Form 5

HKCEE 1983
Mathematics II

83 1. $\dfrac{6}{x^2-9} - \dfrac{5}{x^2+x-6}$

A. $\dfrac{1}{(x-2)(x-3)}$
B. $\dfrac{1}{(x+2)(x+3)}$
C. $\dfrac{1}{(x+2)(x-3)}$
D. $\dfrac{1}{(x-2)(x+3)}$
E. $\dfrac{x-27}{(x-2)(x+3)(x-3)}$

83 2. $\dfrac{\dfrac{1}{a^3}+\dfrac{1}{b^3}}{\dfrac{1}{a}+\dfrac{1}{b}} =$

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

83 3. If $x = \dfrac{y^2}{\sqrt{a^2+bz}}$, then $z =$

A. $\dfrac{1}{b}(\dfrac{y^4}{x^2} - a^2)$
B. $\dfrac{1}{b}(\dfrac{x^2}{y^4} - a^2)$
C. $\dfrac{1}{b}(a^2 - \dfrac{x^2}{y^4})$
D. $\dfrac{1}{b}(a^2 - \dfrac{y^4}{x^2})$
E. $\dfrac{1}{b}(a^2 - \dfrac{x^2}{y^2})$

83 4. $(x^2y^{-1}) \div (x^{\frac{1}{2}}y^{-1})^2 =$

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

83 5. The H.C.F. of $a^3 - 1$ and $a^4 - 1$ is

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

83 6. When f(x) is divided by ($2x$ + 1), the remainder is

A. f(2)
B. f(1)
C. f(−1)
D. f($\frac{1}{2}$)
E. f($-\frac{1}{2}$)

83 7. If α and β are the roots of $2x^2 - 3x - 4 = 0$, then $\alpha^2 + 3\alpha\beta + \beta^2$

A. $\dfrac{1}{4}$
B. $4\dfrac{1}{4}$
C. 5

D. $8\frac{1}{4}$

E. 13

83 8. $2x - 3a - 4 > 3x + 5a + 6$ is equivalent to

A. $x > -8a - 10$
B. $x > 2a - 10$
C. $x < -8a - 10$
D. $x < \frac{1}{5}(2a + 2)$
E. $x > \frac{1}{5}(2a + 2)$

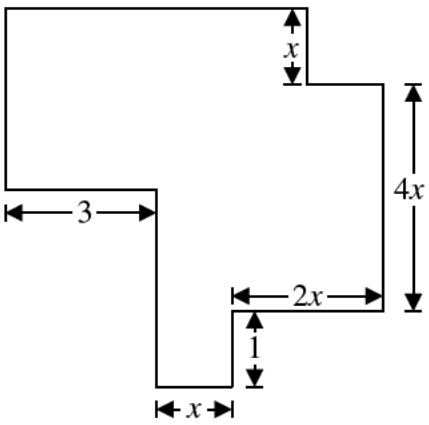
83 9. The sixth term and the eleventh term of an A.P. are 10 and 30 respectively. The first term is

A. −14
B. −10
C. 10
D. 50
E. 54

83 10. If $2x = 3y = 5x$, then $x : y : z =$

A. 2 : 3 : 5
B. 5 : 3 : 2
C. 6 : 10 : 15
D. 15 : 10 : 6
E. 25 : 9 : 4

83 11.



In the figure, all the corners are right-angled. If the perimeter of the figure is 40, then $x =$

A. 0.25
B. 2
C. 2.5
D. 4
E. 4.5

83 12. If the lengths of the diagonals of a rhombus are 2 cm and 4 cm respectively, what is the area of the rhombus?

A. $2\ cm^2$
B. $4\ cm^2$
C. $8\ cm^2$
D. $16\ cm^2$
E. It cannot be determined

83 13. A hollow cylindrical metal pipe, 1 m long, has an external radius and an internal radius of 5 cm and 4 cm respectively. The volume of metal is

A. $90\pi\ cm^3$
B. $100\pi\ cm^3$
C. $180\pi\ cm^3$
D. $900\pi\ cm^3$
E. $1800\pi\ cm^3$

83 14. Two men cycle round a circular track which 3 km long. If they start at the same time and at the same spot but go in opposite direction with speeds 6km/h and 9 km/h respectively, for how long must they cycle before they meet for the first time?

