



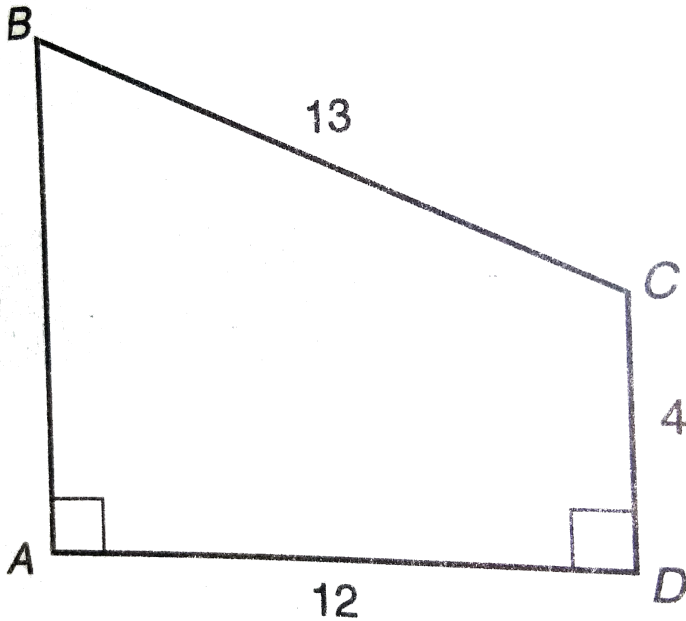
MATHS

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MATHS (ENGLISH)

ADDITIONAL TOPICS IN MATH

Example



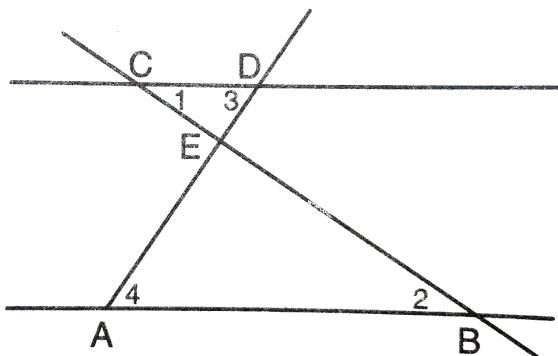
1.

To find the perimeter of trapezoid ABCD above, first draw \overline{EC} parallel to \overline{AD} thereby forming rectangle ABCD, which means that $EC = AD = 12$ and $EA = CD = 4$.



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2. In the accompanying figure, $\overline{AB} \parallel \overline{CD}$. If $AB = 40$, $CD = 16$, and $BC = 49$, what is the length of \overline{BE} ?



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3. If the length of two sides of an isosceles triangle are 3 and 7, what is the perimeter of the triangle?



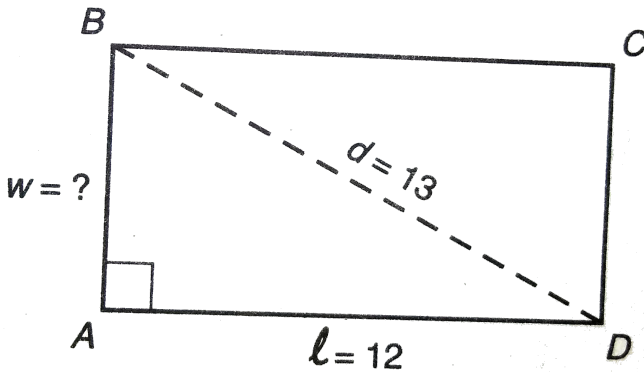
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4. To find the area of parallelgram ABCD, draw perpendicular segment, BH, as shown. Since BH is the side opposite a 45° angle in a right triangle.



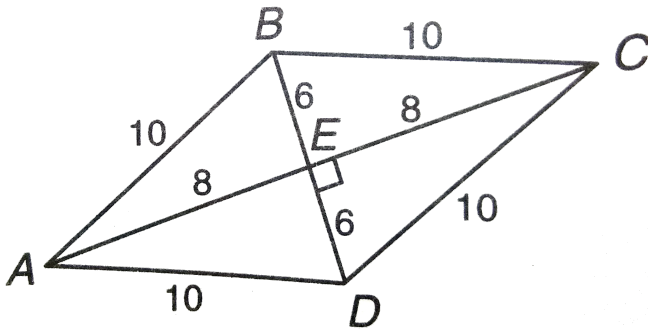
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5. To find the area of rectangle ABCD, note that the diagonal form a (5 – 12 – 13) right triangle so the width of the rectangle is 5. Hence, Find area of triangle.:



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6. If rhombus ABCD has a side length of 10 and the longer diagonal measures 16, then the shorter diagonal measures 12 since, Find area of rhombus.



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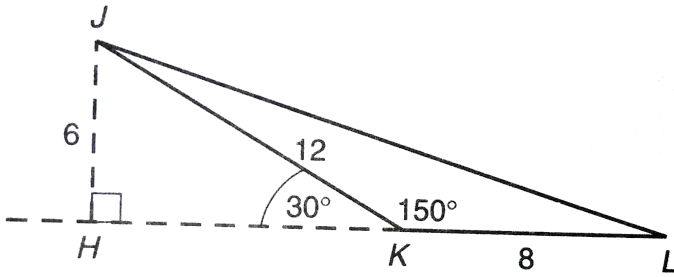
7. To find the area of $\triangle ABC$, note that the lengths of the sides of $\triangle ABC$ form (3-4-5) Pythagorean triple, where $AC = 4$. Hence, Find the area of $\triangle ABC$.



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8. To Find the area of $\triangle JKL$, drop a perpendicular segment from vertex J to side KL, extending it as necessary. Since $\triangle JKH$

measures 30° :



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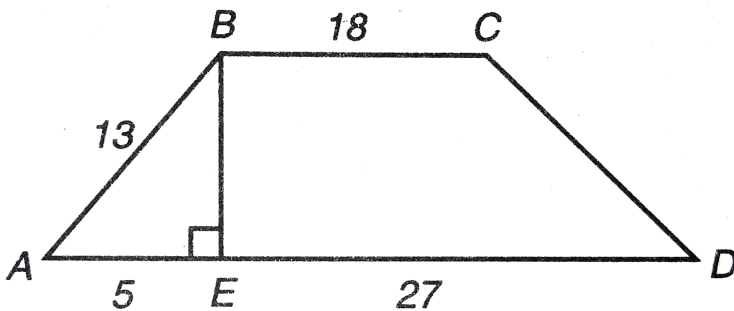
9. If the area of regular hexagon is $96\sqrt{3}$, what is its perimeter?



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10. To find the area of trapezoid ABCD, use the fact that the lengths of the sides of right triangle AEB form a (5-12-13) Pythagorean triple, where height $BE = 12$. The length of lower base

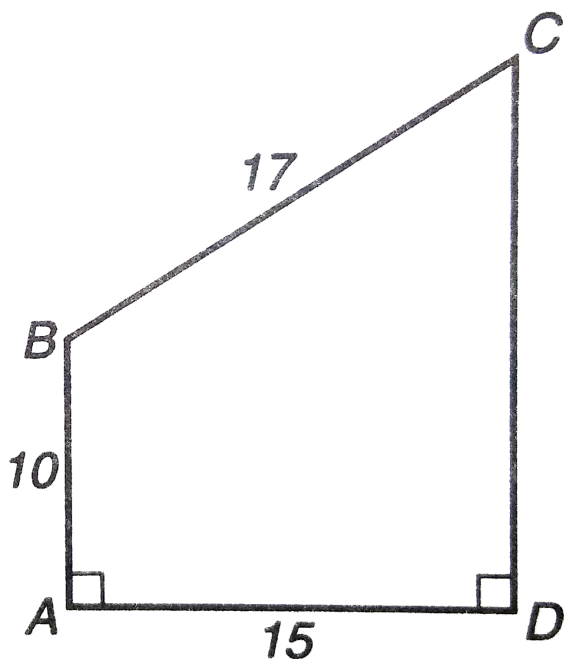
$$AD = AE + ED = 5 + 5 + 27 = 32$$



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11. To find the area of trapezoid ABCD, first the length of base CD by drawing height BH to CD. Since parallel lines are everywhere equidistant, $BH = AD = 15$. The lengths of the sides of right triangle BHC form an (8-15-17) Pythagorean triple, where $CH=8$. Thus,

$$CD = CH + HD = 8 + 10 = 18.$$



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12. In circle O above, $AB = 3$ and $CD = 2$.

Which of the following statements must be

true?

I. $\angle ABC$ and $\angle BCD$ have equal measures

II. $\overline{AB} \parallel \overline{CD}$

III. $2(AE) = 3(CE)$

A. I and II

B. I and III

C. I only

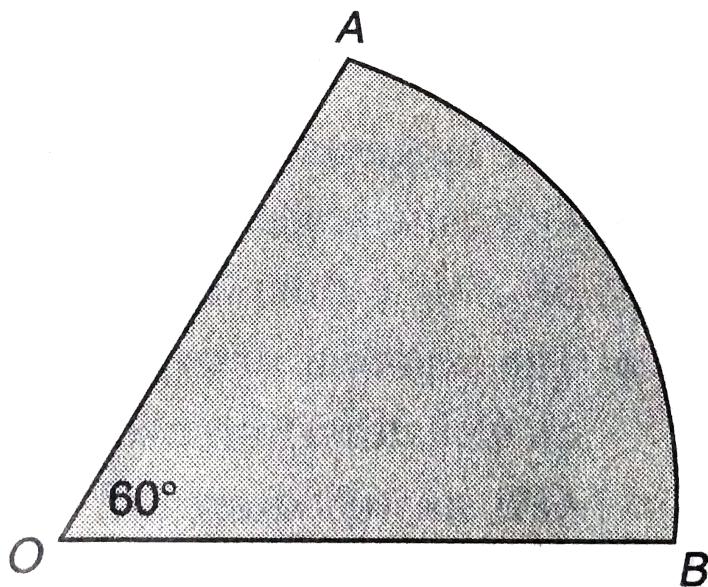
D. III only

Answer: D



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13. If in the accompanying figure the length of arc AB of circle O is 8π , what is the number of square units in the area of the shaded region?



A. 16π

B. 32π

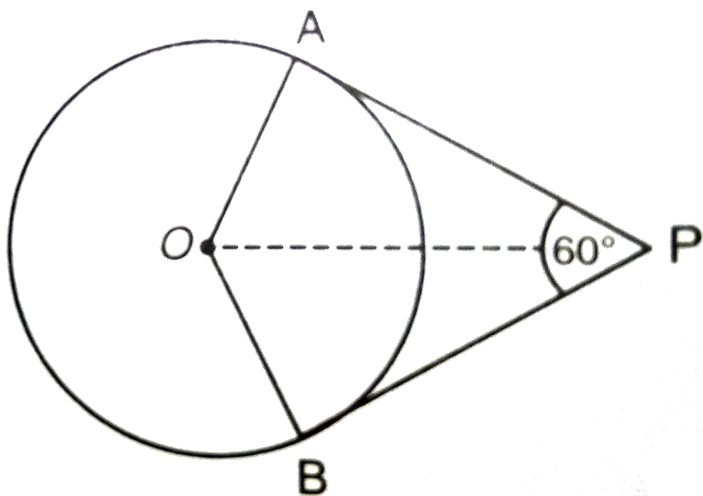
C. 64π

D. 96π

Answer: D



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14.

