Form 5

HKCEE 1980
Mathematics II

80 1. $2ab - a^2 - b^2 =$

A. $(a-b)^2$
B. $(-a-b)^2$
C. $(-a+b)^2$
D. $-(a+b)^2$
E. $-(a-b)^2$

80 2. $125^a \cdot 5^b =$

A. 625^{a+b}
B. 625^{ab}
C. 125^{a+3b}
D. 5^{a+3b}
E. 5^{3a+b}

80 3. If $4p = 9q$, then $\frac{4p^2}{9q^2} =$

A. 1
B. $\frac{4}{9}$
C. $\frac{9}{4}$
D. $(\frac{4}{9})^2$
E. $(\frac{9}{4})^2$

80 4. If $n = 10^a$, then $\log_{10} n =$

A. 10^a
B. 10^n
C. n^a
D. a^n
E. a

80 5. $\frac{x^{-2} - y^{-2}}{x^{-1} - y^{-1}} =$

A. $x^{-1} + y^{-1}$
B. $x^{-1} - y^{-1}$
C. $x^{-3} - y^{-3}$
D. $\frac{1}{x-y}$
E. $\frac{1}{x+y}$

80 6. If $\frac{1}{x} = a + b$ and $\frac{1}{y} = a - b$, then $x + y =$

A. $\frac{2}{a}$
B. $\frac{a^2 - b^2}{a}$
C. $-\frac{a^2 - b^2}{a}$
D. $\frac{2a}{a^2 - b^2}$
E. $\frac{-2a}{a^2 - b^2}$

80 7. If $x = \frac{y + (n-1)z}{n+1}$, then $n =$

A. $\frac{x - y + z}{z}$
B. $\frac{x + y - z}{z}$
C. $\frac{y - x - z}{x + z}$
D. $\frac{y - x - z}{x - z}$
E. $\frac{y + x - z}{x - z}$

80 8. $\frac{5^{n+2} - 35(5^{n-1})}{18(5^{n+1})} =$

A. $\frac{1}{18}$
B. $\frac{1}{15}$
C. $\frac{1}{5}$
D. 5
E. 5^n

80 9. Solve the inequality $(4x + 3)(x - 4) > 0$

A. $x > 4$
B. $4 > x > -\frac{3}{4}$
C. $-\frac{3}{4} > x$
D. $-\frac{3}{4} > x$ or $x > 4$
E. $x > -\frac{3}{4}$

80 10. When the hour hand has turned through an angle x^o, what is the angle through which the minute hand has turned?

A. $6x^o$
B. $12x^o$
C. $60x^o$
D. $360x^o$
E. $3\,600x^o$

80 11. The first term of an arithmetic progression is 6 and its tenth term is three times its second term. The common difference is

A. 18
B. 4
C. 3
D. 2
E. 1

80 12. A man solid a car for \$35 000 at a loss of 30% on the cost price. What would have been the loss or gain percent if he had sold it for \$50 500?

A. A gain of 10%
B. A gain of 1%
C. No gain nor loss
D. A loss of 10%
E. A loss of 1%

80 13. If the length of a rectangle is increased by 10% and the width decreased by 10%, which of the following is true?

A. Its area remains the same
B. Its area is decreased by 1%
C. Its area is increased by 1%
D. Its area is decreased by 10%
E. Its area is increased by 10%

80 14. The length of a side of a rhombus is 10 cm. If its shorter diagonal is of length 12 cm, what is the area of the rhombus in cm^2?

