Form 5

HKCEE 1985
Mathematics II

85 1. $\frac{2}{1+x} - \frac{2}{1-x} - \frac{4x}{x^2-1}$

A. $\frac{1}{1-x}$
B. $\frac{1}{1+x}$
C. $\frac{1-7x}{x^2-1}$
D. $\frac{1-7x}{1-x^2}$
E. $\frac{3x+1}{1-x^2}$

85 2. $\frac{\frac{b}{a}-\frac{a}{b}}{\frac{1}{a}-\frac{1}{b}} =$

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

85 3. If $\frac{ab}{ka+b} = \frac{1}{k}$, then $b =$

A. $\frac{a}{a-k}$
B. $\frac{ka}{ka-1}$
C. $\frac{ka}{1-ka}$
D. $\frac{k^2a}{a-k}$
E. $\frac{k^2a}{k-a}$

85 4. $(x + y)^{-1}(x^{-2} - y^{-2}) =$

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

85 5. If $a - \sqrt{b^2+c^2} = d$, then $c =$

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

85 6. The L.C.M. of $2a^2 - 2b^2$ and $a^3 - 2a^2b + ab^2$ is

A. $a - b$
B. $(a - b)(a + b)$
C. $2a(a - b)(a + b)$
D. $2a(a - b)^2(a + b)$
E. $2a(a - b)^3(a + b)$

85 7. Let a and b be constants. If $3x^3 - ax^2 + 5x - 3b$ is divisible by $x + 3$ then $3a + b =$

A. -32
B. -22
C. 22
D. 32
E. It cannot be determined

85 8. $\log_{10}(a^2 - b^2) =$

A. $\dfrac{\log_{10} a}{\log_{10} b}$
B. $2\log_{10}(a - b)$
C. $2\log_{10}a - 2\log_{10}b$
D. $\log_{10}(a + b) + \log_{10}(a - b)$
E. $(\log_{10}a + \log_{10}b)(\log_{10}a - \log_{10}b)$

85 9. If α and β are roots of x2 + 2x − 4 = 0, then $2^{\alpha}\cdot 2^{\beta} =$

A. $\dfrac{1}{16}$
B. $\dfrac{1}{4}$
C. 2
D. 4
E. 16

85 10. The second term and the fifth term of a geometric progression are −12 and $40\frac{1}{2}$ respectively. The first term is

A. $1\frac{1}{2}$
B. 6
C. 8
D. 15
E. 18

85 11. If $a : b = 1 : 2$ and $b : c = 1 : 3$, then $a + b : b + c =$

A. 1 : 5
B. 2 : 3
C. 3 : 4
D. 3 : 5
E. 3 : 8

85 12. A hawker bought 120 apples and the cost was \$90. It was found that $\frac{1}{8}$ of the apples were rotten and could not be sold. He sold the rest at \$1 each. What percentage of the cost was his profit?

A. $11\frac{1}{9}\%$
B. $14\frac{2}{7}\%$
C. $16\frac{2}{3}\%$
D. $28\frac{4}{7}\%$
E. $33\frac{1}{3}\%$

85 13. The marked price of a book is double that of its cost. In a sale, what percentage discount was given if the profit made was 20% of the cost?

A. 10%
B. 20%
C. 30%
D. 40%
E. 50%

85 14. John spends 40 minutes to walk from his home to school. If he increases his walking speed by 2 km/h, then it takes only 30 minutes. What is the distance between John's home and his school?

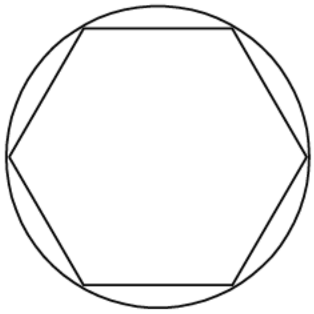
A. 1 km
B. 4 km
C. 6 km
D. 8 km
E. 12 km

85 15. 60% of the students in a school are boys. 70% of the boys and 40% of the girls wear glasses. If 696 students wear glasses, how many students are there in the school?

