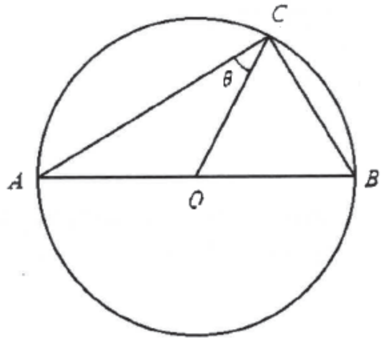
C. $\frac{12}{13}$.

D. $\frac{12}{25}$.

E. $\frac{13}{25}$.

[1987-CE-MATHS 2-47]

27. In the figure, O is the centre of the circle of diameter 13. $AC = 12$. $\sin\theta =$



A. $\frac{5}{12}$.

B. $\frac{5}{13}$.

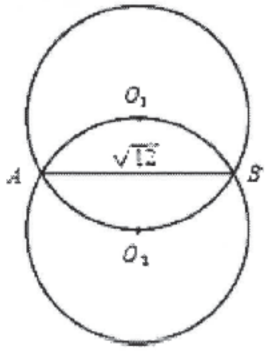
C. $\frac{\sqrt{313}}{13}$.

D. $\frac{12}{13}$.

E. $\frac{13}{12}$.

[1988-CE-MATHS 2-22]

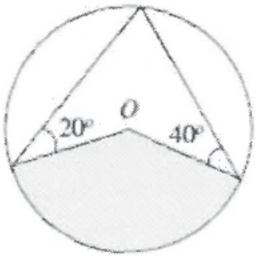
28. In the figure, O_1 and O_2 are the centres of the two circles, each of radius r and $AB = \sqrt{12}$. Find r.



A. $\frac{1}{2}$
B. 2
C. 4
D. 6
E. 8

[1988-CE-MATHS 2-52]

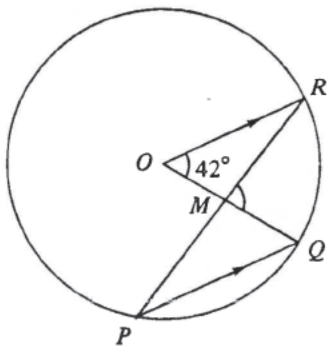
29. In the figure, O is the centre of the circle of radius 6 cm. The area of the shaded part is



A. $2\pi\ \text{cm}^2$.
B. $4\pi\ \text{cm}^2$.
C. $6\pi\ \text{cm}^2$.
D. $9\pi\ \text{cm}^2$.
E. $12\pi\ \text{cm}^2$.

[1989-CE-MATHS 2-38]

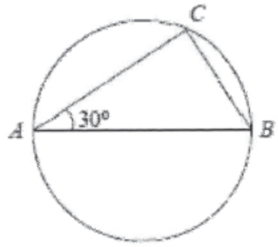
30. In the figure, O is the centre of the circle. If $OR \parallel PQ$ and $\angle ROQ = 42°$, find $\angle RMQ$.



A. 21°
B. 42°
C. 63°
D. 84°
E. 126°

[1990-CE-MATHS 2-21]

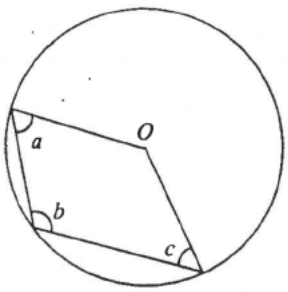
31. In the figure, AB is a diameter and $\angle BAC = 30°$. If the area of ΔABC is $\sqrt{3}$, then the radius of the circle is



A. $\frac{1}{2}$.
B. 1.
C. $\sqrt{2}$.
D. $\sqrt{3}$.
E. 2.

[1990-CE-MATHS 2-48]

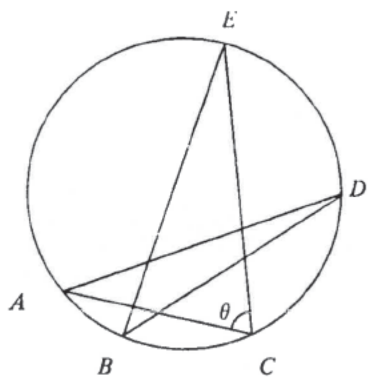
32. In the figure, O is the centre of the circle. Find $a + c$.



A. b
B. $2b$
C. $180° - b$
D. $360° - b$
E. $360° - 2b$

[1991-CE-MATHS 2-21]

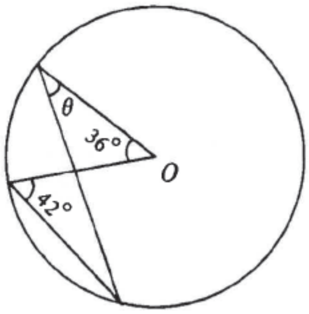
33. In the figure, $\widehat{AB} : \widehat{BC} : \widehat{CD} : \widehat{DE} : \widehat{EA} = 1 : 2 : 3 : 4 : 5$. Find θ.



A. 30°
B. 36°
C. 60°
D. 72°
E. 120°

[1991-CE-MATHS 2-52]

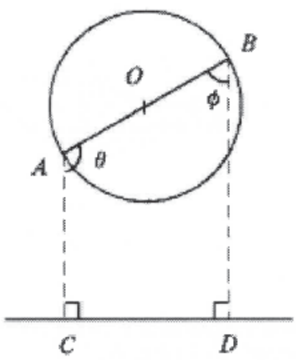
34. In the figure, O is the centre of the circle. Find θ.



A. 42°
B. 36°
C. 24°
D. 21°
E. 18°

[1992-CE-MATHS 2-24]

35.



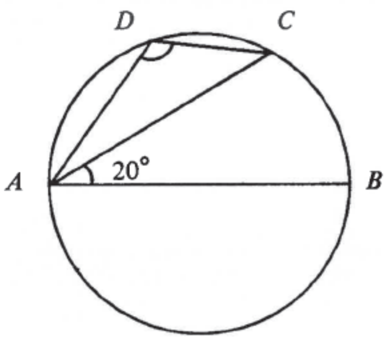
In the figure, O is the centre of the circle. If the diameter AOB rotates about O, which of the following is / are constant?

(1) $\theta + \phi$
(2) $AC + BD$
(3) $AC \times BD$

A. (1) only
B. (2) only
C. (3) only
D. (1) and (2) only
E. (1) and (3) only

[1992-CE-MATHS 2-52]

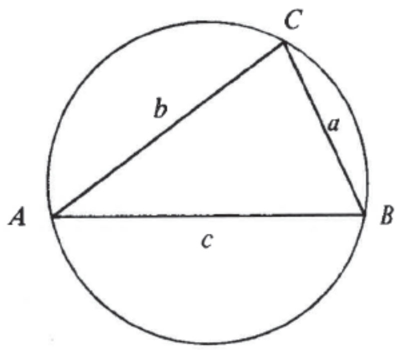
36. In the figure, AB is a diameter. Find $\angle ADC$.



A. 100°
B. 110°
C. 120°
D. 135°
E. 140°

[1993-CE-MATHS 2-26]

37.



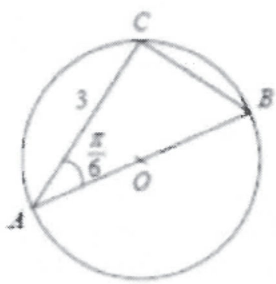
In the figure, if $\overset{\frown}{BC} : \overset{\frown}{CA} : \overset{\frown}{AB} = 1:2:3$, which of the following is / are true?

(1) $\angle A : \angle B : \angle C = 1:2:3$
(2) $a : b : c = 1:2:3$
(3) $\sin A : \sin B : \sin C = 1:2:3$

A. (1) only
B. (2) only
C. (3) only
D. (1) and (2) only
E. (1), (2) and (3)

[1993-CE-MATHS 2-49]

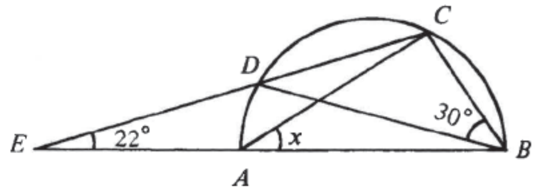
38. In the figure, O is the centre of the circle. If $AC = 3$ and $\angle BAC = \frac{\pi}{6}$ (i.e. 30°), find the diameter AB.



A. $\frac{3}{2}$
B. 6
C. $\frac{3\sqrt{3}}{2}$
D. $2\sqrt{3}$
E. $3\sqrt{3}$

[1994-CE-MATHS 2-21*]

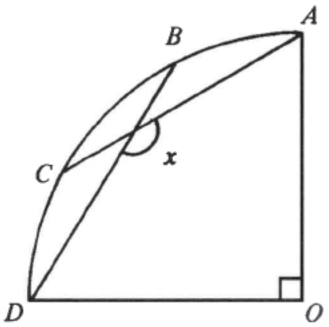
39. In the figure, $ABCD$ is a semi-circle, CDE and BAE are straight lines. If $\angle CBD = 30°$ and $\angle DEA = 22°$, find x.



A. 38°
B. 41°
C. 44°
D. 52°
E. 60°

[1994-CE-MATHS 2-51]

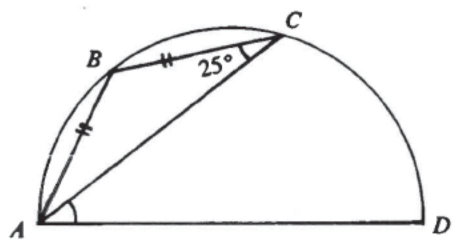
40. In the figure, $OABCD$ is sector of a circle. If $\overparen{AB} = \overparen{BC} = \overparen{CD}$, then $x =$



A. 105°.
B. 120°.
C. 135°.
D. 144°.
E. 150°.

[1994-CE-MATHS 2-52]

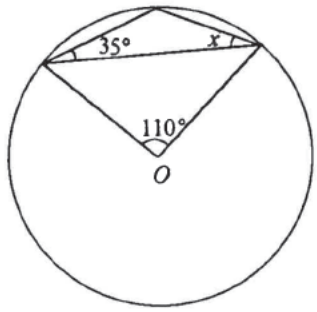
41. In the figure, $ABCD$ is a semi-circle. $\angle CAD =$



A. 25°.
B. 40°.
C. 45°.
D. 50°.
E. 65°.

[1995-CE-MATHS 2-22]

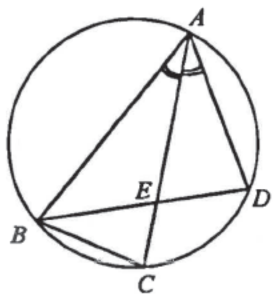
42. In the figure, O is the centre of the circle. Find x.



A. 20°
B. 27.5°
C. 35°
D. 37.5°
E. 40°

[1996-CE-MATHS 2-25]

43.



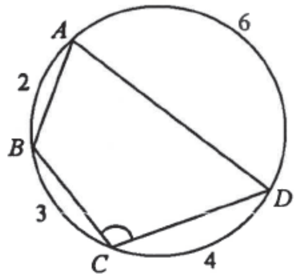
In the figure, AC is the angle bisector of $\angle BAD$. Which of the following statements must be true?

(1) $\Delta BCE \sim \Delta ADE$
(2) $\Delta ABC \sim \Delta AED$
(3) $\Delta ABC \sim \Delta BDA$

A. (1) only
B. (1) and (2) only
C. (1) and (3) only
D. (2) and (3) only
E. (1), (2) and (3)

[1997-CE-MATHS 2-50]

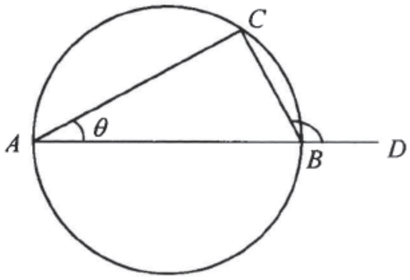
44. In the figure, $\overparen{AB} = 2$, $\overparen{BC} = 3$, $\overparen{CD} = 4$ and $\overparen{DA} = 6$. Find $\angle BCD$.



A. 72°
B. 84°
C. 90°
D. 96°
E. 144°

[1997-CE-MATHS 2-51]

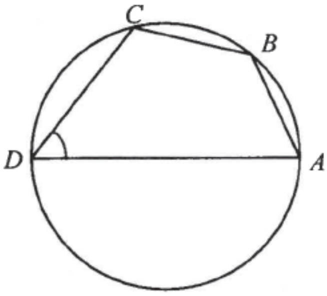
45. In the figure, AB is a diameter of the circle and ABD is a straight line. $\angle CBD =$



A. 2θ.
B. 4θ.
C. $90° + \theta$.
D. $180° - \theta$.
E. $180° - 2\theta$.

[1998-CE-MATHS 2-28]

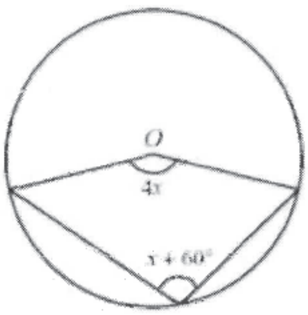
46. In the figure, AD is a diameter of the circle. If $\overset{\frown}{AB} : \overset{\frown}{BC} : \overset{\frown}{CD} = 3 : 5 : 7$, then $\angle ADC =$



A. 36°.
B. 45°.
C. 48°.
D. 49°.
E. 72°.

[1998-CE-MATHS 2-29]

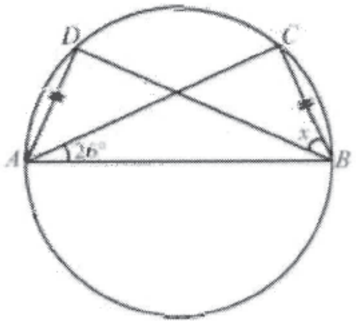
47. In the figure, O is the centre of the circle. Find x.



A. 12°
B. 20°
C. 24°
D. 40°
E. 60°

[1999-CE-MATHS 2-26]

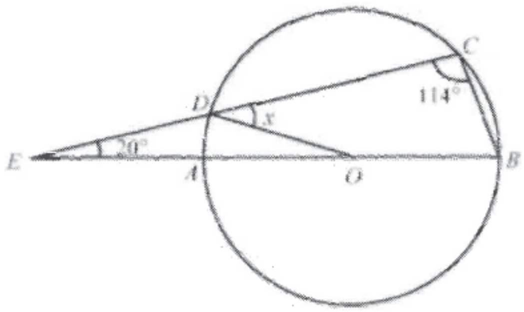
48. In the figure, AB is a diameter of the circle. Find x.



