

## HKCEE 1980 Mathematics II

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

1.

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

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

2.

- 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 Solve the inequality

9.  $(4x + 3)(x - 4) > 0$

- 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 When the hour hand has turned through an angle  $x^\circ$ , what is the angle through which the minute hand has turned?

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

80 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 A man sold 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 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 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  $\text{cm}^2$ ?

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

80 If the bearing of  $B$  from  $A$  is  $S30^\circ W$ , then the bearing of  $A$  from  $B$  is

- A.  $N30^\circ E$
- B.  $N60^\circ W$
- C.  $N60^\circ E$
- D.  $S30^\circ W$
- E.  $S30^\circ E$

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.  $\frac{2 \sin^2 \theta}{\cos \theta}$

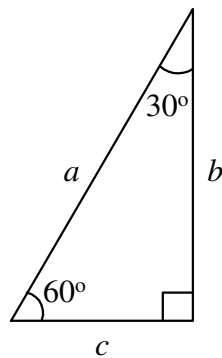
80 If  $\cos \theta = x$  and  $0^\circ < \theta < 90^\circ$ , then  $\tan \theta$

- 17.
- A.  $\frac{1}{\sqrt{1-x^2}}$   
 B.  $\sqrt{1-x^2}$   
 C.  $\frac{\sqrt{1-x^2}}{x}$   
 D.  $\frac{x}{\sqrt{1-x^2}}$   
 E.  $\pm \frac{x}{\sqrt{1-x^2}}$

80 If  $0^\circ \leq \theta < 360^\circ$ , which of the following

18. equations has exactly one root?
- A.  $\sin \theta = -1$   
 B.  $\sin \theta = -\frac{1}{2}$   
 C.  $\sin \theta = 0$   
 D.  $\sin \theta = \frac{1}{2}$   
 E.  $\sin \theta = 2$

80  
19.



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

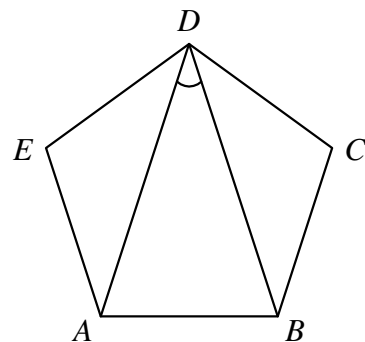
- A.  $3 : 2 : 1$   
 B.  $9 : 4 : 1$   
 C.  $2 : \sqrt{3} : 1$   
 D.  $\sqrt{3} : \sqrt{2} : 1$   
 E.  $\sqrt{3} : 2 : 1$

80 What is the area, in  $\text{cm}^2$ , of an

20. equilateral triangle of side  $x$  cm?

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

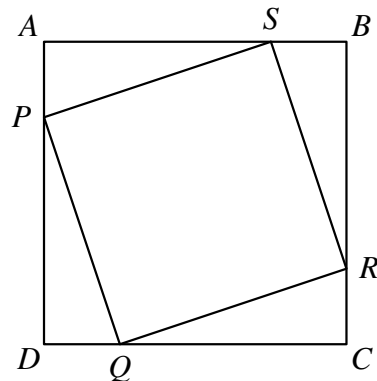
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21.



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

- A.  $35^\circ$   
 B.  $36^\circ$   
 C.  $40^\circ$   
 D.  $54^\circ$   
 E.  $72^\circ$

80  
22.

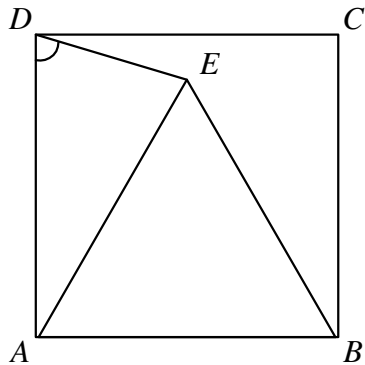


In the figure,  $ABCD$  is a square with  $AB = 5$ .  $AP = BQ = CR = DS = 1$ . What is the area of  $PQRS$ ?

