Form 5

HKCEE 1990
Mathematics II

90 1. $(a^{2n})^3 =$

A. a^{6n}
B. a^{8n}
C. a^{2n^3}
D. a^{6n^3}
E. a^{8n^3}

90 2. $\dfrac{1-\dfrac{x-y}{x+y}}{1-\dfrac{x+y}{x-y}} =$

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

90 3. If $x=\dfrac{ab+1}{a-b}$, then $b =$

A. $\dfrac{ax-1}{a+x}$
B. $\dfrac{ax-1}{a-x}$
C. $\dfrac{1-ax}{a+x}$
D. $\dfrac{1-ax}{a+x}$
E. $\dfrac{ax+1}{a-x}$

90 4. If $f(n)=\dfrac{1}{2}n(n-1)$, then $f(n+1)-f(n) =$

A. f(1)
B. f(n)
C. $\dfrac{n}{2}$
D. 1
E. n

90 5. If $2 = 10^p$, $3 = 10^q$, express $\log\dfrac{1}{6}$ in terms of p and q.

A. $-p-q$
B. $\dfrac{1}{pq}$
C. $\dfrac{1}{p+q}$
D. pq
E. $p+q$

90 6. Let $a > b > 0$. If a and b are respectively the 1st and 2nd terms of a geometric progression, the sum to infinity of the progression is

A. $\dfrac{1}{a-b}$
B. $\dfrac{a}{1-b}$
C. $\dfrac{ab}{b-a}$
D. $\dfrac{a^2}{a+b}$
E. $\dfrac{a^2}{a-b}$

90 7. $a^3 + 8a^{-3} =$

A. $(a-\dfrac{2}{a})(a^2+2+\dfrac{4}{a^2})$

B. $(a - \frac{1}{2a})(a^2 + 1 + \frac{1}{4a^2})$

C. $(a + \frac{1}{2a})(a^2 - \frac{1}{2} + \frac{1}{4a^2})$

D. $(a + \frac{2}{a})(a^2 - 4 + \frac{4}{a^2})$

E. $(a + \frac{2}{a})(a^2 - 2 + \frac{4}{a^2})$

90 8. If p and q are the roots of the equation $x^2 - x + 3 = 0$, then $(2^{p-2})(2^{q-2}) =$

A. $\frac{1}{32}$

B. $\frac{1}{8}$

C. $\frac{1}{2}$

D. 8

E. 32

90 9. If $a : b = 3 : 4$ and $b : c = 2 : 5$, then $a^2 : c^2 =$

A. 3 : 10

B. 9 : 25

C. 9 : 100

D. 36 : 25

E. 36 : 100

90 10. If 1 U.S. dollar is equivalent to 7.8 H.K. dollars and 1000 Japanese yen are equivalent to 53.3 H.K. dollars, how many Japanese yen are equivalent to 50 U.S. dollars?

A. 1463

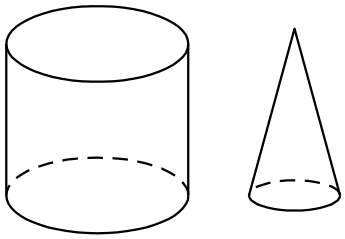
B. 3417

C. 7317

D. 8315

E. 20 787

90 11.



In the figure, the circular cylinder and the circular cone have the same height. The radius of the base of the cylinder is twice that of the cone. If the volume of the cone is 20 cm^3, what is the volume of the cylinder?

A. 40 cm^3

B. 80 cm^3

C. 120 cm^3

D. 240 cm^3

E. 300 cm^3

90 12. The length, width and height of a cuboid are in the ratios 3 : 2 : 1. If the total surface area of the cuboid is 88 cm^2, find its volume.

A. 6 cm^3

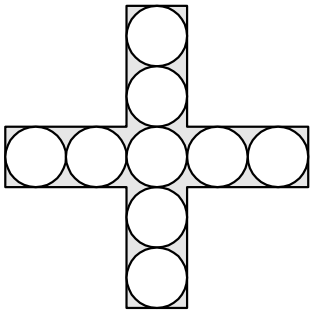
B. 48 cm^3

C. $48\sqrt{2}$ cm^3

D. $96\sqrt{2}$ cm^3

E. 384 cm^3

90 13.