A. 26°
B. 32°
C. 38°
D. 52°
E. 64°

[1999-CE-MATHS 2-27]

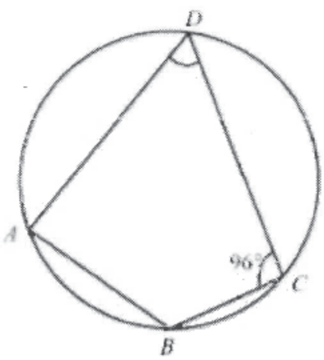
49. In the figure, O is the centre of the circle. $EAOB$ and EDC are straight lines. Find x.



A. 40°
B. 46°
C. 57°
D. 66°
E. 68°

[2000-CE-MATHS 2-20]

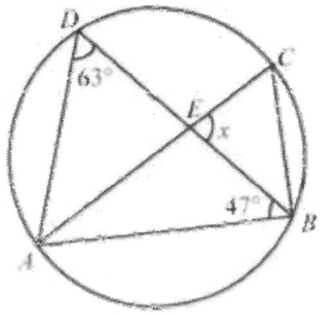
50. In the figure, $\overset{\frown}{AB} : \overset{\frown}{BC} : \overset{\frown}{CD} = 2 : 1 : 3$. Find $\angle ADC$.



A. 56°
B. 60°
C. 63°
D. 72°
E. 84°

[2000-CE-MATHS 2-46]

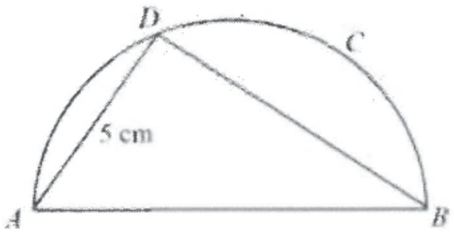
51. In the figure, AEC is a diameter and DEB is a straight line. Find x.



A. 54°
B. 70°
C. 74°
D. 92°
E. 94°

[2001-CE-MATHS 2-18]

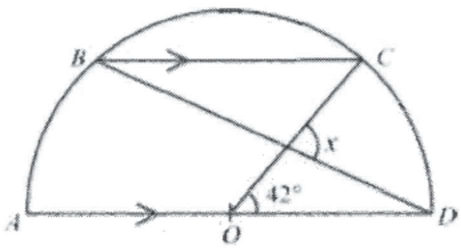
52. In the figure, $ABCD$ is a semicircle, $AB : BD = 4 : 3$. Find AB correct to the nearest 0.1 cm.



A. 5.7 cm
B. 7.6 cm
C. 10.7 cm
D. 13.0 cm
E. 14.3 cm

[2001-CE-MATHS 2-32]

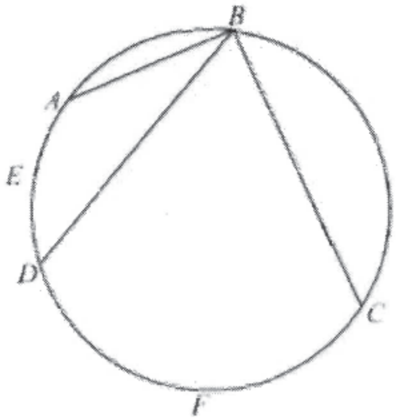
53. In the figure, O is the centre of the semicircle $ABCD$ and $BC // AD$. If $\angle COD = 42°$, then x =



A. 48°.
B. 63°.
C. 84°.
D. 90°.

[2002-CE-MATHS 2-28]

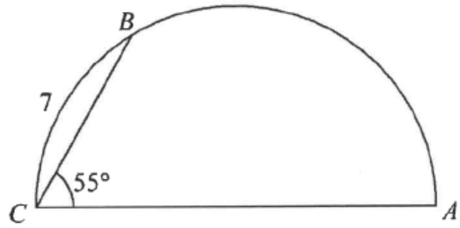
54. In the figure, $\overset{\frown}{AED} = 1$ and $\overset{\frown}{CFD} = 4$. If $\angle ABC = 100°$, then $\angle ABD =$



A. 18°.
B. 20°.
C. 24°.
D. 25°.

[2002-CE-MATHS 2-29]

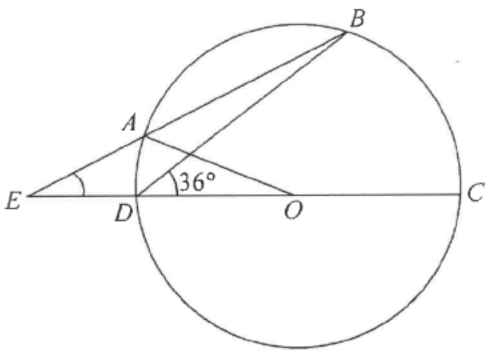
55. In the figure, ABC is a semicircle with $\overset{\frown}{BC} = 7$ and $\angle ACB = 55°$. Find $\overset{\frown}{AB}$.



A. 9
B. 10
C. 11
D. 14

[2003-CE-MATHS 2-25]

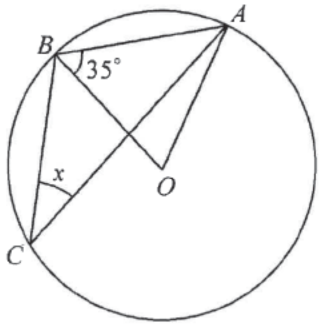
56. In the figure, O is the centre of the circle $ABCD$. If EAB and $EDOC$ are straight lines and $EA = AO$, find $\angle AEO$.



A. 18°
B. 24°
C. 27°
D. 36°

[2004-CE-MATHS 2-23]

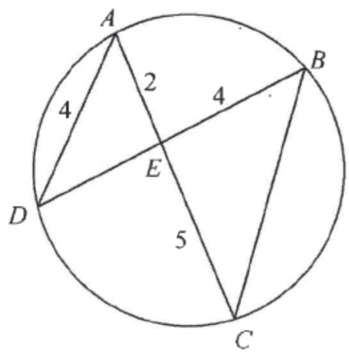
57. In the figure, O is the centre of the circle ABC. Find x.



A. 17.5°
B. 27.5°
C. 35°
D. 55°

[2004-CE-MATHS 2-24]

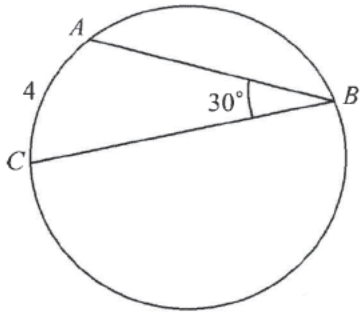
58. In the figure, $ABCD$ is a circle. AC and BD meet at E. If $AD = 4$, $EC = 5$ and $BE = 4$, then $BC =$



A. 6 .
B. 7 .
C. 8 .
D. 10 .

[2004-CE-MATHS 2-25]

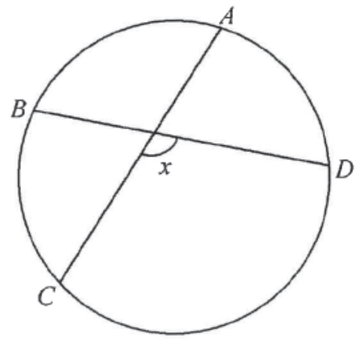
59. In the figure, ABC is a circle. If $\angle ABC = 30°$ and $\overset{\frown}{AC} = 4$, then the circumference of the circle is



A. 24 .
B. 48 .
C. 8π .
D. 16π .

[2004-CE-MATHS 2-26]

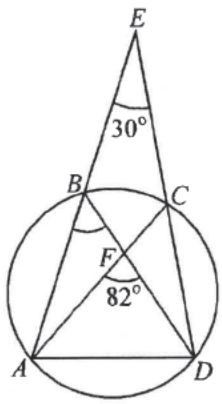
60. In the figure, $ABCD$ is a circle. If $\overset{\frown}{CD} = 2\overset{\frown}{DA} = 2\overset{\frown}{AB} = 2\overset{\frown}{BC}$, then $x =$



A. 108° .
B. 112° .
C. 120° .
D. 144° .

[2004-CE-MATHS 2-50]

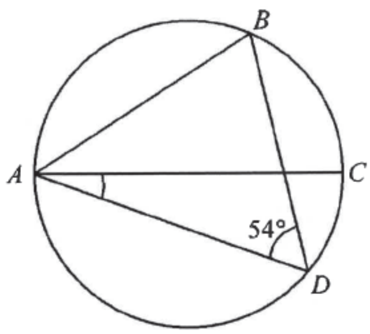
61. In the figure, $ABCD$ is a circle. AB produced and DC produced meet at E. If AC and BD intersect at F, then $\angle ABD =$



A. 41° .
B. 52° .
C. 56° .
D. 60° .

[2005-CE-MATHS 2-24]

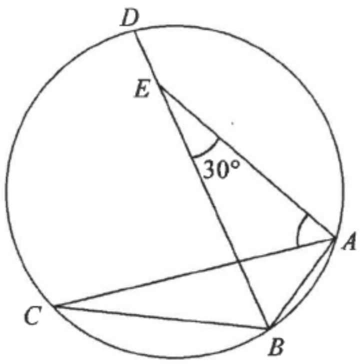
62. In the figure, $ABCD$ is a circle. If AC is a diameter of the circle and $AB = BD$, then $\angle CAD =$



A. 18°.
B. 21°.
C. 27°.
D. 36°.

[2005-CE-MATHS 2-25]

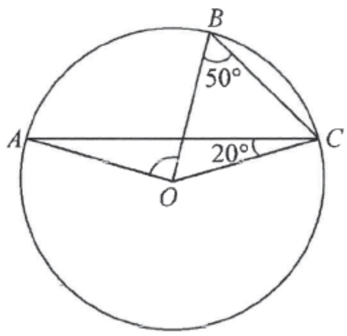
63. In the figure, $ABCD$ is a circle. If $\overset{\frown}{AB} : \overset{\frown}{BC} : \overset{\frown}{CD} : \overset{\frown}{DA} = 1:2:3:3$ and E is a point lying on BD, then $\angle CAE =$



A. 45°
B. 50°
C. 55°
D. 60°

[2005-CE-MATHS 2-51]

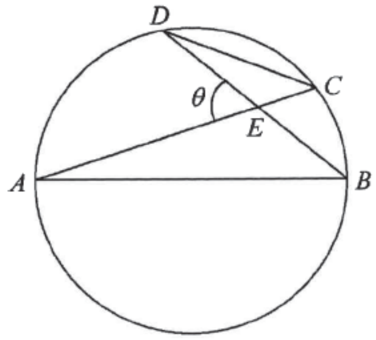
64. In the figure, O is the centre of the circle ABC. If $\angle OBC = 50°$ and $\angle ACO = 20°$, then $\angle BOA =$



A. 50°.
B. 60°.
C. 70°.
D. 80°.

[2006-CE-MATHS 2-46]

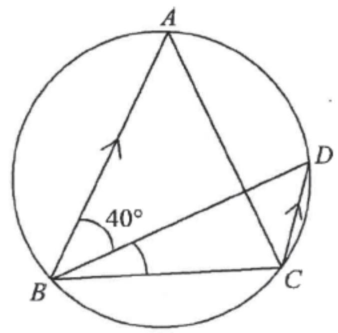
65. In the figure, AB is a diameter of the circle $ABCD$. It is given that AC and BD intersect at E. If $\angle AED = \theta$, then $\dfrac{CD}{AB} =$



A. $\sin\theta$.
B. $\cos\theta$.
C. $\tan\theta$.
D. $\dfrac{1}{\tan\theta}$.

[2009-CE-MATHS 2-48]

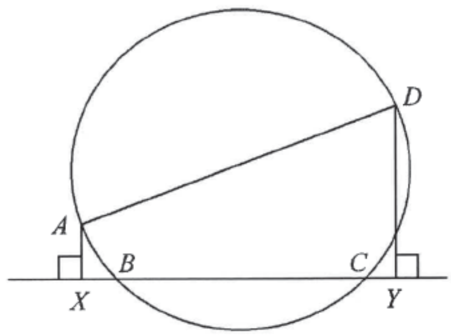
66. In the figure, $ABCD$ is a circle. If $AB = AC$, $AB \parallel DC$ and $\angle ABD = 40°$, then $\angle CBD =$



A. 10°.
B. 20°.
C. 30°.
D. 40°.

[2009-CE-MATHS 2-49]

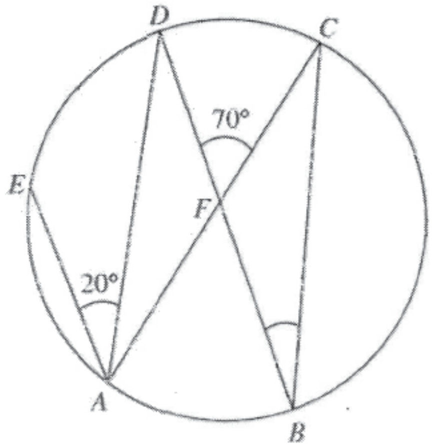
67. In the figure, AD is a diameter of the circle $ABCD$. It is given that $XBCY$ is a straight line. If $AD = 20$ cm and $BC = 12$ cm, then $AX + DY$ =



A. 12 cm.
B. 16 cm.
C. 32 cm.
D. 36 cm.

[2010-CE-MATHS 2-49]

68. In the figure, $ABCDE$ is a circle. AC and BD intersect at F. If $AE // BD$, $\angle DAE = 20°$ and $\angle CFD = 70°$, then $\angle CBD =$

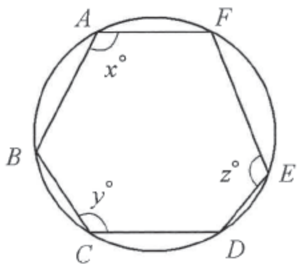


A. $20°$.
B. $35°$.
C. $45°$.
D. $50°$.

[2011-CE-MATHS 2-48]

Cyclic Quadrilaterals

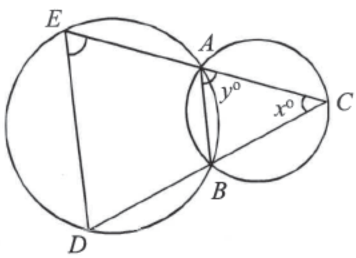
69. In the figure, $ABCDEF$ is a hexagon inscribed in a circle. What is $x+y+z$ equal to?