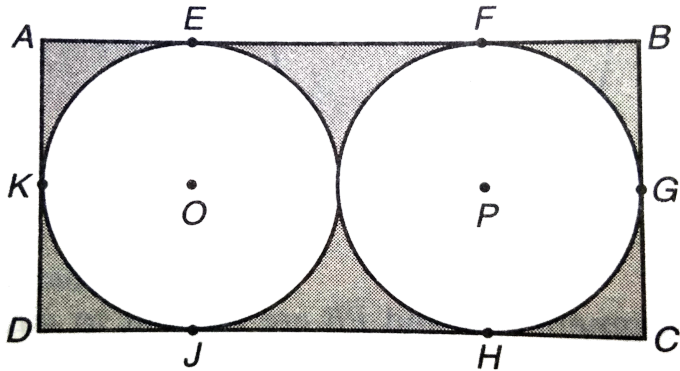
In the figure above, the segments PA and PB are tangent to circle O at points A and B , respectively, and the measure of $\angle APB$ is 60°

. Segment OP is drawn. If $OP = \frac{14}{\pi}$, what is

the length of minor arc AB ?



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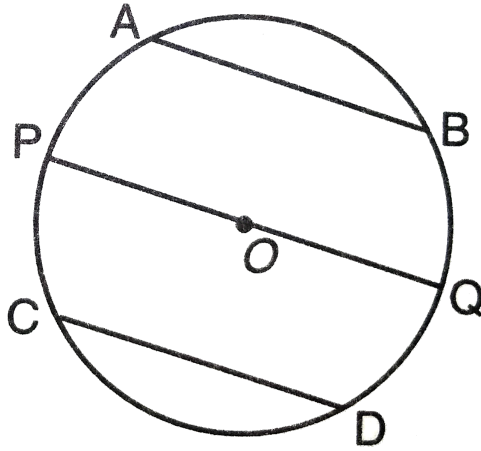


15.

In the figure above, the radius of each circle is 1. If circles O and P touch the sides of rectangle ABCD only at the lettered points, what is the area of the shaded region?



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16.

In the figure above, \overline{PQ} is a diameter of circle O , $\overline{AB} \parallel \overline{PQ} \parallel \overline{CD}$, and $\overline{AB} = \overline{CD}$. The length of chord \overline{AB} is $\frac{3}{4}$ of the length of diameter \overline{PQ} . If r represents the radius length of circle O , what is the distance between chords \overline{AB} and \overline{CD} in terms r ?

A. $\frac{5}{4}r$

B. $\frac{\sqrt{7}}{4}r$

C. $\frac{3}{2}r$

D. $\frac{\sqrt{7}}{2}r$

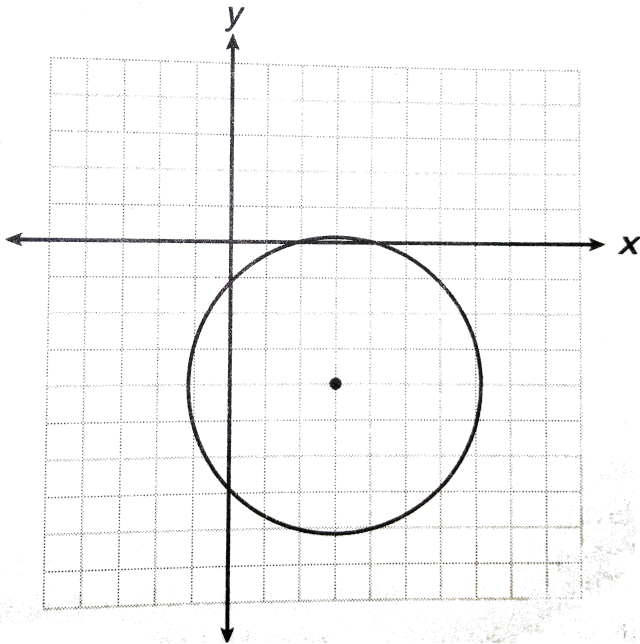
Answer: D



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17. Which equation could represents the circle shown in the graph below that passes

through the point $(0, -1)$?



A. $(x - 3)^2 + (y + 4)^2 = 16$

B. $(x + 3)^2 + (y - 4)^2 = 18$

C. $(x + 3)^2 + (y - 4)^2 = 16$

D. $(x - 3)^2 + (y + 4)^2 = 18$

Answer: D



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18. What is the center and radius of a circle whose equation is

$$3x^2 + 3y^2 - 12x + 18y = 69?$$



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19. An oil tank has the shape of a right circular cylinder is 12 centimeters in height and has a

volume of 108π cubic centimeters. What is the diameter of the base of the cylinder, in centimeters?



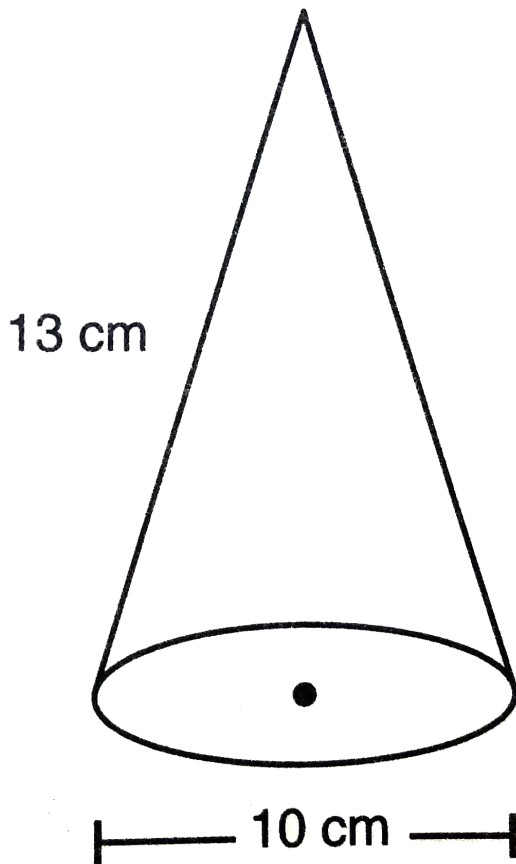
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20. A coffee shop makes coffee in 5 gallon capacity urn and serves it in cylindrical-shaped mugs with an internal diameter of 3 inches. Coffee is poured into each mug at a height of about 4 inches. What is the largest number of full mugs of coffee that can be

filled from the coffee urn if the urn is filled to capacity? (Note: There are 231 cubic inches in 1 gallon)

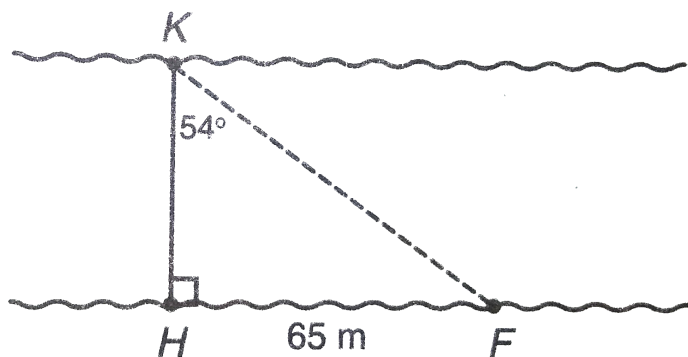


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21.

What is the volume, in cubic centimeters, of the height circular cone in the figure above, in term of π ?



22.

To determine the distance across a river, as shown in the figure above, a surveyor marked two points on one riverbank, H and F, 65 meters apart. She also marked one point, K, on the opposite bank such that $\overline{KH} \perp \overline{HF}$. If $\angle K = 54^\circ$ and x is the width of the river,

which of the following equations could be used to find x ?

A. $\tan 54^\circ = \frac{x}{65}$

B. $\sin 36^\circ = \frac{x}{65}$

C. $\tan 36^\circ = \frac{x}{65}$

D. $\sin 54^\circ = \frac{x}{65}$

Answer: C



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23. If $P(-3, 4)$ is a point on the terminal side of angle θ , what is the value of $\cos \theta$?

A. $-\frac{3}{4}$

B. $-\frac{3}{5}$

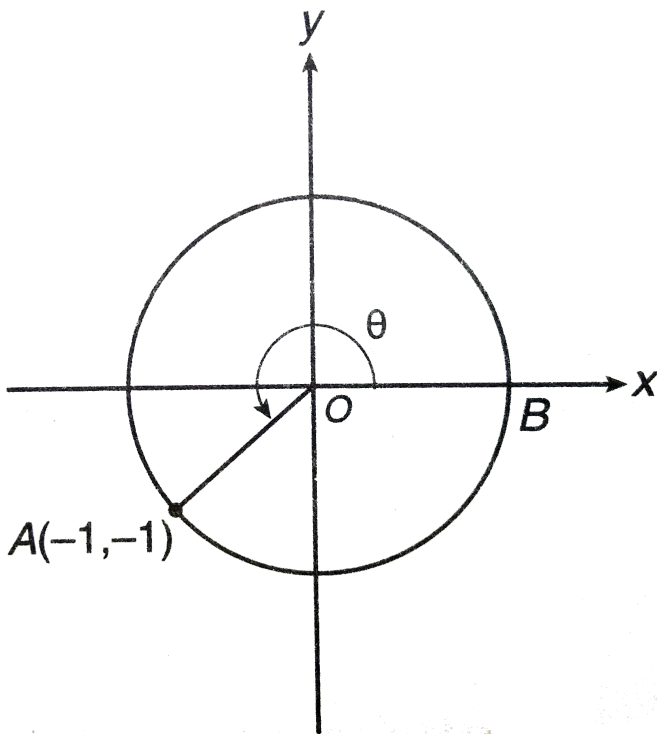
C. $\frac{3}{4}$

D. $\frac{4}{5}$

Answer: B



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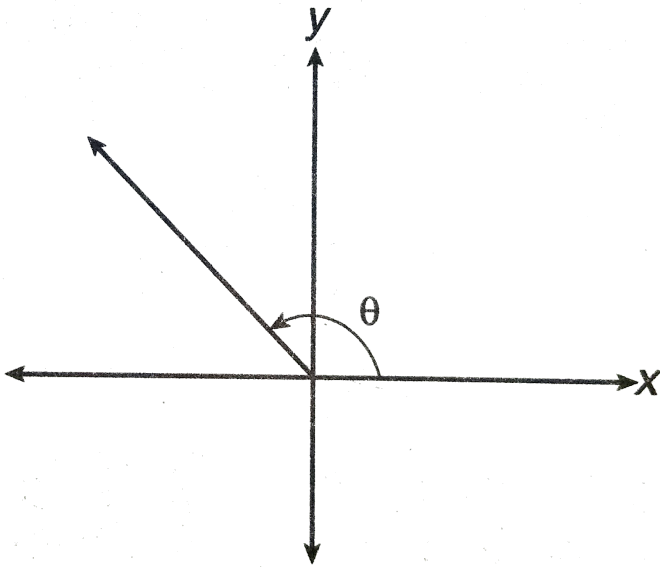


24.