A. 12 minutes
B. 15 minutes
C. 18 minutes
D. 24 minutes
E. 60 minutes

83 15. A man marks his good at a price that will bring him a profit of 25% on the cost price. If he wants to sell his goods to a friend at the cost price, the percentage discount on the marked price should be

A. 25% .
B. 20% .
C. $16\frac{2}{3}\%$.
D. 15% .
E. 12% .

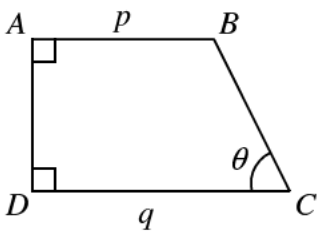
83 16. $\sin^2\theta - (\sin^2\theta \cos^4\theta + \sin^4\theta \cos^2\theta) =$

A. $\sin^4\theta$
B. $\cos^4\theta$
C. $-\sin^4\theta$
D. $-\cos^4\theta$
E. $\sin^2\theta \cos^2\theta$

83 17. $\dfrac{\cos(90^\circ - \theta)}{\tan(180^\circ - \theta)} =$

A. $\cos\theta$
B. $-\cos\theta$
C. $-\dfrac{\sin^2\theta}{\cos\theta}$
D. $-\dfrac{\cos^2\theta}{\sin\theta}$
E. $\dfrac{\sin^2\theta}{\cos\theta}$

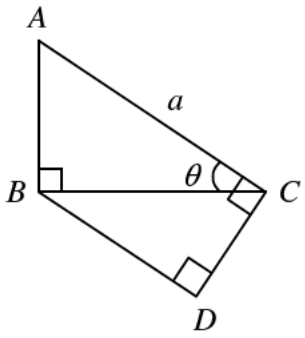
83 18.



In the figure, $AB = p$, $DC = q$ and $\angle A = \angle D = 90^\circ$. $BC =$

A. $(q - p)\sin\theta$
B. $(q - p)\cos\theta$
C. $(q - p)\tan\theta$
D. $\dfrac{q - p}{\sin\theta}$
E. $\dfrac{q - p}{\cos\theta}$

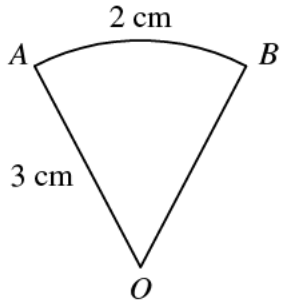
83 19.



In the figure, $\angle ABC = \angle ACD = \angle BDC = 90^\circ$. $AC = a$. $CD =$

A. $a\sin^2\theta$
B. $a\sin^2\theta$
C. $a\tan\theta$
D. $a\sin\theta\cos\theta$
E. $\dfrac{a\cos\theta}{\sin\theta}$

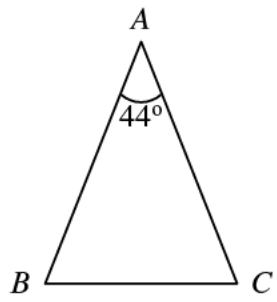
83 20.



In the figure, OAB is a sector of a circle. Radius OA is 3 cm long and arc $AB = 2$ cm. The area of the sector is

A. $3\ \text{cm}^2$.
B. $6\ \text{cm}^2$.
C. $9\ \text{cm}^2$.
D. $3\pi\ \text{cm}^2$.
E. $6\pi\ \text{cm}^2$.

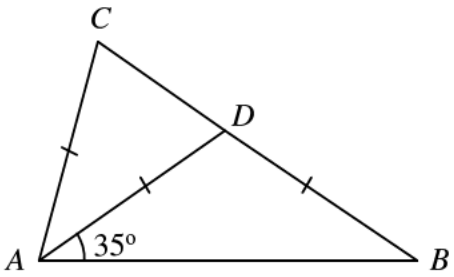
83
21.



In the figure, $AB = AC$. If the area of ΔABC is 64 cm^2, then $AB =$

A. 32 cm
B. $16\sqrt{2}$ cm
C. 16 cm
D. $8\sqrt{2}$ cm
E. 4 cm

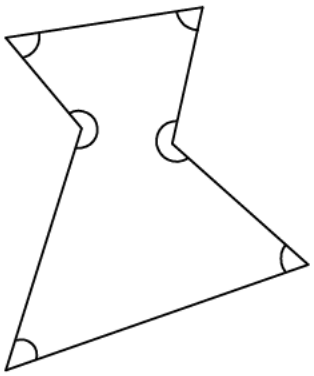
83
22.