A. 270
B. 360
C. 450
D. 540
E. the sum, $x+y+z$, is not a constant.

[1979-CE-MATHS 2-32]

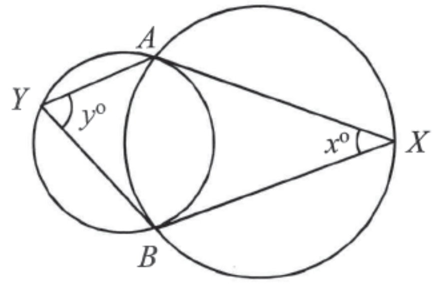
70. In the figure, the two circles intersect at A and B. CAE and CBD are straight lines. $\angle CED =$



A. $y°$.
B. $180° - y°$.
C. $180° - x° - y°$.
D. $180° - x° + y°$.
E. $360° - x° - y°$.

[1980-CE-MATHS 2-24]

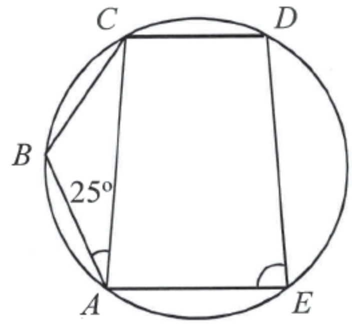
71. In the figure, circle AXB passes through the centre of circle AYB. $y =$



A. $2x$.
B. $180 - 2x$.
C. $180 - x$.
D. $\frac{1}{2}(90 - x)$.
E. $\frac{1}{2}(180 - x)$.

[1980-CE-MATHS 2-25]

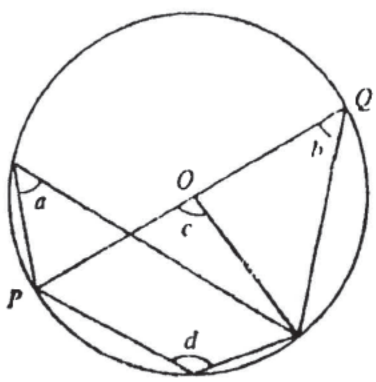
72. In the figure, $AB = BC = CD$. $\angle AED =$



A. 50°
B. 65°
C. 75°
D. 90°
E. 105°

[1980-CE-MATHS 2-47]

73.



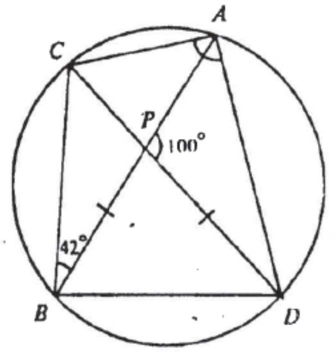
In the figure, O is the centre of the circle. PQ is a diameter. Which of the following is/are true?

(1) $a = b$
(2) $c = 2a$
(3) $c + d = 180°$

A. (1) only
B. (1) and (2) only
C. (1) and (3) only
D. (2) and (3) only
E. (1), (2) and (3)

[1982-CE-MATHS 2-52]

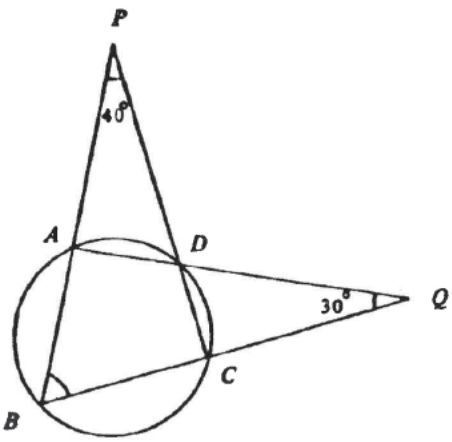
74. In the figure, chords AB and CD intersect at P. $BP = DP$. $\angle CAD =$



A. 58°.
B. 86°.
C. 88°.
D. 92°.
E. 142°.

[1983-CE-MATHS 2-24]

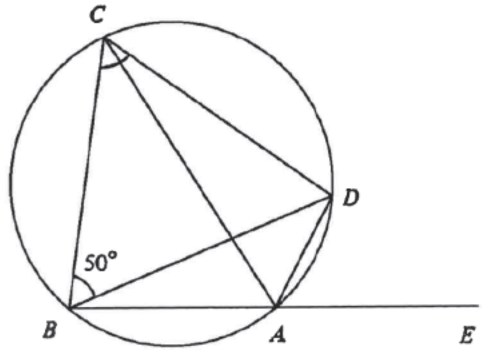
75. In the figure, the chords BA and CD, when produced, meet at P. The chords AD and BC, when produced, meet at Q. $\angle B =$



A. 35°.
B. 40°.
C. 45°.
D. 50°.
E. 55°.

[1984-CE-MATHS 2-54]

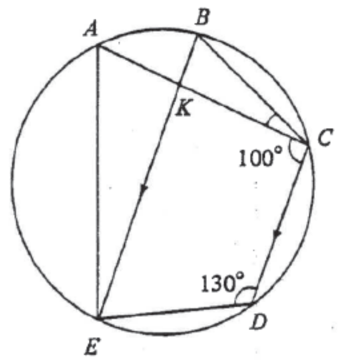
76. In the figure, $ABCD$ is a cyclic quadrilateral. BA is produced to E. DA bisects $\angle CAE$. $\angle BCD =$



A. 40°.
B. 45°.
C. 50°.
D. 55°.
E. 65°.

[1985-CE-MATHS 2-22]

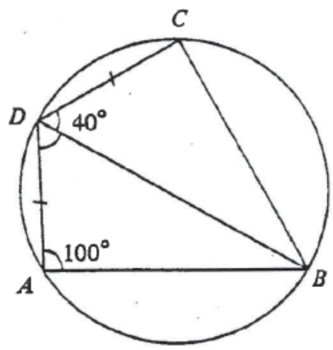
77. In the figure, A, B, C, D and E lie on a circle. AC intersects BE at K. $\angle ACD = 100°$ and $\angle CDE = 130°$. If $BE \,//\, CD$, then $\angle ACB =$



A. 25°.
B. 30°.
C. 36°.
D. 40°.
E. 42°.

[1986-CE-MATHS 2-25]

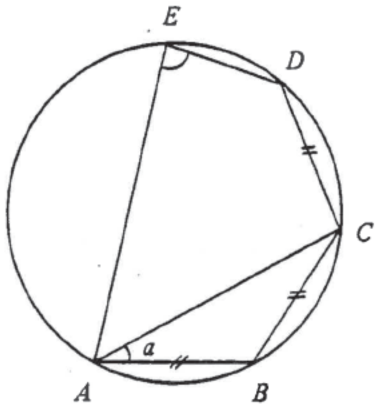
78. DA and DC are equal chords of the circle $ABCD$. $\angle CDB = 40°$ and $\angle DAB = 100°$. $\angle ADB =$



A. 20°.
B. 25°.
C. 30°.
D. 35°.
E. 40°.

[1986-CE-MATHS 2-49]

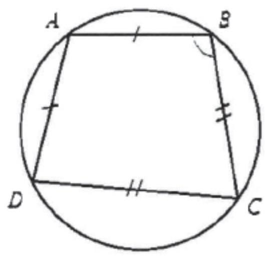
79. In the figure, AB, BC and CD are three equal chords of a circle. If $\angle BAC = a$, then $\angle AED =$



A. $2a$.
B. $3a$.
C. $90° - a$.
D. $180° - 2a$.
E. $180° - 3a$.

[1987-CE-MATHS 2-23]

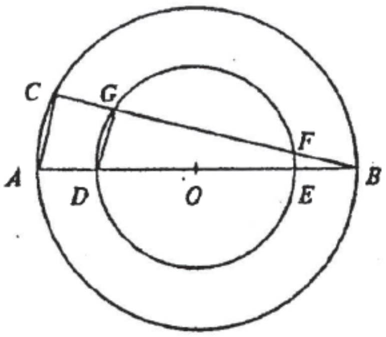
80. $ABCD$ is a cyclic quadrilateral with $AB = AD$ and $CB = CD$. Find $\angle ABC$.



A. 75°
B. 90°
C. 105°
D. 120°
E. It cannot be found

[1988-CE-MATHS 2-51]

81.



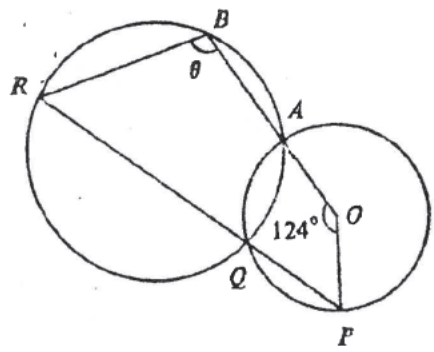
In the figure, O is the centre of two concentric circles. $ADOEB$ and $CGFB$ are straight lines. Which of the following is/are true?

(1) $AC \parallel DG$
(2) $BF = CG$
(3) A, E, F, C are concyclic

A. (1) only
B. (2) only
C. (1) and (2) only
D. (1) and (3) only
E. (1), (2) and (3)

[1989-CE-MATHS 2-23]

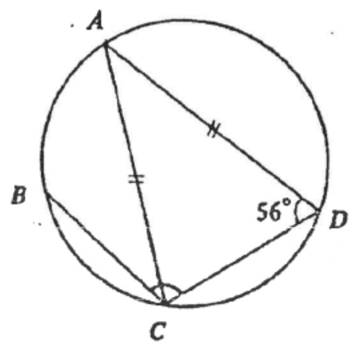
82. In the figure, O is the centre of the smaller circle. OAB and PQR are straight lines. Find θ.



A. 56°
B. 108°
C. 112°
D. 118°
E. 124°

[1989-CE-MATHS 2-51]

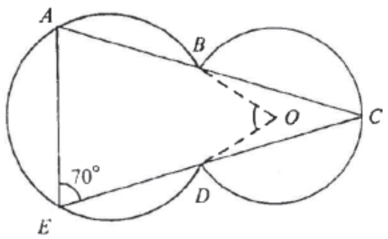
83. In the figure, B is the mid-point of arc AC. $AC = AD$. If $\angle ADC = 56°$, then $\angle BCD =$



A. 84°.
B. 90°.
C. 96°.
D. 112°.
E. 124°.

[1989-CE-MATHS 2-52]

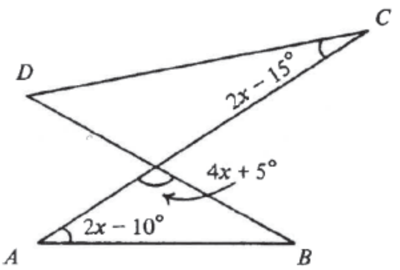
84. In the figure, O is the centre of the circle BCD. ABC and EDC are straight lines. $BC = DC$ and $\angle AED = 70°$. Find $\angle BOD$.



A. 40°
B. 70°
C. 80°
D. 90°
E. 140°

[1991-CE-MATHS 2-22]

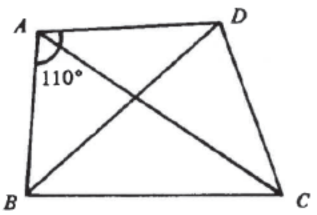
85. In the figure, points A, B, C and D are concyclic. Find x.



A. 20°
B. 22.5°
C. 25°
D. 27.5°
E. 30°

[1993-CE-MATHS 2-24]

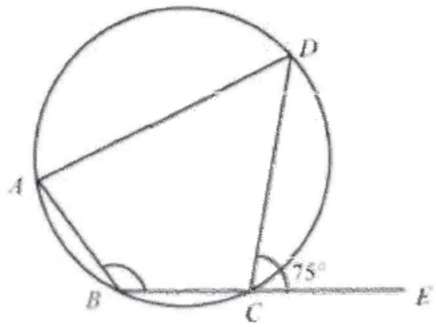
86. In the figure, $ABCD$ is a cyclic quadrilateral. If $\angle DAB = 110°$ and $BC = BD$, find $\angle DAC$.



A. 20°
B. 35°
C. 40°
D. 55°
E. 70°

[1995-CE-MATHS 2-24]

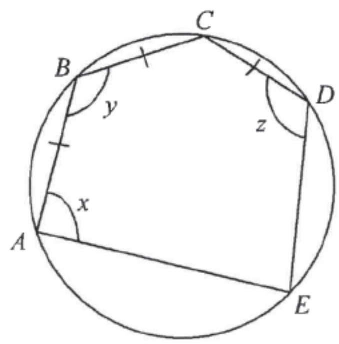
87. In the figure, $\overset{\frown}{AB} = \overset{\frown}{BC} = \frac{1}{2}\overset{\frown}{CD}$. Find $\angle ABC$.



A. 100°
B. 105°
C. 112.5°
D. 130°
E. 150°

[2001-CE-MATHS 2-46]

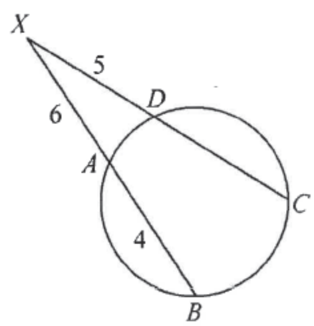
88. The figure shows a circle with diameter AD. If $AB = BC = CD$, find $x + y + z$.



A. 315°
B. 324°
C. 330°
D. 360°

[2003-CE-MATHS 2-50]

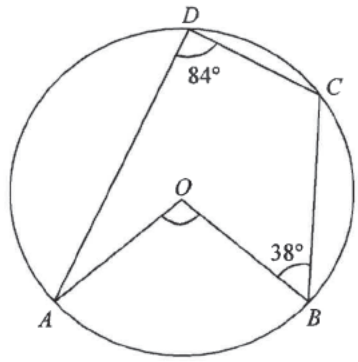
89. In the figure, XAB and XDC are straight lines. If $DX = 5$, $AX = 6$ and $AB = 4$, find CD.