A. 60
B. 96
C. 100
D. 120
E. 192

80 15. If the bearing of B from A is S30°W, then the bearing of A from B is

A. N30°E
B. N60°W
C. N60°E
D. S30°W
E. S30°E

80 16. $\frac{1}{\frac{1}{\sin\theta} - 1} - \frac{1}{\frac{1}{\sin\theta} + 1} =$

A. $2\tan\theta$
B. $2\tan^2\theta$
C. $\frac{2}{\tan^2\theta}$
D. $\frac{2\sin\theta}{\cos^2\theta}$
E. $\frac{2\sin^2\theta}{\cos\theta}$

80 17. If $\cos\theta = x$ and $0^\circ < \theta < 90^\circ$, then $\tan\theta$

A. $\dfrac{1}{\sqrt{1-x^2}}$

B. $\sqrt{1-x^2}$

C. $\dfrac{\sqrt{1-x^2}}{x}$

D. $\dfrac{x}{\sqrt{1-x^2}}$

E. $\pm\dfrac{x}{\sqrt{1-x^2}}$

80 18. If $0^\circ \le \theta < 360^\circ$, which of the following equations has exactly one root?

A. $\sin\theta = -1$

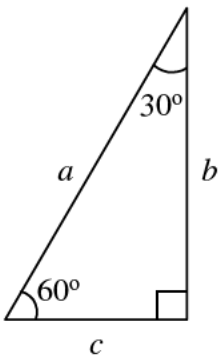
B. $\sin\theta = -\dfrac{1}{2}$

C. $\sin\theta = 0$

D. $\sin\theta = \dfrac{1}{2}$

E. $\sin\theta = 2$

80 19.



In the figure, $a : b : c =$

A. 3 : 2 :1

B. 9 : 4 : 1

C. $2 : \sqrt{3} : 1$

D. $\sqrt{3} : \sqrt{2} : 1$

E. $\sqrt{3} : 2 : 1$

80 20. What is the area, in cm^2, of an equilateral triangle of side x cm?

A. $\dfrac{\sqrt{3}}{4}x^2$

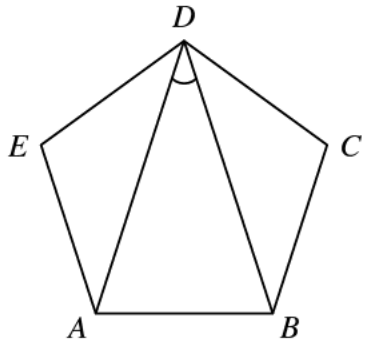
B. $\dfrac{\sqrt{3}}{2}x^2$

C. $\dfrac{1}{4}x^2$

D. $\dfrac{1}{2}x^2$

E. $\sqrt{3}x^2$

80 21.



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

A. 35°

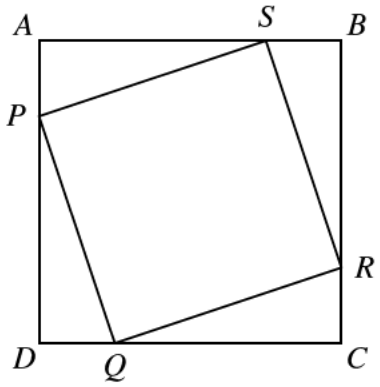
B. 36°

C. 40°

D. 54°

E. 72°

80 22.



In the figure, $ABCD$ is a square with $AB = 5$. $AP = BQ = CR = DS = 1$. What is the area of $PQRS$?

A. 9

B. 15
C. 16
D. 17
E. 18

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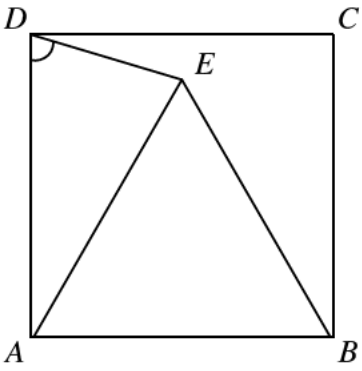

In the figure, *ABCD* is a square and *ABE* is an equilateral triangle.
$\angle ADE = ?$

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

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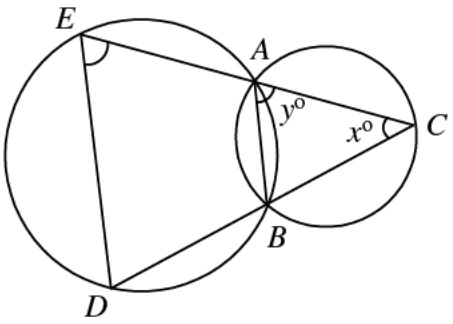
24.



