HKCEE 1994
Mathematics II

94 1. If $f(x) = x^2 + 2x$, then $f(x - 1) =$

A. x^2 .
B. $x^2 - 1$.
C. $x^2 + 2x - 1$.
D. $x^2 + 2x - 3$.
E. $x^2 + 4x - 1$.

94 2. If $y = \frac{2x-1}{x+2}$, then $x =$

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

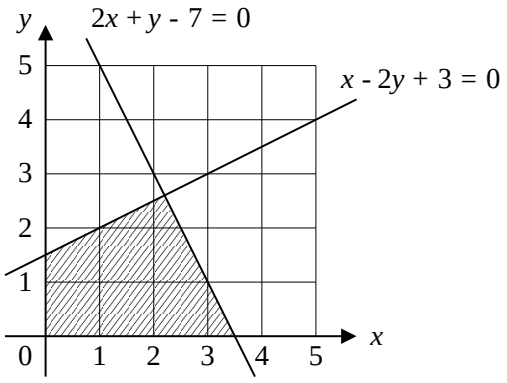
94 3. The L.C.M. of $(x - 1)^2$, $x^2 - 1$ and $x^3 -$ is

A. $x - 1$.
B. $(x - 1)^4(x + 1)(x^2 + x + 1)$.
C. $(x - 1)^2(x + 1)(x^2 + x + 1)$.
D. $(x - 1)^2(x + 1)(x^2 - x + 1)$.
E. $(x - 1)(x + 1)(x^2 + x + 1)$.

94 4. If $a = \sqrt{3} + \sqrt{2}$, then $a - \frac{1}{a} =$

A. 0 .
B. $2\sqrt{2}$.
C. $2\sqrt{3}$.
D. $\sqrt{3} - \sqrt{2}$.
E. $\frac{2\sqrt{3}}{3} + \frac{\sqrt{2}}{2}$.

94 5.



In the figure, (x, y) is a point in the shaded region (including the boundary) and x, y are integers. Find the greatest value of $3x + y$.

A. 7
B. 8
C. 9.2
D. 10
E. 10.5

94 6. If $x(x + 1) < 5(x + 1)$, then

A. $x < 5$
B. $x < -5$ or $x > 1$.
C. $x < -5$ or $x > 1$.
D. $-5 < x < 1$.
E. $-1 < x < 5$.

94 7. Which of the following is/are an identity/identities?

I. $(x + 2)(x - 2) = x^2 - 4$
II. $(x + 2)(x - 2) = 0$
III. $(x + 2)^3 = x^3 + 8$

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

94 8. If $\alpha \neq \beta$ and $\begin{cases} 3\alpha^2 - h\alpha - b = 0 \\ 3\beta^2 - h\beta - b = 0 \end{cases}$, then $\alpha + \beta =$

A. $-\frac{b}{3}$.
B. $\frac{b}{3}$.
C. h.
D. $-\frac{h}{3}$.
E. $\frac{h}{3}$.

94 9. Mr. Chan bought a car for \$ 143 900. If the value of the car goes down by 10% each year, find its value at the end of the third year. (Give your answer correct to the nearest hundred dollars.)

A. \$ 94 400
B. \$ 100 700
C. \$ 104 900
D. \$ 115 100
E. \$ 116 600

94 10. A wholesaler sells an article to a retailer at a profit of 20 %. The retailer sells it to a customer for \$ 3 600 at a profit of \$ 720. Find the original cost of the article to the wholesaler.

A. \$ 2 304
B. \$ 2 400
C. \$ 2 880
D. \$ 3 000
E. \$ 3 456

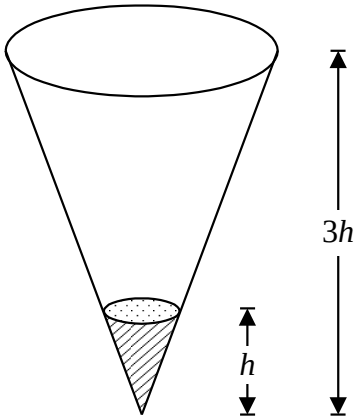
94 11. The bearing of A from B is 075^o. What is the bearing of B from A?