- A. 9

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

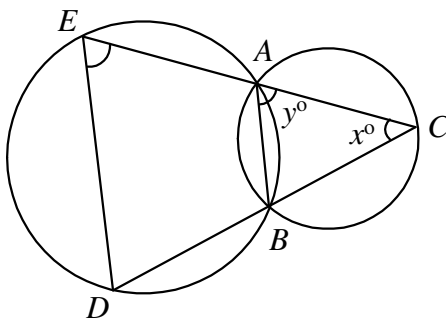
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23.



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

- A.  $72^\circ$
- B.  $74^\circ$
- C.  $76^\circ$
- D.  $78^\circ$
- E. None of the above

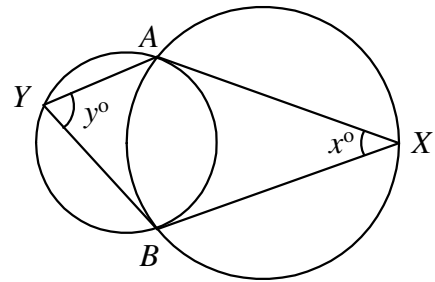
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24.



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

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

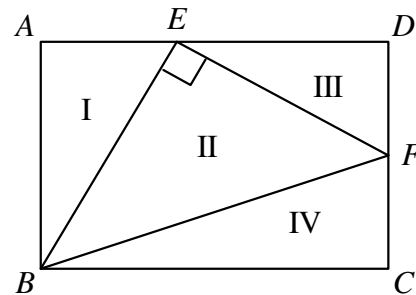
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25.



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.  $\frac{1}{2}(180 - x)$

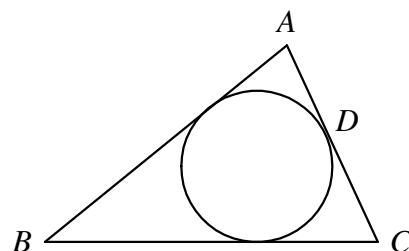
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26.



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

80  
27.



In the figure, the inscribed circle of  $\triangle ABC$  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 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 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 A, B, C are three spheres. If

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

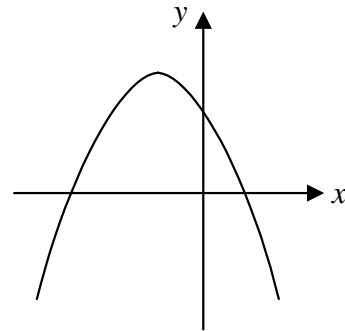
- A. 16
- B. 8
- C. 2

- D.  $\frac{1}{8}$
- E.  $\frac{1}{16}$

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

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

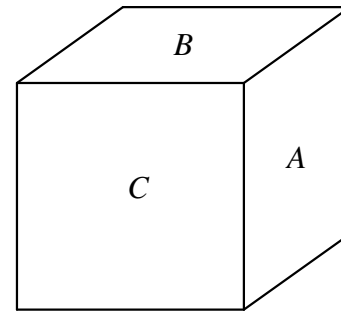
80  
 37. If  $x^2 - kx + 9 \geq 0$  for all real values of  $x$ , what is the value of  $k$ ?

- 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  $10 \text{ cm}^2, 14 \text{ cm}^2$  and  $35 \text{ cm}^2$  respectively. What is the volume of the cuboid?

- A.  $49 \text{ cm}^3$   
 B.  $70 \text{ cm}^3$   
 C.  $140 \text{ cm}^3$   
 D.  $350 \text{ cm}^3$   
 E.  $4\,900 \text{ cm}^3$

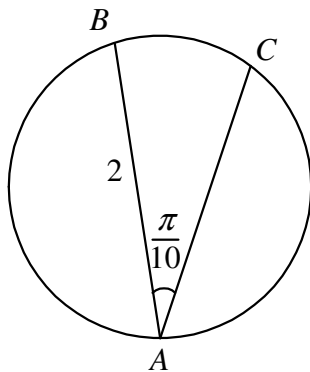
80  
 40.  $x$  is a positive integer such that  $x^2 + 2x + 7$  is even. What are the possible values of  $x$ ?

- 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 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.  $16\pi$
- E.  $32\pi$

80  
42.