A. 1200

B. 1050
C. 868
D. 849
E. 800

85
16.



In the figure, a regular hexagon of side 2 cm is inscribed in a circle. The area of the circle is greater than the area of the hexagon by

A. $(3\pi - 6)$ cm^2
B. $(3\pi - 3\sqrt{3})$ cm^2
C. $(4\pi - 6)$ cm^2
D. $(4\pi - 3\sqrt{3})$ cm^2
E. $(4\pi - 6\sqrt{3})$ cm^2

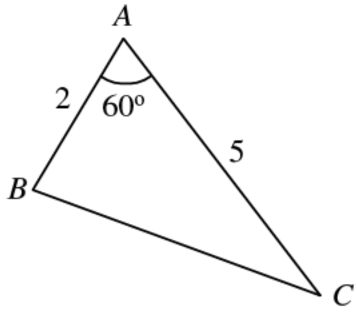
85
17. $\tan\theta\left(\frac{1}{\sin\theta} - \sin\theta\right) =$

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

85
18. If $\tan\theta = \frac{2ab}{a^2 - b^2}$ and $0^\circ < \theta < 90^\circ$, then $\cos\theta =$

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

85
19.



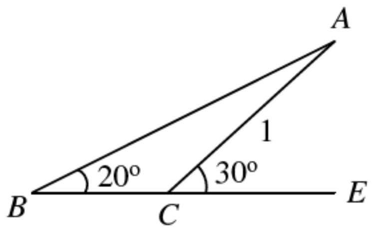
In the figure, $AB = 2$ and $AC = 5$, $BC =$

A. $\sqrt{39}$
B. $\sqrt{29}$
C. $\sqrt{24}$
D. $\sqrt{20}$
E. $\sqrt{19}$

85
20. In ΔABC, $\angle A = 30^\circ$, $AB = 6$ cm. If the area of ΔABC is 15 cm^2, $AC =$

A. 2.5 cm
B. 5 cm
C. 10 cm
D. 12 cm
E. 15 cm

85
21.



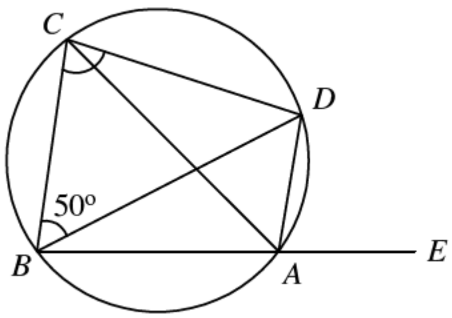
In the figure, BCX is a straight line. $AC = 1$, $AB =$

A. $2 \sin 20^\circ$
B. $2 \cos 20^\circ$
C. $\sqrt{2} \cos 20^\circ$

D. $\dfrac{1}{2\sin 20^\circ}$

E. $\dfrac{\sqrt{3}}{2\sin 20^\circ}$

85 22.



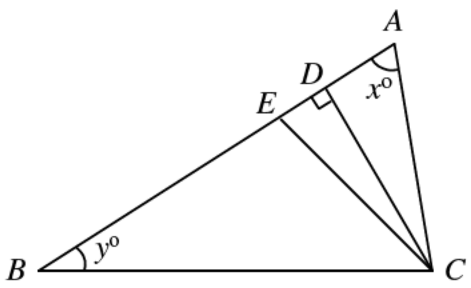
In the figure, $ABCD$ is a cyclic quadrilateral. BA is produced to E. DA bisects $\angle CAE$. $\angle BCD =$

A. 40°
B. 45°
C. 50°
D. 55°
E. 65°

85 23. The exterior angles of a pentagon are x°, $2x^\circ$, $3x^\circ$, $4x^\circ$, $5x^\circ$. The smallest interior angle of the pentagon is

A. 120°
B. 60°
C. 48°
D. 36°
E. 24°

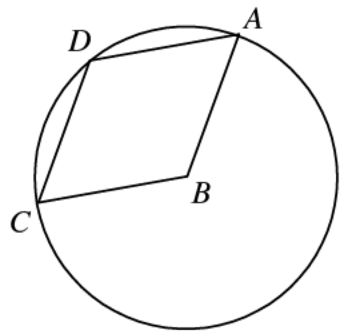
85 24.