A. 015^o
B. 075^o
C. 105^o
D. 195^o
E. 255^o

94 12. If the sum to infinity of a G.P. is $\frac{81}{4}$ and its second term is –9, the common ratio is

A. $-\frac{1}{3}$.
B. $\frac{1}{3}$.
C. $-\frac{4}{3}$.
D. $\frac{4}{3}$.
E. $-\frac{4}{9}$.

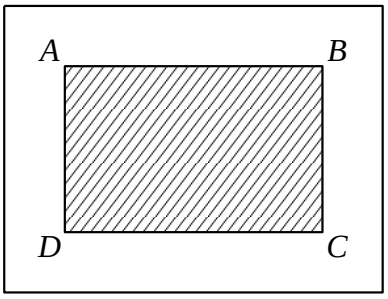
94 13.



In the figure, the paper cup in the form of a circular cone contains 10 ml of water. How many ml of water must be added to fill up the paper cup?

A. 20
B. 80
C. 90
D. 260
E. 270

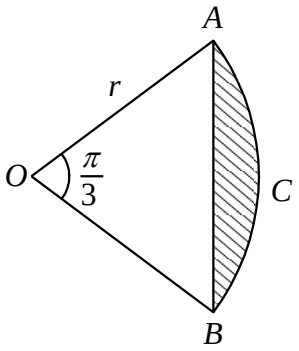
94
14.



In the figure, *ABCD* is a rectangular field of length p metres and width q meters. The path around the field is of width 2 metres. Find the area of the path.

A. $(4p + 4q)\ m^2$
B. $(2p + 2q + 4)\ m^2$
C. $(2p + 2q + 16)\ m^2$
D. $(4p + 4q + 16)\ m^2$
E. $(pq + 4p + 4q + 16)\ m^2$

94
15.



In the figure, *OACB* is a sector of radius r. If $\angle AOB = \frac{\pi}{3}$, find the area of the shaded part.

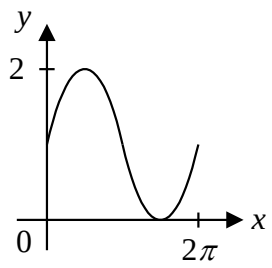
A. $\left(\frac{\pi}{6} - \frac{\sqrt{3}}{4}\right)r^2$
B. $\left(\frac{\pi}{6} - \frac{1}{4}\right)r^2$
C. $\left(\frac{\pi}{3} - \frac{\sqrt{3}}{2}\right)r^2$
D. $\left(\frac{\pi}{3} - \frac{1}{2}\right)r^2$
E. $\frac{\pi}{3}r - \frac{\sqrt{3}}{4}r^2$

94
16. $\frac{\cos\theta}{\sin\theta + 1} - \frac{\cos\theta}{\sin\theta - 1} =$

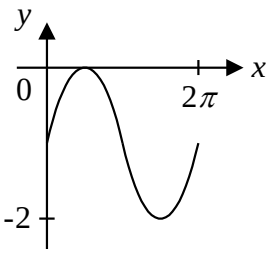
A. $\frac{2}{\cos\theta}$
B. $-\frac{2}{\cos\theta}$
C. 0
D. $2\tan\theta$
E. $-2\tan\theta$

94
17. Which of the following figures shows the graph of $y = 1 + \sin x$

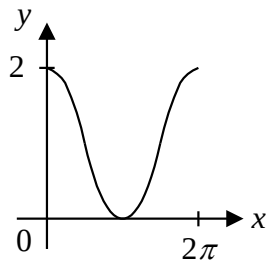
A.



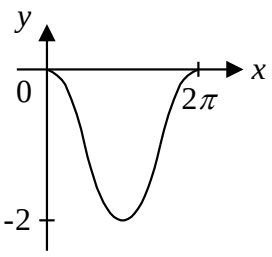
B.



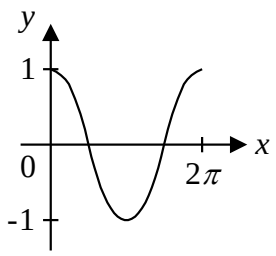
C.



D.



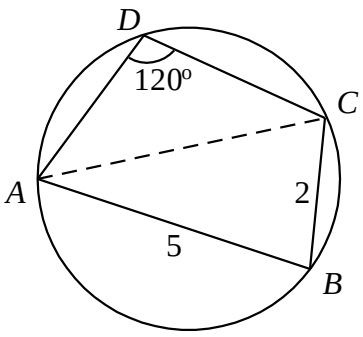
E.



