Form 5

HKCEE 1987
Mathematics II

87 1. $\left(\frac{x+1}{x}\right)^2 - \left(\frac{x-1}{x}\right)^2 =$

A. $\frac{2}{x}$
B. $\frac{4}{x}$
C. $\frac{2}{x^2}$
D. $\frac{4}{x^2}$
E. 0

87 2. If $\frac{1}{x} - \frac{1}{y} = \frac{1}{z}$, and $x = \frac{1}{2}$, $z = \frac{1}{3}$, then $y =$

A. -1 .
B. 1 .
C. 5 .
D. 6 .
E. $\frac{1}{6}$.

87 3. If $a = \frac{b+3cd}{b-3cd}$, then $c =$

A. $\frac{a}{6d}$.
B. $\frac{b}{3d}$.
C. $\frac{b(a-1)}{6d}$.
D. $\frac{b(a+1)}{a-1}$.
E. $\frac{b(a-1)}{3d(a+1)}$.

87 4. The radii of two solid spheres made of the same material are in the ratio 2 : 3. If the smaller sphere weight 16 kg, then the larger one weighs

A. 24 kg .
B. 36 kg .
C. 48 kg .
D. 54 kg .
E. 60 kg .

87 5. Given that $x \neq 0$ and $-x$, x, $3x^2$ are in G.P., find x.

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

87 6. If $x + \frac{1}{x} = 1 + \sqrt{2}$, then $x^2 + \frac{1}{x^2} =$

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

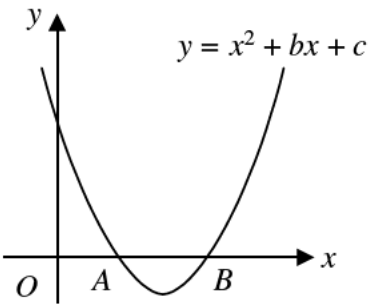
87 7. If $3^{2k} + 1 = 3^{2k} + 6$, then $k =$

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

87 8. When the expression $x^2 + px + q$ is divided by $x + 1$, the remainder is 4. Find the value of $2p - 2q + 1$.

A. -3
B. -5
C. -7
D. -9
E. It cannot be determined.

87 9.



In the figure, the graph of $y = x^2 + bx + c$ cuts the x-axis at A and B. $OA + OB =$

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

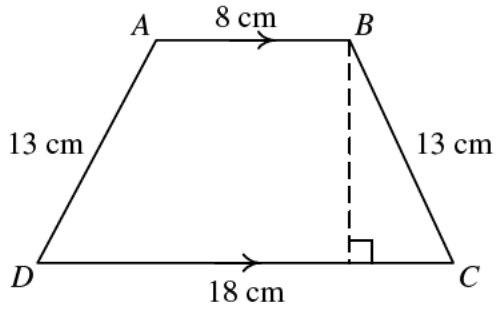
87 10. If $f(x) = x^2 + 1$, then $f(x - 1) =$

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

87 11. If $\log_{10}x$, $\log_{10}y$, $\log_{10}z$ are in A.P., then

A. $y = 10^{\frac{x+z}{2}}$.
B. $y = \frac{x+z}{2}$.
C. $y^2 = x + z$.
D. $y^2 = xz$.
E. $y = 10^{\sqrt{xz}}$.

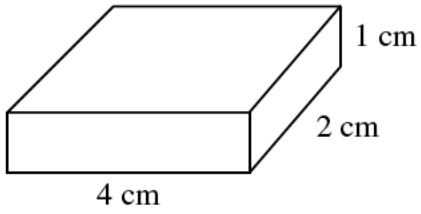
87 12.



$ABCD$ is a trapezium in which AB // DC, $AB = 8$ cm, $DC = 18$ cm, $AD = BC = 13$ cm. Find the area of the trapezium.

A. 156 cm^2
B. 169 cm^2
C. 216 cm^2
D. 312 cm^2
E. 338 cm^2

87 13.



A solid rectangular iron block, 4cm × 2 cm × 1 cm, is melted and recast into a cube. The decrease in the total surface area is

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

87
14.

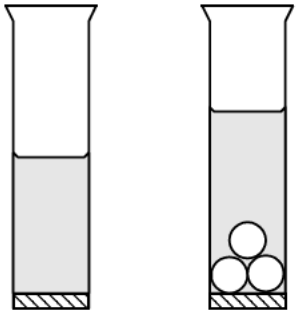


Figure a Figure b

Figure a shows a circular measuring cylinder 4 cm in diameter containing water. Three iron balls, each of diameter 2 cm, are dropped into the cylinder as shown in Figure b. What is the rise in the water level?