In the xy -plane above, O is the center of the circle, and the measure of angle θ is $k\pi$ radians. If $0 \leq \theta \leq 2\pi$, what is the value of k ?



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25.

In the figure above, if $\cos \theta = -0.36$, what is the value of $\sin \theta$ to the nearest hundredth?

A. 0.64

B. 0.80

C. 0.93

D. -0.93

Answer: C



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26. If $\sin w = a$ and $\frac{\pi}{2} < w < \pi$, what is $\tan w$ in terms of a ?

A. $\frac{a}{\sqrt{1-a^2}}$

B. $\frac{-a}{\sqrt{1-a^2}}$

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

D. $\frac{-a}{1-a}$

Answer: B



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27. Point P is on the unit circle with center at O and point A is the point at which the unit circle intersects the positive x-axis. If angle AOP measures $\frac{7\pi}{6}$ radians, what are the coordinates of point P?



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28. If $\cos x = a$, $\cos w = -a$, and $\frac{\pi}{2} < x < \pi$, which of the following is positive value of w ?

A. $\pi - x$

B. $x - \pi$

C. $2\pi - x$

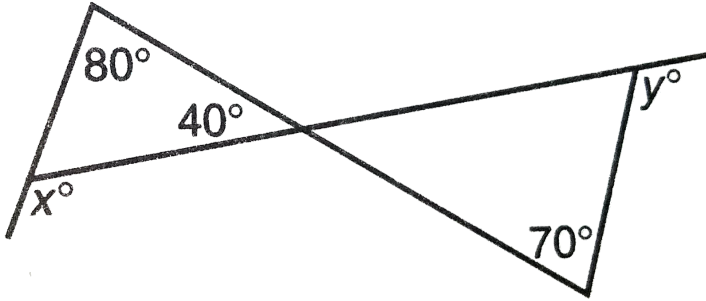
D. $x + 2\pi$

Answer: A



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Multiple Choice



1.

in the figure above , $x+y=$

A. 270

B. 230

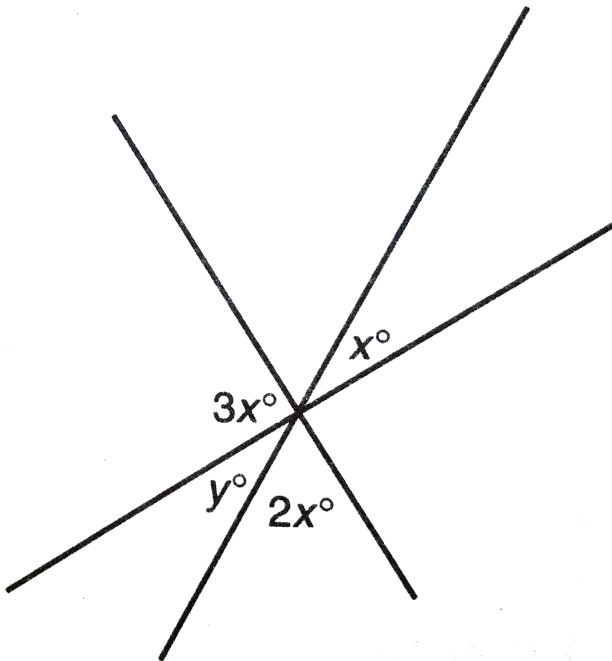
C. 210

D. 190

Answer: B



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2.

In the figure above, what is the value of y ?

A. 20

B. 30

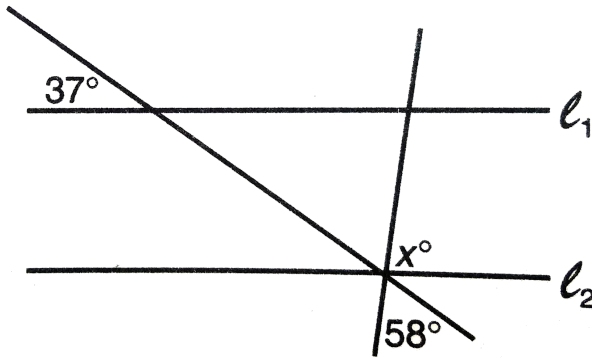
C. 45

D. 60

Answer: B



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3.

In the figure above, if $l_1 \parallel l_2$, what is the value of x ?

A. 90

B. 85

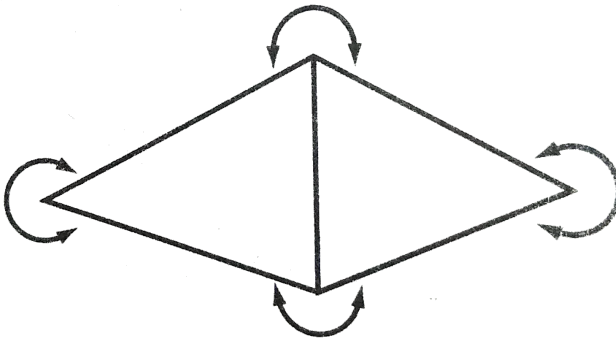
C. 75

D. 70`

Answer: B



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4.

In the figure above, what is the sum of the degree measures of all of the angles marked?

A. 540

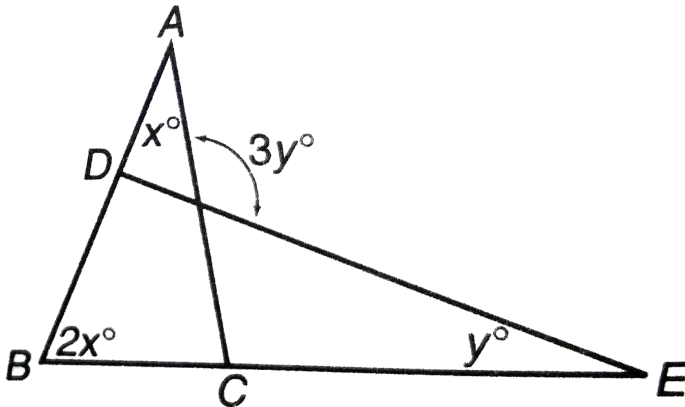
B. 720

C. 900

D. 1080

Answer: D

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5.

In the figure above, what is y in terms of x ?

A. $\frac{3}{2}x$

B. $\frac{4}{3}x$

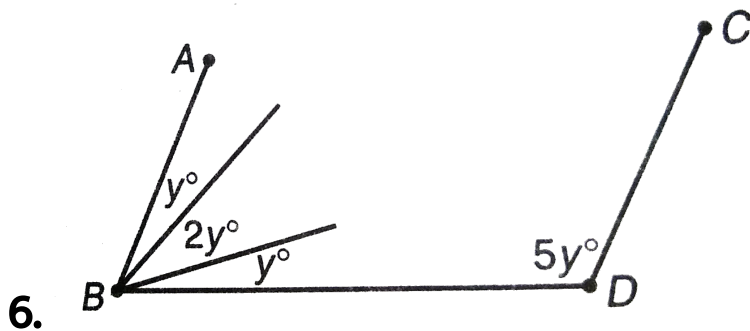
C. x

D. $\frac{3}{4}x$

Answer: A



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In the figure above, if line segment AB is parallel to line segment CD, what is the value of y ?

A. 12

B. 15

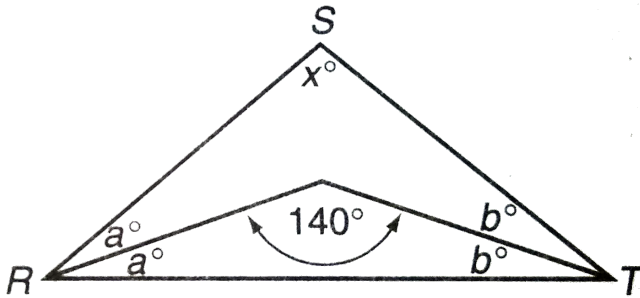
C. 18

D. 20

Answer: D



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7.

Note: Figure not drawn to scale.

In $\triangle RST$ above, what is the value of x ?

A. 80

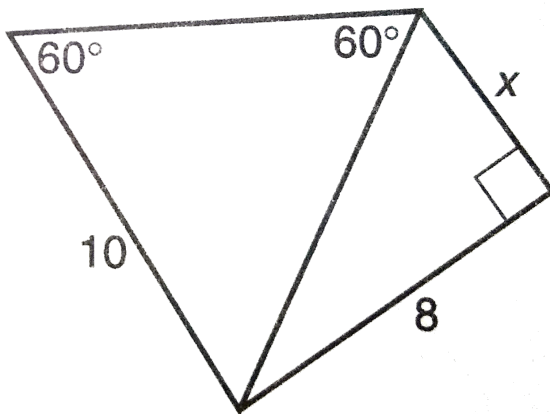
B. 90

C. 100

D. 110

Answer: C

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8.

In the figure above, $x =$

A. 4

B. 6

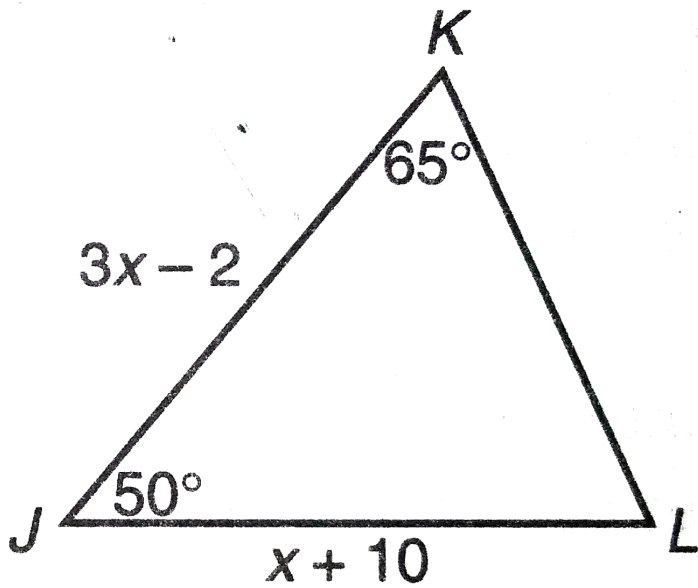
C. $4\sqrt{2}$

D. $4\sqrt{3}$

Answer: B



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9.