94
18. $\dfrac{\sin(180^o+\theta)}{\cos(90^o-\theta)} =$

A. $\tan\theta$
B. $-\tan\theta$
C. $\dfrac{1}{\tan\theta}$
D. 1
E. –1

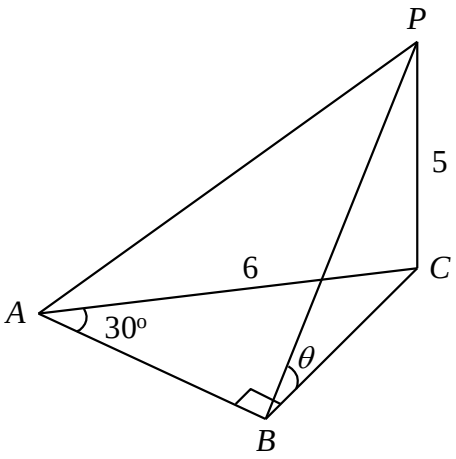
94
19.



In the figure, *ABCD* is a cyclic quadrilateral with *AB* = 5, *BC* = 2 and $\angle ADC = 120^o$. Find *AC*

A. $\sqrt{19}$
B. $\sqrt{21}$
C. $\sqrt{6}$
D. $\sqrt{34}$
E. $\sqrt{39}$

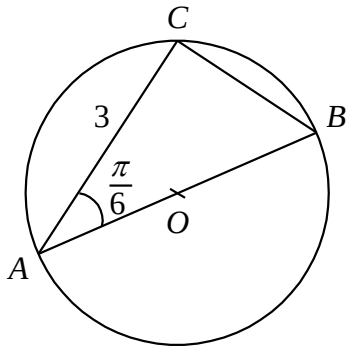
94
20.



In the figure, *PC* is a vertical pole standing on the horizontal plane *ABC*. If $\angle ABC = 90^o$, $\angle BAC = 30^o$, *AC* = 6 and *PC* = 5, find $\tan\theta$.

A. $\dfrac{3}{5}$
B. $\dfrac{5}{6}$
C. $\dfrac{5}{3}$
D. $\dfrac{3\sqrt{3}}{5}$
E. $\dfrac{5\sqrt{3}}{9}$

94
21.

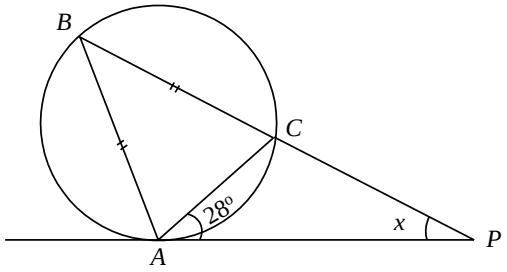


In the figure, *O* is the centre of the circle. If *AC* = 3 and $\angle BAC = \dfrac{\pi}{6}$, find the diameter *AB*.

A. $\dfrac{3}{2}$

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

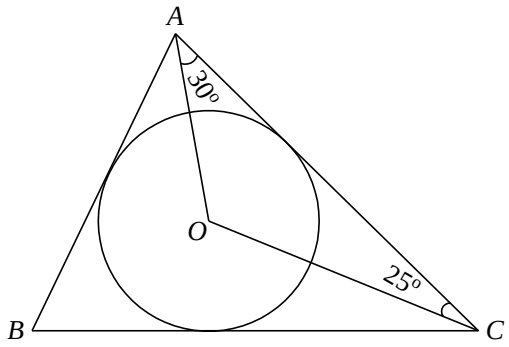
94
22.



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

A. 28^o
B. 48^o
C. 56^o
D. 62^o
E. 76^o

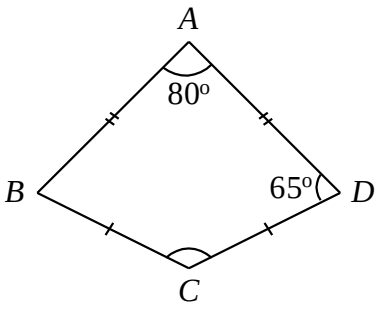
94
23.



In the figure, O is the centre of the inscribed circle of ΔABC. If $\angle OAC = 30^o$ and $\angle OCA = 25^o$, find $\angle ABC$.

A. 50^o
B. 55^o
C. 60^o
D. 62.5^o
E. 70^o

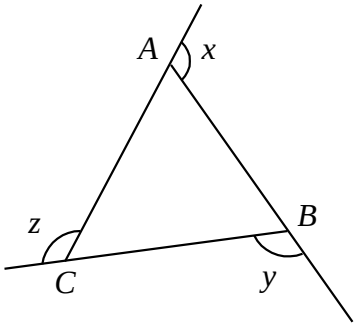
94
24.