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

85 25.



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°

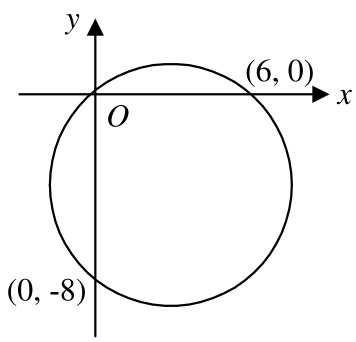
85 26. The distance between $(1 - k, k)$ and $(2, 1 + k)$ is $\sqrt{26}$, $k =$

A. 4
B. 6
C. -4 or 6
D. 4 or -6
E. -4 or -6

85 27. The equation of the perpendicular bisector of the line joining (1, 2) and (7, 4) is

A. $3x + y + 15 = 0$
B. $3x + y - 15 = 0$
C. $3x - y + 9 = 0$
D. $3x - y - 9 = 0$
E. $x + 3y - 13 = 0$

85 28.



In the figure, the circle passes through (0, 0) and cuts the two axes at (6, 0) and (0, –8). Its equation is

A. $x^2 + y^2 - 3x + 4y = 0$
B. $x^2 + y^2 + 3x - 4y = 0$
C. $x^2 + y^2 + 6x - 8y = 0$
D. $x^2 + y^2 - 6x + 8y = 0$
E. $x^2 + y^2 - 6x - 8y = 0$

85 29. The equation of a circle is $x^2 + y^2 - 4x - 5 = 0$. Which of the following is/are true?

I. The circle passes through the origin.
II. The centre lies on the x-axis.
III. The line $x - 5 = 0$ touches the circle.

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

85 30.

Class mid-value	Frequency
$m - 8$	3
$m - 4$	1
m	2
$m + 4$	6

The mean of the above distribution is

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

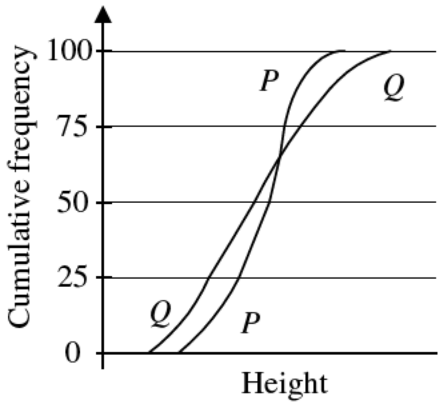
85 31. There are four balls, numbered 1, 2, 5 and 10 in a bag. If 2 balls are taken out at random, the probability that the sum of the numbers on the two balls drawn is greater than or equal to 7 is

A. $\frac{1}{2}$
B. $\frac{5}{8}$
C. $\frac{2}{3}$
D. $\frac{3}{4}$
E. $\frac{5}{6}$

85 32. Two dice are thrown. The probability of getting at least one “6” is

A. $\frac{1}{6}$
B. $\frac{1}{3}$
C. $\frac{11}{36}$
D. $\frac{25}{36}$
E. $\frac{35}{36}$

85
33.

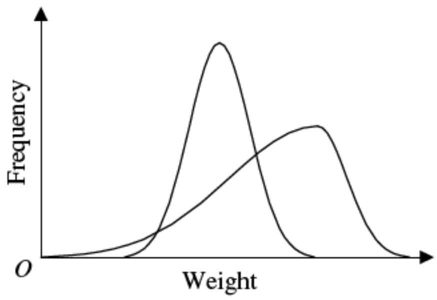


In the figure, P and Q are the cumulative frequency curves for the heights of two groups of students, each having 100 students. Which of the following must be true?