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

87
15. Find, correct to the nearest dollar, the compound interest on \$10 000 at 8% p.a. for 4 years, compounded half-yearly.

A. \$3200
B. \$3605
C. \$3686
D. \$13 200
E. \$13 686

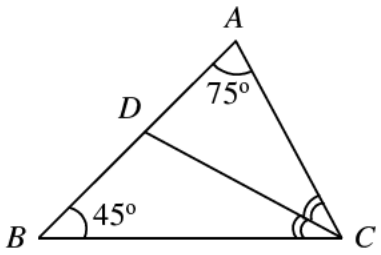
87
16. If the selling price of 5 pens is the same as the cost price of 6 pens, the percentage profit in selling a pen will be

A. $16\frac{2}{3}\%$.
B. 20%.
C. 60%.
D. $116\frac{2}{3}\%$.
E. 120%.

87
17. The circumference of a circle is 6π cm. The length of an arc of the circle which subtends an angle of $\frac{1}{3}$ radian at the centre is

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

87
18.



In the figure, $\angle A = 75^\circ$, $\angle B = 45^\circ$ and CD bisects $\angle ACB$. $\frac{BD}{CD}$

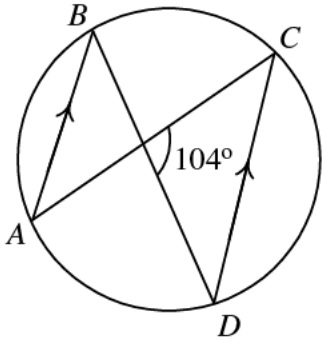
A. $\frac{2}{3}$.
B. $\frac{1}{\sqrt{2}}$.
C. $\sqrt{2}$.
D. $\sqrt{\frac{2}{3}}$.
E. $\sqrt{\frac{3}{2}}$.

87
19. A rectangle is 6 cm long and 8 cm wide. The acute angle between its diagonals, correct to the nearest degree is

A. 37°.
B. 41°.

C. 49^o.
D. 74^o.
E. 83^o.

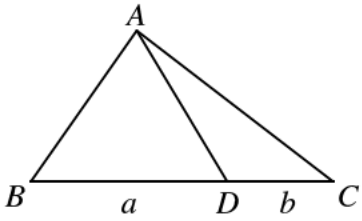
87
20.



In the figure, chords AC and BD meet at E and $AB \parallel DC$. If $\angle CED = 104^o$, find $\angle ABD$.

A. 76^o
B. 52^o
C. 38^o
D. 14^o
E. It cannot be determined.

87
21.



In the figure, $BD = a$. $DC = b$ and the area of ΔABC.

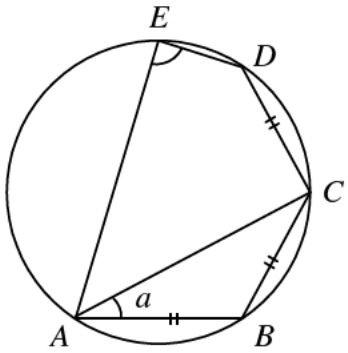
A. $\dfrac{s(a+b)}{a}$
B. $\dfrac{s(a+b)}{b}$
C. $\dfrac{s(a+b)^2}{a^2}$
D. $\dfrac{s(a+b)^2}{b^2}$
E. $\dfrac{s(a^2+b^2)}{a^2}$

87
22.

The real number π is

A. $\dfrac{22}{7}$.
B. 3.1416 .
C. the ratio of the area of a circle to the square of its diameter.
D. the ratio of the circumference of a circle to its radius.
E. the ration of the circumference of a circle to its diameter.

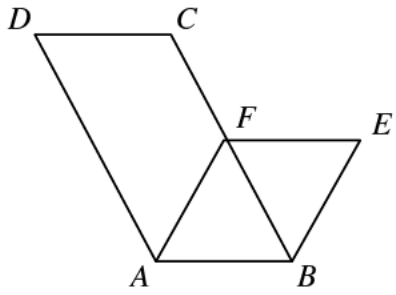
87
23.



In the figure, AB, BC and CD are three equal chords of a circle. If $\angle BAC = a$, then $\angle AED =$

A. $2a$.
B. $3a$.
C. $90^o - a$.
D. $180^o - 2a$.
E. $180^o - 3a$.

87
24.