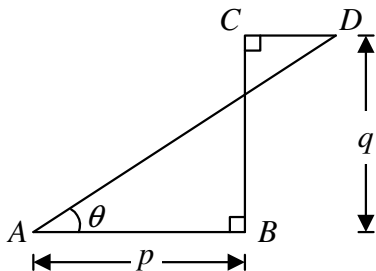


In the figure, diameter  $AB = 2$ .

$\angle CAB = \frac{\pi}{10}$  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.

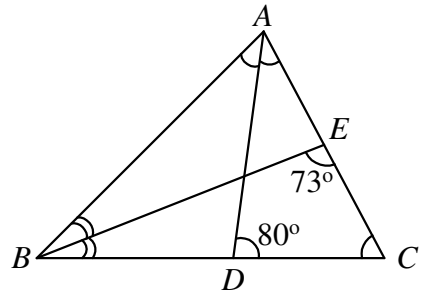


In the figure,  $\angle B = \angle C = 90^\circ$ .

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.  $-p + \frac{q}{\tan \theta}$

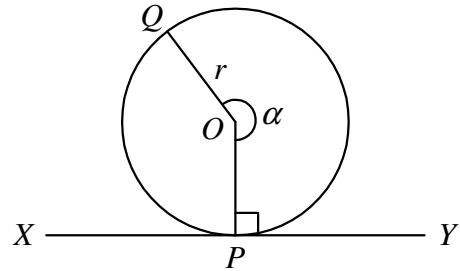
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44.



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

- A.  $50^\circ$
- B.  $68^\circ$
- C.  $74^\circ$
- D.  $78^\circ$
- E.  $80^\circ$

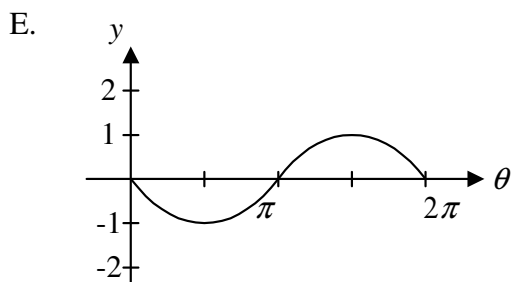
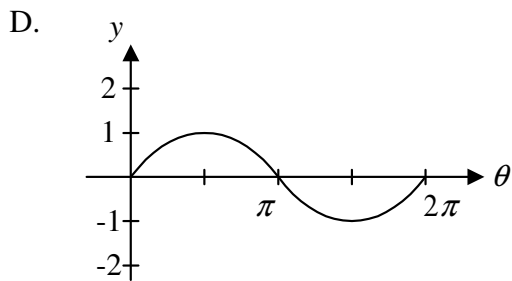
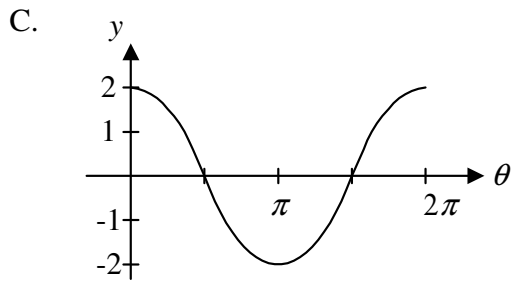
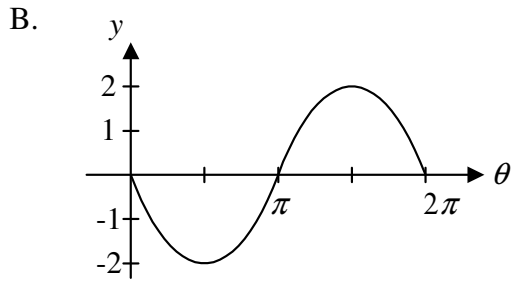
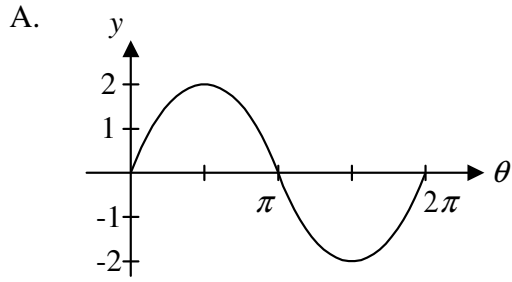
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45.



