HKCEE 1988
Mathematics II

88 1. Simplify $\dfrac{2^{n+4}-2(2^n)}{2(2^{n+3})}$

A. $\dfrac{7}{8}$
B. $\dfrac{7}{4}$
C. $1-2^{n+1}$
D. $2^{n+4}-\dfrac{1}{8}$
E. 2^{n+1}

88 2. If $x=\dfrac{1+y}{1-y}$, then $y=$

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

88 3. $\dfrac{x^2-2x}{x^3-25x}\times\dfrac{x^2-2x-15}{x^2+x-6}=$

A. $\dfrac{1}{x-5}$
B. $\dfrac{x-2}{(x+2)(x-5)}$
C. $\dfrac{1}{x+5}$
D. $\dfrac{1}{x}$
E. $\dfrac{x-3}{(x+3)(x-5)}$

88 4. If α and β are the two roots of $x^2 - 8x - 4 = 0$, then the value of $\dfrac{1}{\alpha}+\dfrac{1}{\beta}$ is

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

88 5. Let $f(x) = ax^2 + bx + c$. When $f(x)$ is divided by $(x - 1)$, the remainder is 10. When $f(x)$ is divided by $(x + 1)$, the remainder is 8. Find the value of b.

A. –4
B. –2
C. 2
D. 4
E. It cannot be found

88 6. $\dfrac{1}{2x-x^2}+\dfrac{1}{x^2+x-6}=$

A. $\dfrac{3}{x(2-x)(x+3)}$
B. $\dfrac{-3}{x(x+2)(x-3)}$
C. $\dfrac{6-x}{x(2-x)(x+2)(x-3)}$
D. $\dfrac{x-6}{x(2-x)(x+2)(x-3)}$
E. $\dfrac{2x+3}{x(2-x)(x+3)}$

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

I. $\frac{1}{x} - 1 = \frac{1-x}{x}$

II. $(ax + b)(x - b) = ax^2 - b^2$

III. $2x^2 - 3x + 1 = 0$

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

88 8. If the roots of a quadratic equation are $a + \sqrt{b}$ and $a - \sqrt{b}$, then the equation is

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

88 9. Which of the following is a G.P./are G.P.'s?

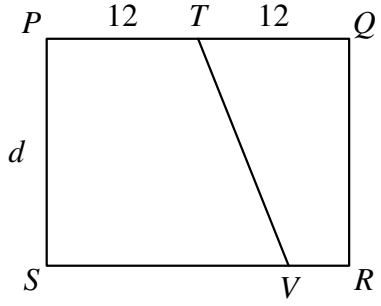
I. 5, 0.5, 0.05, 0.005, 0.0005
II. log 5, log 50, log 500, log 5000, log 50000
III. 5, $5\sin 70^o$, $5(\sin 70^o)^2$, $5(\sin 70^o)^3$, $5(\sin 70^o)^4$

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

88 10. A solid iron sphere of radius r is melted and recast into a circular cone and a circular cylinder. If both of them have the same height h and the same base radius r, find h in terms of r.

A. $\frac{1}{2}r$
B. $\frac{9}{16}r$
C. $\frac{2}{3}r$
D. $\frac{3}{4}r$
E. r

88 11.



In the figure, $PQRS$ is a rectangle with $PQ = 24$ and $PS = d$. T is the mid-point of PQ. V is a point on SR and $\frac{\text{area of } PTVS}{\text{area of } TQRV} = 2$. $SV =$

A. 14 .
B. 16 .
C. 18 .
D. 20 .
E. 22 .

88 12. Find the difference between simple interest and compound interest (compounded annually) on a loan of \$1000 for 4 years at 6% per annum. (The answer should be correct to the nearest dollar.)

A. \$22
B. \$196
C. \$540
D. \$760
E. \$1022

88 13. Last year, the cost of a school magazine consisted of:

cost of paper ……\$8
cost of printing …… \$5
cost of binding …… \$3

This year, the cost of paper will increase by 25% and the cost of printing will increase by 40% while the cost of binding will remain unchanged. The cost of a school magazine will increase by

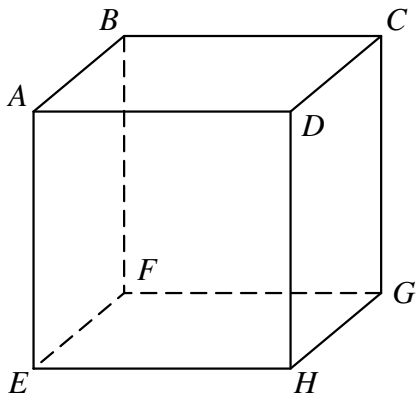
A. 20%
B. 25%
C. 27.5%
D. 32.5%
E. 65%

88 14. Given that $\sin\theta\cos\theta > 0$, which of the following is/are true?