In the figure, $ABCD$ and $ABEF$ are parallelograms. $\dfrac{\text{Area of } ABCD}{\text{Area of } ABEF} =$

A. $\frac{AD}{AF}$.

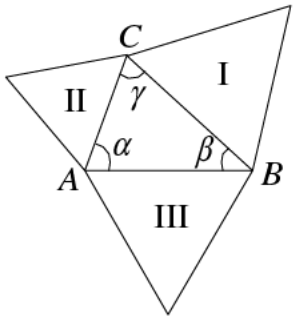
B. $\frac{BC}{BF}$.

C. $\frac{BC}{EF}$.

D. $\frac{AD^2}{AF^2}$.

E. $\frac{BC^2}{EF^2}$.

87
25.



In the figure, I, II and III are equilateral triangles.
Area of I : Area of II : Area of III =

A. $\alpha : \beta : \gamma$.

B. $\sin\alpha : \sin\beta : \sin\gamma$.

C. $\sin^2\alpha : \sin^2\beta : \sin^2\gamma$.

D. $\cos\alpha : \cos\beta : \cos\gamma$.

E. $\cos^2\alpha : \cos^2\beta : \cos^2\gamma$.

87
26. Which of the following straight lines divide(s) the circle $(x-1)^2 + (y+1)^2 = 1$ into two equal parts?

I. $x - y - 2 = 0$
II. $x + y + 2 = 0$
III. $x - y + 2 = 0$

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

87
27. The equation of a circle is $x^2 + y^2 - 4x + 2y + 1 = 0$. Which of the following is/are true?

I. The centre is $(-2, 1)$.
II. The radius is 2 units.
III. The circle intersects the y-axis at two distinct points.

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

87
28. Two perpendicular lines $kx + y - 4 = 0$ and $x - 2y + 3 = 0$ intersect at the point (h, k). Find h and k.

A. $h = -7, k = -2$

B. $h = -2, k = \frac{1}{2}$

C. $h = 1, k = 2$

D. $h = -4, k = -\frac{1}{2}$

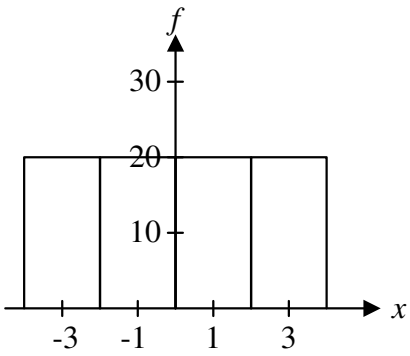
E. $h = -3, k = 2$

87
29. If the median of the 5 different integers $2, 7, 10, x, 2x - 3$ is 7, then $x =$

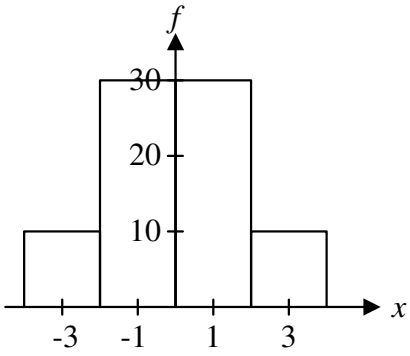
A. 3 .
B. 4 .
C. 5 .
D. 6 .
E. 8 .

87
30. The figures show the histograms of the three frequency distributions. Arrange their standard deviations in ascending order of magnitude.

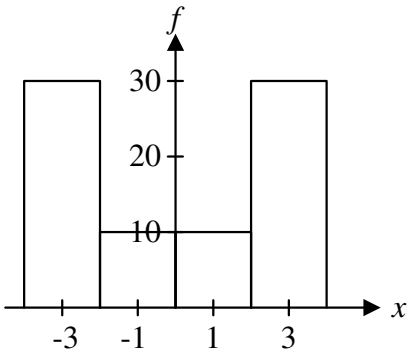
I.



II.



III.



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

87 31. One letter is taken from each of the words "MAN" and "ART" at random. Find the probability that the two letters are not the same.

A. $\frac{1}{9}$
B. $\frac{1}{3}$
C. $\frac{4}{9}$
D. $\frac{2}{3}$
E. $\frac{8}{9}$

87 32. Four persons A, B, C, D sit randomly around a round table. The probability that A sits next to B is

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

87 33. A die is thrown twice. Find the probability that the number obtained at the first throw is greater than that at the second throw.