In the figure, there are nine circles, each of radius 1. Find the shaded area.

A. $9 - 9\pi$

B. $36 - 9\pi$

C. $40 - 9\pi$
D. $10 - 10\pi$
E. $40 - 10\pi$

90 14. Find the amount (correct to the nearest dollar) of \$10 000 at 12% p.a., compounded monthly, for 2 years.

A. 10 201
B. 12 400
C. 12 544
D. 12 697
E. 151 786

90 15. If a flat is sold for \$720 000, the gain is 20%. Find the percentage loss if the flat is sold for \$540 000.

A. 5%
B. $6\frac{1}{4}\%$
C. 10%
D. $11\frac{1}{9}\%$
E. $33\frac{1}{3}\%$

90 16. $\sin(180^\circ + \theta) + \sin(\theta - 90^\circ) =$

A. $\sin\theta + \cos\theta$
B. $\sin\theta - \cos\theta$
C. $\cos\theta - \sin\theta$
D. $-\cos\theta - \sin\theta$
E. $2\sin\theta$

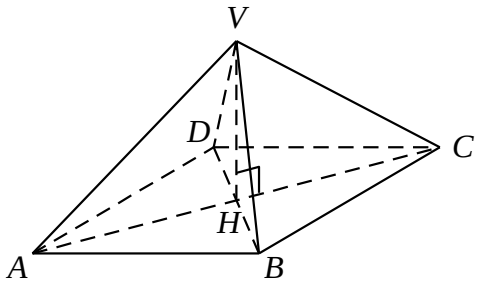
90 17. If $0^\circ \le x < 360^\circ$, which of the following equations has only one root?

A. $\sin x = 0$
B. $\sin x = \frac{1}{2}$
C. $\sin x = 2$
D. $\cos x = 0$
E. $\cos x = -1$

90 18. If $\tan\theta = -\frac{4}{3}$ and θ lies in the second quadrant, then $\sin\theta - 2\cos\theta =$

A. 2
B. –2
C. $\frac{11}{5}$
D. $\frac{2}{5}$
E. $-\frac{2}{5}$

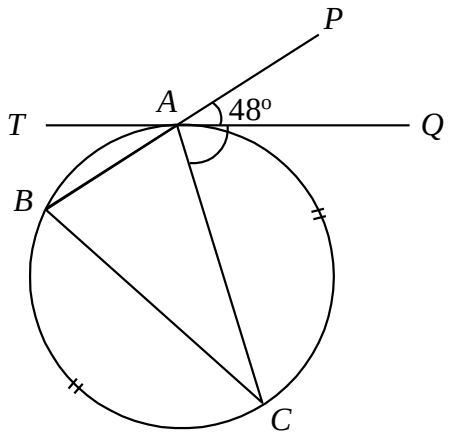
90 19.



The figure shows a right pyramid with a square base. *VAB*, *VBC*, *VCD* and *VDA* are equilateral triangles. Find $\sin\angle VAH$.

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

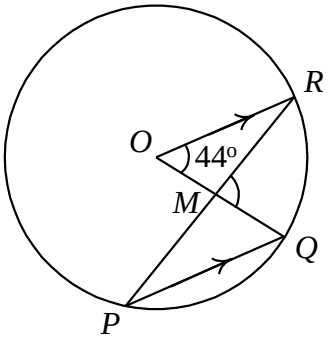
90
20.



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

A. 42^o
B. 48^o
C. 66^o
D. 71^o
E. 84^o

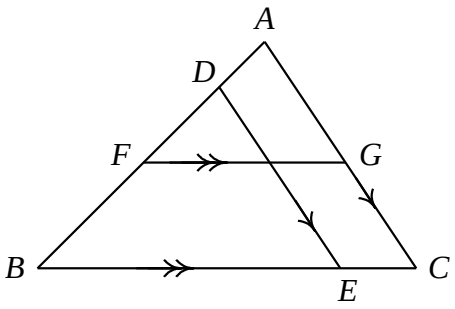
90
21.



In the figure, O is the centre of the circle. If OR // PQ and $\angle ROQ = 42^o$, find $\angle RMQ$.