I. $0^o < \theta < 90^o$
II. $90^o < \theta < 180^o$
III. $180^o < \theta < 270^o$

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

88 15.



In the figure, *ABCDEFGH* is a cube. Which of the following is a right angle/are right angles?

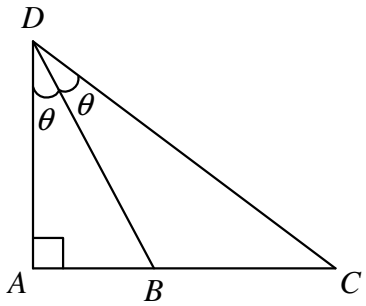
I. $\angle DHG$
II. $\angle AHG$
III. $\angle BEH$

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

88 16. If $\tan A = -\frac{5}{4}$, then $\frac{2\sin A - 3\cos A}{3\sin A + 2\cos A} =$

A. $-\frac{22}{7}$
B. $-\frac{22}{23}$
C. $-\frac{2}{23}$
D. $\frac{2}{23}$
E. $\frac{22}{7}$

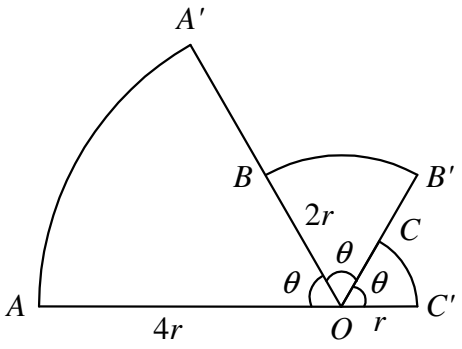
88 17.



In the figure, $\frac{AC}{AB} =$

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

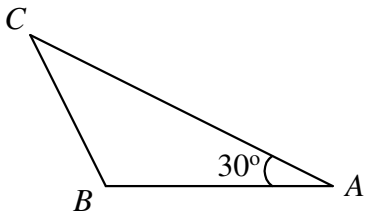
88
18.



In the figure, AOC' is a straight line. OAA', OBB' and OCC' are 3 sectors. If $OA = 4r$, $OB = 2r$ and $OC' = r$, find the total area of the sectors in terms of r.

A. $7\pi r^2$
B. $\frac{7}{2}\pi r^2$
C. $\frac{7}{4}\pi r^2$
D. $\frac{7}{6}\pi r^2$
E. $\frac{7}{12}\pi r^2$

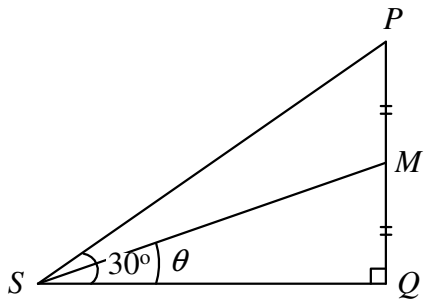
88
19.



In the figure, the area of ΔABC is 15 cm^2 and $\angle A = 30^o$. AC is longer than AB by 4 cm. $AC =$

A. 6 cm
B. 8.8 cm
C. 10 cm
D. 11.5 cm
E. 14 cm

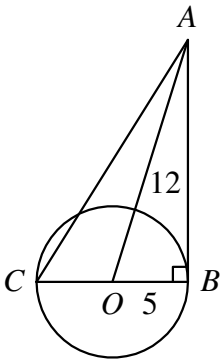
88
20.



In the figure, M is the mid-point of PQ and $\angle PSQ = 30^o$. Find $\tan\theta$.