A. $\frac{1}{6}$
B. $\frac{5}{12}$
C. $\frac{1}{2}$
D. $\frac{7}{12}$
E. $\frac{5}{6}$

87 34. If $a : b = 3 : 2$, $b : c = 4 : 3$, then $a + b : b + c =$

A. 7 : 10 .
B. 5 : 7 .
C. 1 : 1 .
D. 7 : 5 .
E. 10 : 7 .

87 35. Peter bought an article for \$ x. He sold it to Mary at a profit of 20%. Mary then sold it to John for \$90 at a loss of 25%. Find x.

A. 56.25
B. 81
C. 90
D. 100
E. 144

87 36. If x and y are integers with $x > y$, which of the following is/are true?

I. $x^2 > y^2$
II. $\frac{1}{x} < \frac{1}{y}$
III. $10^x > 10^y$

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

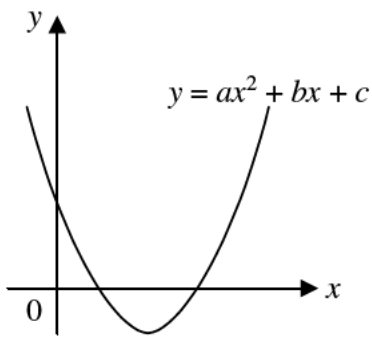
87 37. Solve the inequality $x \log_{10} 0.1 > \log_{10} 10$.

A. $x > -1$
B. $x > 1$
C. $x > 100$
D. $x < 1$
E. $x < -1$

87 38. If $x^2 + y^2 = 5$ and $x + y = 3$, then $x - y =$

A. 1 .
B. -1 .
C. 1 or -1 .
D. 1 or -5 .
E. -1 or 5.

87 39.



The figure shows the graph of $y = ax^2 + bx + c$. 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. I and II only
E. I, II and III

87 40. Find the H.C.F. of $(2x - 1)(x^2 - 6x + 9)$ and $(x^2 - 3x)(4x^2 - 1)$.

A. $(x - 3)$
B. $(2x - 1)$
C. $(x - 3)\ (2x - 1)$
D. $x(x - 3)^2\ (2x - 1)\ (2x + 1)$
E. There is no H.C.F.

87 41. If a is 10% less than b and b is 10% greater than c, then $a : c =$

A. 1 : 1 .
B. 9 : 10 .
C. 10 : 9 .
D. 99 : 100 .
E. 100 : 99 .

87 42. If $3a = 2b = 5c$, then $\frac{1}{a} : \frac{1}{b} : \frac{1}{c} =$

A. 3 : 2 : 5 .
B. 5 : 2 : 3 .

C. $\frac{1}{3}:\frac{1}{2}:\frac{1}{5}$.

D. $\frac{1}{5}:\frac{1}{3}:\frac{1}{2}$.

E. $\frac{1}{2}:\frac{1}{3}:\frac{1}{5}$.

87 43. A man walks from place A to place B at a speed of 3 km/h and cycles immediately back to place A along the same road at a speed of 15 km/h. The average speed for the whole trip is

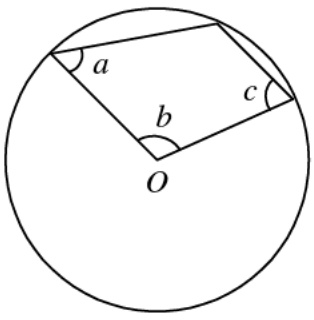
A. 5 km/h .
B. 6 km/h .
C. 9 km/h .
D. 10 km/h .
E. 12 km/h .

87 44. Let n be a positive integer. Which of the following number is/are odd?

I. 2^{2n+1}
II. $2^n + 1$
III. $3(2^n)$

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

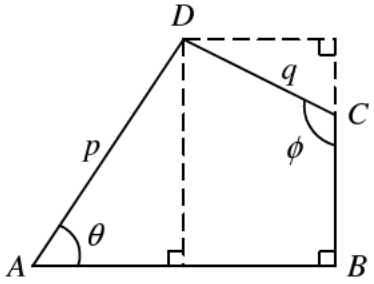
87 45.