A. 5
B. 7
C. $\frac{10}{3}$
D. $\frac{24}{5}$

[2003-CE-MATHS 2-51]

90. In the figure, O is the centre of the circle $ABCD$. If $\angle ADC = 84°$ and $\angle CBO = 38°$, then $\angle AOB =$

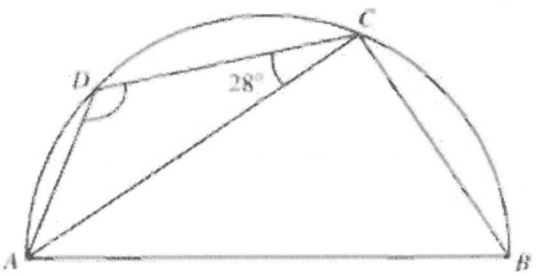


A. 64°.
B. 88°.
C. 104°.
D. 168°.

[2008-CE-MATHS 2-50]

HKDSE Problems

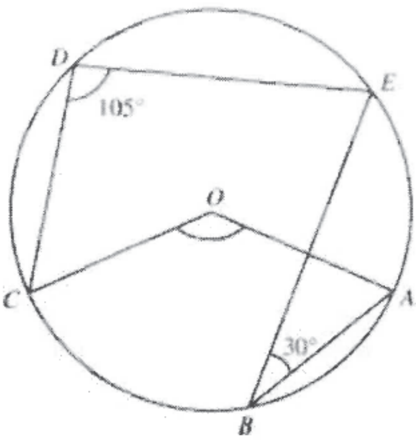
91. In the figure, $ABCD$ is a semi-circle. If $BC = CD$, then $\angle ADC =$



A. 118°.
B. 121°.
C. 124°.
D. 126°.

[SP-DSE-MATHS 2-21]

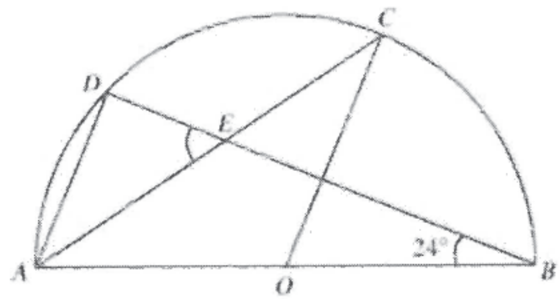
92. In the figure, O is the centre of the circle $ABCDE$. If $\angle ABE = 30°$ and $\angle CDE = 105°$, then $\angle AOC =$



A. 120°.
B. 135°.
C. 150°.
D. 165°.

[SP-DSE-MATHS 2-22]

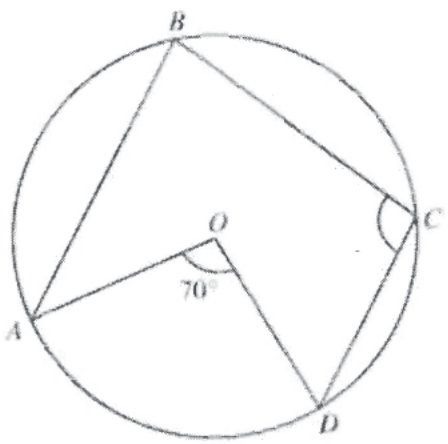
93. In the figure, O is the centre of the semi-circle $ABCD$. AC and BD intersect at E. If $AD // OC$, then $\angle AED =$



A. 48°.
B. 55°.
C. 57°.
D. 66°.

[PP-DSE-MATHS 2-20]

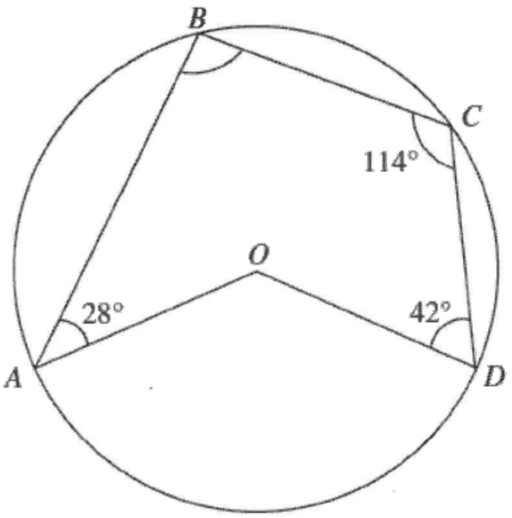
94. In the figure, O is the centre of the circle $ABCD$. If $\overset{\frown}{AB} = \overset{\frown}{BC} = 2\overset{\frown}{CD}$, then $\angle BCD =$



A. 64°.
B. 87°.
C. 93°.
D. 116°.

[PP-DSE-MATHS 2-21]

95. In the figure, O is the centre of the circle $ABCD$. If $\angle BAO = 28°$, $\angle BCD = 114°$ and $\angle CDO = 42°$, then $\angle ABC =$



A. 90°.

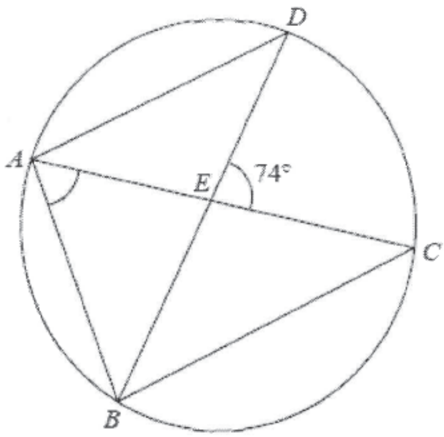
B. 96°.

C. 100°.

D. 138°.

[2012-DSE-MATHS 2-20]

96. In the figure, $ABCD$ is a circle. AC and BD intersect at E. If $AB = AD$ and $AD // BC$, then $\angle BAE =$



A. 53°.

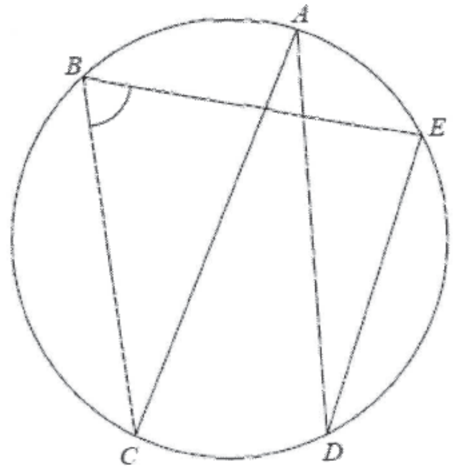
B. 57°.

C. 69°.

D. 74°.

[2013-DSE-MATHS 2-19]

97. In the figure, AC is a diameter of the circle $ABCDE$. If $\angle ADE = 28°$, then $\angle CBE =$



A. 56°.

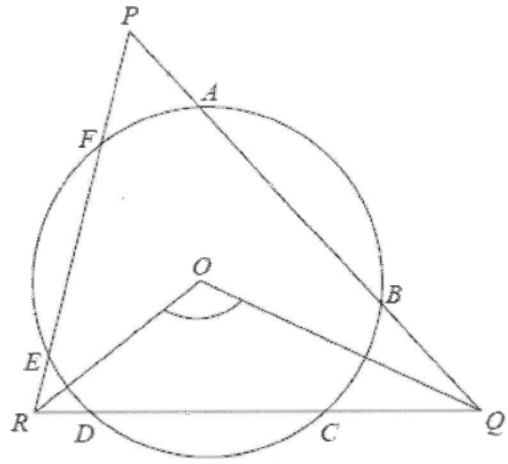
B. 62°.

C. 72°.

D. 76°.

[2014-DSE-MATHS 2-20]

98. In the figure, O is the centre of the circle $ABCDEF$. ΔPQR intersects the circle at A, B, C, D, E and F. If $\angle QPR = 38°$ and $AB = CD = EF$, then $\angle QOR =$



A. 109°.

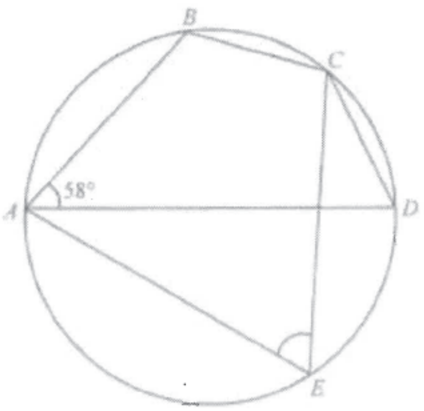
B. 117°.

C. 123°.

D. 142°.

[2014-DSE-MATHS 2-21]

99. In the figure, AD is a diameter of the circle $ABCDE$. If $\angle BAD = 58°$ and $BC = CD$, then $\angle AEC =$



A. $32°$.

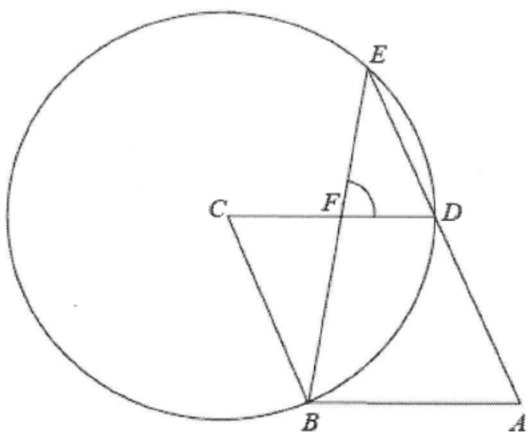
B. $58°$.

C. $61°$.

D. $64°$.

[2015-DSE-MATHS 2-20]

100. In the figure, $ABCD$ is a rhombus. C is the centre of the circle BDE and ADE is a straight line. BE and CD intersect at F. If $\angle ADC = 118°$, then $\angle DFE =$



A. $59°$.

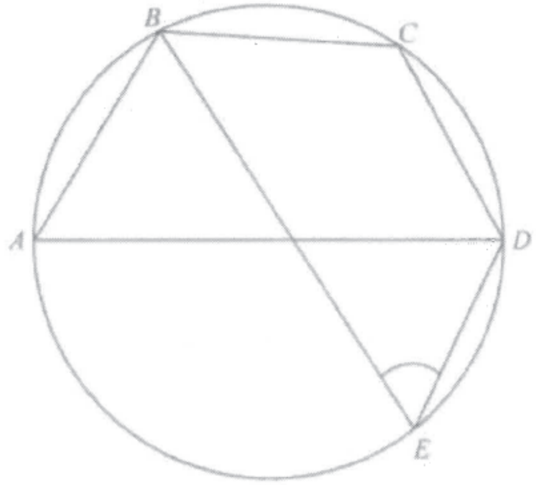
B. $62°$.

C. $78°$.

D. $87°$.

[2016-DSE-MATHS 2-22]

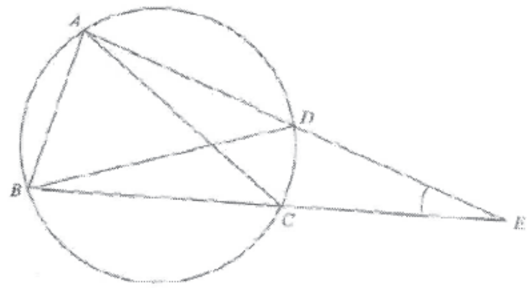
101. In the figure, AD is a diameter of the circle $ABCDE$. If $BC = CD$ and $\angle ABC = 110°$, then $\angle BED =$



A. $20°$.
B. $35°$.
C. $40°$.
D. $55°$.

[2017-DSE-MATHS 2-21]

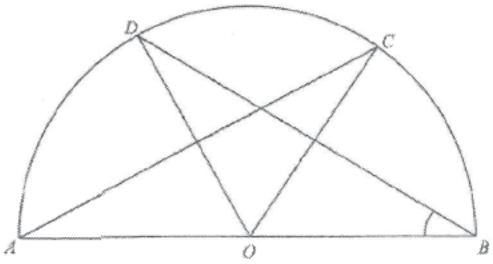
102. In the figure, $ABCD$ is a circle. AD produced and BC produced meet at the point E. It is given that $BD = DE$, $\angle BAC = 66°$ and $\angle ABD = 30°$. Find $\angle CED$.



A. $20°$
B. $28°$
C. $36°$
D. $42°$

[2018-DSE-MATHS 2-22]

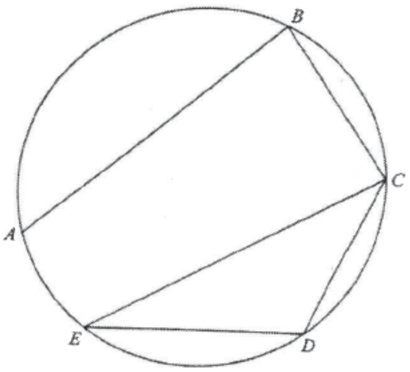
103. In the figure, O is the centre of the semi-circle $ABCD$. If $AC = BD$ and $\angle COD = 48°$, then $\angle ABD =$



A. 31°
B. 33°
C. 42°
D. 48°

[2019-DSE-MATHS 2-21]

104. In the figure, $ABCDE$ is a circle. If $AB = 10\ cm, BC = 5\ cm,\ \angle ABC = 90°$ and $\angle CED = 40°$, find CD correct to the nearest cm.

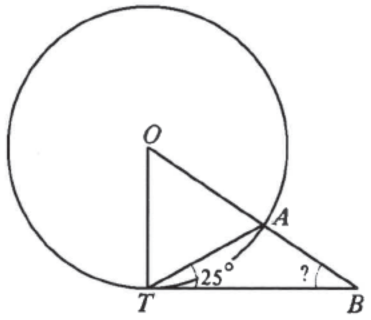


A. 5 cm
B. 6 cm
C. 7 cm
D. 8 cm

[2020-DSE-MATHS 2-22

Properties of Tangents

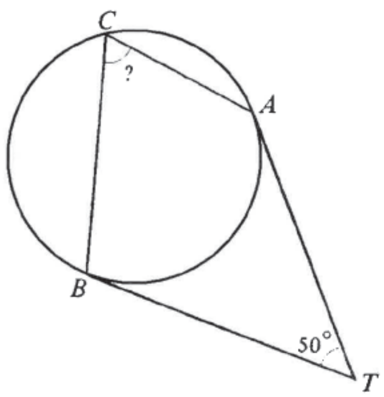
1. In the figure, O is the centre of the circle. TB is a tangent. OAB is a straight line. $\angle ATB = 25°$. $\angle ABT =$



A. $30°$.
B. $40°$.
C. $45°$.
D. $50°$.
E. $60°$.

[SP-CE-MATHS 2-23]

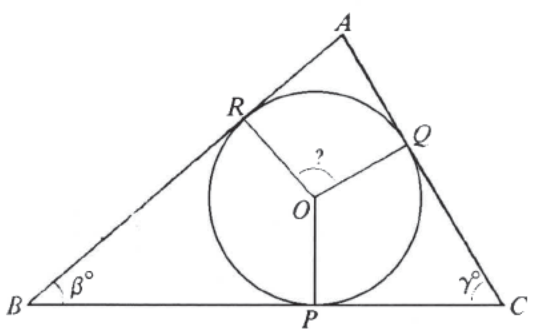
2. In the figure, TA and TB are tangents. $\angle ATB = 50°$. $\angle ACB =$



A. $40°$.
B. $50°$.
C. $60°$.
D. $65°$.
E. $75°$.

[SP-CE-MATHS A2-47]

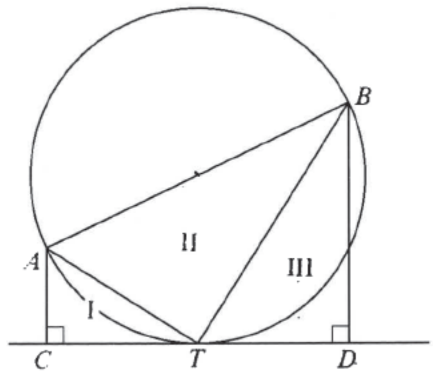
3. In the figure, circle O touches the three sides of ΔABC. $\angle B = \beta°$; $\angle C = \gamma°$. $\angle ROQ =$



A. $(\beta + \gamma)°$.
B. $(\beta + \gamma)° - 180°$.
C. $90° - (\beta + \gamma)°$.
D. $180° - (\beta + \gamma)°$.
E. $360° - (\beta + \gamma)°$.

