Form 5

HKCEE 1992
Mathematics II

92 1. $\frac{1}{a}+\frac{1}{b}=$

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

92 2. If $a = 1 - \frac{1}{1-b}$, then $b =$

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

92 3. For what value(s) of x does the equality $\frac{(x+1)(x-2)}{x-2} = x + 1$ hold?

A. –1 only
B. 2 only
C. Any value
D. Any value except –1
E. Any value except 2

92 4. $\frac{\sqrt{5}+1}{\sqrt{5}-1}-\frac{\sqrt{5}-1}{\sqrt{5}+1}=$

A. 0
B. $\frac{1}{2}$
C. 3
D. $\sqrt{5}$
E. $\frac{1}{2}+\sqrt{5}$

92 5. If $\log_{10} b = 1 + \frac{1}{2}\log_{10} a$, then $b =$

A. $10\sqrt{a}$.
B. $10+\sqrt{a}$.
C. $5a$.
D. $\frac{a}{2}$.
E. $1 + \frac{a}{2}$.

92 6. Which of the following is a factor of $4(a + b)^2 - 9(a - b)^2$?

A. $5b - a$
B. $5b + a$
C. $- a - b$
D. $13b - 5a$
E. $13a - 5b$

92 7. If $\frac{a}{b} = \frac{c}{d} = k$ and a, b, c, d are positive, then which of the following must be true?

A. $\frac{a+c}{b+d} = k$
B. $ab = cd = k$
C. $ac = bd = k$
D. $a = c = k$
E. $\frac{ac}{bd} = k$

92 8. Simplify $\dfrac{\overbrace{n \times n \times \cdots \times n}^{n \text{ times}}}{\underbrace{n + n + \cdots + n}_{n \text{ terms}}}$.

A. n^{n-2}
B. $n^{\frac{n}{2}}$
C. $n - 2$
D. $\dfrac{n}{2}$
E. 1

92 9. If a and b are greater than 1, which of the following statements is/are true?

I. $\sqrt{a+b} = \sqrt{a} + \sqrt{b}$
II. $(a^{-1} + b^{-1})^{-1} = a + b$
III. $a^2b^3 = (ab)^6$

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

92 10. If $a : b = 2 : 3$, $a : c = 3 : 4$ and $b : d = 5 : 2$, find $c : d$.

A. 1 : 5
B. 16 : 45
C. 10 : 3
D. 20 : 9
E. 5 : 1

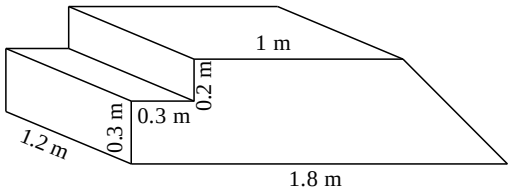
92 11. Suppose x varies directly as y^2 and inversely as z. Find the percentage increase of x when y is increased by 20% and z is decreased by 20%.

A. 15.2%
B. 20%
C. 50%
D. 72.8%
E. 80%

92 12. A sum of \$ 10 000 is deposited at 4% p.a., compounded yearly. Find the interest earned *in the second year*.

A. \$16
B. \$400
C. \$416
D. \$800
E. \$816

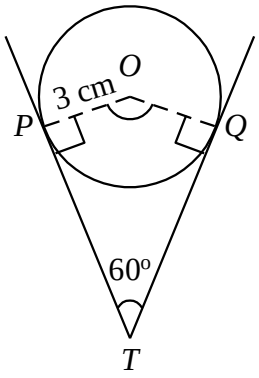
92 13.



The figure shows a solid platform with steps on one side and a slope on the other. Find its volume.

A. 0.75 m^3
B. 0.84 m^3
C. 0.858 m^3
D. 1.008 m^3
E. 1.608 m^3

92 14.



In the figure, TP and TQ are tangent to the circle of radius 3 cm. Find the length of the minor arc PQ.