A. 0.268
B. $\frac{\sqrt{3}}{6}$
C. $\frac{\sqrt{3}}{2}$
D. $\frac{\sqrt{3}}{4}$
E. $\frac{\sqrt{3}}{8}$

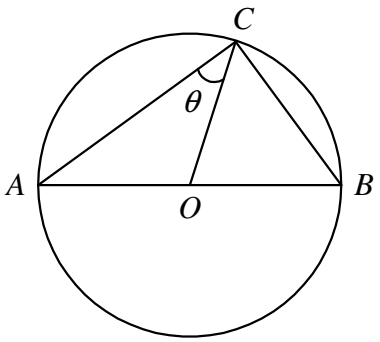
88
21.



In the figure, O is the centre of the circle of radius 5. AB is a tangent and $AO = 12$. $AC =$

A. 13
B. 17
C. $\sqrt{219}$
D. $\sqrt{244}$
E. $\sqrt{269}$

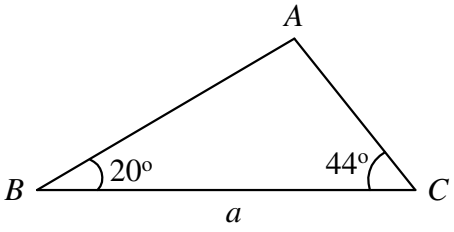
88
22.



In the figure, O is the centre of the circle of diameter 13. $AC = 12$. $\sin\theta$

A. $\frac{5}{12}$
B. $\frac{3}{13}$
C. $\frac{\sqrt{313}}{13}$
D. $\frac{12}{13}$
E. $\frac{13}{12}$

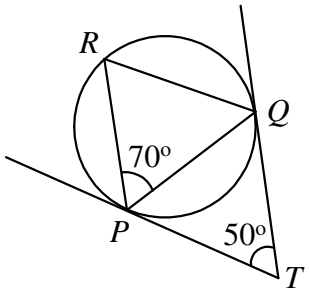
88
23.



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

A. $\frac{5a}{11}$
B. $a \sin 50^\circ$
C. $\frac{a \sin 70^\circ}{\sin 50^\circ}$
D. $\frac{a \sin 50^\circ}{\sin 70^\circ}$
E. $\frac{a \sin 50^\circ}{\sin 20^\circ}$

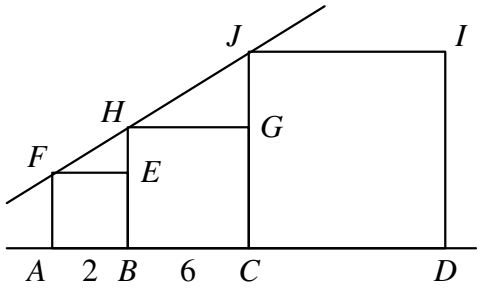
88
24.



In the figure, TP and TQ are tangents to the circle PQR. If $\angle RPQ = 70^\circ$ and $\angle PTQ = 50^\circ$, then $\angle RQP =$

A. 20°
B. 45°
C. 50°
D. 60°
E. 70°

88
25.



In the figure, $ABEF$, $BCGH$ and $CDIJ$ are three squares. If $AB = 2$ and $BC = 6$ and F, H, J lie on a straight line, then $CD =$

A. 8
B. 10
C. 12
D. 16
E. 18

88
26. The line $y = mx + c$ is perpendicular to the line $y = 3 - 2x$. Find m.

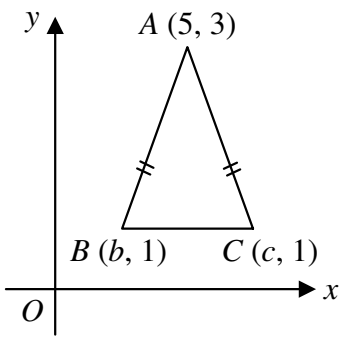
A. 2
B. $-\frac{1}{2}$
C. -2
D. $\frac{1}{2}$

E. $-\frac{1}{3}$

88 27. Which of the following circles has the lines $x = 1$, $x = 5$, $y = 4$ and $y = 8$ as its tangents?

A. $(x-1)^2 + (y-4)^2 = 4$
B. $(x-5)^2 + (y-8)^2 = 4$
C. $(x-3)^2 + (y-6)^2 = 4$
D. $(x-1)^2 + (y-8)^2 = 4$
E. $(x-5)^2 + (y-4)^2 = 4$

88 28.