I. range of $P <$ range of Q
II. median of $P <$ median of Q
III. the 3rd quartile of $P <$ the 3rd quartile of Q

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

85
34.

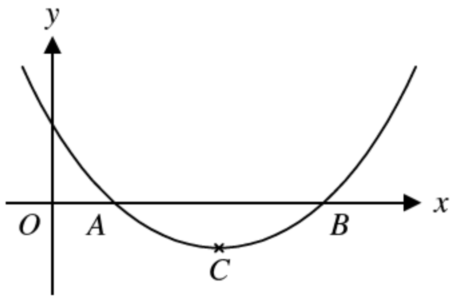


In the figure, P and Q are curves showing the distribution of weights of students in two schools, each having the same number of students. Which of the following must be true?

I. standard deviation of $P >$ standard deviation of Q
II. mode of $P >$ mode of Q
III. median of $P >$ median of Q

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

85
35.



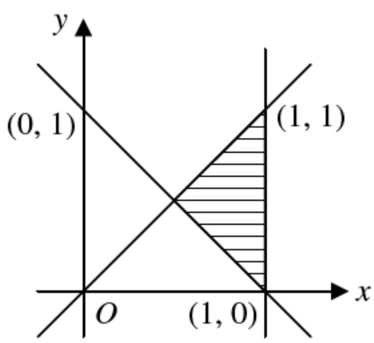
In the figure, the equation of the curve is $y = (x - 2)^2 - 1$. The curve intersects the x-axis at A and B. C is the vertex of the curve. The area of ΔABC is

A. 1
B. 1.5
C. 2
D. 2.5
E. 3

85
36. Which of the following is the solution of $(x - 1)(x - 3) \leq 0$ and $x - 2 \leq 0$

A. $x \leq 2$
B. $x \leq 3$
C. $2 \leq x \leq 3$
D. $1 \leq x \leq 2$
E. $1 \leq x \leq 3$

85
37.



Which of the following systems of inequalities determine the shaded region in the figure?

A. $\begin{cases} x \geq 1 \\ x + y \geq 1 \\ x \geq y \end{cases}$

B. $\begin{cases} x \geq 1 \\ x + y \leq 1 \\ x \geq y \end{cases}$

C. $\begin{cases} x \leq 1 \\ x + y \leq 1 \\ x \leq y \end{cases}$

D. $\begin{cases} x \leq 1 \\ x + y \leq 1 \\ x \geq y \end{cases}$

E. $\begin{cases} x \leq 1 \\ x + y \geq 1 \\ x \geq y \end{cases}$

85 38. If $\frac{1}{a}$, $\frac{1}{b}$, $\frac{1}{c}$ are in geometric progression, then which of the following is true?

A. $b^2 = ac$

B. $b^2 = \frac{1}{ac}$

C. $b^2 = \frac{a+c}{2}$

D. $b^2 = \frac{a+c}{2ac}$

E. $b^2 = \frac{2ac}{a+c}$

85 39. Three distinct numbers x, y and z are in arithmetic progression. Which of the following is/are also in arithmetic progression?

I. $x + 10, y + 10, z + 10$

II. $10x, 10y, 10z$

III. x^2, y^2, z^2

A. I and II only

B. I and III only

C. II and III only

D. I, II and III

E. None of I, II and III

85 40. If $f(2x) = 8x^3 + 4x$, then $f(3a) =$

A. $9a^3 + 6a$

B. $12a^3 + 6a$

C. $27a^3 + 6a$

D. $108a^3 + 6a$

E. $216a^3 + 12a$

85 41. A number is first reduced by $p\%$ and then increased by $x\%$. If the number so obtained is the same as the original number then $x =$

A. p

B. $\frac{p}{100}$

C. $\frac{p}{1-p}$

D. $\frac{100}{100-p}$

E. $\frac{100p}{100-p}$

85 42. The length and width of a cuboid are each increased by 10% and the height remains unchanged. The percentage increase in volume is