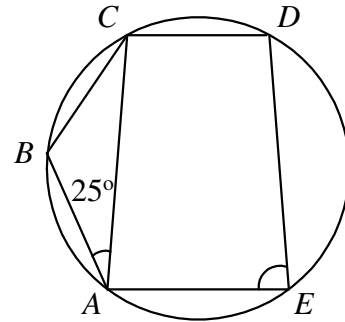
In the figure,  $O$  is the centre of the circle and its radius is  $r$ .  $XY$  touches the circle at  $P$ . Find the distance of  $Q$  from  $XY$ .

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



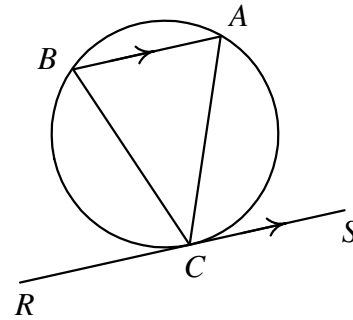
80  
47.



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

- A.  $50^\circ$
- B.  $65^\circ$
- C.  $75^\circ$
- D.  $90^\circ$
- E.  $105^\circ$

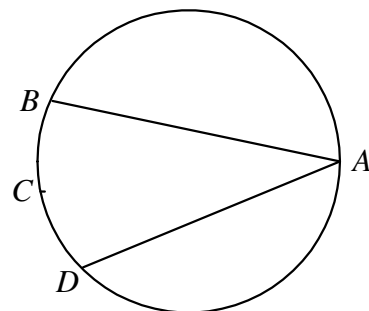
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48.



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

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49.



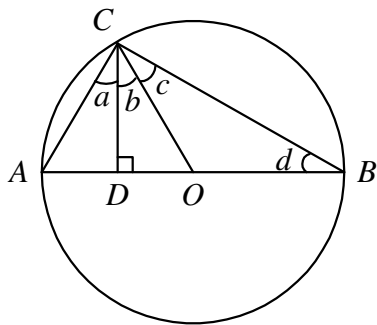


In the figure,  $AB = AC$ ,  $D$  is the mid-point of arc  $BC$ . Which of the following is/are true?

- 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

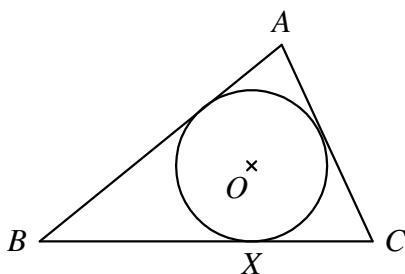
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50.



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  $30^\circ$ ?

- 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.

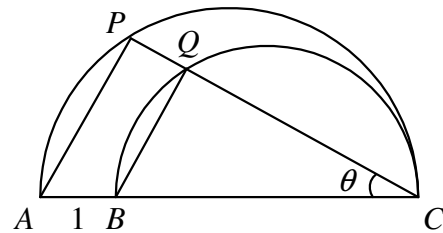


In the figure, circle  $O$  is inscribed in  $\triangle ABC$ , touching  $BC$  at  $X$ . Which of the following must be true?

- 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

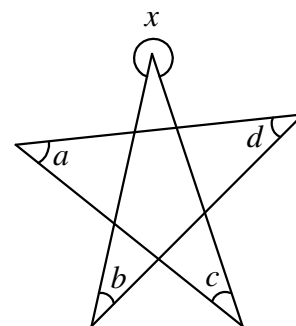
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52.



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.  $\frac{1}{\sin \theta}$
- E.  $\frac{1}{\cos \theta}$

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53.

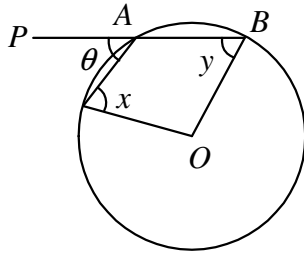


With the notation in the figure, express  $a + b + c + d$  in terms of  $x$ .

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

E.  $180^\circ - x$

80  
54.



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

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