A. 21^o
B. 42^o
C. 63^o
D. 84^o
E. 126^o

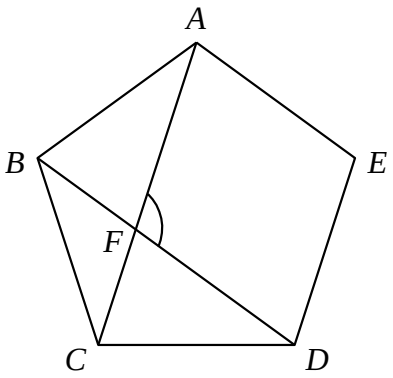
90
22.



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

90
23.



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

A. 120^o
B. 112^o
C. 110^o
D. 108^o
E. 100^o

90
24. If the mean of the numbers 3, 3, 3, 3, 4, 4, 5, 5, 6, x is also x, which of the following is/are true?

I. Mean = Median
II. Mode = Range
III. Median = Mode

A. I and II only

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

90 25. Ten years ago, the mean age of a band of 11 musicians was 30. One of them is now leaving the band at the age of 40. What is the present mean age of the remaining 10 musician?

A. 40
B. 39
C. 37
D. 30
E. 29

90 26. There are 7 bags, 3 of which are empty and the remaining 4 each contains a ball. An additional ball is now put into one of the bags at random. After that a bag is randomly selected. Find the probability of selecting an empty bag.

A. $\frac{2}{7}$
B. $\frac{3}{7}$
C. $\frac{6}{49}$
D. $\frac{12}{49}$
E. $\frac{18}{49}$

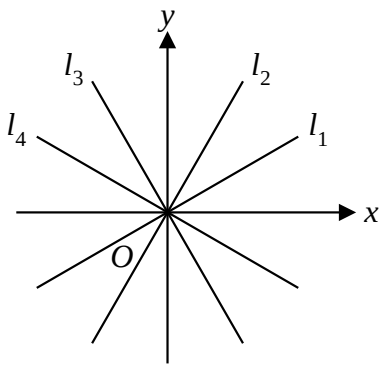
90 27. $ABCD$ is a line segment. $AB : BC : CD = 3 : 2 : 1$. If $A = (4, 5)$, $D = (10, 11)$, find C.

A. (5, 6)
B. (6, 7)
C. (7, 8)
D. (8, 9)
E. (9, 10)

90 28. If the line $y = mx + b$ and $\frac{x}{a} + \frac{y}{b} = 1$ are perpendicular, find m.

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

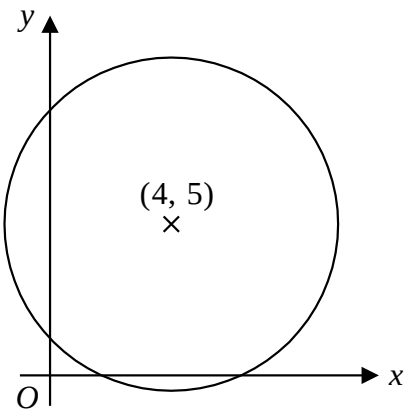
90 29.



In the figure, the slopes of the straight lines l_1, l_2, l_3, and l_4 are m_1, m_2, m_3, m_4 respectively. Which of the following is true?

A. $m_1 > m_2 > m_3 > m_4$
B. $m_2 > m_1 > m_3 > m_4$
C. $m_1 > m_2 > m_4 > m_3$
D. $m_2 > m_1 > m_4 > m_3$
E. $m_4 > m_3 > m_2 > m_1$

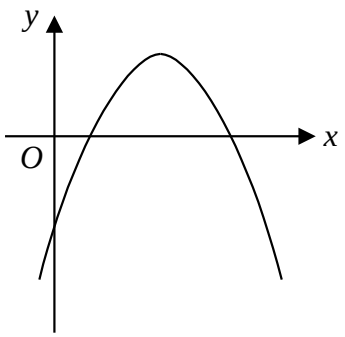
90 30.



In the figure, a circle cuts the x-axis at tow points 6 units apart. If the circle has centre (4, 5), then its equation is

A. $(x-4)^2+(y-5)^2=25$
B. $(x-4)^2+(y-5)^2=34$
C. $(x-4)^2+(y-5)^2=52$
D. $(x+4)^2+(y+5)^2=34$
E. $(x+4)^2+(y+5)^2=25$

90 31.



The graph of $y=ax^2+bx+c$ is given as shown. Which of the following is/are true?