[SP-CE-MATHS A2-49]

4. In the figure, AB is a diameter. CTD is a tangent. $AC \perp CD$; $BD \perp CD$. ΔACT, ΔATB and ΔBTD are denoted by I, II and III respectively.

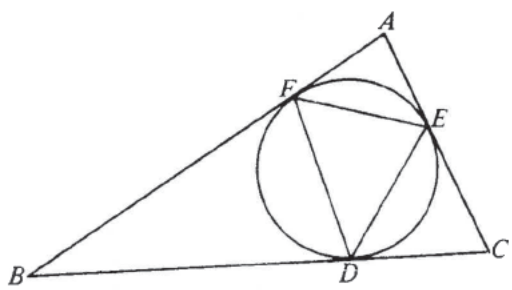


Which of the following is a true statement about the triangles?

A. No two of them are similar.
B. Only I and II are similar.
C. Only I and III are similar.
D. Only II and III are similar.
E. All three of them are similar.

[SP-CE-MATHS A2-54]

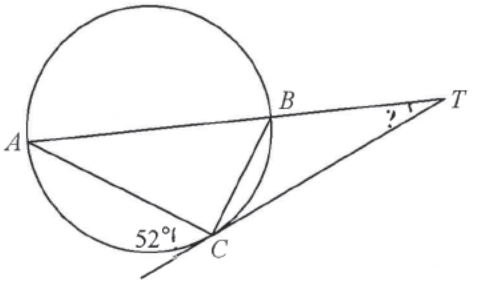
5. ABC is a triangle. The circle touches the sides of ΔABC at D, E and F as shown in the figure. Which of the following statements is true?



A. $FD // AC$.
B. BDF is an isosceles triangle.
C. $FD = \frac{1}{2}AC$.
D. $ACDF$ is a cyclic quadrilateral.
E. DEF is an equilateral triangle.

[SP-CE-MATHS A2-56]

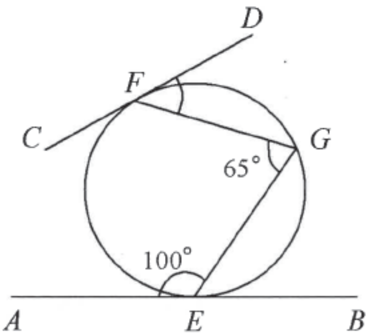
6. In the figure, the tangent to the circle at C meets the diameter AB produced at T. $\angle ATC =$



A. 38°.
B. 26°.
C. 19°.
D. 14°.
E. 13°.

[1978-CE-MATHS 2-7]

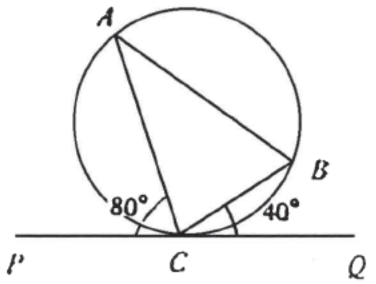
7. In the figure, AB and CD touch the circle at E and F respectively. If $\angle AEG = 100°$ and $\angle EGF = 65°$, then $\angle GFD =$



A. 30°.
B. 35°.
C. 45°.
D. 50°.
E. 60°.

[1979-CE-MATHS 2-9]

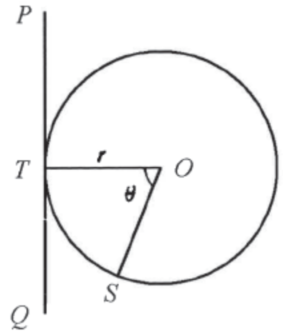
8. In the figure, PQ touches the circle at C, and the length of minor arc AC is 12 cm. What is the length of minor arc AB?



A. 9 cm
B. 8 cm
C. 7.5 cm
D. 7 cm
E. 6 cm

[1979-CE-MATHS 2-10]

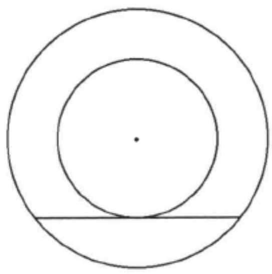
9. In the figure, PQ touches the circle centre O and radius r, at T. $\angle TOS = \theta$. How far is S from PQ?



A. $r \sin\theta$
B. $r \cos\theta$
C. $r(1 - \sin\theta)$
D. $r(1 - \cos\theta)$
E. $r(1 - \tan\theta)$

[1979-CE-MATHS 2-33]

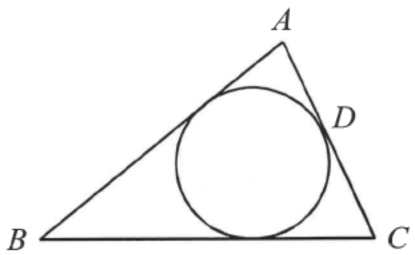
10. In the figure, the two concentric circles are of radii a and b, where $a > b$. A chord of the greater circle touches the smaller circle. How long is this chord?



A. $2(a-b)$
B. $\sqrt{a^2+b^2}$
C. $2\sqrt{a^2+b^2}$
D. $\sqrt{a^2-b^2}$
E. $2\sqrt{a^2-b^2}$

[1979-CE-MATHS 2-34]

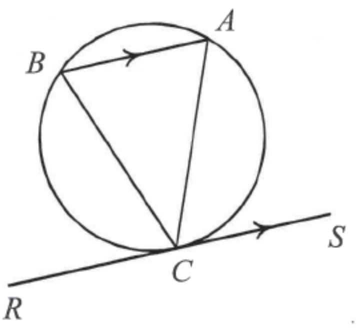
11. In the figure, the inscribed circle of ΔABC touches AC at D. If $AB = 7$, $AC = 5$ and $AD = 2$, then $BC =$



A. 9.5 .
B. 9 .
C. 8.5 .
D. 8 .
E. 7.5 .

[1980-CE-MATHS 2-27]

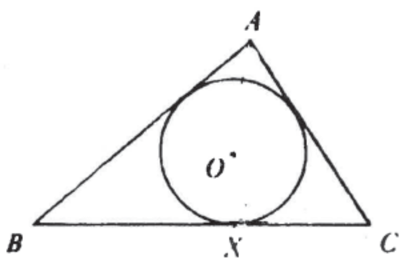
12. In the figure, RS is a tangent to the circle at C. BA is any chord parallel to RCS. Which of the chords AB, BC and CA must be equal in length?



A. AB and BC only
B. AC and BC only
C. AB and AC only
D. All of them
E. No two of them

[1980-CE-MATHS 2-48]

13.



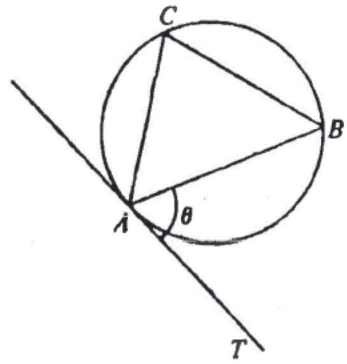
In the figure, circle O is inscribed in ΔABC, touching BC at X. Which of the following must be true?

(1) $OX \perp BC$
(2) OA bisects $\angle A$
(3) AO produced bisects BC

A. (1) only
B. (1) and (2) only
C. (1) and (3) only
D. (1), (2) and (3)
E. None of them

[1980-CE-MATHS 2-51]

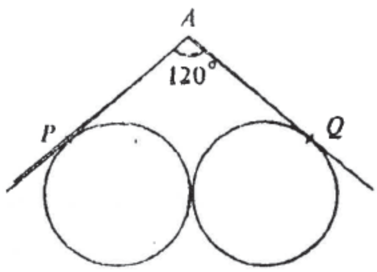
14. In the figure, AT touches the circle at A. In ΔABC, $\angle A : \angle B : \angle C = 2 : 3 : 4$. $\theta =$



A. 40° .
B. 50° .
C. 60° .
D. 70° .
E. 80° .

[1981-CE-MATHS 2-25]

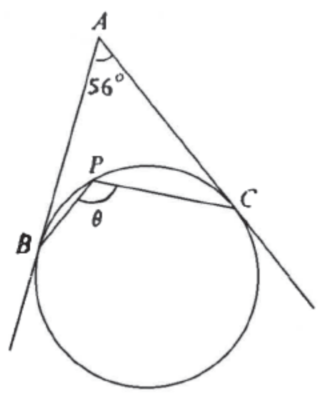
15. In the figure, two circles both with radius 2 cm touch each other externally. AP and AQ are equal tangents to the two circles. $AP =$



A. $\sqrt{3}$ cm .
B. $2\sqrt{3}$ cm .
C. 4 cm .
D. $4\sqrt{3}$ cm .
E. $\frac{4\sqrt{3}}{3}$ cm .

[1981-CE-MATHS 2-27]

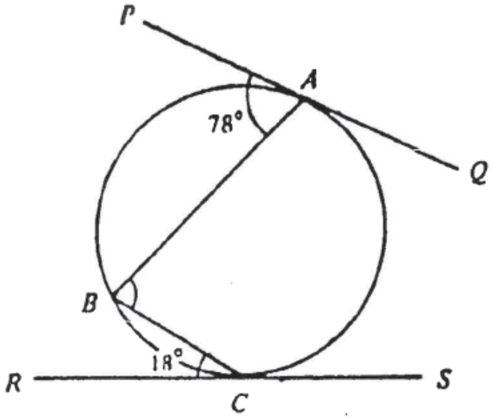
16. In the figure, AB and AC touch the circle at B and C. If P is any point on the minor arc BC, what is θ?



A. 112°
B. 118°
C. 124°
D. 146°
E. It cannot be determined

[1981-CE-MATHS 2-51]

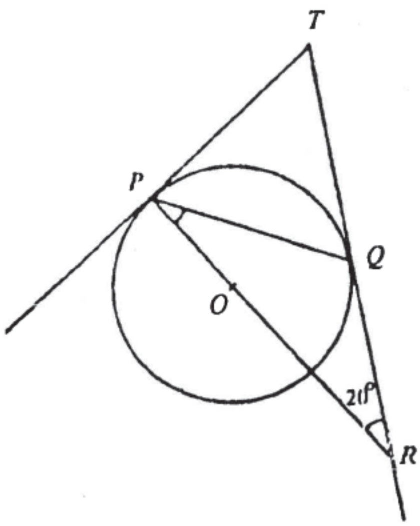
17. In the figure, PQ and RS touch the circle at A and C respectively. $\angle ABC =$



A. 48°.
B. 60°.
C. 84°.
D. 90°.
E. 96°.

[1982-CE-MATHS 2-28]

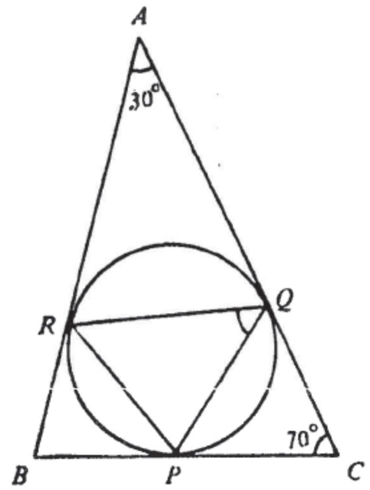
18. In the figure, TP and TQ touch the circle at P and Q respectively. R is the point on TQ produced such that PR passes through the centre O of the circle. $\angle QPR =$



A. 55°.
B. 40°.
C. 35°.
D. 30°.
E. 20°.

[1982-CE-MATHS 2-54]

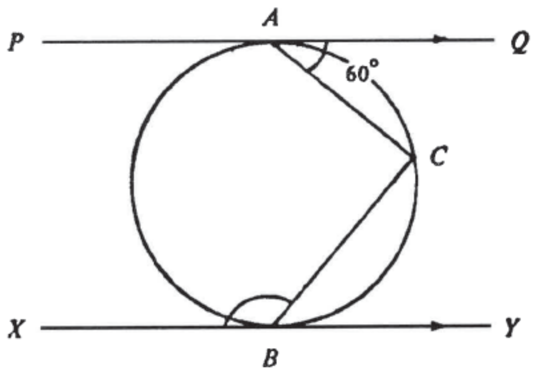
19. In the figure, the three sides of ΔABC touch the circle at the points P, Q and R. $\angle PQR =$



A. 30°.
B. 50°.
C. 55°.
D. 70°.
E. 75°.

[1983-CE-MATHS 2-25]

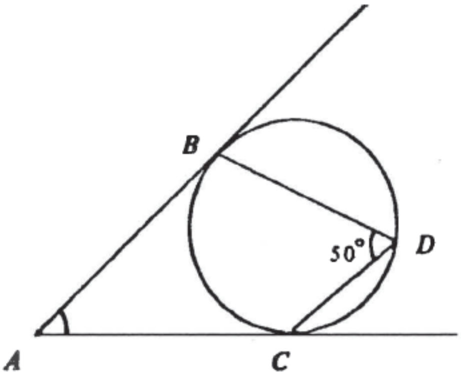
20. In the figure, PQ and XY touch the circle at A and B respectively. $PQ // XY$ and $\angle QAC = 60°$. $\angle CBX =$



A. 150°.
B. 135°.
C. 120°.
D. 110°.
E. 100°.

[1983-CE-MATHS 2-54]