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

A. 100^o.
B. 130^o.
C. 145^o.
D. 150^o.
E. 160^o.

94
25.



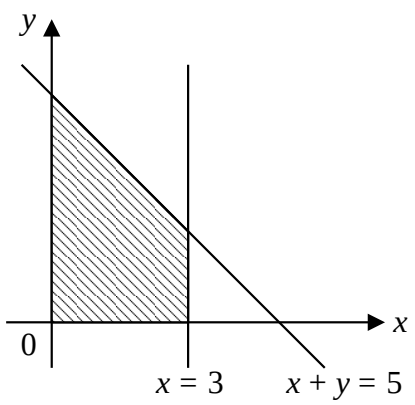
In the figure, x, y and z are the exterior angles of ΔABC. if $x : y : z = 4 : 5 : 6$, then $\angle BAC =$

A. 48^o.
B. 84^o.
C. 96^o.
D. 120^o.
E. 132^o.

94
26. The points A (4, –1), B (–2, 3) and C (x, 5) lie on a straight line. Find x.

A. –5
B. –4
C. 0
D. 2
E. 5

94
27.



In the figure, the shaded part is bounded by the axes, the line $x = 3$ and $x + y = 5$. Find the area.

A. 10.5
B. 12
C. 15
D. 19.5
E. 21

94
28. AB is a diameter of the circle $x^2 + y^2 - 2x - 2y - 18 = 0$. If A is (3, 5), then B is

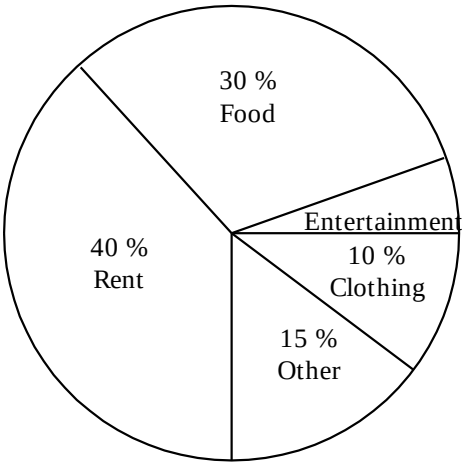
A. (2, 3) .
B. (1, –1) .
C. (–1, –3) .
D. (–5, –7) .
E. (–7, –9) .

94
29. The equations of two circles are
$x^2 + y^2 - 4x - 6y = 0$,
$x^2 + y^2 + 4x + 6y = 0$,
Which of the following is/are true?

I. The two circles have the same centre.
II. The two circles have equal radii.
III. The two circles pass through the origin.

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

94
30.



In the figure, the pie chart shows the monthly expenditure of a family. If the family spends \$ 4 800 monthly on rent, what is the monthly expenditure on entertainment?

A. \$240
B. \$600
C. \$720
D. \$1 800
E. \$12 000

94
31. A box contains 5 eggs, 2 of which are rotten. If 2 eggs are chosen at random, find the probability that exactly one of them is rotten.

A. $\frac{2}{5}$
B. $\frac{3}{5}$
C. $\frac{3}{10}$
D. $\frac{6}{25}$
E. $\frac{12}{25}$

94
32. The mean, standard deviation and interquartile range of n numbers are m, s and q respectively. If 3 is added to each of the n numbers, what will be their new mean, standard deviation and interquartile range?

	Mean	Standard Deviation	Interquartile Range
A.	m	s	q
B.	m	$s + 3$	$q + 3$
C.	$m + 3$	s	q
D.	$m + 3$	s	$q + 3$
E.	$m + 3$	$s + 3$	$q + 3$

94 33. $(3^x)^2 =$

A. $3^{(x^2)}$
B. 3^{x+2}
C. 3^{2x}
D. 6^x
E. 9^{2x}

94 34. If $\log 2 = a$ and $\log 9 = b$, then $\log 12 =$

A. $2a + \frac{b}{3}$.
B. $2a + \frac{b}{2}$.
C. $\frac{2}{3}a + \frac{2}{3}b$.
D. $a^2 + b^{\frac{1}{2}}$.
E. $a^2 b^{\frac{1}{2}}$

94 35. Factorize $a^2 - 2ab + b^2 - a + b$.