In the figure, $A(5, 3)$, $B(b, 1)$ and $C(c, 1)$ are the vertices of a triangle. If $AB = AC$, then $b + c =$

A. 3
B. 5
C. 6
D. 8
E. 10

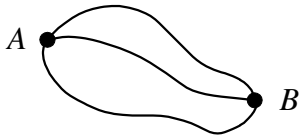
88 29. The maximum load a lift can carry is 600 kg. 11 men with a mean weight of 49 kg are already in the lift. If one more man is to enter the lift, his weight must not exceed

A. 49 kg
B. 50 kg
C. 51 kg
D. 59 kg
E. 61 kg

88 30. The mean length of 30 rods is 80 cm. If one of these rods of length 68 cm is taken out and replaced by another rod of length 89 cm, then the new mean length is

A. 79.3 cm
B. 79.7 cm
C. 80 cm
D. 80.3 cm
E. 80.7 cm

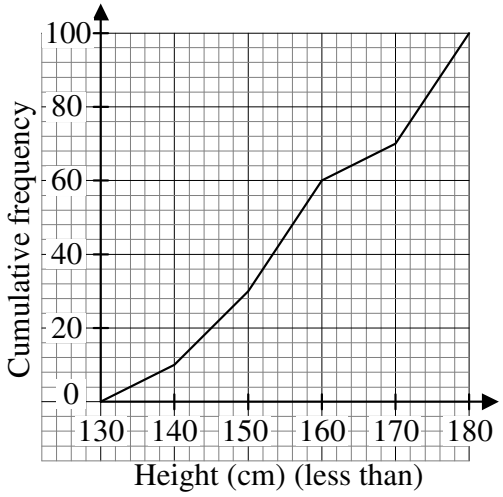
88 31.



The figure shows 3 paths joining A and B. A man walks from A to B and another man walks from B to A at the same time. If they choose their paths at random, what is the probability that they will meet?

A. $1 - \frac{1}{9}$
B. $\frac{1}{3}$
C. $1 - \frac{1}{3}$
D. $\frac{1}{2} \times \frac{1}{3}$
E. $\frac{1}{3} \times \frac{1}{3}$

88
32.



The figure shows the cumulative frequency polygon of the heights of 100 persons. If one person is selected at random from the group, find the probability that his height is less than 170 cm but not less than 150 cm.

A. $\frac{1}{5}$
B. $\frac{2}{5}$
C. $\frac{3}{10}$
D. $\frac{1}{2}$
E. $\frac{7}{10}$

88
33. Which of the following expressions CANNOT be factorized?

A. $x^3 - 125$
B. $4x^2 - 9y^2$
C. $x^3 + 125$
D. $4x^2 + 9y^2$
E. $3x^2 + 6xy + 3y^2$

88
34. If $f(x) = 3 + 2^x$, then $f(2x) - f(x) =$

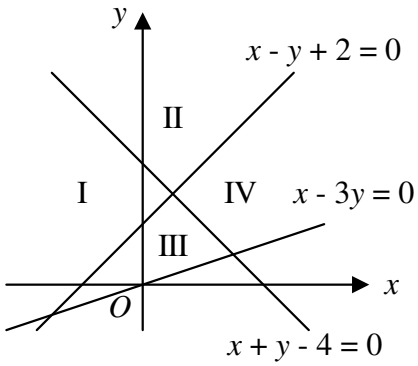
A. 2^x
B. 2^{3x}
C. $3 + 2^x$
D. $2^x(2^x + 1)$
E. $2^x(2^x - 1)$

88
35. If $\log a > 0$ and $\log b < 0$, which of the following is/are true?

I. $\log\frac{a}{b} > 0$
II. $\log b^2 > 0$
III. $\log\frac{1}{a} > 0$

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

88
36.

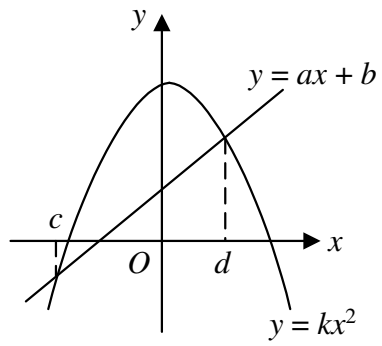


In the figure, which region represents the solution to the following inequalities?

$$\begin{cases} x - 3y \le 0 \\ x - y + 2 \ge 0 \\ x + y - 4 \ge 0 \end{cases}$$

A. I
B. II
C. III
D. IV
E. V

88 37.