In the figure, D is a point on BC and $AC = AD = BD$. $\angle CAD =$

A. 20^o
B. 25^o
C. 30^o
D. 35^o
E. 40^o

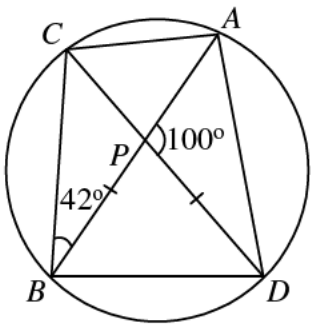
83
23.



The sum of the six marked angles in the figure is

A. 360^o.
B. 540^o.
C. 600^o.
D. 720^o.
E. 900^o.

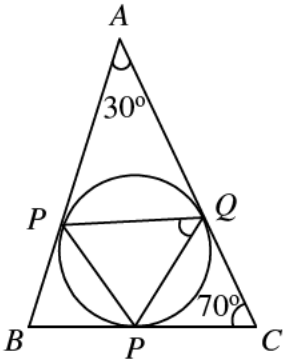
83
24.



In the figure, chords AB and CD intersect at P. $BP = DP$. $\angle CAD =$

A. 58^o
B. 86^o
C. 88^o
D. 92^o
E. 142^o

83
25.



In the figure, the three sides of ΔABC touch the circle at the points P, Q and R. $\angle PQR =$

A. 30^o
B. 50^o
C. 55^o
D. 70^o
E. 75^o

83 26. If the line $2x - 3y + c = 0$ passes through the point (1, 1), then $c =$

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

83 27. The equation of the line passing through (1, –1) and perpendicular to the x-axis is

A. $x - 1 = 0$.
B. $x + 1 = 0$.
C. $y - 1 = 0$.
D. $y + 1 = 0$.
E. $x + y = 0$.

83 28. A circle has its centre at (3, 4) and passes through the origin. Its equation is

A. $x^2 + y^2 - 6x - 8y + 25 = 0$
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. $x^2 + y^2 - 6x - 8y + 25 = 0$

83 29. If d is the distance between the point (a, b) and (b, a), then d^2

A. 0
B. $a^2 + b^2$
C. $2(a^2 + b^2)$
D. $(a - b)^2$
E. $2(a - b)^2$

83 30.

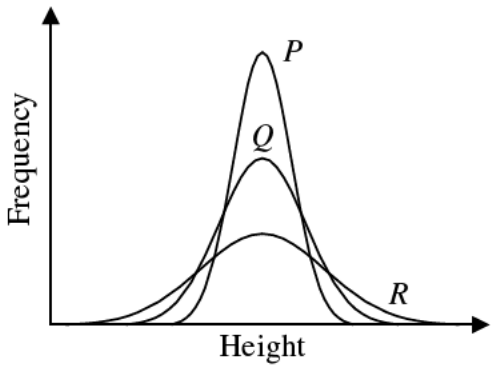
The pie chart shows how a boy spends the 24 hours of a day. If the boy spends 4 hours playing, how much time does he spend watching television?

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

83 31. There are 12 boys and 8 girls in a class. $\frac{1}{4}$ of the boys and $\frac{1}{4}$ of the girls wear glasses. What is the probability that a student chosen at random from the class is a boy not wearing glasses or a girl wearing glasses?

A. $\frac{5}{20}$
B. $\frac{9}{20}$
C. $\frac{11}{20}$
D. $\frac{15}{20}$
E. $\frac{9}{100}$

83 32.



In the figure, P, Q and R are curves showing the frequency distributions of the heights of students in three schools, each having the same number of students. Which distribution has the greatest standard deviation and which the smallest?

	Greatest	Smallest
A.	P	Q
B.	P	R
C.	Q	R
D.	R	P
E.	R	Q

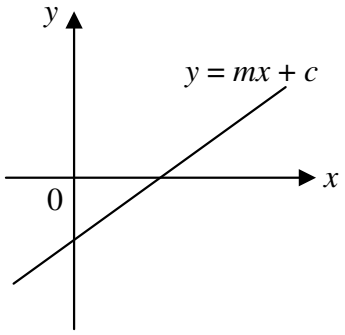
83 33. If $x + \frac{1}{x} = 2 + \frac{1}{2}$, then $x =$

A. 2 only
B. –2 only
C. $\frac{1}{2}$ only
D. –2 or 2
E. $\frac{1}{2}$ or 2

83 34. $12 - x - x^2 < 0$ is equivalent to

A. $x < -4$.
B. $x > 3$.
C. $-4 < x < 3$.
D. $x < -3$ or $x > 4$.
E. $x < -4$ or $x > 3$.

83 35.



In the figure, the equation of the straight line is $y = mx + c$. Which one of the following is true?