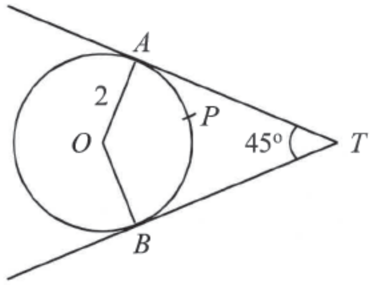
21. In the figure, AB and AC touch the circle at B and C respectively. $\angle A =$



A. 30°.
B. 40°.
C. 50°.
D. 80°.
E. 85°.

[1984-CE-MATHS 2-24]

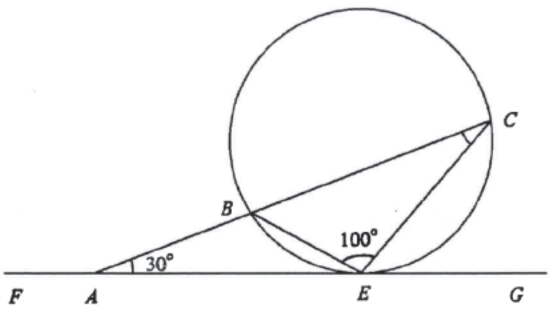
22. In the figure, O is the centre of the circle. TA and TB touch the circle at A and B respectively. $OA = 2$. The length of the arc APB is



A. $\frac{\pi}{4}$.
B. $\frac{\pi}{2}$.
C. $\frac{3\pi}{4}$.
D. $\frac{3\pi}{2}$.
E. 3π.

[1984-CE-MATHS 2-25]

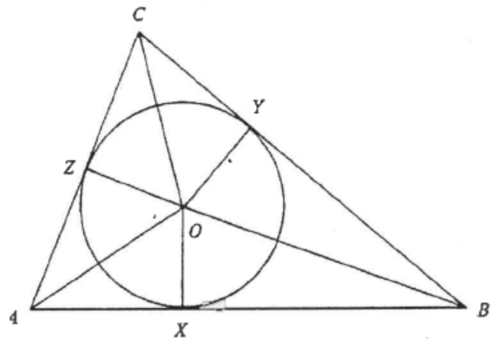
23. In the figure, FG touches the circle at E. The chord CB is produced to meet FG at A. $\angle ACE =$



A. 10°.
B. 20°.
C. 25°.
D. 30°.
E. 35°.

[1985-CE-MATHS 2-53]

24.



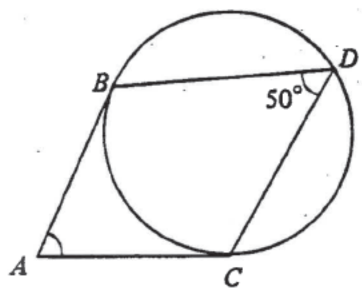
In the figure, the circle touches the sides of ΔABC at X, Y and Z. O is the centre of the circle. Which of the following must be true?

(1) OA bisects $\angle BAC$
(2) A, X, O and Z are concyclic
(3) $AX = AZ$

A. (3) only
B. (1) and (2) only
C. (1) and (3) only
D. (2) and (3) only
E. (1), (2) and (3)

[1985-CE-MATHS 2-54]

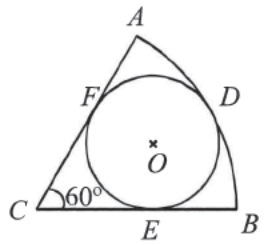
25. In the figure, AB and AC are tangents to the circle BCD. If $\angle BDC = 50°$, then $\angle A =$



A. 130°.
B. 100°.
C. 85°.
D. 80°.
E. 50°.

[1986-CE-MATHS 2-50]

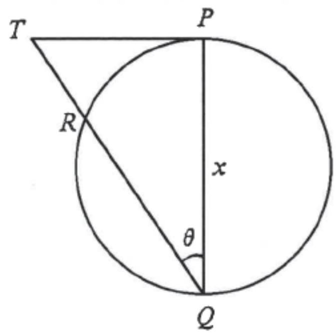
26. A circle, centre O, touches the sector ABC internally at D, E and F. $\angle C = 60°$ and $AC = 18$. Find the radius of the circle.



A. 9
B. 6
C. 5
D. 4
E. 3

[1986-CE-MATHS 2-53]

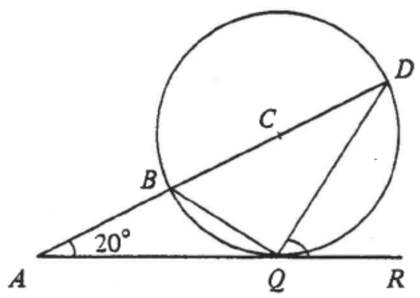
27. In the figure, PQ is a diameter and PT is a tangent of the circle. QT cuts the circle at R. Let $\angle Q = \theta$ and $PQ = x$, then $TR =$



A. $\dfrac{x}{\cos\theta}$.
B. $\dfrac{x}{\sin\theta}$.
C. $\dfrac{x}{\sin\theta\tan\theta}$.
D. $x\sin\theta\tan\theta$.
E. $x\cos\theta\tan\theta$.

[1986-CE-MATHS 2-54]

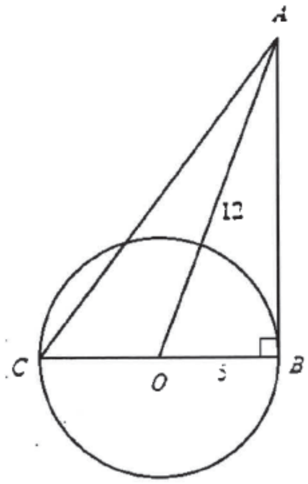
28. In the figure, C is the centre of the circle. $ABCD$ is a straight line. AQR touches the circle at Q. If $\angle DAR = 20°$, then $\angle DQR =$



A. 35°.
B. 40°.
C. 55°.
D. 65°.
E. 70°.

[1987-CE-MATHS 2-53]

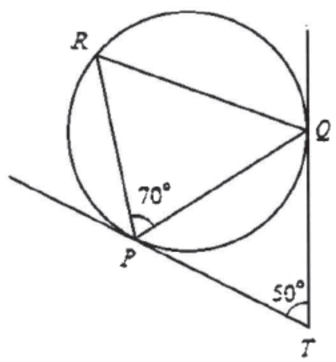
29. In the figure, O is the centre of the circle of radius 5. AB is a tangent and $AO = 12$. $AC =$



A. 13
B. 17
C. $\sqrt{219}$
D. $\sqrt{244}$
E. $\sqrt{269}$

[1988-CE-MATHS 2-21]

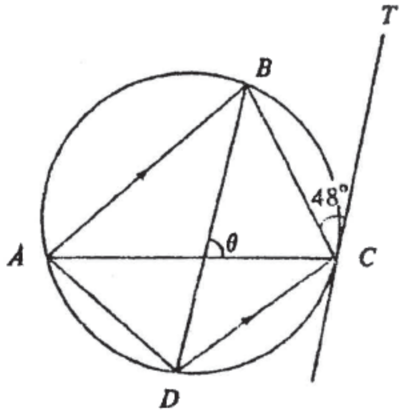
30. In the figure, TP and TQ are tangents to the circle PQR. If $\angle RPQ = 70°$ and $\angle PTQ = 50°$, then $\angle RQP =$



A. 20°
B. 45°
C. 50°
D. 60°
E. 70°

[1988-CE-MATHS 2-24]

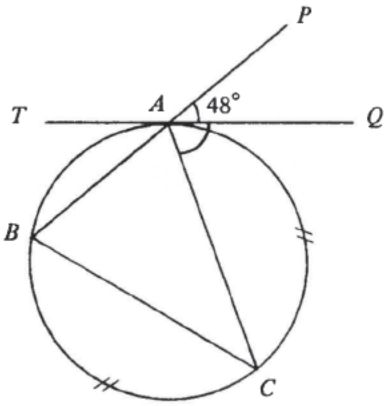
31. In the figure, TC is a tangent to the circle at C and $AB // DC$. If $\angle BCT = 48°$, then $\theta =$



A. $48°$.
B. $72°$.
C. $84°$.
D. $90°$.
E. $96°$.

[1989-CE-MATHS 2-24]

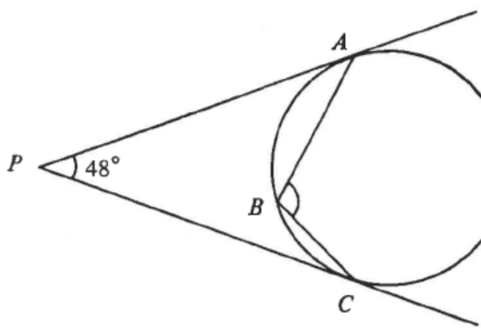
32. In the figure, TQ is a tangent to the circle at A. If arc AC = arc BC and $\angle PAQ = 48°$, then $\angle QAC =$



A. $42°$.
B. $48°$.
C. $66°$.
D. $71°$.
E. $84°$.

[1990-CE-MATHS 2-20]

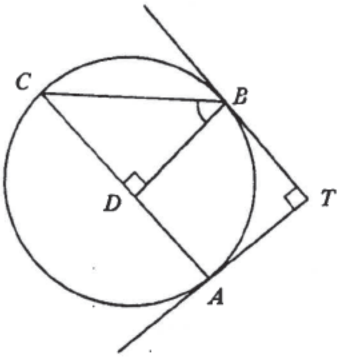
33. In the figure, PA and PC are tangents to the circle ABC. If $\angle P = 48°$, then $\angle ABC =$



A. $84°$.
B. $96°$.
C. $106°$.
D. $114°$.
E. $132°$.

[1990-CE-MATHS 2-50]

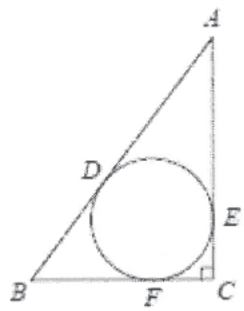
34. In the figure, TA and TB are tangents to the circle ABC. If $TA \perp TB$ and $BD \perp AC$, find $\angle CBD$.



A. 30°
B. 40°
C. 45°
D. 50°
E. 60°

[1990-CE-MATHS 2-51]

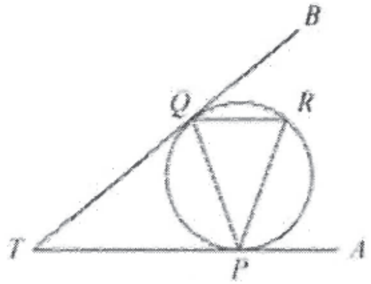
35. In the figure, AB, AC and BC are three tangents touching the circle at D, E and F respectively. If $AC = 24$, $BC = 18$ and $\angle ACB = 90°$, find the radius of the circle.



A. 3
B. 4
C. 5
D. 6
E. 7

[1990-CE-MATHS 2-53]

36.



In the figure, TPA and TQB are tangents to the circle at P and Q respectively. If $PQ = PR$, which of the following must be true?

(1) $\angle APR = \angle QRP$

(2) $\angle QTP = \angle QPR$

(3) $\angle QPR = \angle APR$

A. (1) only

B. (2) only

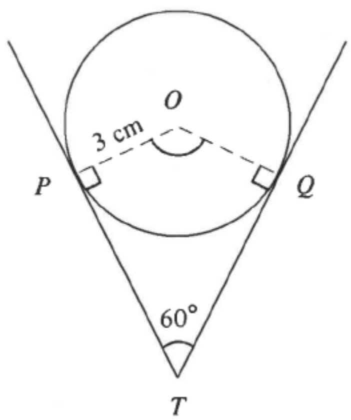
C. (3) only

D. (1) and (2) only

E. (1) and (3) only

[1991-CE-MATHS 2-24]

37. In the figure, TP and TQ are tangent to the circle of radius 3 cm. Find the length of the minor arc PQ.



A. 3π cm

B. 2π cm

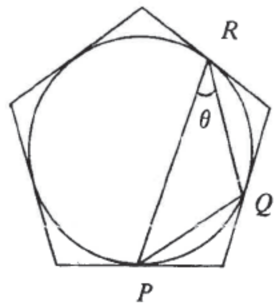
C. $\frac{3\pi}{2}$ cm

D. π cm

E. $\frac{\pi}{2}$ cm

[1992-CE-MATHS 2-14]

38. In the figure, the circle is inscribed in a regular pentagon. P, Q and R are points of contact. Find θ.



A. 30°

B. 32°

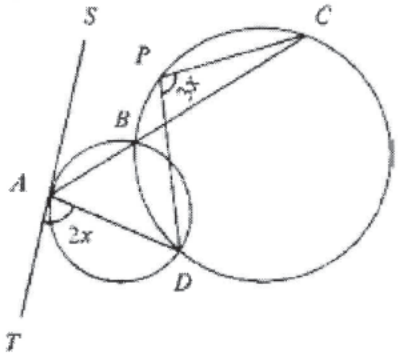
C. 35°

D. 36°

E. 45°

[1992-CE-MATHS 2-26]

39. In the figure, ST is a tangent to the smaller circle. ABC is a straight line. If $\angle TAD = 2x$ and $\angle DPC = 3x$, find x.



A. 30°

B. 36°

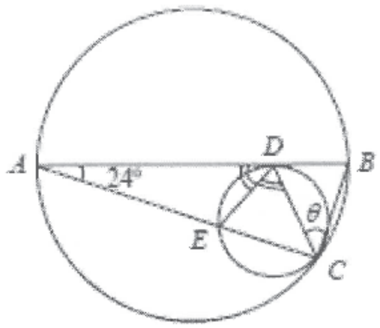
C. 40°

D. 42°

E. 45°

[1992-CE-MATHS 2-27]

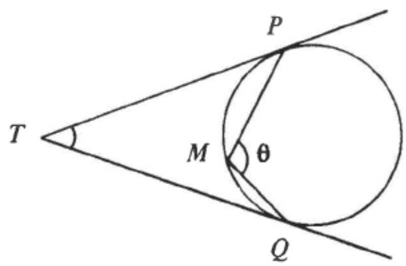
40. In the figure, the two circles touch each other at C. The diameter AB of the bigger circle is tangent to the smaller circle at D. If DE bisects $\angle ADC$, find θ.