In $\triangle JKL$ above, what is value of x ?

A. 2

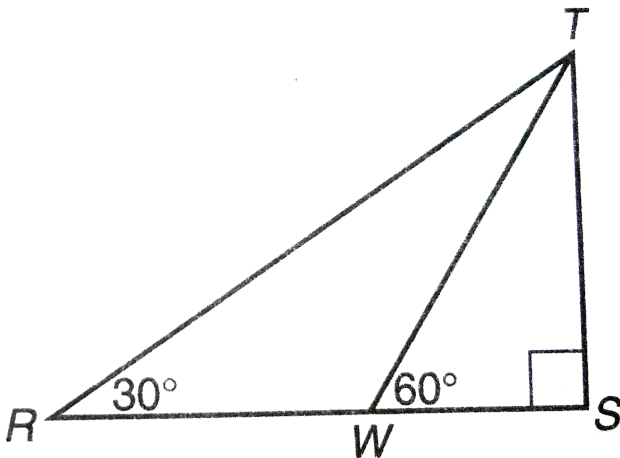
B. 3

C. 4

D. 6

Answer: D

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10.

In the figure above, what is the ratio of RW to

WS?

A. $\sqrt{2}$ to 1

B. $\sqrt{3}$ to 1

C. 2 to 1

D. 3 to 1

Answer: C



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11. Katie hikes 5 miles north, 7 miles east, and then 3 miles north again. What number of miles, measured in a straight line, is katie from her starting point?

A. $\sqrt{83}$

B. 10

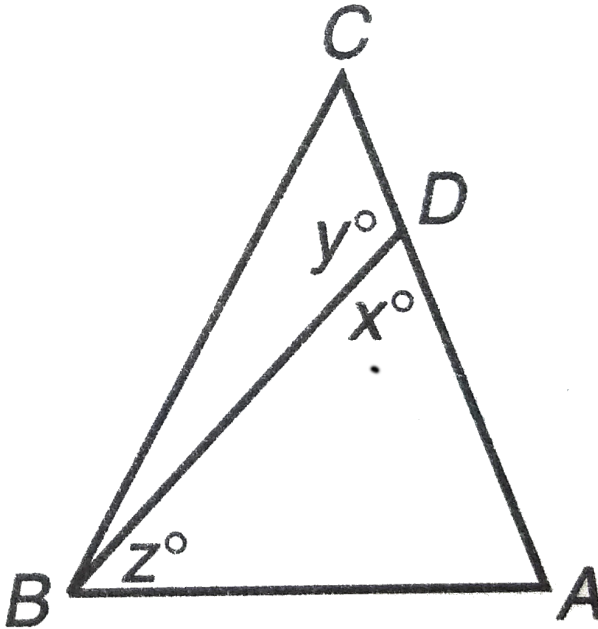
C. $\sqrt{113}$

D. 13

Answer: C



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12.

In $\triangle ABC$, if $AB=CD$, which of the following statements must be true?

I. $x > z$

II. $y > x$

III. $AB > BC$

A. I only

B. II only

C. I and II only

D. II and III only

Answer: A



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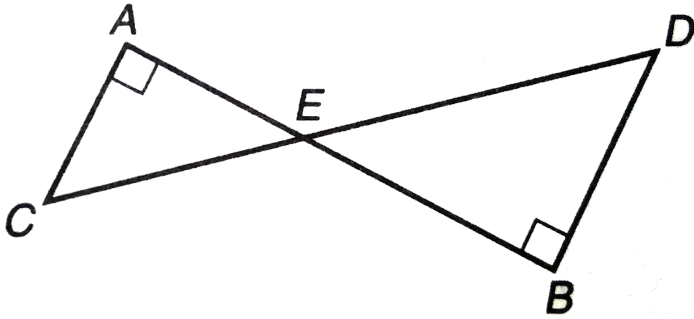
13. How many different triangles are there for which the lengths of the sides are 3, 8, and n , where n is an integer and $3 < n < 8$?

- A. Two
- B. Three
- C. Four
- D. Five

Answer: A



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14.

If, in the figure above, $AC=3$, $DB=4$, and $AB=14$,
then $AE=$

A. 4.5

B. 6

C. 8

D. 10.5

Answer: B



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15. What is the number of sides of a polygen in which the sum of the degree measure of the interior angles is 4 times the sum of the degree measures of the exterior angles?

A. 10

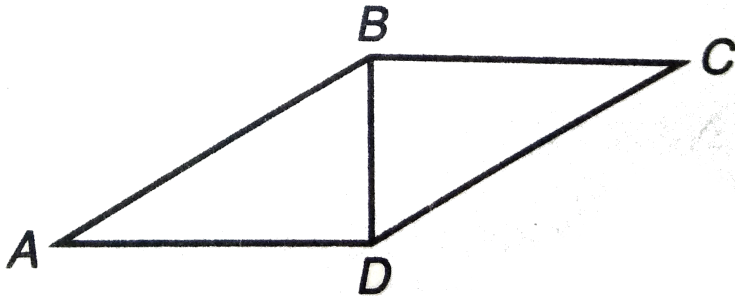
B. 12

C. 14

D. No such polygon exist

Answer: A

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16.

For parallelogram ABCD above, if $AB > BD$ which of the following statements must be true?

I. $CD > BD$

II. $\angle ADB > \angle C$

$\angle CBD > \angle A$

A. None

B. I only

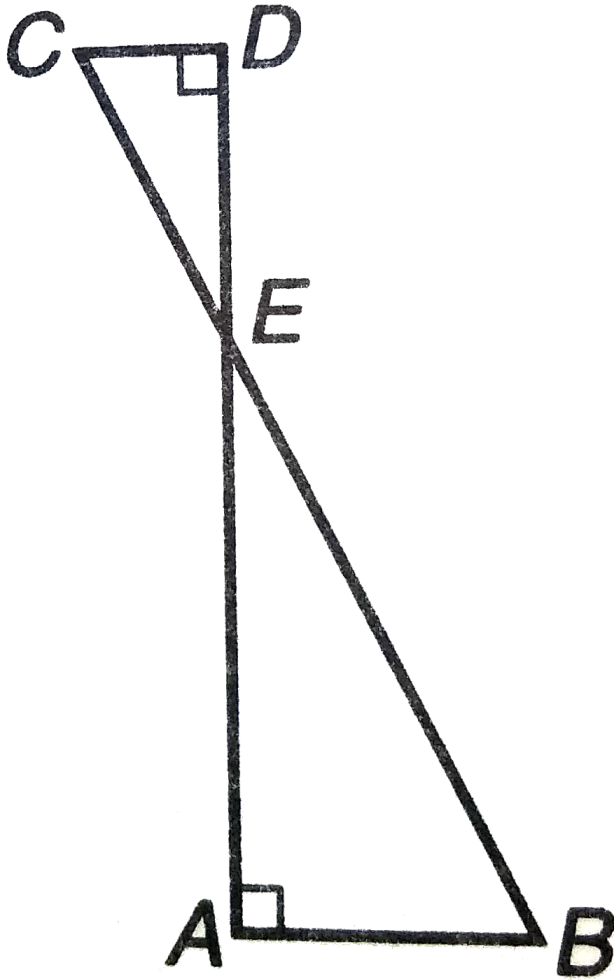
C. II and III only

D. I and III only

Answer: C



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17.

If, in the figure above, $CD=1$, $AB=2$, and $AD=6$,
then $BC=$

A. 5

B. 9

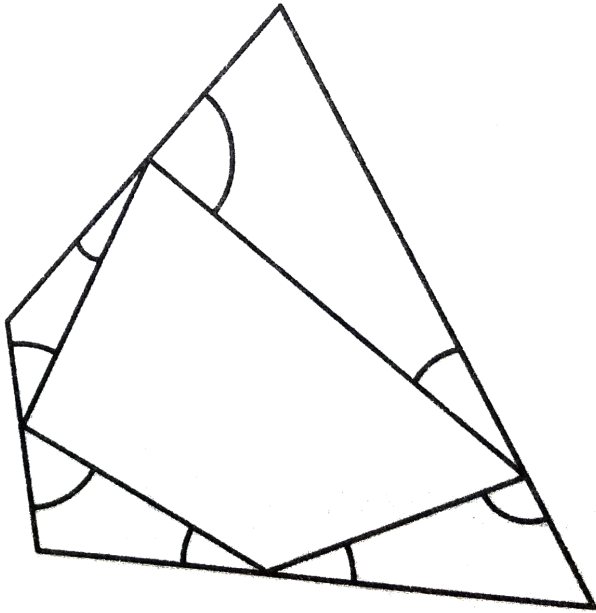
C. $2 + \sqrt{5}$

D. $3\sqrt{5}$

Answer: D



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18.

In the figure above, what is the sum of the degree measures of the marked angles?

A. 120

B. 180

C. 360

D. It cannot be determined from the information given

Answer: C



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19. If each interior angle of a regular polygon measures 140° , how many side does the polygon have?

A. 5 sides

B. 6 sides

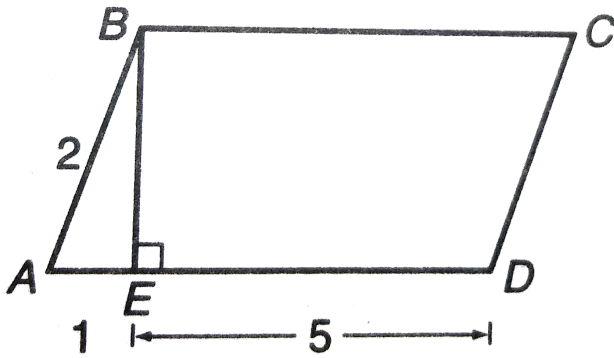
C. 9 sides

D. 10 sides

Answer: C



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20.

In the figure above, what is the area of parallelogram ABCD?

A. $4\sqrt{2}$

B. $4\sqrt{3}$

C. $6\sqrt{2}$

D. $6\sqrt{3}$

Answer: D



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21. What is the area of square with an diagonal of $\sqrt{2}$?

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

B. 1

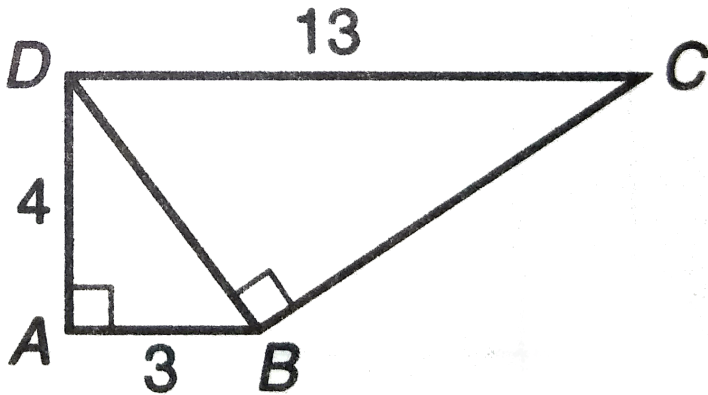
C. $\sqrt{2}$

D. 2

Answer: B



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22.