In the figure, the line $y = ax + b$ cuts the curve $y = kx^2$ at $x = c$ and $x = d$. Find the range of values of x for which $kx^2 < ax + b$.

A. $c < x < d$
B. $c < x < 0$
C. $x < c$ or $x < d$
D. $x < c$
E. $x > d$

88 38. p, q, r, s are in A.P. If $p + q = 8$ and $r + s = 20$, then the common difference is

A. 3
B. 4
C. 6
D. 7
E. 12

88 39. y varies inversely as x^2. If x is increased by 100%, then y is

A. increased by 100%
B. increased by 300%
C. decreased by 25%
D. decreased by 75%
E. decreased by 100%

88 40. $8abc^3$ is the H.C.F. of $24ab^2c^3$ and

A. $12a^2bc^4$
B. $30a^2bc^3$
C. $32a^2bc^5$
D. $40ab^2c^3$
E. $48a^3bc^5$

88 41. X sells an article to Y at a profit. Y ten sells it to Z for \$60 at a profit of 20%. If X had sold the article directly to Z for \$60, how much MORE profit would he have made?

A. \$10
B. \$12
C. \$48
D. \$50
E. It cannot be found

88 42. A car travels from P to Q. If its speed is increased by k%, then the time it takes to travel the same distance is reduced by

A. $k\%$
B. $\frac{100}{k}\%$
C. $\frac{100k}{100+k}\%$
D. $\frac{k}{100+k}\%$
E. $\frac{k}{100-k}\%$

88 43. A bag contains n balls of which 60% are red and 40% are white. After 10 red balls are taken out from the bag, the percentage of red balls becomes 50%. Find n.

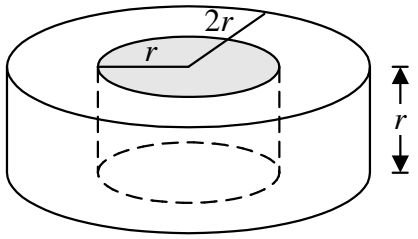
A. 20
B. 40
C. 50
D. 60
E. 100

88 44. The weight of a gold coin of a given thickness varies as the square of its diameter. If the weights of two such coins are in the ratio 1 : 4, then their diameter are in ratio

A. 1 : 2
B. 2 : 1
C. 1 : 4

D. 4 : 1
E. 1 : 16

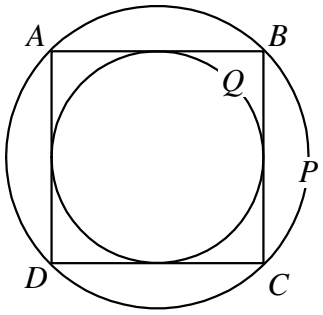
88
45.



A cylindrical hole of radius r is drilled through a solid cylinder, base radius $2r$ and height r, as shown in the figure. The percentage increase in the total surface area is

A. 0%
B. $16\frac{2}{3}\%$
C. 20%
D. 25%
E. $33\frac{1}{3}\%$

88
46.



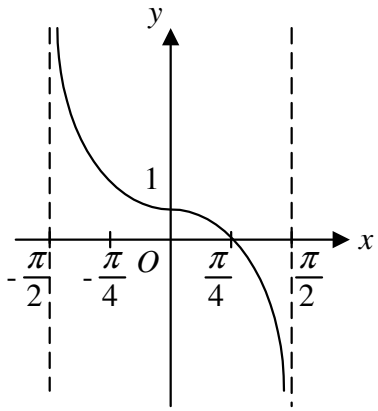
The figure shows the circumscribed circle P and the inscribed circle Q of the square $ABCD$.
Find area of P : area of Q

A. $\sqrt{2} : 1$
B. 2 : 1
C. $2\sqrt{2} : 1$
D. $\pi : 1$
E. 4 : 1

88
47. If x and y can take any value between 0 and 360, what is the greatest value of $2 \sin x^{\circ} - \cos y^{\circ}$?

A. 1
B. 2
C. 3
D. $\sqrt{5}$
E. It cannot be found

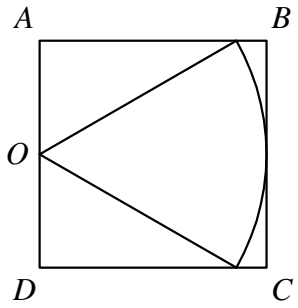
88
48.