In the figure, O is the center of the circle. $a + b =$

A. 180^o .
B. c .
C. $\frac{c}{2}$.
D. $180^o - c$.
E. $180^o - \frac{c}{2}$.

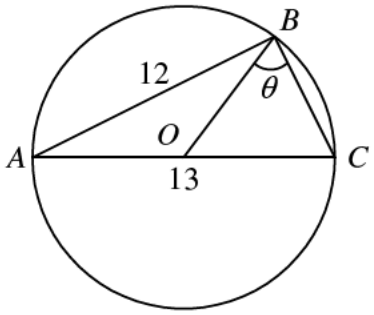
87 46.



In the figure, $AD = p$, $CD = q$ and $\angle B = 90^o$, $BC =$

A. $p \sin \theta - q \sin \phi$.
B. $p \sin \theta - q \cos \phi$.
C. $p \cos \theta - q \sin \phi$.
D. $p \sin \theta + q \cos \phi$.
E. $p \cos \theta + q \sin \phi$.

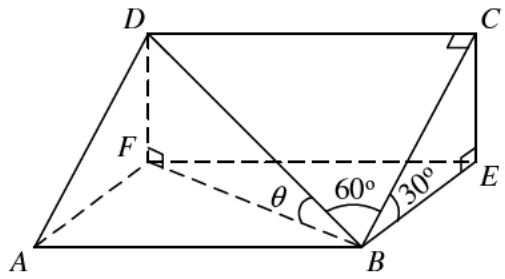
87 47.



In the figure, O is the centre of the circle. If $AB = 12$ and $AC = 13$, then $\cos \theta =$

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

87
48.



In the figure, $ABCD$ is a rectangle inclined at an angle of 30° to the horizontal plane $ABEF$. $\angle CBD = 60^\circ$. Let θ be the inclination of BD to the horizontal plane. $\sin\theta =$

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

87
49. How many different values of x between 0° and 360° will satisfy the equation $(\sin x + 1)(2\sin x + 1) = 0$?

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

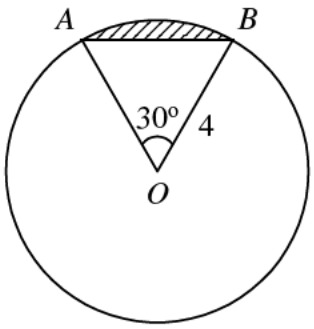
87
50. If $0^\circ \le x < 360^\circ$, the number of points of intersection of the graph of $y = \sin x$ and $y = 1 + \cos x$ is

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

87
51. In ΔABC, if $AB : BC : CA = 4 : 5 : 6$, then $\cos A =$

A. $\frac{1}{8}$.
B. $\frac{1}{5}$.
C. $\frac{3}{10}$.
D. $\frac{9}{16}$.
E. $\frac{3}{4}$.

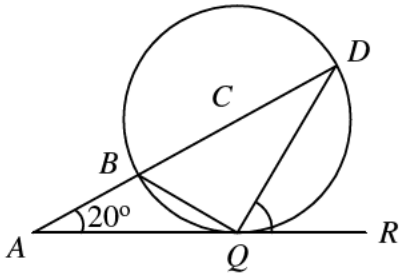
87
52.



In the figure, O is the centre of the circle of radius 4. The area of the shaded region is

A. $\frac{4\pi}{3} - 4$.
B. $\frac{4\pi}{3} - 8$.
C. $\frac{4\pi}{3} - 4\sqrt{3}$.
D. $\frac{2\pi}{3} - 4$.
E. $\frac{8\pi}{3} - 8$.

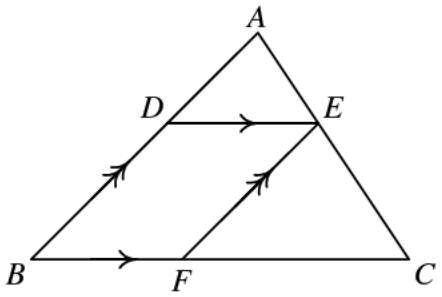
87
53.



In the figure, C is the centre of the circle. $ABCD$ is a straight line. AQR touches the circle at Q. If $\angle DAR = 20^{o}$, then $\angle DQR =$

A. 35^{o}.
B. 40^{o}.
C. 55^{o}.
D. 65^{o}.
E. 70^{o}.

87
54.



In the figure, DE // BC and AB // EF. If $AE : EC = 1 : 2$, then area of ΔADE : area of parallelogram $BFED$ =

A. 1 : 2 .
B. 1 : 3 .
C. 1 : 4 .
D. 1 : 5 .
E. 1 : 6 .