I. $a<0$
II. $b<0$
III. $c<0$

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

90 32.

x	Sign of f(x)
1.22	+
1.23	+
1.24	+
1.25	–
1.245	+

From the table, a root of the equation f(x) = 0 must be

A. 1.20, correct to 2 decimal places
B. 1.24, correct to 2 decimal places
C. 1.25, correct to 2 decimal places
D. 1.245, correct to 3 decimal places
E. 1.2475, correct to 4 decimal places

90 33. $\frac{1}{1+\sqrt{2}}+\frac{1}{\sqrt{2}+\sqrt{3}}+\frac{1}{\sqrt{3}+\sqrt{4}}+\frac{1}{\sqrt{4}+\sqrt{5}}=$

A. $\frac{1}{1-\sqrt{5}}$
B. $\frac{1}{\sqrt{5}-1}$
C. $1+\sqrt{5}$
D. $1-\sqrt{5}$
E. $-1+\sqrt{5}$

90 34. Let $f(x)=3x^3-4x+k$. If f(x) is divisible by $x-k$, find the remainder when f(x) is divided by $x+k$.

A. $2k$
B. k
C. 0
D. $-k$
E. $-k-1$

90 35. Let m be a constant. Find the value of x such that $\begin{cases} x^2+x+1=m \\ x-1=\frac{26}{m} \end{cases}$

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

90 36. If $a<b<0$, which of the following must be true?

A. $-a<-b$
B. $\frac{a}{b}<1$
C. $a^2<b^2$
D. $10^a<10^b$

E. $a^{-1} < b^{-1}$

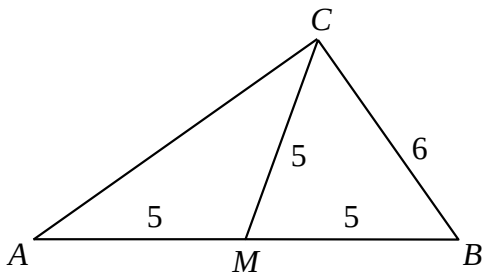
90 37. The H.C.F. and L.C.M. of three expressions are xyz^2 and $x^3y^5z^4$ respectively. If two of the expressions are $x^2y^3z^3$ and x^3yz^2, find the third expression.

A. $x^2y^3z^3$
B. $x^2y^5z^3$
C. xy^3z^3
D. xy^5z^4
E. xy^3z^4

90 38. Let a, x_1, x_2, b and a, y_1, y_2, y_3, b be two arithmetic progressions. $\dfrac{x_2 - x_1}{y_3 - y_2} =$

A. $\frac{3}{4}$
B. $\frac{4}{3}$
C. 1
D. $\frac{4}{5}$
E. $\frac{5}{4}$

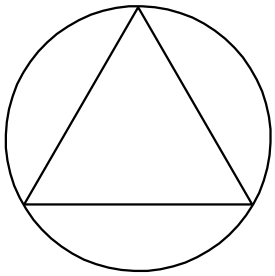
90 39.



In the figure, $AM = MB = MC = 5$ and $BC = 6$. The area of triangle ABC =

A. 12
B. 16
C. 24
D. 30
E. 48

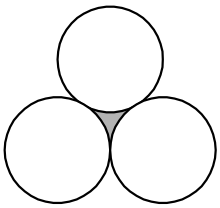
90 40.



In the figure, an equilateral triangle is inscribed in a circle of radius 1. The circumference of the circle is greater than the perimeter of the triangle by

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

90 41.



Three equal circles of radii 1 touch each other as shown in the figure.

A. $1 - \frac{\pi}{2}$
B. $\sqrt{3} - \frac{\pi}{2}$
C. $2\sqrt{3} - \frac{\pi}{2}$
D. $\sqrt{3} - \frac{\pi}{6}$
E. $2\sqrt{3} - \frac{\pi}{6}$

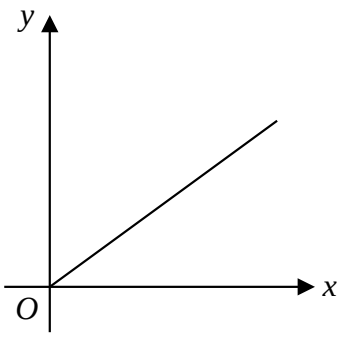
90 42. If A is 30% greater than B and B is 30% less than C, then