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

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

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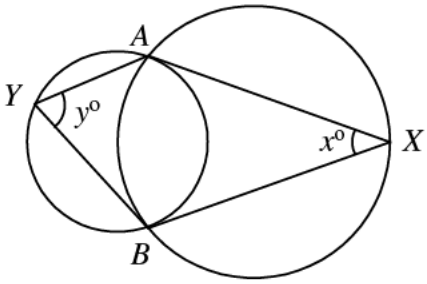

In the figure, circle *AXB* passes through the centre of circle *AYB*. $y =$

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

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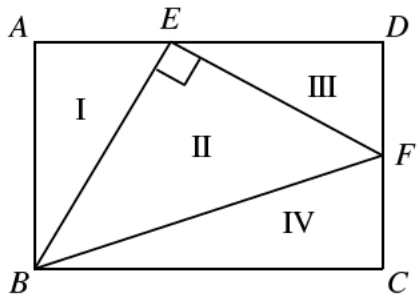
26.



In the figure, *ABCD* is a rectangle $\angle BEF = 90^o$. 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

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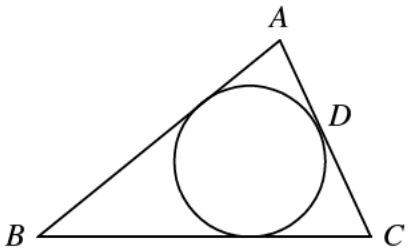
27.



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

80 28. A certain sum of money is just sufficient to pay the wages of one man for m days or the wages of one boy for n days. For how many days will this sum be just sufficient to pay the wages of one man and one boy together?

A. $m + n$
B. $\frac{m+n}{2}$
C. $\frac{1}{m} + \frac{1}{n}$
D. $\frac{m+n}{mn}$
E. $\frac{mn}{m+n}$

80 29. If the value of $y^2 + 3y + 7$ is 2, what is the value of $2y^2 + 6y - 3$?

A. -13
B. -7
C. 7
D. 13
E. It cannot be found from the information given

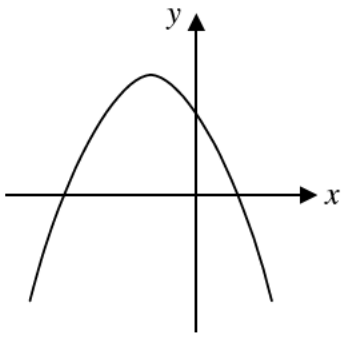
80 30. A, B, C are three spheres. If $\frac{\text{Surface area of } A}{\text{Surface area of } B} = 4$ and $\frac{\text{Volume of } B}{\text{Volume of } C} = 2$, then $\frac{\text{Volume of } A}{\text{Volume of } C} =$

A. 16
B. 8
C. 2
D. $\frac{1}{8}$
E. $\frac{1}{16}$

80 31. The $2n^{\text{th}}$ term of the geometric progression, 8, -4, 2, -1, …, is

A. $\frac{1}{2^{2n+2}}$
B. $\frac{-1}{2^{2n+2}}$
C. $\frac{1}{2^{2n-3}}$
D. $\frac{1}{2^{2n-4}}$
E. $\frac{-1}{2^{2n-4}}$

80 32.



The figure above shows the graph of $y = ax^2 + bx + c$. Determine whether a and c are positive or negative.