The figure shows the graph of the function

A. $y = -\tan x$
B. $y = 1 - \tan x$
C. $y = 1 + \tan x$
D. $y = \cos x - \sin x$
E. $y = \cos x + \sin x$

88
49.



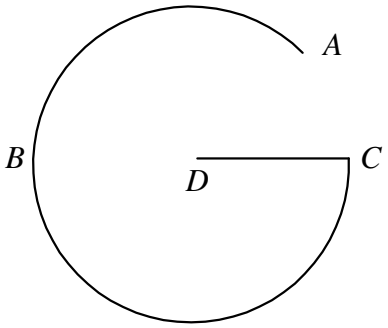
$ABCD$ is a square of side 2 cm. O is the mid-point of AD. A sector with centre O is inscribed in the square as shown in the figure. What is the area of the sector?

A. $\frac{\pi}{2}$ cm^2
B. $2\sqrt{3}\,\pi$ cm^2
C. $\sqrt{3}\,\pi$ cm^2

D. $\frac{2}{3}\pi$ cm^2

E. $\frac{4}{3}\pi$ cm^2

88
50.



In the figure, $ABCD$ is a G-shaped curve, where ABC is an arc of a circle and DC is a radius. If the length of the curve $ABCD$ is the same as that of the complete circle, find, in radians, the angle subtended by the arc ABC at the centre.

A. $\frac{3\pi}{2}$ rad

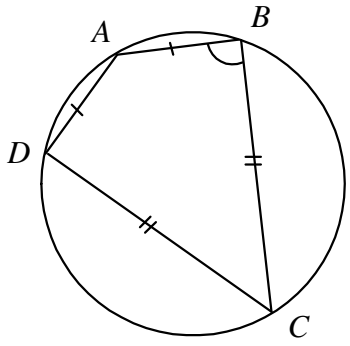
B. $(\pi + 1)$ rad

C. $\frac{4}{3}\pi$ rad

D. $(2\pi - 1)$ rad

E. $\frac{7}{4}\pi$ rad

88
51.



$ABCD$ is a cyclic quadrilateral with $AB = AD$ and $CB = CD$. Find $\angle ABC$.

A. 75^o

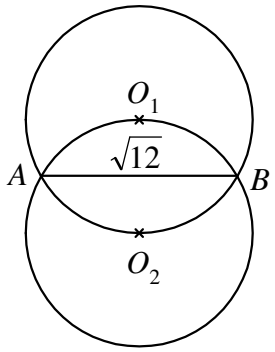
B. 90^o

C. 105^o

D. 120^o

E. It cannot be found

88
52.



In the figure, O_1 and O_2 are the centres of the two circles, each of radius r and $AB = \sqrt{12}$ find r.

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

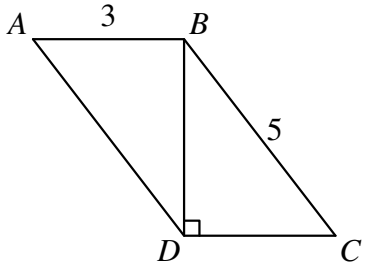
B. 2

C. 4

D. 6

E. 8

88
53.



In the figure, $ABCD$ is a parallelogram. $AB \perp BD$, $AB = 3$ and $BC = 5$. $AC =$

A. 10 .

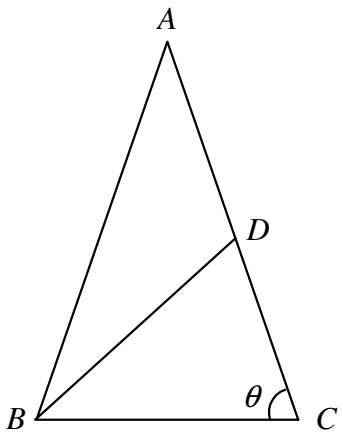
B. 12 .

C. $\sqrt{13}$.

D. $\sqrt{26}$.

E. $2\sqrt{13}$.

88
54.



In the figure if $AB = AC$ and $AD = BD = BC$, then $\angle ACB =$

A. 30^o
B. 32^o
C. 36^o
D. 40^o
E. 72^o