A. 3π cm
B. 2π cm
C. $\dfrac{3\pi}{2}$ cm
D. π cm
E. $\dfrac{\pi}{2}$ cm

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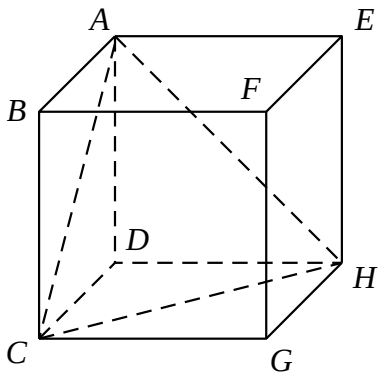
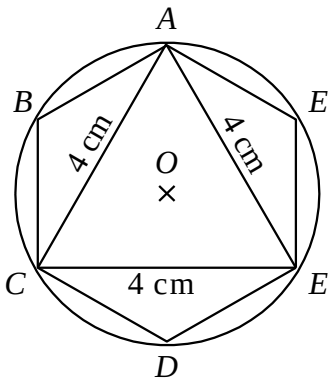
15.



Find the ratio of the volume of the tetrahedron *ACHD* to the volume of the cube *ABCDEFGH* in the figure.

A. 1 : 8
B. 1 : 6
C. 1 : 4
D. 1 : 3
E. 1 : 2

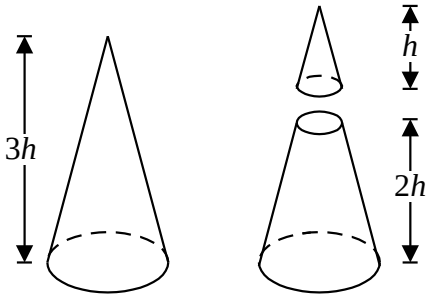
92
16.



In the figure, the equilateral triangle *ACE* of side 4 cm is inscribed in the circle. Find the area of the inscribed regular hexagon *ABCDEF*.

A. $8\sqrt{3}$ cm^2
B. $8\sqrt{2}$ cm^2
C. $4\sqrt{3}$ cm^2
D. $4\sqrt{2}$ cm^2
E. 16 cm^2

92
17.



In the figure, a cone of height $3h$ is cut by a plane parallel to its base into a smaller cone of height h and a frustum. Find the ratio of the volume of the smaller cone to the volume of the frustum.

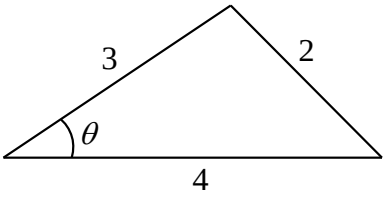
A. 1 : 27
B. 1 : 26
C. 1 : 9
D. 1 : 8
E. 1 : 7

92
18.

The greatest value of $1 - 2\sin\theta$ is

A. 5 .
B. 3 .
C. 1 .
D. 0 .
E. –1 .

92
19.



In the figure, find $\cos\theta$.

A. $-\frac{1}{4}$
B. $\frac{11}{16}$
C. $\frac{3}{4}$
D. $\frac{7}{8}$

E. $\frac{\sqrt{77}}{9}$

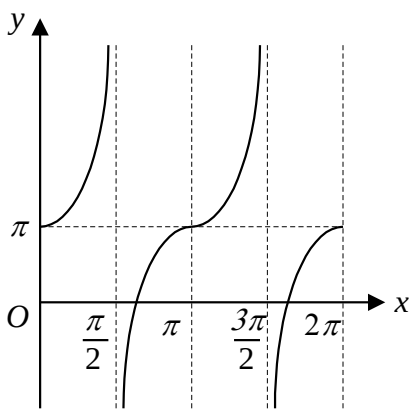
92 20. In which two quadrants will the solution(s) of $\sin\theta \cos\theta < 0$ lie?

A. In quadrants I and II only
B. In quadrants I and III only
C. In quadrants II and III only
D. In quadrants II and IV only
E. In quadrants III and IV only

92 21. If $A + B + C = 180^o$, then $1 + \cos A \cos(B + C) =$

A. 0 .
B. $\sin^2 A$.
C. $1 + \cos^2 A$.
D. $1 + \sin A \cos A$.
E. $1 - \sin A \cos A$.

92 22.