A. $(a - b)(a - b - 1)$
B. $(a - b)(a - b + 1)$
C. $(a - b)(a + b - 1)$
D. $(a + b)(a - b - 1)$
E. $(a - b - 1)^2$

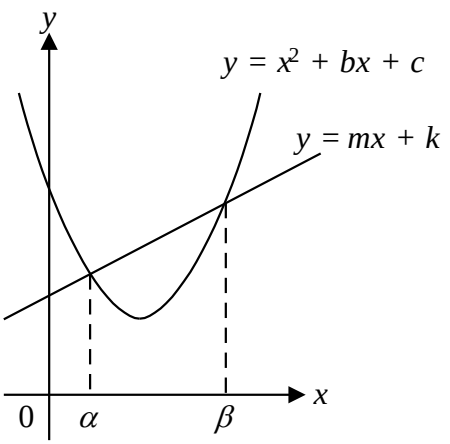
94 36. $\dfrac{\frac{2}{x} - \frac{1}{y}}{\frac{4y}{x} - \frac{x}{y}} =$

A. $2y - x$
B. $2y + x$
C. $\dfrac{1}{2y - x}$
D. $\dfrac{1}{2y + x}$
E. $\dfrac{1}{4y - x}$

94 37. $P(x)$ is a polynomial. When $P(x)$ is divided by $(5x - 2)$, the remainder is R. If $P(x)$ is divided by $(2 - 5x)$, then the remainder is

A. R .
B. $-R$.
C. $\frac{2}{5}R$.
D. $\frac{2}{5}$.
E. $-\frac{2}{5}$.

94 38.



In the figure, the line $y = mx + k$ cuts the curve $y = x^2 + bx + c$ at $x = \alpha$ and $x = \beta$. Find the value of $\alpha\beta$

A. $-b$
B. c
C. $m - b$
D. $k - c$
E. $c - k$

94 39. If $x = 3$, $y = 2$ satisfy the simultaneous equations $\begin{cases} ax + by = 2 \\ bx - ay = 3 \end{cases}$, find the values of a and b

A. $a = 0, b = 1$
B. $a = 0, b = -1$
C. $a = \frac{5}{6}, b = -\frac{1}{4}$
D. $a = -\frac{1}{13}, b = \frac{37}{39}$
E. $a = -\frac{12}{13}, b = \frac{5}{13}$

94 40. From the table, which of the following intervals must contain a root of $f(x) - x = 0$

x	$f(x)$
–2	1.2
–1	0.8
0	0.7
1	0.2
2	–0.1
3	0.8

A. $-2 < x < -1$
B. $-1 < x < 0$
C. $0 < x < 1$
D. $1 < x < 2$
E. $2 < x < 3$

94 41. If the product of the first n terms of the sequence $10, 10^2, 10^3, \ldots, 10^n, \ldots$ exceeds 10^{55}, find the minimum value of n.

A. 9
B. 10
C. 11
D. 12
E. 56

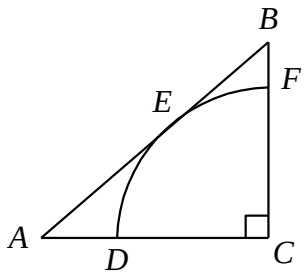
94 42. If $a : b = 2 : 3$, $a : c = 3 : 4$ and $a : d = 4 : 5$, then $b : c : d =$

A. 2 : 3 : 4 .
B. 3 : 4 : 5 .
C. 3 : 6 : 10 .
D. 18 : 16 : 15 .
E. 40 : 45 : 48 .

94 43. Let x vary inversely as $\sqrt{y}$. If y is increased by 69%, then x will be

A. increased by 23.1% (3 sig. fig.).
B. increased by 30%.
C. decreased by 23.1% (3 sig. fig.).
D. decreased by 30%.
E. decreased by 76.9% (3 sig. fig.).

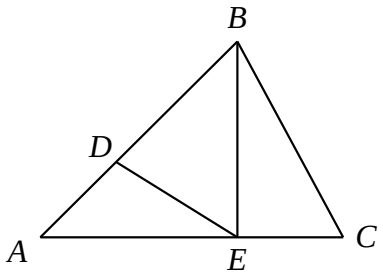
94 44.



In the figure, $CDEF$ is a sector of a circle which touched AB at E. If $AB = 25$ and $BC = 15$, find the radius of the sector.

A. 9
B. 10
C. 11.25
D. 12
E. 12.5

94 45.