A. $m > 0$ and $c > 0$
B. $m > 0$ and $c < 0$
C. $m < 0$ and $c > 0$
D. $m < 0$ and $c < 0$
E. $m > 0$ and $c = 0$

83 36. If a and b are positive numbers, which of the following is/are true?

I. $\log_{10}(a + b) = \log_{10}a + \log_{10}b$
II. $\log_{10}\frac{a}{b} = \log_{10}a - \log_{10}b$
III. $\frac{\log_{10}a}{\log_{10}b} = \frac{a}{b}$

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

83 37. A function f(x) is called an even function if f(x) = f($-x$). Which of the following function is/are even functions?

I. $f_1(x) = \frac{1}{x}$
II. $f_2(x) = x^2$
III. $f_3(x) = x^3$

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

83 38. In an arithmetic progression, the first term is 3 and the common difference is 2. If the sum of the first n terms of the arithmetic progression is 143 then $n =$

A. 10
B. 11
C. 12
D. 13
E. 14

83 39. Three positive numbers a, b and c are in geometric progression. Which of the following are true?

I. $\frac{1}{a}$, $\frac{1}{b}$, $\frac{1}{c}$ are in geometric progression

II. a^2, b^2, c^2 are in geometric progression.

III. $\log_{10}a$, $\log_{10}b$, $\log_{10}c$ are in arithmetic progression.

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

83 40. The scale of a map is 1 : 20 000. On the map the area of a farm is 2 cm^2. The actual area of the farm is

A. 400 m^2.
B. 800 m^2.
C. 40 000 m^2.
D. 80 000 m^2.
E. 8 000 000 m^2.

83 41. It took Paul 40 minutes to walk from Town A to Town B. If the return journey took him 30 minutes, the percentage increase in his speed was

A. 10%.
B. $16\frac{2}{3}\%$.
C. 25%.
D. $33\frac{1}{3}\%$.
E. 40%.

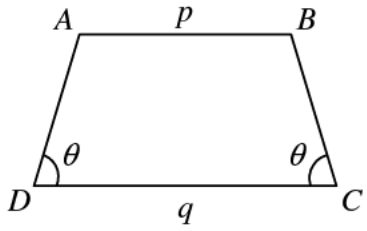
83 42. A merchant sold 2 articles each at \$1000. For first article, he gained 25% on the cost price. For the second article, he lost 20% on the cost price. Altogether

A. he gained \$100 .
B. he gained \$50 .
C. he lost \$100 .
D. he lost \$50 .
E. he lost \$48 .

83 43. Three number are in the ratio 2 : 3 : 5. The ratio of their average to the largest of the three numbers is

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

83 44.



In the figure, $ABCD$ is a trapezium in which AB // DC and $\angle C = \angle D = \theta$. If $CD = p$ and $AB = q$, then the area of the trapezium is

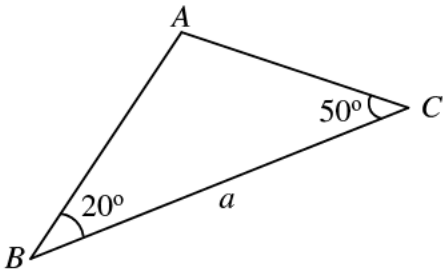
A. $\frac{1}{2}(p+q)^2\tan\theta$.
B. $\frac{1}{4}(p^2+q^2)\tan\theta$.
C. $\frac{1}{2}(p^2-q^2)\tan\theta$.
D. $\frac{1}{4}(p^2-q^2)\tan\theta$.
E. $\frac{(p^2-q^2)}{4\tan\theta}$

83 45. A solid sphere is cut into two hemispheres. The percentage increase in the total surface area is

A. 25%.
B. $33\frac{1}{3}\%$.
C. 50%.
D. 75%.

E. 100% .

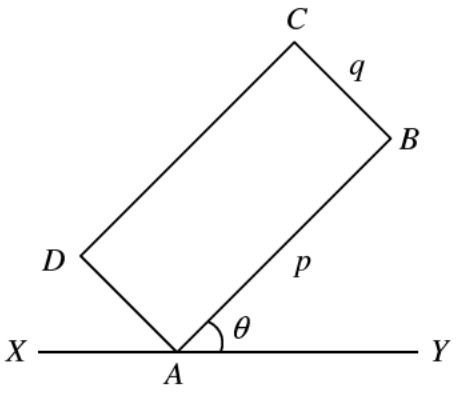
83
46.