The figure shows the graph of the function

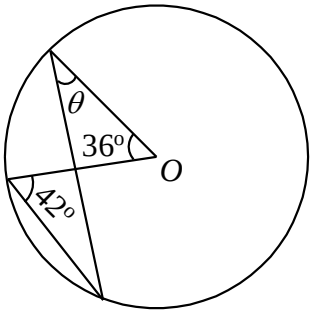
A. $\tan(x + \pi)$.
B. $\tan(x - \pi)$.
C. $\pi \tan x$.
D. $\pi + \tan x$.
E. $\pi - \tan x$.

92 23. Which of the following equations has/have solutions?

I. $2\cos^2\theta - \sin^2\theta = 1$
II. $2\cos^2\theta - \sin^2\theta = 2$
III. $2\cos^2\theta - \sin^2\theta = 1$

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

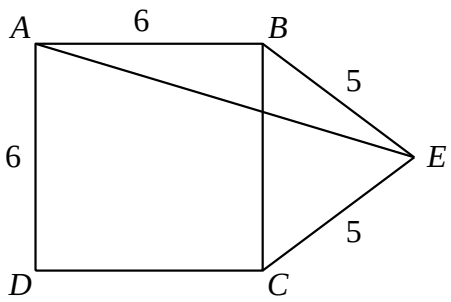
92 24.



In the figure, O is the centre of the circle. Find θ.

A. 42^o
B. 36^o
C. 24^o
D. 21^o
E. 18^o

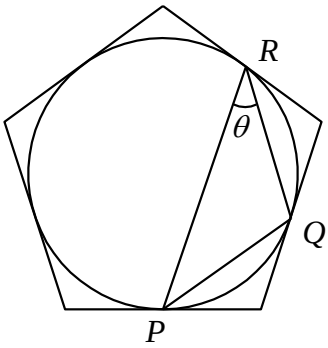
92 25.



In the figure, *ABCD* is a square with side 6. If $BE = CE = 5$, find AE.

A. $\sqrt{61}$
B. 9
C. 10
D. $6\sqrt{3}$
E. $\sqrt{109}$

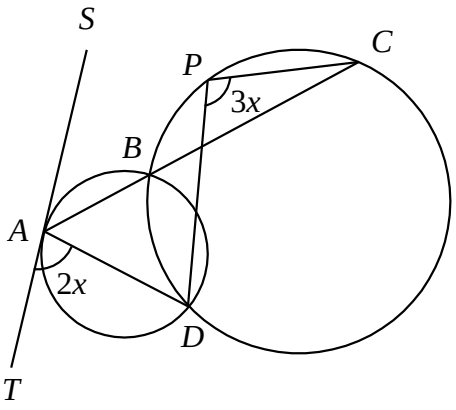
92
26.



In the figure, the circle is inscribed in a regular pentagon. P, Q and R are points of contact. Find θ.

A. 30^o
B. 32^o
C. 35^o
D. 36^o
E. 45^o

92
27.



In the figure, ST is a tangent to the smaller circle. ABC is a straight line. If $\angle TAD = 2x$ and $\angle DPC = 3x$, find x.

A. 30^o
B. 36^o
C. 40^o
D. 42^o
E. 45^o

92
28. If the two lines $2x - y + 1 = 0$ and $ax + 3y - 1 = 0$ do not intersect, then a =

A. -6 .
B. -2 .
C. 2 .
D. 3 .
E. 6 .

92
29. If $0 < k < h$, which of the following circles intersect(s) the y-axis?

I. $(x - h)^2 + (y - k)^2 = k^2$
II. $(x - h)^2 + (y - k)^2 = h^2$
III. $(x - h)^2 + (y - k)^2 = h^2 + k^2$

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

92
30. If the line $y = mx + 3$ divides the circle $x^2 + y^2 - 4x - 2y - 5 = 0$ into two equal parts, find m.

A. $-\frac{1}{4}$
B. -1
C. 0
D. $\frac{5}{4}$
E. 2

92
31. The mid-points of the sides of a triangle are (3, 4), (2, 0) and (4, 2). Which of the following points is a vertex of the triangle?