A. 10%

B. 20%

C. 21%

D. 24%

E. 33%

85 43. A cone of base radius $2r$ cm and height h cm has a volume of 60 cm^3. The volume of a cylinder of base radius r cm and height $4h$ cm is

A. 60 cm^3

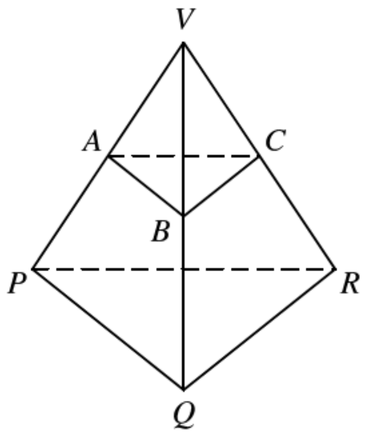
B. 120 cm^3

C. 180 cm^3

D. 240 cm^3

E. 360 cm^3

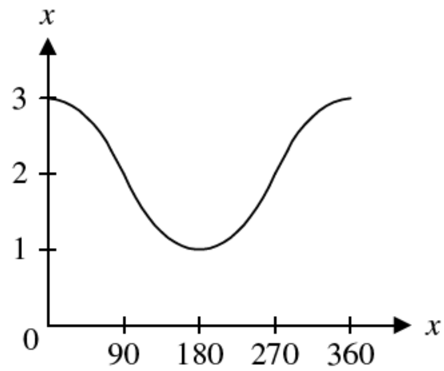
85
44.



In the figure, the volumes of the pyramids $VABC$ and $VPQR$ are 27 cm^3 and 64 cm*3* respectively. Planes ABC and PQR are parallel.
Area of ΔABC : Area of ΔPQR =

A. $\sqrt{27} : \sqrt{64}$
B. $\sqrt{37} : \sqrt{64}$
C. 3 : 4
D. 9 : 16
E. 27 : 64

85
45.



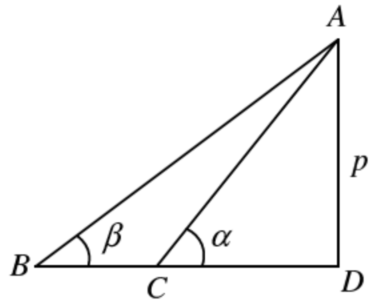
The figure shows the graph of

A. $y = 3\cos x^{\circ}$, $0 \le x \le 360$
B. $y = 3\sin x^{\circ}$, $0 \le x \le 360$
C. $y = 2 + \sin x^{\circ}$, $0 \le x \le 360$
D. $y = 2 + \cos x^{\circ}$, $0 \le x \le 360$
E. $y = 3 + \sin x^{\circ}$, $0 \le x \le 360$

85
46. If $0^{\circ} \le \theta \le 360^{\circ}$, then the largest value of $2\sin 2\theta + \cos 2\theta + 2$ is

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

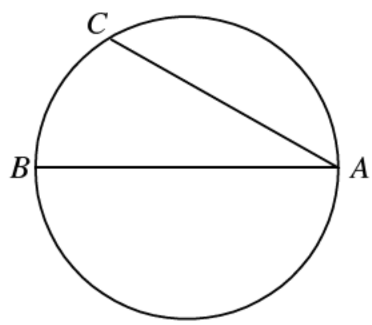
85
47.



In the figure, BCD is a straight line $AD = p$, then BC =

A. $p\tan(\beta - \alpha)$
B. $p(\tan\alpha - \tan\beta)$
C. $p(\tan\beta - \tan\alpha)$
D. $p(\frac{1}{\tan\alpha} - \frac{1}{\tan\beta})$
E. $p(\frac{1}{\tan\beta} - \frac{1}{\tan\alpha})$

85
48.