A. $a > 0$ and $c > 0$
B. $a < 0$ and $c < 0$
C. $a > 0$ and $c < 0$
D. $a < 0$ and $c > 0$
E. It cannot be determined from the given data

80 33. $\$P$ amounts to $\$Q$ in n years at simple interest. The rate per annum is

A. $\frac{100n(Q-P)}{P}\%$
B. $\frac{100(Q-P)}{n}\%$

C. $\frac{100(Q-P)}{nP}\%$

D. $\frac{100(Q-P)}{nQ}\%$

E. $100[(\frac{Q}{P})^{\frac{1}{n}} - 1]\%$

80 34. If $0 < x < 1$, which of x, x^2, $\frac{1}{x}$, $\sqrt{x}$ is the smallest? Which is the largest?

A. $\sqrt{x}$ is smallest, x^2 is largest

B. $\frac{1}{x}$ is smallest, x^2 is largest

C. x is smallest, $\frac{1}{x}$ is largest

D. x^2 is smallest, $\frac{1}{x}$ is largest

E. x^2 is smallest, $\sqrt{x}$ is largest

80 35. The Highest Common Factor of two unequal Positive integers a and b is 8. Which of the following must be true?

I. The difference between a and b is divisible by 8
II. $(a + b)$ is divisible by 16
III. ab is divisible by 64

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

80 36. x, y and z are three consecutive positive integers. Which of the following is true?

A. $x + y + z$ must be odd
B. $x + y + z$ must be even
C. xyz must be odd
D. xyz must be even
E. $x^2 + y^2 + z^2$ must be even

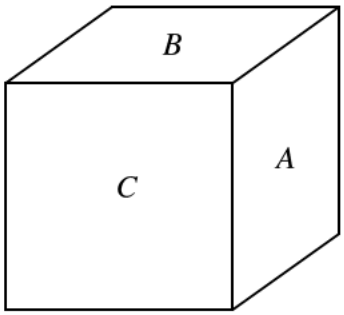
80 37. If $x^2 - kx + 9 \geq 0$ for all real values of x, what is the value of k?

A. $k = -6$ only
B. $k = 6$ only
C. $-6 \leq k \leq 6$
D. $k = 6$ or -6 only
E. $k \leq -6$ or $k \geq 6$

80 38. If x and y are real numbers, what is the minimum value of the expression $(x + y)^2 - 1$?

A. -5
B. -1
C. 0
D. 3
E. It cannot be determined

80 39.



In the figure, the areas of the surfaces A, B, C of the cuboid are 10 cm^2, 14 cm^2 and 35 cm^2 respectively. What is the volume of the cuboid?

A. 49 cm^3
B. 70 cm^3
C. 140 cm^3
D. 350 cm^3
E. 4 900 cm^3

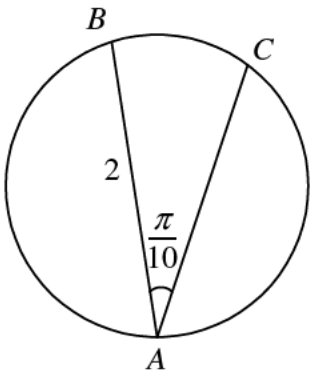
80 40. x is a positive integer such that $x^2 + 2x + 7$ is even. What are the possible values of x?

A. x can be any positive integer
B. x can be any positive even number
C. x can be any positive odd number
D. x must be an even number greater than 10 000
E. x must be an positive odd number greater than 10 000

80 41. The perimeter of a sector is 16 and its angle is 2 radians. What is the area of the sector?

A. 16
B. 32
C. 64
D. 16π
E. 32π

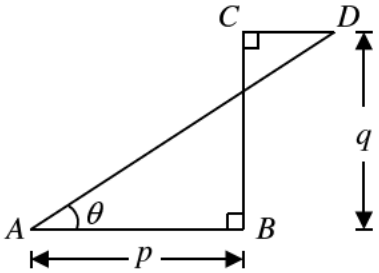
80 42.