A. 24°
B. 38°
C. 45°
D. 52°
E. 66°

[1992-CE-MATHS 2-50]

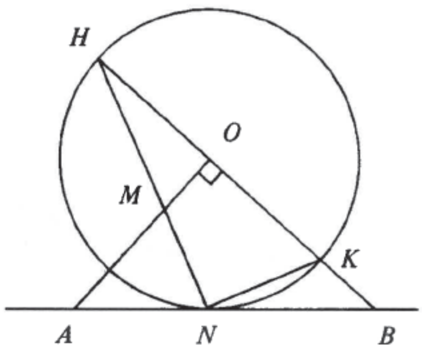
41. In the figure, TP and TQ are tangents to the circle at P and Q respectively. If M is a point on the minor arc PQ and $\angle PMQ = \theta$, then $\angle PTQ =$



A. $\frac{\theta}{2}$.
B. $\theta - 90°$.
C. $180° - \theta$.
D. $180° - 2\theta$.
E. $2\theta - 180°$.

[1993-CE-MATHS 2-50]

42.



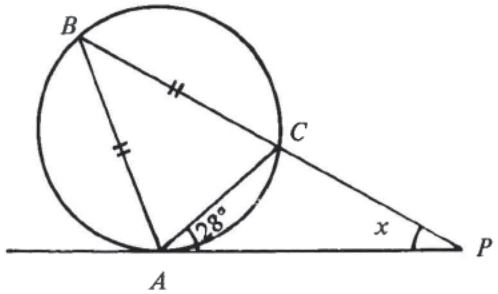
In the figure, O is the centre of the circle. AB touches the circle at N. Which of the following is/are correct?

(1) M, N, K, O are concyclic.
(2) $\Delta HNB \sim \Delta NKB$
(3) $\angle OAN = \angle NOB$

A. (1) only
B. (2) only
C. (3) only
D. (1) and (2) only
E. (1), (2) and (3)

[1993-CE-MATHS 2-51]

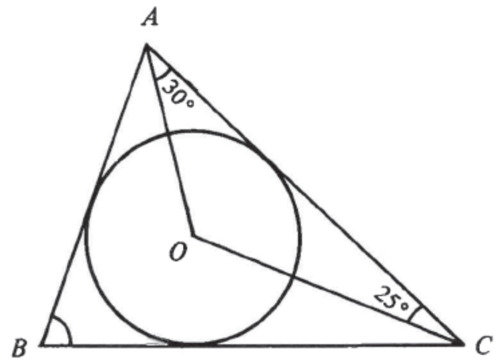
43. In the figure, PA is tangent to the circle at A, $\angle CAP = 28°$ and $BA = BC$. Find x.



A. 28°
B. 48°
C. 56°
D. 62°
E. 76°

[1994-CE-MATHS 2-22]

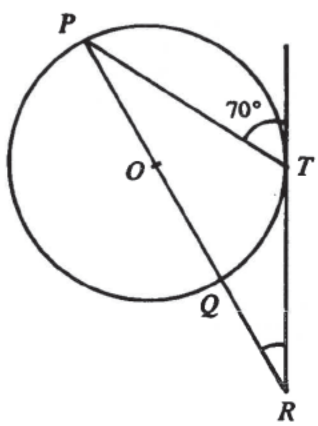
44. In the figure, O is the centre of the inscribed circle of ΔABC. If $\angle OAC = 30°$ and $\angle OCA = 25°$. Find $\angle ABC$.



A. 50°
B. 55°
C. 60°
D. 62.5°
E. 70°

[1994-CE-MATHS 2-23]

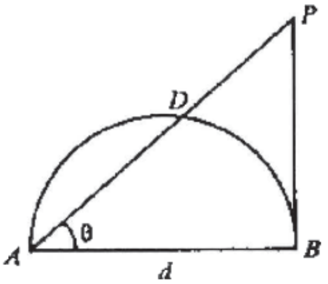
45. In the figure, O is the centre of the circle, $POQR$ is a straight line. TR is the tangent to the circle at T. $\angle PRT =$



A. 20°.
B. 35°.
C. 45°.
D. 50°.
E. 70°.

[1995-CE-MATHS 2-23]

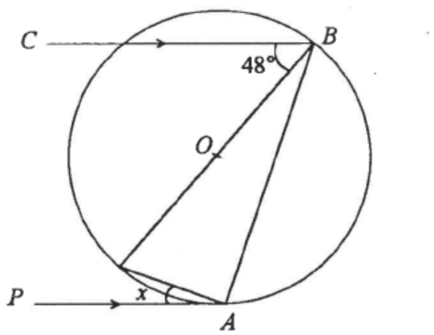
46. In the figure, PB touches the semicircle ADB at B. $PD =$



A. $\dfrac{d}{2\cos\theta}$.
B. $d\sin\theta\tan\theta$.
C. $\dfrac{d}{\sin\theta\tan\theta}$.
D. $\dfrac{d\cos\theta}{\tan\theta}$.
E. $\dfrac{d\tan\theta}{\cos\theta}$.

[1995-CE-MATHS 2-52]

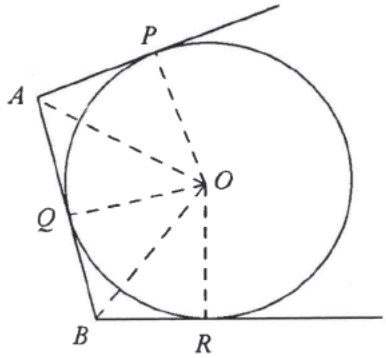
47. In the figure, O is the centre of the circle. PA is the tangent to the circle at A and $CB // PA$. Find x.



A. 21°
B. 24°
C. 42°
D. 45°
E. 48°

[1996-CE-MATHS 2-26]

48.



In the figure, O is the centre of the circle. AP, AB and BR are tangents to the circle at P, Q and R respectively. Which of the following must be true?

(1) $AP + BR = AB$

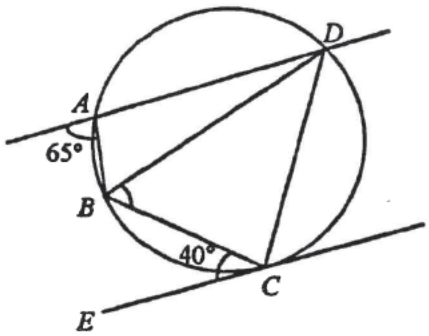
(2) OQ bisects $\angle AOB$

(3) $\angle AOB = \frac{1}{2}\angle POR$

A. (1) only
B. (2) only
C. (1) and (2) only
D. (1) and (3) only
E. (1), (2) and (3)

[1996-CE-MATHS 2-50]

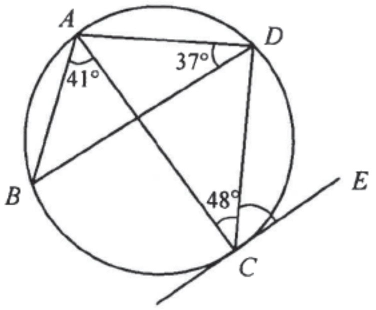
49. In the figure, EC is the tangent to the circle at C. Find $\angle CBD$.



A. 40°
B. 50°
C. 65°
D. 70°
E. 75°

[1997-CE-MATHS 2-20]

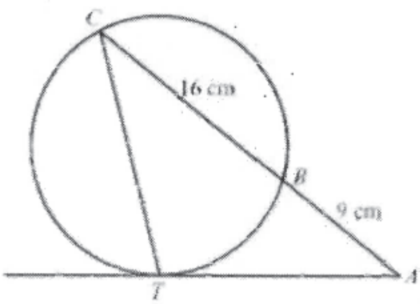
50. In the figure, CE is tangent to the circle at C. Find $\angle DCE$.



A. 40°
B. 42°
C. 49°
D. 54°
E. 78°

[1998-CE-MATHS 2-49]

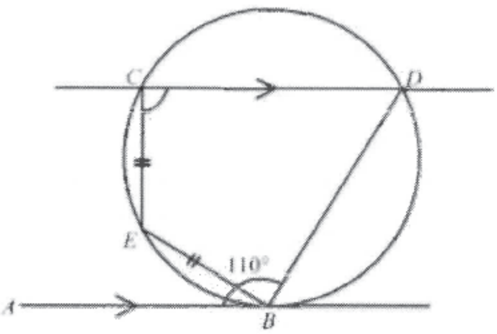
51. In the figure, AT is tangent to the circle at T and ABC is a straight line. Find AT.



A. 9 cm
B. 12 cm
C. 15 cm
D. 16 cm
E. 20 cm

[1999-CE-MATHS 2-50]

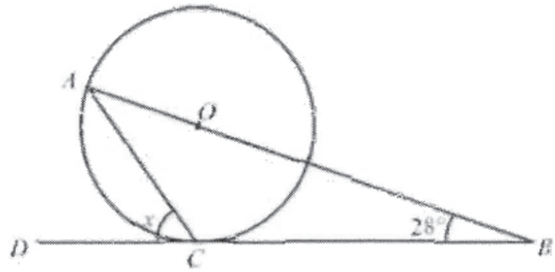
52. In the figure, AB is tangent to the circle at B. Find $\angle DCE$.



A. 70°
B. 75°
C. 90°
D. 95°
E. 105°

[2000-CE-MATHS 2-45]

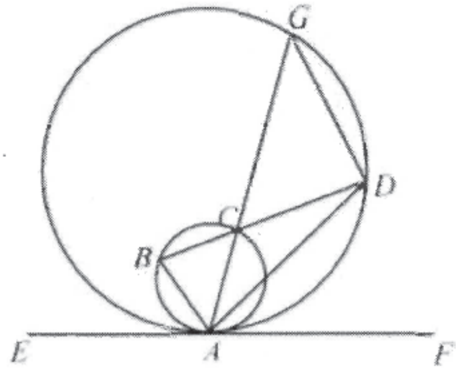
53. In the figure, O is the centre of the circle, AOB is a straight line and BCD is the tangent to the circle at C. Find x.



A. 50°
B. 53°
C. 56°
D. 59°
E. 62°

[2001-CE-MATHS 2-45]

54.



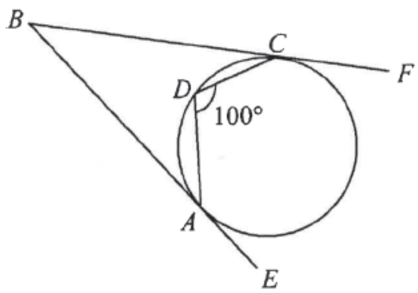
In the figure, EAF is a common tangent to the circles at the point A. Chords AC and BC of the smaller circle are produced to meet the larger circle at G and D respectively. Which of the following must be true?

(1) $\angle ADG = \angle EAG$
(2) $\angle ABD = \angle AGD$
(3) $\angle BAE = \angle ADB$

A. (1) only
B. (2) only
C. (1) and (3) only
D. (2) and (3) only

[2002-CE-MATHS 2-51]

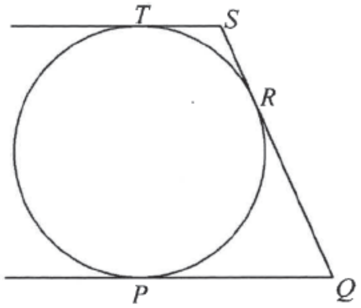
55. In the figure, BE and BF are tangents to the circle at A and C respectively. If $\angle ADC = 100°$, then $\angle ABC =$



A. 20°.
B. 30°.
C. 40°.
D. 50°.

[2003-CE-MATHS 2-52]

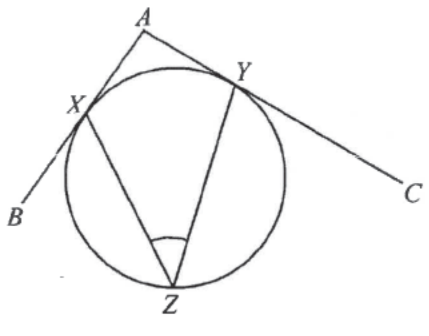
56. In the figure, TS, SQ and QP are tangents to the circle at T, R and P respectively. If TS // PQ, $TS = 3$ and $QP = 12$, then the radius of the circle is



A. 4.5.
B. 6.
C. 7.5.
D. 9.

[2004-CE-MATHS 2-51]

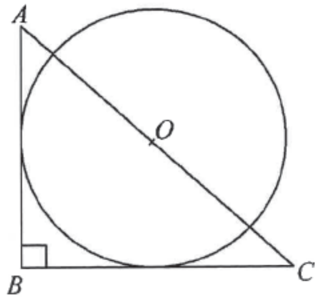
57. In the figure, AB and AC are tangents to the circle at X and Y respectively. Z is a point lying on the circle. If $\angle BAC = 100°$, then $\angle XZY =$



A. 40°.
B. 45°.
C. 50°.
D. 55°.

[2005-CE-MATHS 2-49]

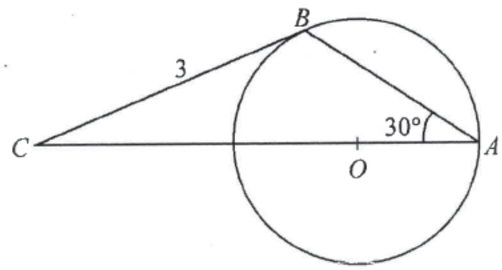
58. In the figure, O is the centre of the circle and AOC is a straight line. If AB and BC are tangents to the circle such that $AB = 3$ and $BC = 4$, then the radius of the circle is



A. $\frac{3}{2}$.
B. $\frac{12}{7}$.
C. 2.
D. $\frac{5}{2}$.

[2005-CE-MATHS 2-50]

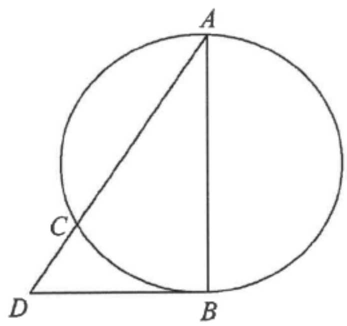
59. In the figure, O is the centre of the circle. A and B are points lying on the circle. If AOC is a straight line and BC is a tangent to the circle, then the radius of the circle is



A. $\frac{3}{2}$.
B. $\sqrt{3}$.
C. $2\sqrt{3}$.
D. $3\sqrt{3}$.

[2006-CE-MATHS 2-47]

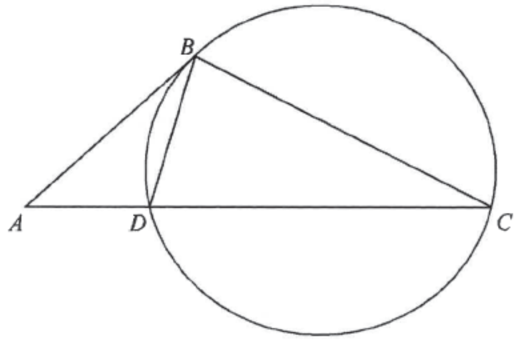
60. In the figure, A, B and C are points lying on the circle. AB is a diameter of the circle. DB tangent to the circle at B. If ACD is a straight line with $AC = 4$ and $CD = 2$, then $AB =$



A. $2\sqrt{6}$.
B. $4\sqrt{3}$.
C. $4\sqrt{6}$.
D. $8\sqrt{3}$.

[2007-CE-MATHS 2-49]

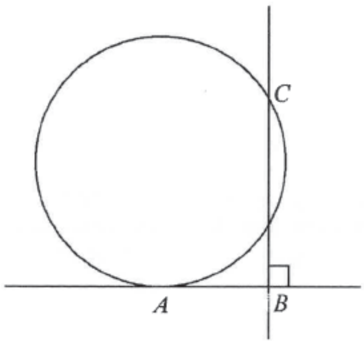
61. In the figure, AB is the tangent to the circle at B and ADC is a straight line. If $AB : AD = 2 : 1$, then the area of ΔABD : the area of ΔBCD =



A. 1 : 2.
B. 1 : 3.
C. 1 : 4.
D. 2 : 3.

[2008-CE-MATHS 2-51]

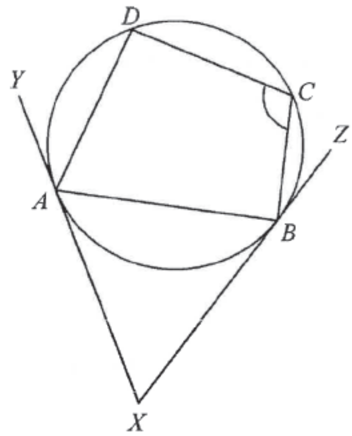
62. In the figure, AB is the tangent to the circle at A. If $AB = 20$ and $BC = 50$, find the radius of the circle.