A. (3.5, 3)
B. (3, 2)
C. (3, 1)
D. (1.5, 2)
E. (1, 2)

92
32. The table shows the mean marks of two classes of students in a

	Number of students	Mean mark
Class A	38	72
Class B	42	54

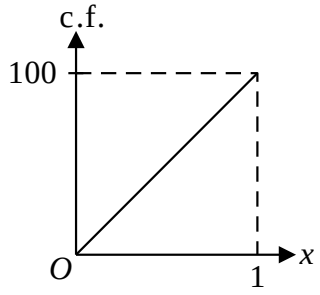
A student in Class A has scored 91 marks. It is found that his score was wrongly recorded as 19 in the calculation of the mean mark for Class A in the above table. Find the correct mean mark of the 80 students in the two classes.

A. 61.65
B. 62.55
C. 63
D. 63.45
E. 63.9

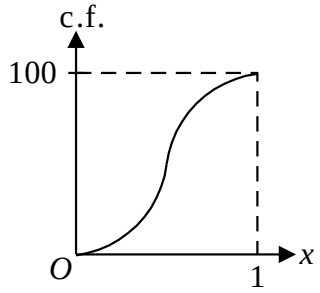
92 33. Two cards are drawn randomly from five cards *A*, *B*, *C*, *D* and *E*. Find the probability that card *A* is drawn while card *C* is not.

A. $\frac{3}{25}$
B. $\frac{3}{20}$
C. $\frac{4}{25}$
D. $\frac{6}{25}$
E. $\frac{3}{10}$

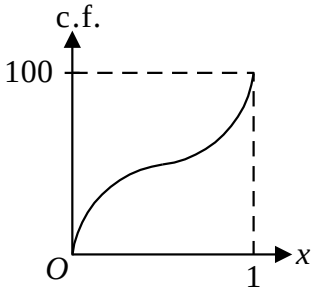
92 34. I.



II.



III.



The figure shows the cumulative frequency curves of three distributions. Arrange the three distributions in the order of their standard deviations, from the smallest to the largest.

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

92 35. If the quadratic equation $ax^2 - 2bx + c = 0$ has two equal roots, which of the following is/are true?

I. *a*, *b*, *c* form an arithmetic progression.
II. *a*, *b*, *c* form a geometric progression.
III. Both roots are $\frac{b}{a}$.

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

92 36. Which of the following intervals must contain a root of $2x^3 - x^2 - x - 3 = 0$?

I. $-1 < x < 1$
II. $0 < x < 2$
III. $1 < x < 3$

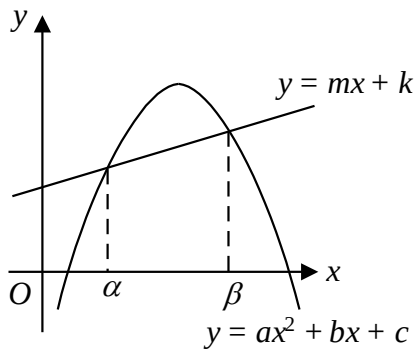
A. I only
B. II only
C. III only

D. I and II only
E. II and III only

92 37. How many integers x satisfy the inequality $6x^2 - 7x - 20 \le 0$?

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

92 38.



From the figure, if $\alpha \le x \le \beta$, then

A. $ax^2 + (b - m)x + (c - k) \le 0$.
B. $ax^2 + (b - m)x + (c - k) < 0$.
C. $ax^2 + (b - m)x + (c - k) = 0$.
D. $ax^2 + (b - m)x + (c - k) > 0$.
E. $ax^2 + (b - m)x + (c - k) \ge 0$.

92 39. Under which of the following conditions *must* the mean of n consecutive positive integers also be an integer?

A. n is any positive integer
B. n is any positive odd integer
C. n is any positive even integer
D. n is any multiple of 3
E. n is the square of any positive integer

92 40. The L.C.M. of P and Q is $12ab^3c^2$. The L.C.M. of X, Y and Z is $30a^2b^3c$. What is the L.C.M. of P, Q, X, Y and Z?