In the figure above, what is the area of quadrilateral ABCD?

A. 28

B. 32

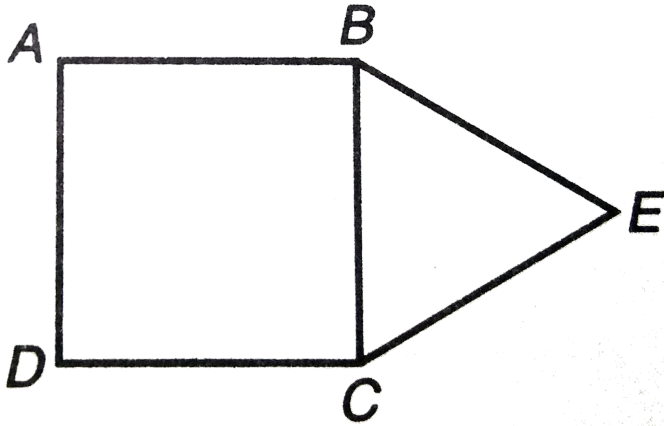
C. 36

D. 42

Answer: C



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23.

In the figure above, if the area of square ABCD is 64. What is the area equilateral triangle BEC?

A. 8

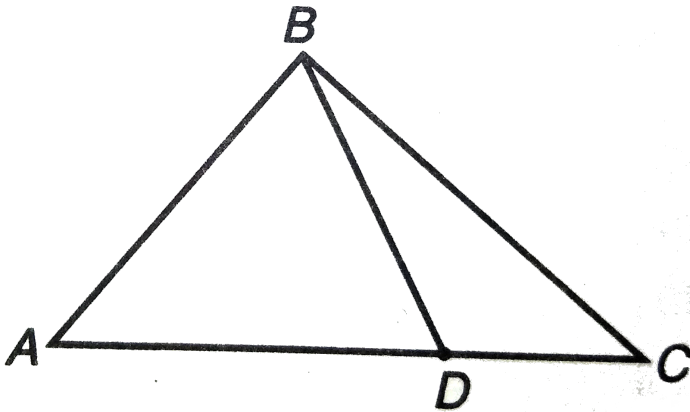
B. $8\sqrt{3}$

C. $12\sqrt{3}$

D. $16\sqrt{3}$

Answer: D

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24.

In the figure above, the ratio of AD to DC is 3

to . If the area of $\triangle ABC$ is 40, what is the area of $\triangle BDC$?

A. 16

B. 24

C. 30

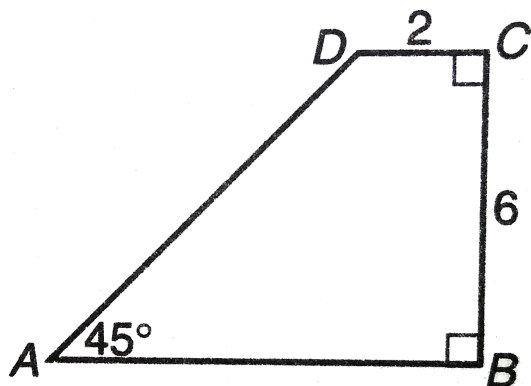
D. 36

Answer: A



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25. Question 6-7 are based on the diagram below.



Q. What is the perimeter of quadrilateral ABCD?

A. $16 + 3\sqrt{2}$

B. $16 + 6\sqrt{2}$

C. 28

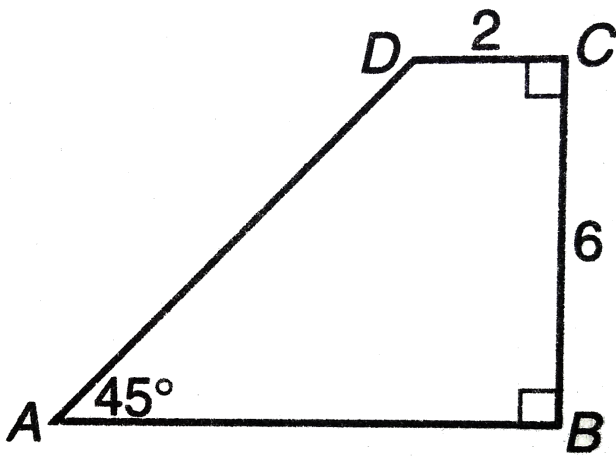
$$D. 22 + 6\sqrt{2}$$

Answer: B



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26. Question 6-7 are based on the diagram below.



Q. What is the area of quadrilateral ABCD?

A. 20

B. 24

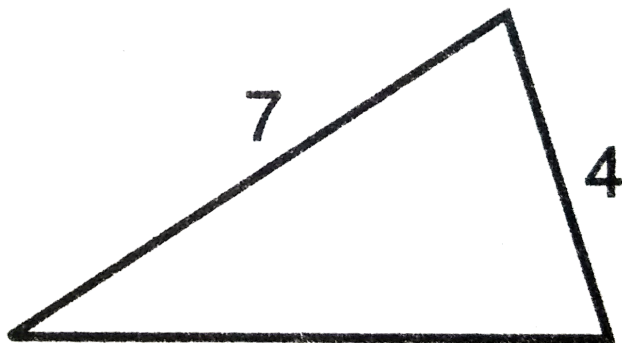
C. 30

D. 36

Answer: C



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27.

If the perimeter above is 18, what is the area of the triangle?

A. $2\sqrt{33}$

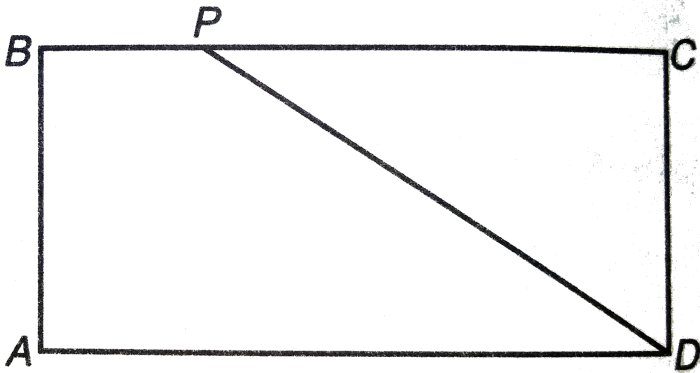
B. $6\sqrt{5}$

C. 14

D. $9\sqrt{5}$

Answer: B

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28.

In rectangle ABCD, point P divide BC such that BP is 25% of the length of BC. If the area of

quadrilateral ABPD is $\frac{3}{4}$, what is the area of rectangle ABCD?

A. $\frac{15}{6}$

B. $\frac{9}{8}$

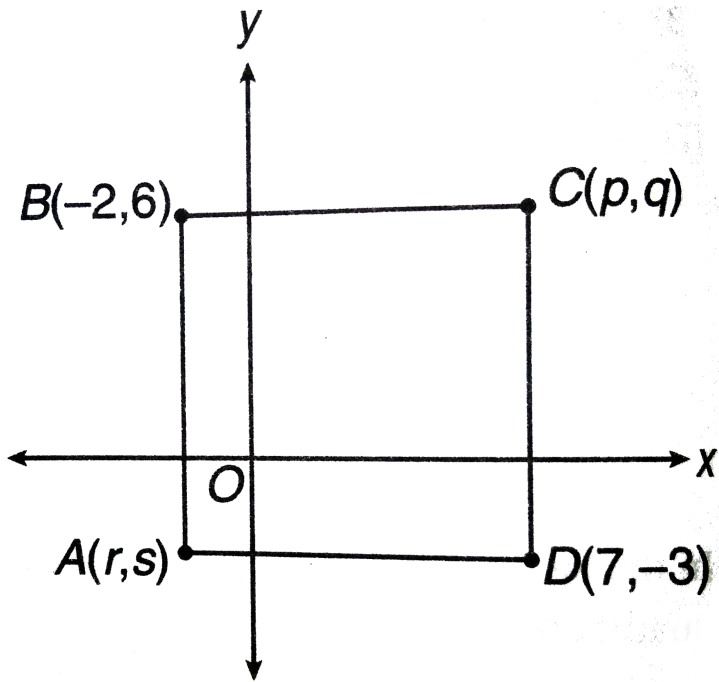
C. $\frac{6}{5}$

D. $\frac{3}{2}$

Answer: C



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29.

In the figure above, what is an equation of the line that contains diagonal AC of square ABCD?

A. $y = 2x + 1$

B. $y = \frac{1}{2}x - 2$

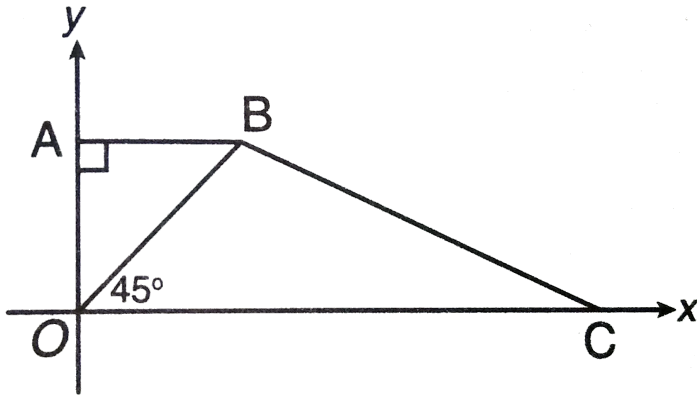
C. $y = 2x - 8$

D. $y = x - 1$

Answer: D



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30.

In the figure above,

$\overline{OA} \perp \overline{AB}$ and $m\angle BOC = 45^\circ$. If the

coordinates of point A are $(0, 3)$ and the

coordinates of point C are $(7, 0)$, what is the

number of square units in the area of

quadrilateral OABC?

A. 15

B. 20

C. 25

D. 30

Answer: A



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31. If one pair of opposite sides of a square are increased in length by 20% and the other pair of sides are increased in length by 50%, by what percent is the area of the rectangle that

results greater than the area of the original square?

A. 80 %

B. 77 %

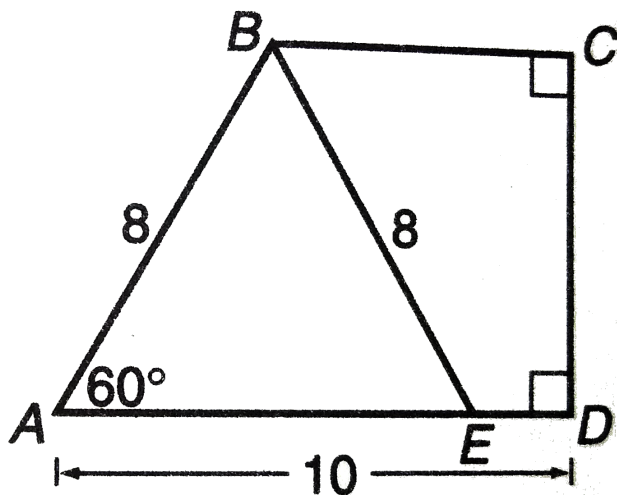
C. 75 %

D. 70 %

Answer: A



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32.