In the figure, diameter $AB = 2$.
$\angle CAB = \frac{\pi}{10}$ rad. Minor arc $BC =$

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

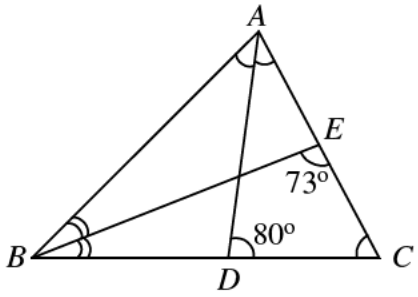
80 43.



In the figure, $\angle B = \angle C = 90^o$.
If $AB = p$ and $BC = q$, then $CD =$

A. $p + q \tan \theta$
B. $p + \frac{q}{\tan \theta}$
C. $p + q \cos \theta$
D. $-p + q \tan \theta$
E. $-p + \frac{q}{\tan \theta}$

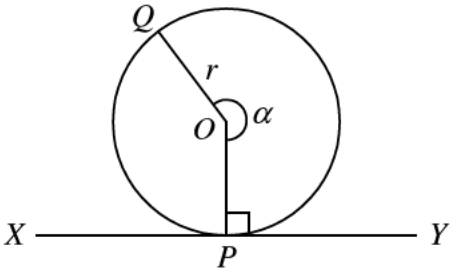
80 44.



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

A. 50^o
B. 68^o
C. 74^o
D. 78^o
E. 80^o

80 45.

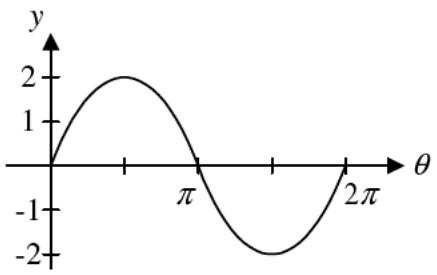


In the figure, O is the centre of the circle and its radius is r. XY touches the circle at P. Find the distance of Q from XY.

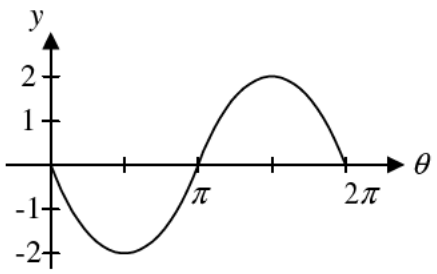
A. $r(1 - \sin \alpha)$
B. $r(1 + \sin \alpha)$
C. $r(1 - \cos \alpha)$
D. $r(1 + \cos \alpha)$
E. $r(2 - \sin \alpha)$

80 46. Which of the following is the graph of $y = 2 \sin \theta$, where $0 \leq \theta \leq 2\pi$?

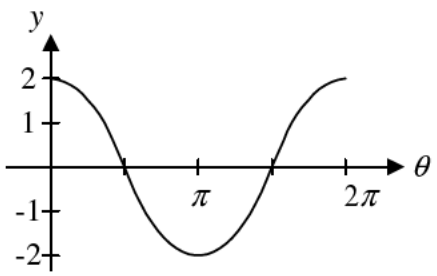
A.



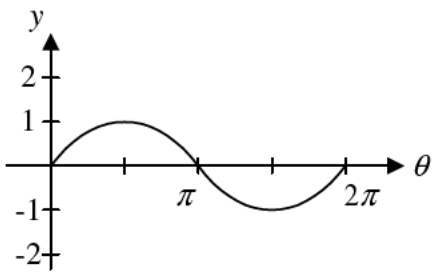
B.



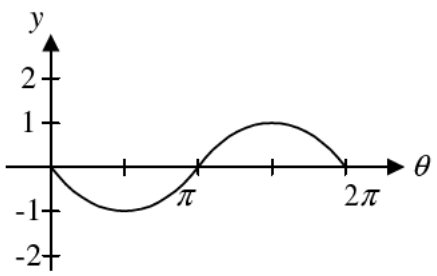
C.