A. A is 9% less than C

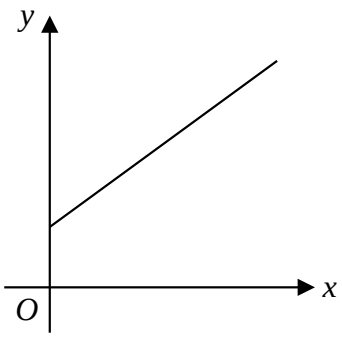
B. C is 9% less than A
C. $A = C$
D. A is 9% greater than C
E. C is 9% greater than A

90 43. Which of the following graphs shows that y is partly constant and partly varies inversely as x?

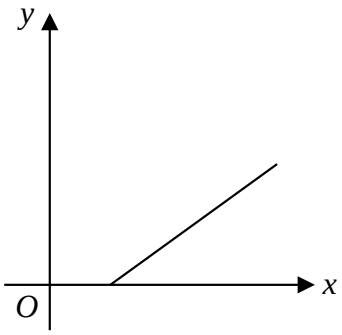
A.



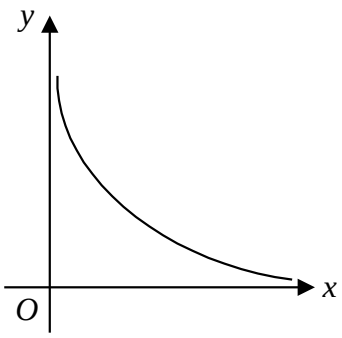
B.



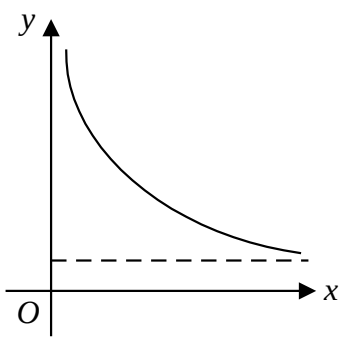
C.



D.



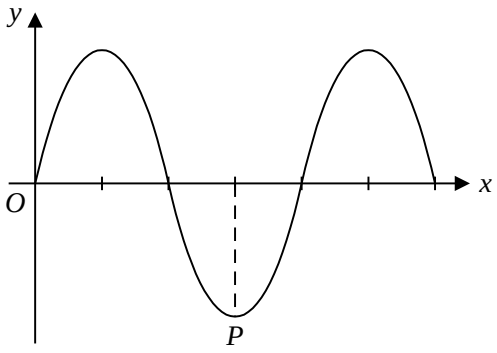
E.



90 44. If $\sin\theta$ and $\cos\theta$ are the roots of the equation $x^2 + k = 0$, then $k =$

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

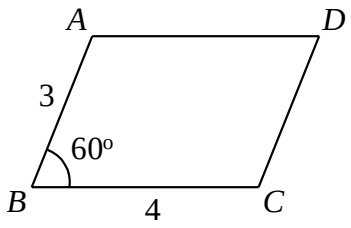
90 45.



The figure shows the graph of $y = 3\sin 2x$. The point P is

A. $(\frac{4\pi}{3}, -3)$
B. $(\frac{3\pi}{4}, -3)$
C. $(\frac{4\pi}{3}, -1)$
D. $(\frac{3\pi}{4}, -1)$
E. $(\frac{3\pi}{2}, -1)$

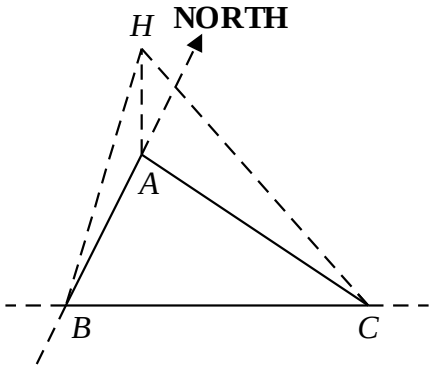
90
46.



In the figure, $ABCD$ is a parallelogram. BD =

A. 5
B. 7
C. $\sqrt{13}$
D. $\sqrt{27}$
E. $\sqrt{37}$

90
47.