In the figure above, what is the area of quadrilateral BCDE?

A. $8\sqrt{3}$

B. $16\sqrt{3}$

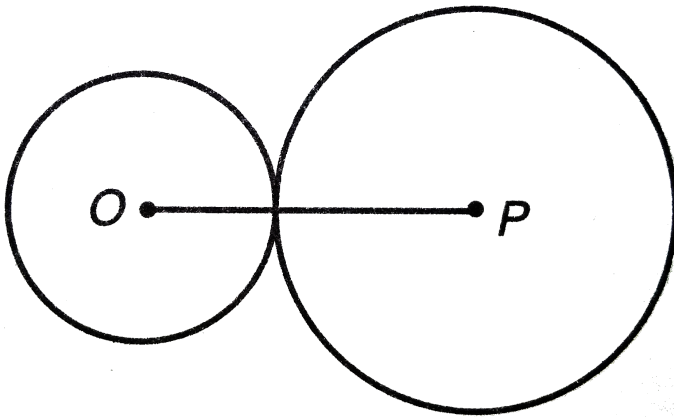
C. $8 + 4\sqrt{3}$

$$D. 4 + 12\sqrt{3}$$

Answer: B



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33.

Circles O and P intersect at exactly one point, as shown in the figure above. If the radius of

circle O is 2 and the radius of circle P is 6, what is the circumference of any circle that has OP as a diameter?

A. 4π

B. 8π

C. 12π

D. 16π

Answer: B



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34. What is the area of circle with a circumference of 10π ?

A. $\sqrt{10\pi}$

B. 5π

C. 25π

D. 100π

Answer: C



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35. Every time the pedals go through a 360° rotation on a certain bicycle, the tires rotate three times. If the tires are 24 inches in diameter, what is the minimum number of complete rotations of the pedals needed for the bicycle to travel at least 1 mile?
(1mile=5,280feet)

A. 24

B. 281

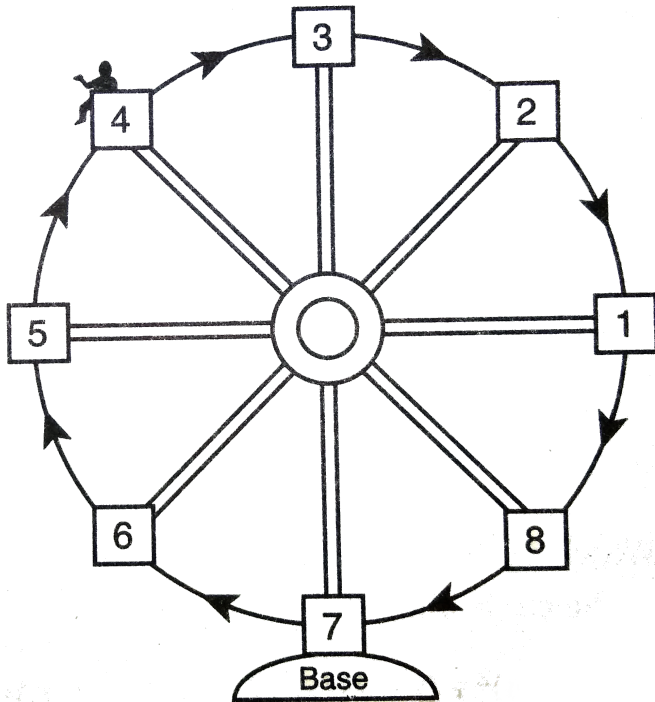
C. 561

D. 5, 280

Answer: B



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36.

Kristine is riding in car 4 of the ferris wheel represented in the diagram above, which is $\frac{84}{\pi}$ meters from car 8. The ferris wheel is rotating in the direction indicated by the arrows. If each of the cars are equally spaced

around the circular wheel, what is the best estimate of the number of meters in the distance through which kristine's car will travel to reach the botton of the ferris wheel before her car returns to the same position?

A. 42.0

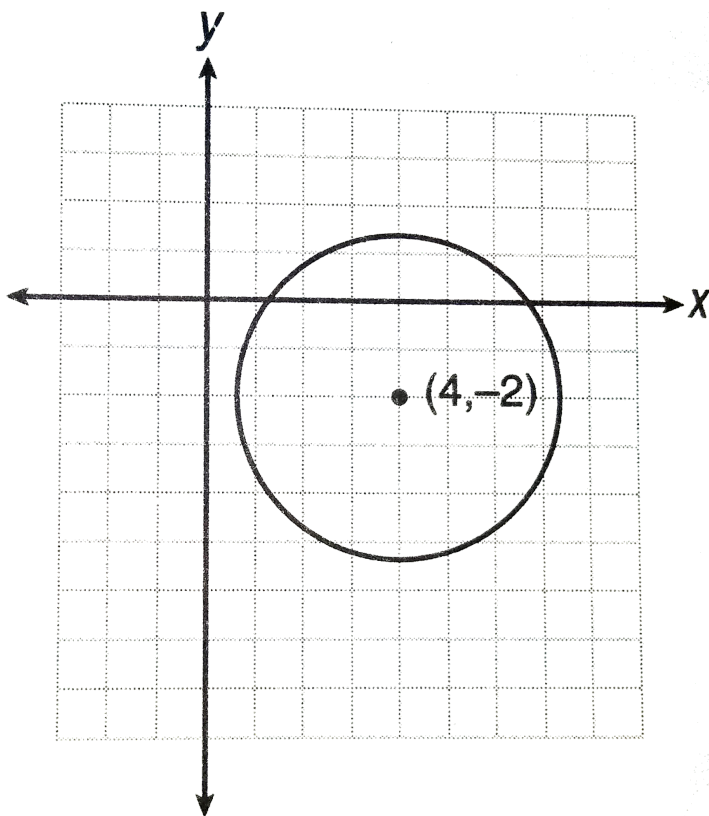
B. 52.50

C. 64.75

D. 105.0

Answer: B





37.

Which of the following could be an equation of the circle above?

A. $(x - 4)^2 + (y + 2)^2 = 17$

B. $(x + 4)^2 + (y - 2)^2 = 17$

C. $(x - 4)^2 + (y + 2)^2 = 13$

D. $(x + 4)^2 + (y - 2)^2 = 13$

Answer: C



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38. If the equation of a circle of a circle is

$10x^2 - 10x + y^2 + 6y = -9$, which of the

following lines contains a diameter of the circle?

A. $y = 2x - 7$

B. $y = -2x + 7$

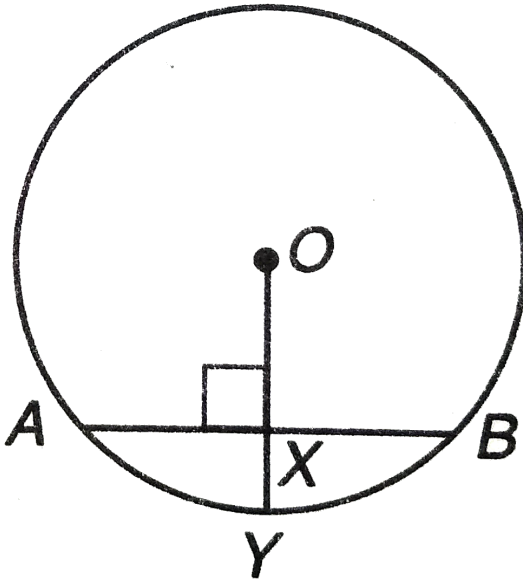
C. $y = 2x + 13$

D. $y = -2x + 13$

Answer: B



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39.

In the figure above, if the radius length of circle O is 10. $\overline{OY} \perp \overline{AB}$, and $Ab = 16$, what is the length of segment XY?

A. 2

B. 3

C. 4

D. 6

Answer: C



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40. If a bicycle wheel has traveled $\frac{f}{\pi}$ feet after n complete revolutions, what is the length in feet of the diameter of the bicycle wheel?

A. $\frac{f}{n\pi^2}$

B. $\frac{\pi^2}{fn}$

C. $\frac{nf}{\pi^2}$

D. nf

Answer: A



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41. $x^2 + y^2 - 6x + 8y = 56$

What is the area of a circle whose equation is given above?

A. 25π

B. 81π

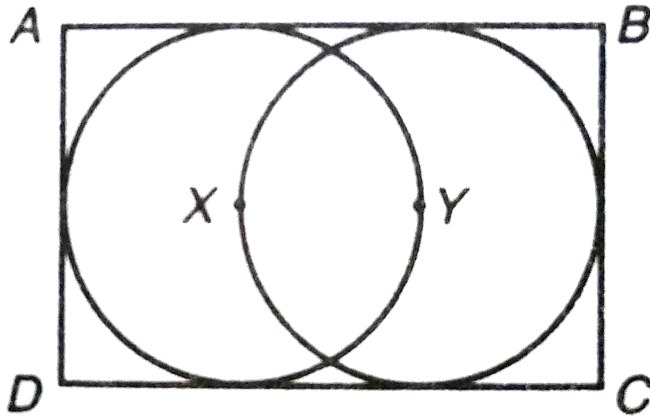
C. 162π

D. $6,561\pi$

Answer: B



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42.

In the figure above, X and Y are the centers of two overlapping circles. If the area of each circle is 7, what is the area of rectangle ABCD?

A. $14 - \frac{17}{\pi}$

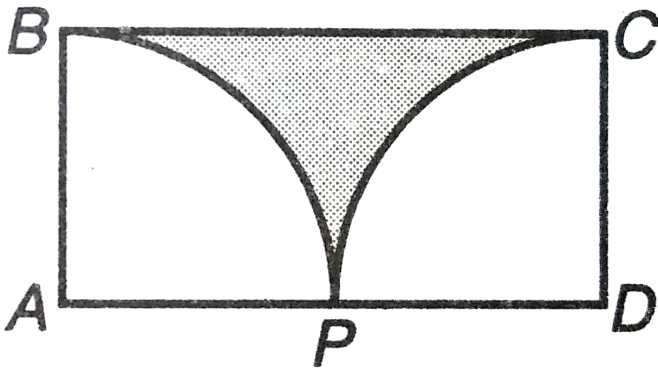
B. $7 + \frac{14}{\pi}$

C. $\frac{28}{\pi}$

D. $\frac{42}{\pi}$

Answer: D

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43.

In rectangle ABCD above, arcs BP and CP are quarter circles with centers at points A and D,

respectively. If the area of each quarter circle is π , what is the area of the shaded region?