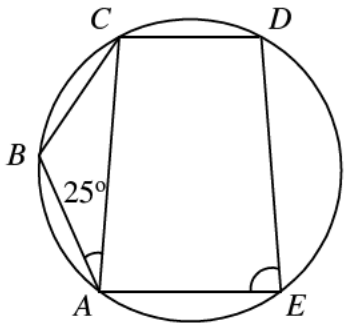
D.



E.



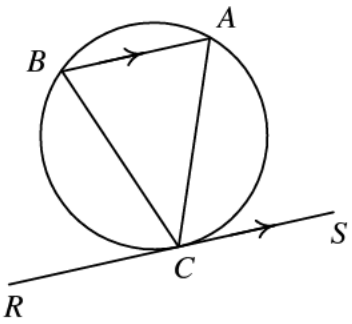
80 47.



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

A. 50°
B. 65°
C. 75°
D. 90°
E. 105°

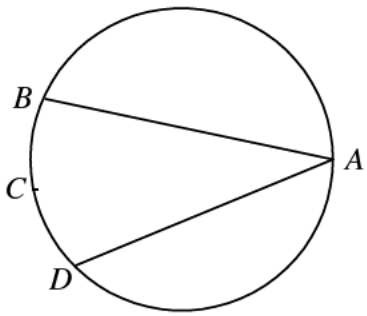
80 48.



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

80 49.



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

I. AD bisects $\angle BAC$
II. $BC \perp AD$
III. AD is a diameter of the circle

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

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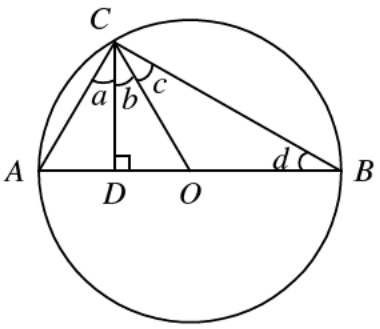

In the figure, AOB is a diameter of the circle, centre O. CD is the perpendicular bisector of OA. Which of the angles a, b, c, d is/are equal to 30°?

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

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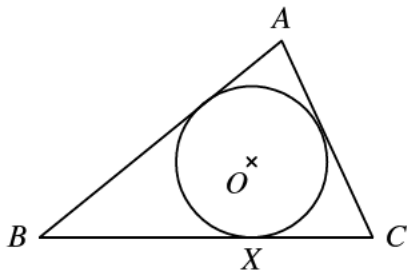
51.



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

I. $OX \perp BC$
II. OA bisect $\angle A$
III. AO produced bisect BC

A. I only
B. I and II only
C. I and III only
D. I, II and III only
E. None of them

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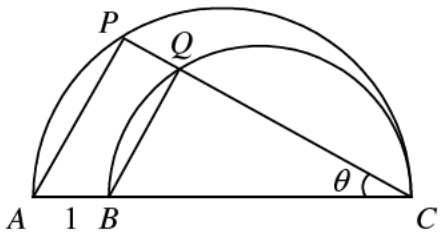
52.



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. $\dfrac{1}{\sin\theta}$
E. $\dfrac{1}{\cos\theta}$

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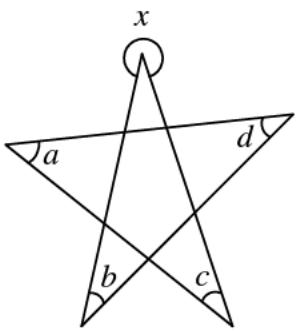
53.

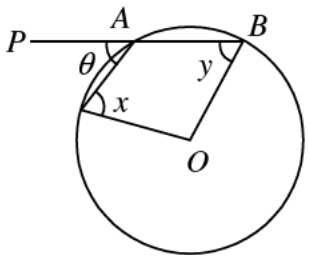


With the notation in the figure, express $a + b + c + d$ in terms of x.

A. $x - 180^{\circ}$
B. x
C. $540^{\circ} - x$
D. $360^{\circ} - x$

E. $180^o - x$

80
54. In the figure, O is the centre of the circle. PAB is a straight line. $x + y =$



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