A. $360a^3b^6c^3$
B. $60a^2b^3c^2$
C. $60ab^3c^2$
D. $6a^2b^3c$
E. $6ab^3c$

92 41. If a polynomial f(x) is divisible by $x - 1$, then f($x - 1$) is divisible by

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

92 42. Find the (2n)th term of G.P.
$-\frac{1}{2}$, 1, –2, 4, …

A. 2^{2n}
B. -2^{2n}
C. -2^{2n-3}
D. 2^{2n-2}
E. -2^{2n-2}

92 43. If the price of an orange rises by \$1, then 5 fewer oranges could be bought for \$100. Which of the following equations gives the original price \$$x$ of an orange?

A. $\frac{100}{x+1} = 5$
B. $\frac{100}{x+1} - \frac{100}{x} = 5$
C. $\frac{100}{x} - \frac{100}{x+1} = 5$
D. $\frac{100}{x-1} - \frac{100}{x} = 5$
E. $\frac{100}{x} - \frac{100}{x-1} = 5$

92 44. By selling an article at 10% discount off the marked price, a shop still makes 20% profit. If the cost price of the article is \$19 800, then the marked price is

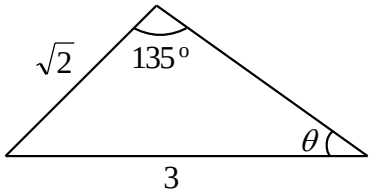
A. \$21 600 .

B. \$26 136 .
C. \$26 400 .
D. \$27 225 .
E. \$27 500 .

92 45. Coffee *A* and coffee *B* are mixed in the ratio $x : y$ by weight. *A* costs \$50/kg and *B* costs \$40/kg. If the cost of *A* is increased by 10% which that of *B* is decreased by 15%, the cost of the mixture per kg remains unchanged. Find $x : y$.

A. 2 : 3
B. 5 : 6
C. 6 : 5
D. 3 : 2
E. 55 : 34

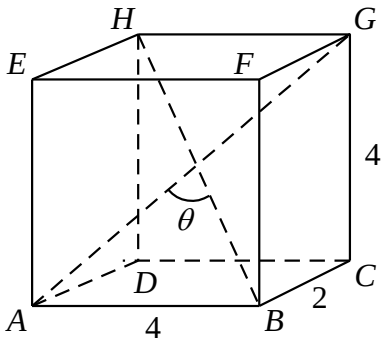
92 46.



In the figure, find $\tan\theta$.

A. $\frac{1}{3}$
B. $\frac{1}{\sqrt{8}}$
C. $\frac{3}{8}$
D. $\sqrt{\frac{2}{7}}$
E. $\frac{1}{\sqrt{2}}$

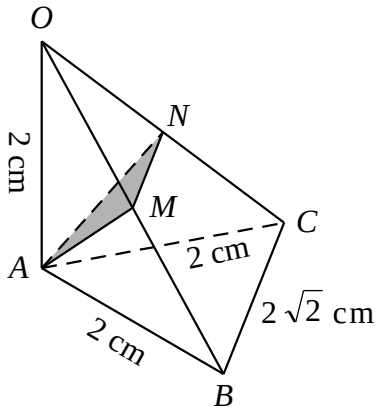
92 47.



In the figure, if θ is the angle between the diagonals *AG* and *BH* of the cuboid, then

A. $\sin\frac{\theta}{2} = \frac{2}{3}$.
B. $\sin\frac{\theta}{2} = \frac{3}{4}$.
C. $\sin\frac{\theta}{2} = \frac{1}{3}$.
D. $\sin\theta = \frac{2}{3}$
E. $\sin\theta = \frac{3}{4}$

92 48.



In the figure, *OA* is perpendicular to the plane *ABC*. $OA = AB = AC = 2$ cm and $BC = 2\sqrt{2}$ cm. If *M* and *N* are the mid-point of *OB* and *OC* respectively, find the area of ΔAMN.