A. $4 - \frac{\pi}{2}$

B. $4 - \pi$

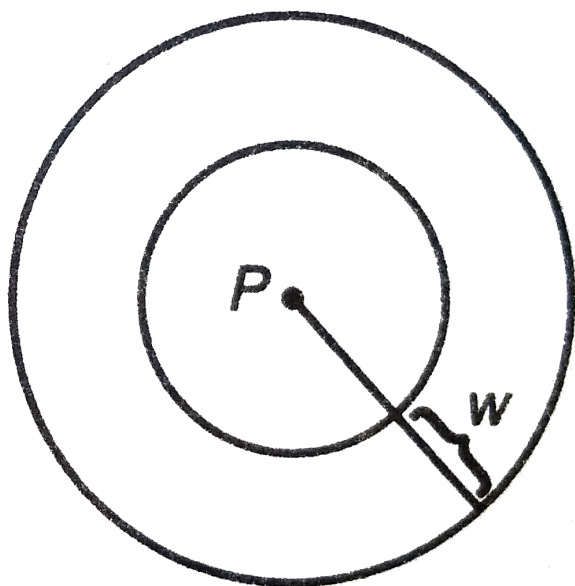
C. $8 - \pi$

D. $8 - 2\pi$

Answer: D



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44.

In the figure above, point P is the center of each circle. The circumference of the larger circle exceeds the circumference of the smaller circle by 12π . What is the width, w , of the region between the two circles?

A. 4

B. 6

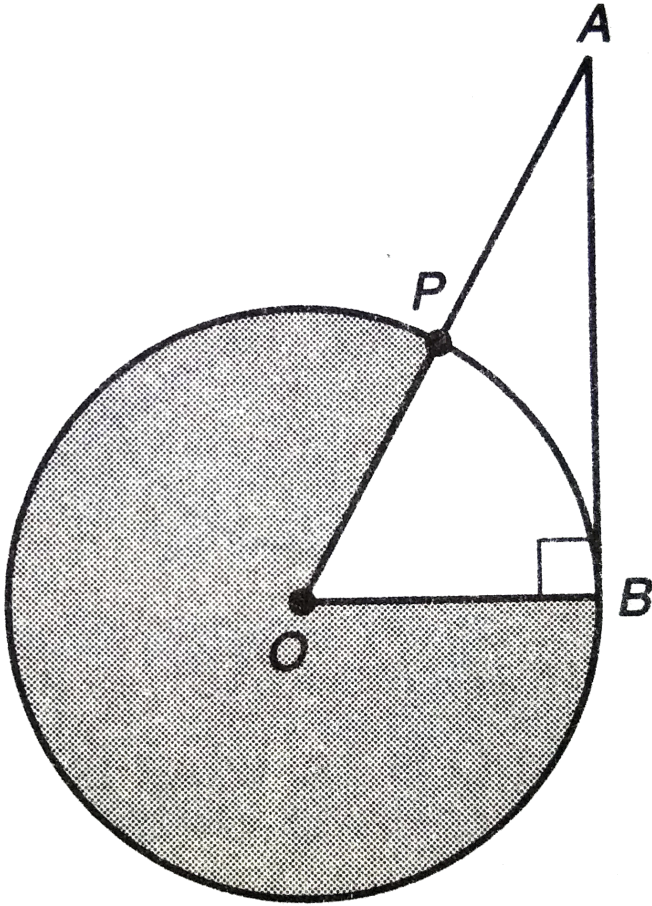
C. 8

D. 9

Answer: B



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45.

The circle shown above has center O and a radius length of 12. If P is the midpoint of

\overline{OA} and \overline{AB} is tangent to circle O at B, what is the area of the shaded region?

A. 81π

B. 96π

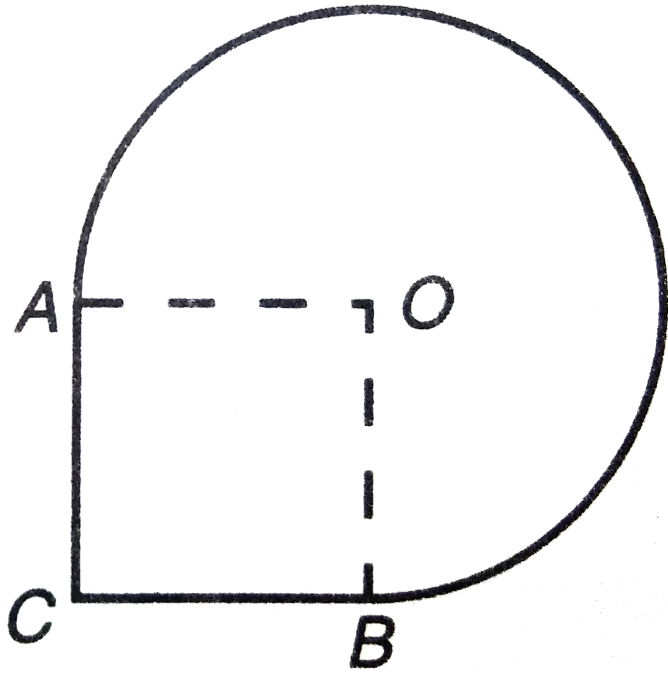
C. 120π

D. 128π

Answer: C



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46.

In the figure above, OACB is a square with area $4x^2$. If OA and OB are radii of a sector of a circle O, what is the perimeter, in terms of x , of the unbroken figure?

A. $x(4 + 3\pi)$

B. $x(3 + 4\pi)$

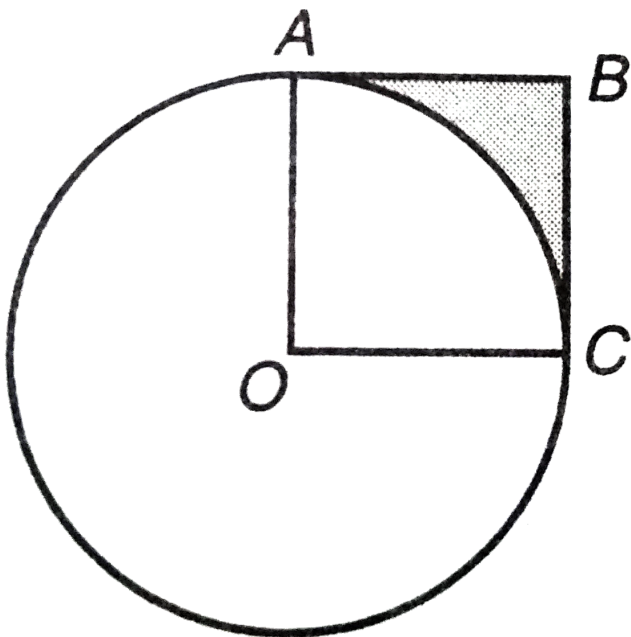
C. $x(6 + 4\pi)$

D. $x(x + 2\pi)$

Answer: A



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47.

In the figure above, OABC is a square. If the area of circle O is 2π , what is the area of the shaded region?

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

B. $2 - \frac{\pi}{2}$

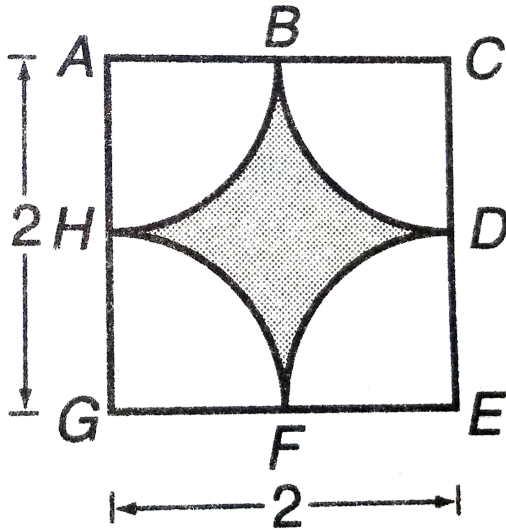
C. $\pi - 2$

D. $\frac{\pi - 1}{2}$

Answer: B



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48.

In the figure above, the vertices of square ACEG are the centers of four quarter circles of equal are. What is best approximation for the area of the shaded region? (Use $\pi = 3.14$)

A. 0.64

B. 0.79

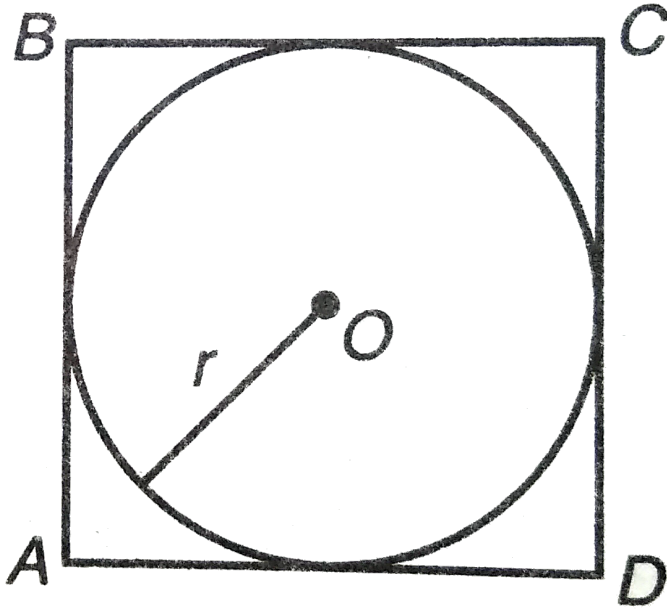
C. 0.86

D. 1.57

Answer: C



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49.

In the figure above, if circle O is inscribed in square ABCD in such a way that each side of the square is tangent to the circle, which of the following statements must be true?

I. $AB \times CD < \pi \times r$

II. Area ABCD = $4r^2$

III. $r < \frac{2(CD)}{\pi}$

A. I and II

B. I and III

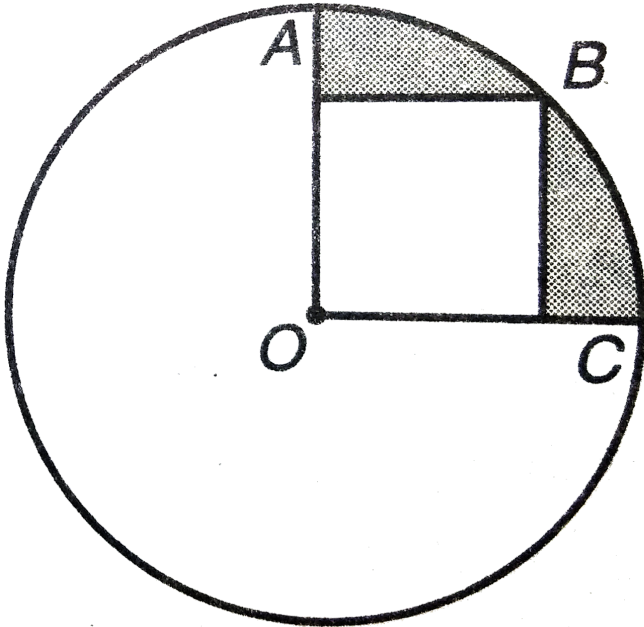
C. II and III

D. II only

Answer: C



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50.