A. 20
B. 25
C. 29
D. 30

[2009-CE-MATHS 2-50]

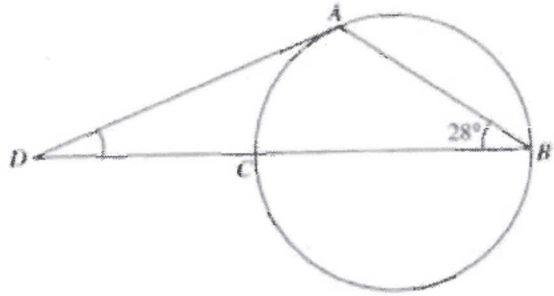
63. In the figure, XY and XZ are the tangents to the circle $ABCD$ at A and B respectively. If $\angle AXB = 50°$ and $\angle DAY = 30°$, then $\angle BCD$ =



A. 65°.
B. 80°.
C. 95°.
D. 130°.

[2010-CE-MATHS 2-50]

64. In the figure, BC is a diameter of the circle ABC. BCD is a straight line and DA is the tangent to the circle at A. If $\angle ABC = 28°$, then $\angle ADB$ =

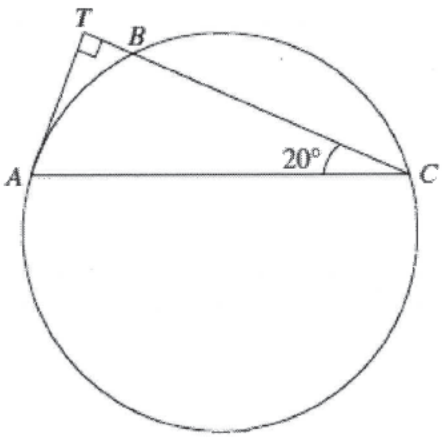


A. 22°.
B. 28°.
C. 34°.
D. 62°.

[2011-CE-MATHS 2-49]

HKDSE Problems

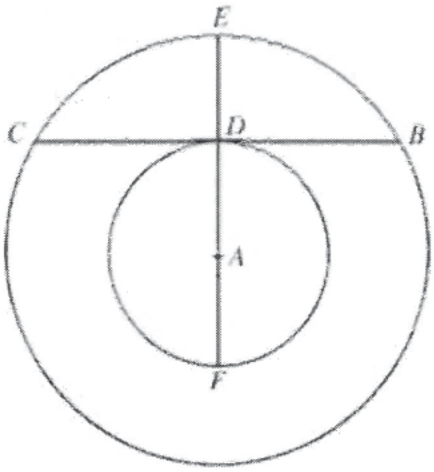
65. In the figure, A, B and C are points lying on the circle. TA is the tangent to the circle at A. The straight line CBT is perpendicular to TA. If $BC = 6$ cm, find the radius of the circle correct to the nearest 0.1 cm.



A. 3.2 cm
B. 3.9 cm
C. 4.2 cm
D. 4.7 cm

[SP-DSE-MATHS 2-41]

66. In the figure, A is the common centre of the two circles. BC is a chord of the larger circle and touches the smaller circle at D. AD produced meets the larger circle at E. F is a point lying on the smaller circle such that E, D, A and F are collinear. If $BC = 24$ cm and $DE = 8$ cm, then $EF =$



A. 13 cm .

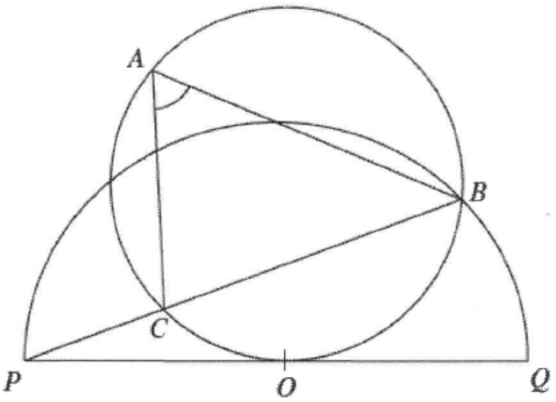
B. 16 cm .

C. 18 cm .

D. 20 cm .

[PP-DSE-MATHS 2-40]

67. In the figure, PQ is the tangent to the circle ABC at O, where O is the centre of the semicircle PBQ. It is given that BCP is a straight line. If $\angle BPQ = 12°$, then $\angle BAC =$



A. 18° .

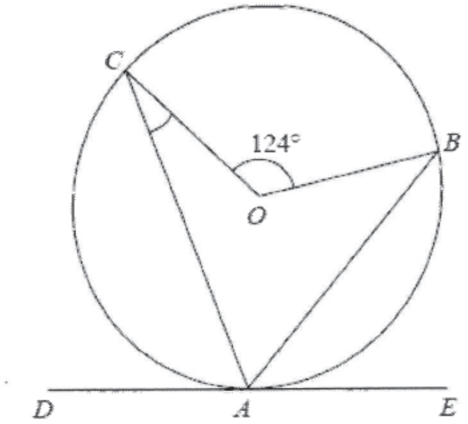
B. 24° .

C. 36° .

D. 54° .

[2012-DSE-MATHS 2-41]

68. In the figure, O is the centre of the circle ABC. DE is the tangent to the circle at A. If AB is the angle bisector of $\angle CAE$, then $\angle ACO =$



A. 26° .

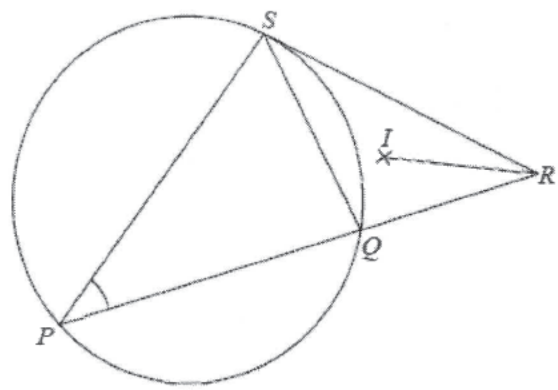
B. 28° .

C. 31° .

D. 34° .

[2013-DSE-MATHS 2-41]

69. In the figure, PQS is a circle. PQ is produced to R such that RS is the tangent to the circle at S. I is the in-centre of ΔQRS. If $\angle IRQ = 12°$ and $\angle PSQ = 70°$, then $\angle QPS =$



A. 24° .

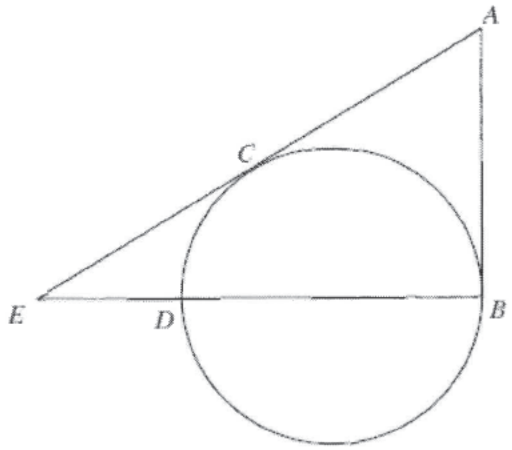
B. 37° .

C. 43° .

D. 62° .

[2014-DSE-MATHS 2-41]

70. In the figure, AB and AC are the tangents to the circle at B and C respectively. BD is a diameter of the circle. AC produced and BD produced meet at E. If $AB = 6$ cm and $AE = 10$ cm, then $BD =$



A. 3 cm .

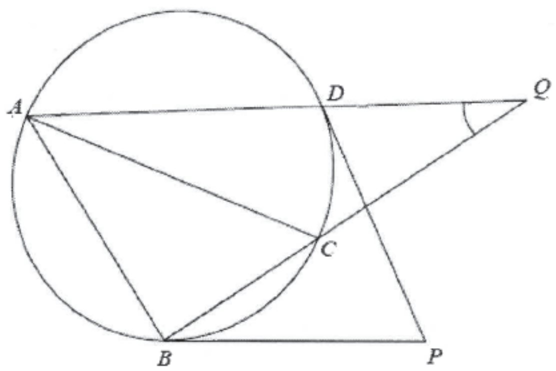
B. 5 cm .

C. 6 cm .

D. 8 cm .

[2015-DSE-MATHS 2-40]

71. In the figure, AC is a diameter of the circle $ABCD$. PB and PD are tangents to the circle. AD produced and BC produced meet at Q. If $\angle BPD = 68°$, then $\angle AQB =$



A. 22° .

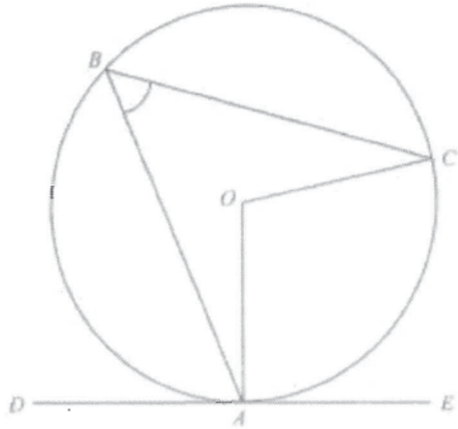
B. 28° .

C. 32° .

D. 34° .

[2016-DSE-MATHS 2-40]

72. In the figure, O is the centre of the circle ABC. DE is the tangent to the circle at A. If $\angle BAD = 68°$ and $\angle BCO = 26°$, then $\angle ABC =$



A. 42° .

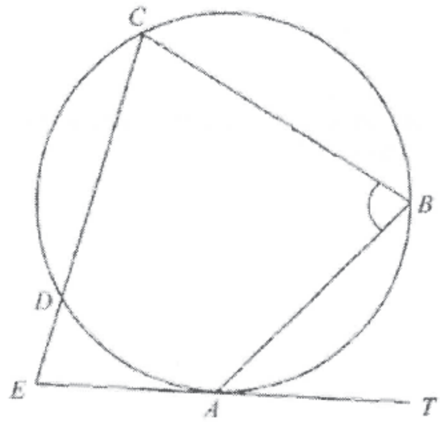
B. 48° .

C. 54° .

D. 64° .

[2017-DSE-MATHS 2-40]

73. In the figure, TA is the tangent to the circle $ABCD$ at the point A. CD produced and TA produced meet at the point E. It is given that $AB = CD$, $\angle BAT = 24°$ and $\angle AED = 72°$. Find $\angle ABC$.



A. 60°

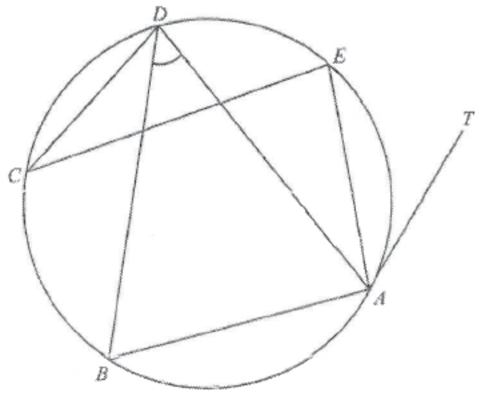
B. 66°

C. 72°

D. 78°

[2018-DSE-MATHS 2-39]

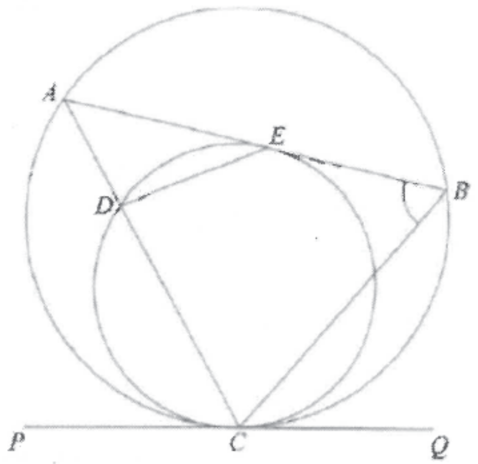
74. In the figure, TA is the tangent to the circle $ABCDE$ at point A. If $\angle BAD = 64°$, $\angle EAT = 38°$ and $\angle DCE = 22°$, then $\angle ADB =$



A. 52°
B. 56°
C. 60°
D. 68°

[2019-DSE-MATHS 2-39]

75. In the figure, ABC and CDE are circles such that ADC is a straight line. PQ is the common tangent to the two circles at C. AB is the tangent to the circle CDE at E. If $\angle ADE = 100°$ and $\angle BCQ = 35°$, then $\angle ABC =$



A. 55°
B. 65°
C. 70°
D. 80°

[2020-DSE-MATHS 2-39]