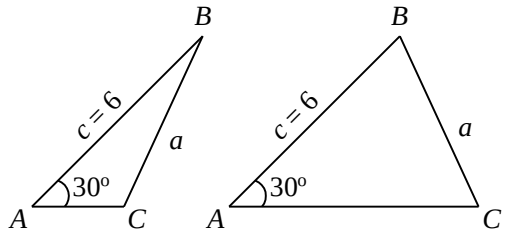
A. $\frac{1}{2}$ cm^2
B. 1 cm^2

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

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

E. $\sqrt{3}$ cm^2

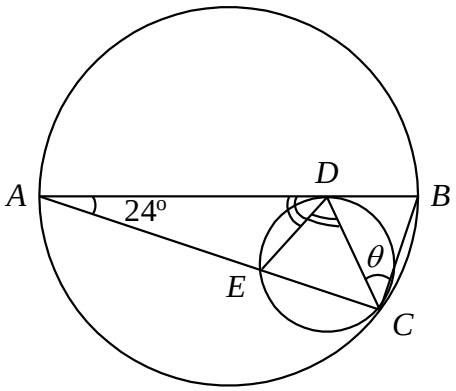
92
49.



In ΔABC, $\angle A = 30^o$, $c = 6$. If it is possible to draw two distinct triangles as shown in the figure, find the range of values of a.

A. $0 < a < 3$
B. $0 < a < 6$
C. $3 < a < 6$
D. $a > 3$
E. $a > 6$

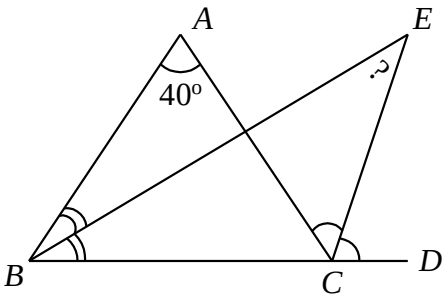
92
50.



In the figure, the two circles touch each other at C. The diameter AB of the bigger circle is tangent to the smaller circle at D. If DE bisects $\angle ADC$, find θ.

A. 24^o
B. 38^o
C. 45^o
D. 52^o
E. 66^o

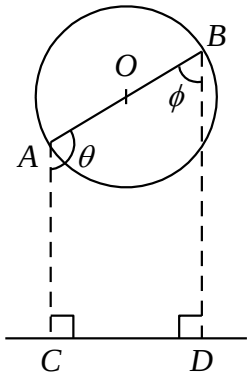
92
51.



In the figure, EB and EC are the angle bisectors of $\angle ABC$ and $\angle ACD$ respectively. If $\angle A = 40^o$, find $\angle E$.

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

92
52.

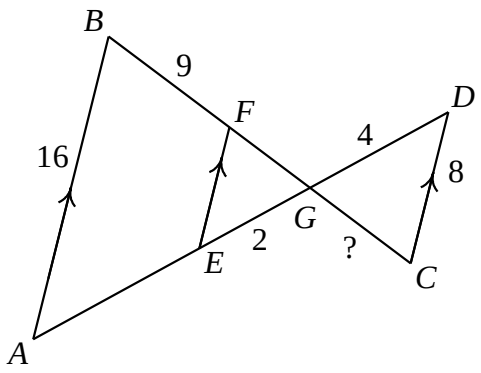


In the figure, O is the centre of the circle. If the diameter AOB rotates about O, which of the following is/are constant?

I. $\theta + \phi$
II. $AC + BD$
III. $AC \times BD$

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

92
53.



In the figure, $AB = 16$, $CD = 8$, $BF = 9$, $GD = 4$, $EG = 2$. Find GC.

A. 4.5
B. 5
C. 6
D. 8
E. 10

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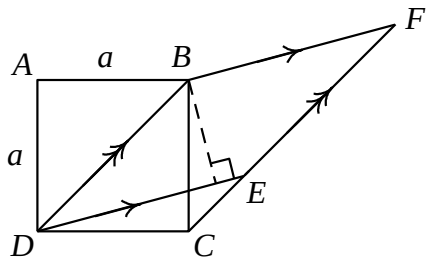
54.



In the figure, $ABCD$ is a square of side a and $BDEF$ is a rhombus. CEF is a straight line. Find the length of the perpendicular from B to DE.

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