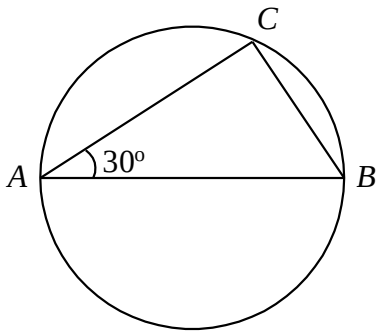


In the figure, A, B and C are three points on the same horizontal plane. A is due north of B, C is due east of B and H is a point vertically above A. Which of the following angles is/are 90^o?

I. $\angle HAC$
II. $\angle ABC$
III. $\angle HBC$

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

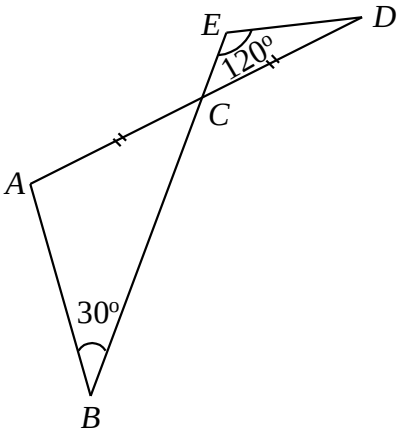
90
48.



In the figure, AB is a diameter and $\angle BAC = 30^o$. 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

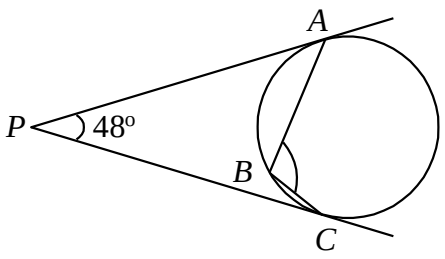
90
49.



In the figure, $AC = CD$, $\angle ABC = 30^o$ and $\angle CED = 120^o$. $\frac{AB}{DE}$ =

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

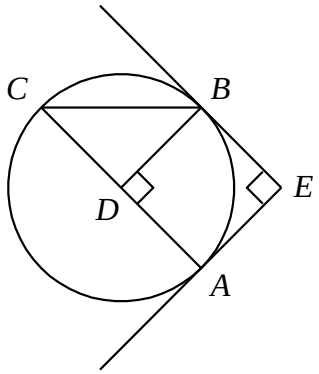
90
50.



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

A. 84^o
B. 96^o
C. 106^o
D. 114^o
E. 132^o

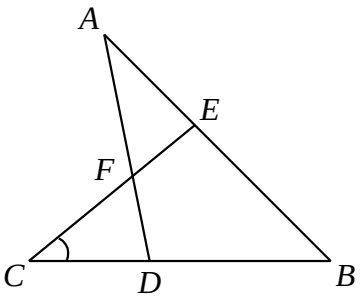
90
51.



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^o
B. 40^o
C. 45^o
D. 50^o
E. 60^o

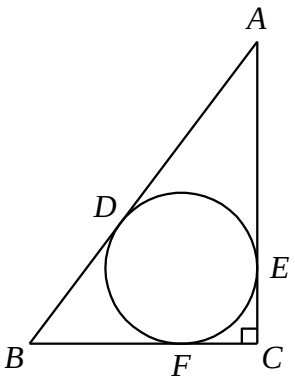
90
52.



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

A. 30^o
B. 36^o
C. 40^o
D. 45^o
E. 60^o

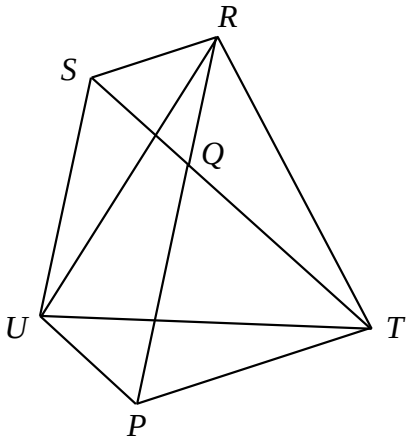
90
53.



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 $\angle ACB = 90^o$, find the radius of the circle.

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

90
54.



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

I. $\Delta UPT \cong \Delta RQT$
II. $PU = QS$
III. $PQSU$ is a parallelogram

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