In the figure, $BC = a$. $AB =$

A. $a \sin 20^\circ$
B. $\dfrac{a \sin 20^\circ}{\sin 70^\circ}$
C. $\dfrac{a \sin 20^\circ}{\sin 50^\circ}$
D. $\dfrac{a \sin 50^\circ}{\sin 20^\circ}$
E. $\dfrac{a \sin 50^\circ}{\sin 70^\circ}$

83
47.



In the figure, $ABCD$ is a rectangle. $AB = p$ and $BC = q$. If $\angle BAY = \theta$, the distance of C from the XAY is

A. $(p + q) \sin \theta$.
B. $(p + q) \cos \theta$.
C. $\sqrt{p^2 + q^2} \sin \theta$.
D. $p \cos \theta + q \sin \theta$.
E. $p \sin \theta + q \cos \theta$.

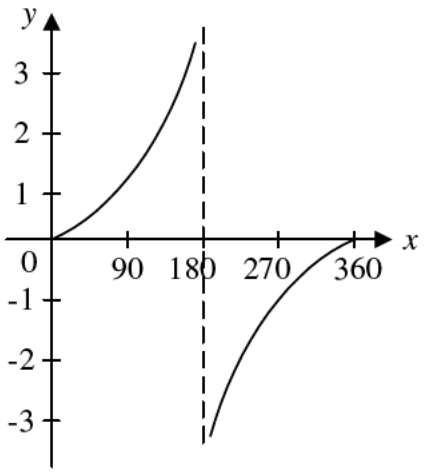
83
48. If $0^o \le \theta < 360^o$, the number of roots of the equation $4 \sin^2\theta \cos\theta = \cos\theta$ is

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

83
49. The maximum value of $\cos^2 3x$ is

A. 1 .
B. 2 .
C. 3 .
D. 6 .
E. 9 .

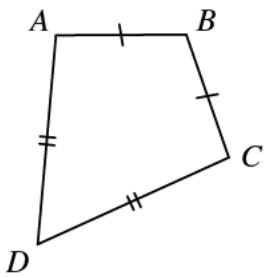
83
50.



The figure above shows the graph of a tangent function form 0^o to 360^o. The function is

A. $y = \tan \dfrac{x^o}{2}$.
B. $y = \tan x^o$.
C. $y = \tan 2x^o$.
D. $y = \tan(x - 90)^o$.
E. $y = \tan(x + 90)^o$.

83
51.

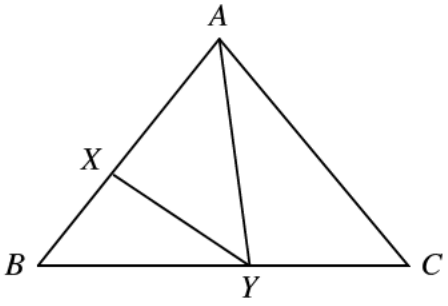


In the figure, $ABCD$ is a quadrilateral with $AB = BC$ and $AD = DC$. Which of the following is/ar true?

I. $\angle BAD = \angle BCD$
II. $AC \perp BD$
III. BD bisect AC

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

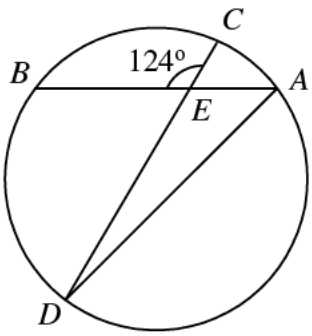
83
52.



In the figure, X and Y are points on AB and BC respectively such that $AX : XB = 3 : 2$ and $BY : YC = 4 : 3$. If the area of $\Delta ABC = 70$, then the area of $\Delta AXY =$

A. 16
B. 24
C. 30
D. 40
E. 42

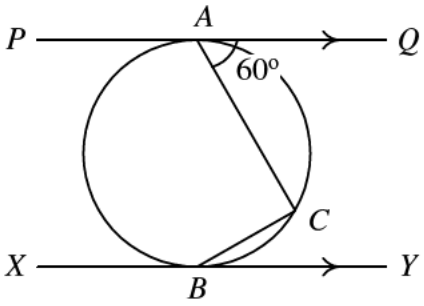
83
53.



In the figure, chords AB and CD intersect at E. The length of the minor arc BD is three times the length of the minor arc AC. $\angle BAD =$

A. 31^o
B. 35^o
C. 42^o
D. 45^o
E. 56^o

83
54.



In the figure, PQ and XY touch the circle at A and B respectively. $PQ \parallel XY$ and $\angle QAC = 60^o$. $\angle CBX =$

A. 150^o
B. 135^o
C. 120^o
D. 110^o
E. 100^o