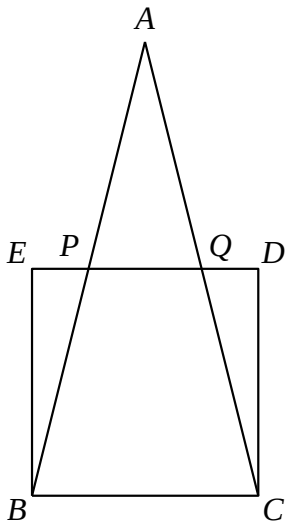


In the figure, $AD : DB = 1 : 2$, $AE : EC = 3 : 2$. Area of ΔBDE : Area of ΔABC =

A. 1 : 3
B. 2 : 5

C. 3 : 4
D. 4 : 25
E. 36 : 65

94
46.



In the figure, area of ΔABC : area of square $BCDE$ = 2 : 1. Find PQ : BC.

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

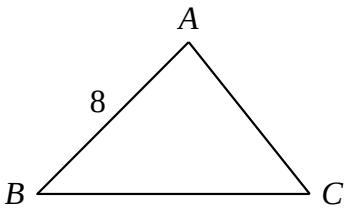
94
47. For $0^o \le x \le 360^o$, how many roots does the equation $\sin x(\cos x + 2) = 0$ have?

A. 0
B. 1
C. 2
D. 3
E. 4

94
48. The largest value of $(3\cos 2\theta - 1)^2 + 1$ is

A. 2 .
B. 5 .
C. 17 .
D. 26 .
E. 50 .

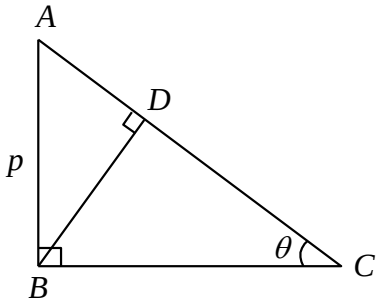
94
49.



In the figure,
$\sin A : \sin B : \sin C = 4 : 5 : 6$. If AB = 8, find AC.

A. $5\frac{1}{3}$
B. $6\frac{2}{3}$
C. $9\frac{3}{5}$
D. 10
E. 12

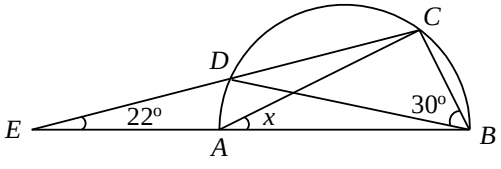
94
50.



In the figure, $AB = p$, $\angle ACB = \theta$. Find CD

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

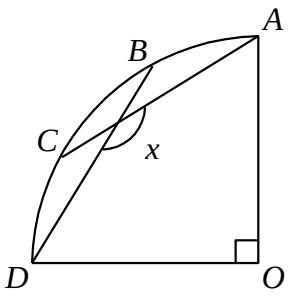
94
51.



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

A. 38^o
B. 41^o
C. 44^o
D. 52^o
E. 60^o

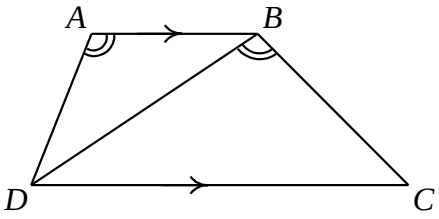
94
52.



In the figure, $OABCD$ is a sector of a circle. If arc AB = arc BC = arc CD, then x =

A. 105^o .
B. 120^o .
C. 135^o .
D. 144^o .
E. 150^o .

94
53.

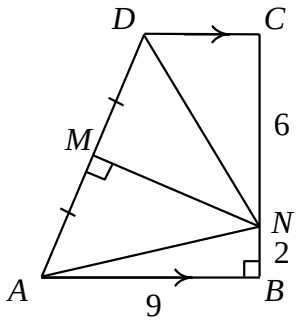


In the figure, AB // DC and $\angle DAB = \angle DBC$. Which of the following is/are true?

I. $\frac{AB}{BD} = \frac{BD}{DC}$
II. $\frac{AB}{BD} = \frac{AD}{BC}$
III. $\frac{AD}{BD} = \frac{BD}{CD}$

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

94
54.



In the figure, $ABCD$ is a trapezium with AB // DC, $\angle ABC = 90^o$ and MN is the perpendicular bisector of AD. If $AB = 9$, $BN = 2$ and $NC = 6$, find CD.

A. $4\frac{1}{2}$
B. $6\frac{3}{4}$
C. 7
D. $\sqrt{41}$
E. $\sqrt{113}$