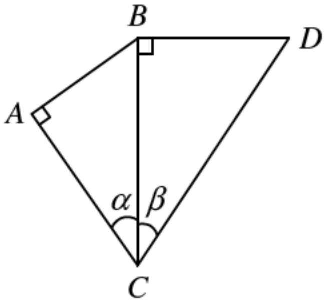
In the figure, AB is a diameter of the circle ABC. If arc AC has the same length as AB, then $\angle CAB$ =

A. $\frac{\pi}{2}$ radians
B. $(\frac{\pi}{2} - \frac{1}{2})$ radians
C. $(\frac{\pi}{2} - 1)$ radians

D. $(\frac{\pi}{2} - 2)$ radians

E. $(\pi - \frac{1}{2})$ radians

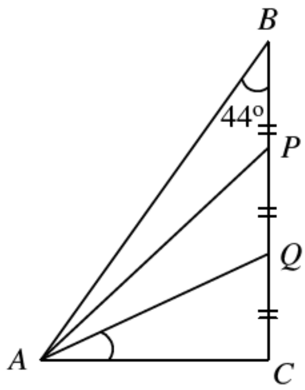
85 49.



In the figure, $\angle CAB = \angle CBD = 90^\circ$. $BC = 2$. The area of quadrilateral $ABCD =$

A. $2\sin(\alpha + \beta)$
B. $2(\tan\alpha + \tan\beta)$
C. $2(\sin\alpha\cos\alpha + \sin\beta\cos\beta)$
D. $2(\tan\alpha + \sin\beta\cos\beta)$
E. $2(\sin\alpha\cos\alpha + \tan\beta)$

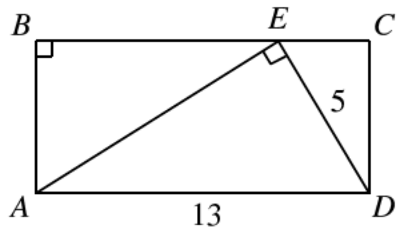
85 50.



In the figure, $\angle C = 90^\circ$. P and Q are points on BC such that $BP = PQ = QC$. $\angle CAQ =$

A. 30°
B. 25°
C. 22°
D. 20°
E. 15°

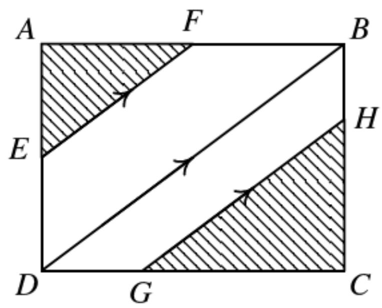
85 51.



In the figure, $ABCD$ is a rectangle. E is a point on BC such that $\angle AED = 90^\circ$. $AD = 13$ and $DE = 5$. The area of $ABCD =$

A. 30
B. 52
C. 60
D. 65
E. 120

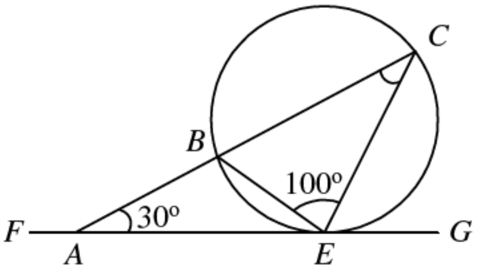
85 52.



In the figure, $ABCD$ is a rectangle E, F, G and H are points on the four sides such that $EF // DB // GH$. $AF = FB$ and $HC = 2BH$. What fraction of the area of $ABCD$ is shaded?

A. $\frac{13}{36}$
B. $\frac{5}{12}$
C. $\frac{25}{36}$
D. $\frac{25}{72}$
E. $\frac{47}{72}$

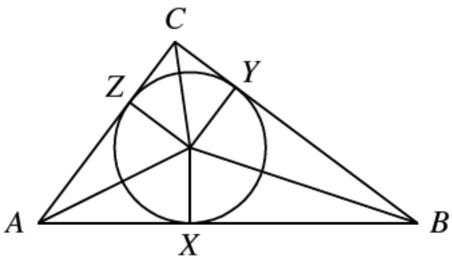
85
53.



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°

85
54.



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?

I. OA bisects $\angle BAC$
II. A, X, O and Z are concyclic
III. $AX = AZ$

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