In the figure above, $OABC$ is a square and B is a point on the circle with center O . If $AB = 6$, what is the area of the shaded region?

A. $9(\pi - 2)$

B. $9(\pi - 1)$

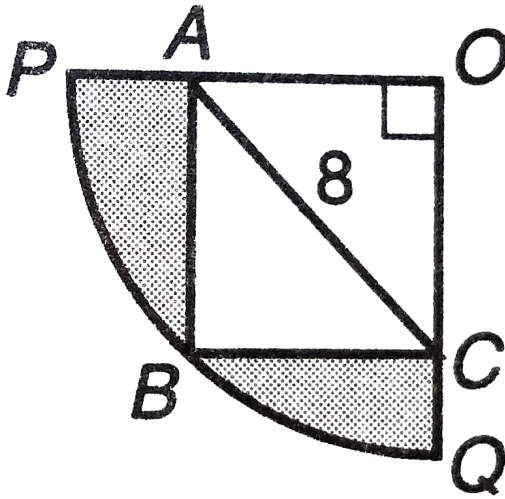
C. $12(\pi - 2)$

D. $18(\pi - 2)$

Answer: D



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51.

In the figure above, arc PBQ is one-quarter of a circle with center at O , and $OABC$ is a rectangle. If AOC is an isosceles right triangle with $AC = 8$, what is the perimeter of the figure that encloses the shaded region?

A. $24 - 4\pi$

B. $24 - 4\sqrt{2} + 4\pi$

C. $16 - 4\sqrt{2} + 4\pi$

D. $16 + 4\pi$

Answer: D



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52. The center of circle Q has coordinates $(3, -2)$ in the xy -plane. If an endpoint of a radius of circle Q has coordinates $R(7, 1)$, what is the equation of circle Q ?

A. $(x - 3)^2 + (y + 2)^2 = 5$

B. $(x + 3)^2 + (y - 2)^2 = 25$

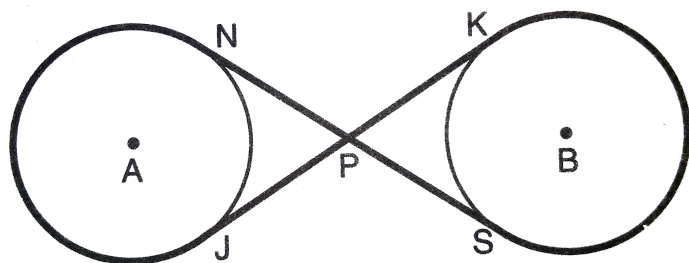
C. $(x - 3)^2 + (y + 2)^2 = 25$

D. $(x + 3)^2 + (y - 2)^2 = 5$

Answer: C



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53.

In the pulley system illustrated in the figure above, a belt with negligible thickness is stretched tightly around two identical wheels represented by circles A and B. If the radius of each wheel is $\frac{12}{\pi}$ inches and the measure of $\angle NHJ$ is 60° , what is the length of the belt?

A. $32 + \frac{48\sqrt{3}}{\pi}$

B. $48 + \frac{32\sqrt{3}}{\pi}$

C. $(32 + 48\sqrt{3})\pi$

D. $80\pi\sqrt{3}$

Answer: A



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54. A pyramid has a height of 12 centimeters and a square base. If the volume of the pyramid is 256 cubic centimeters, how many centimeters are in the length of one side of its base?

A. 8

B. 16

C. 32

D. $\frac{8}{\sqrt{3}}$

Answer: A



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55. The volume of a rectangle box is 144 cubic inches. The height of the solid is 8 inches.

Which measurements, in inches, could be the dimensions of the base?

A. 3.3×5.5

B. 2.5×7.2

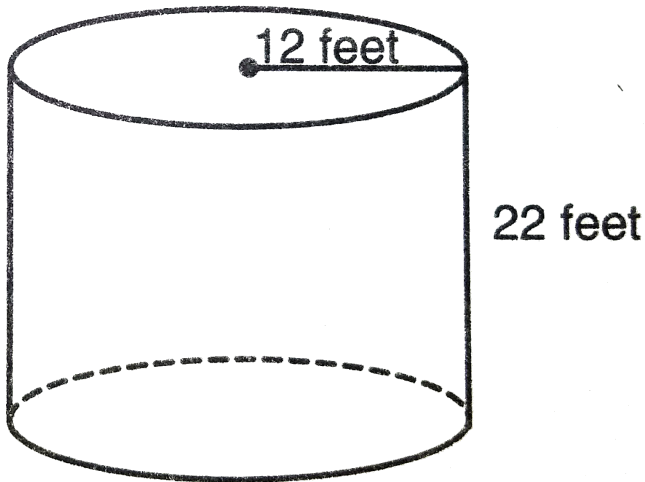
C. 12.0×8.0

D. 9.0×9.0

Answer: B



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56.

The cylindrical tank shown in the diagram above is to be painted. The tank is open at the top, and the bottom does not need to be painted. Only the outside needs to be painted. Each can of paint covers 500 square feet. What is the least number of cans of paint that must be purchased to complete the job?

A. 2

B. 3

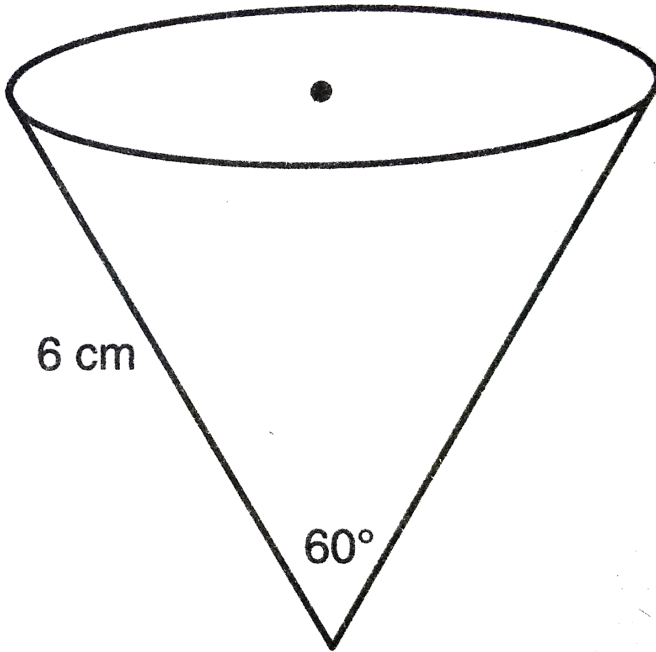
C. 4

D. 5

Answer: C



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57.

In the figure above of a right circular cone, what is the approximate number of cubic centimeters in the volume of cone?

A. 49

B. 105

C. 210

D. 306

Answer: A



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58. Sophie has a hard rubber ball whose circumference measures 13 inches. She wants to store it in a box. What is the number of cubic inches in the volume of the smallest

cube shaped box with integer dimensions that she can use?

A. 64

B. 81

C. 125

D. 216

Answer: C



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59. The amount of light produced by a cylindrical fluorescent light bulb depends on its lateral area. A certain cylindrical fluorescent light bulb is 36 inches long, has a 1 inch diameter, and is manufactured to produce 0.283 watts of light per square inch. What is the best estimate for the total amount of light that it is able to produce?

A. 32 watts

B. 34 watts

C. 40 watts

D. 48 watts

Answer: A



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60. A rectangular fish tank has a base 2 feet wide and 2 feet long. When the tank is partially filled with water, a solid cube with an edge length of 1 foot is placed in the tank. If no overflow of water from the tank is assumed, by how many inches will be level of the water

in the tank rise when the cube becomes completely submerged?

A. $\frac{1}{6}$

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

C. 2

D. 3

Answer: D



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61. The volume of a cylinder of radius r is $\frac{1}{4}$ of the volume of a rectangular box with a square base of side length x . If the cylinder and the box have equal heights, what is r in terms of

x ? (a) $\frac{x^2}{2\pi}$ (b) $\frac{x}{2\sqrt{\pi}}$ (c) $\frac{\sqrt{2x}}{\pi}$ (d) $\frac{\pi}{2\sqrt{x}}$

A. $\frac{x^2}{2\pi}$

B. $\frac{x}{2\sqrt{\pi}}$

C. $\frac{\sqrt{2x}}{\pi}$

D. $\frac{\pi}{\sqrt{2x}}$

Answer: B



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62. The height of sand in a cylinder-shaped can drops 3 inches foot of sand is poured out. What is the diameter, in inches of the cylinder?

A. $\frac{2}{\sqrt{\pi}}$

B. $\frac{4}{\sqrt{\pi}}$

C. $\frac{16}{\pi}$

D. $\frac{48}{\sqrt{\pi}}$

Answer: D



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63. The height h of a cylinder equals the circumference of the cylinder. In terms of h , what is the volume of the cylinder?

A. $\frac{h^3}{4\pi}$

B. $\frac{h^2}{2\pi}$

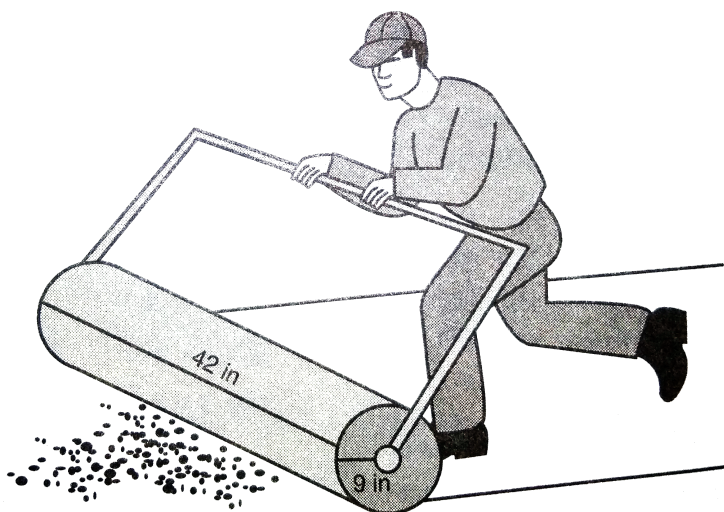
C. $\frac{h^3}{2}$

D. $h^2 + 4\pi$

Answer: A



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64.

As shown in the figure above, a worker uses a cylindrical roller to help pave a road. The roller has a radius of 9 inches and a width of 42 inches. To the nearest square inch, what is the

area of the roller covers in one complete rotation?

A. 2, 374

B. 2, 375

C. 10, 682

D. 10, 688

Answer: B



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65. The density of lead is approximately 0.41 pounds per cubic inch. What is the approximately mass, in pounds, of a lead ball that has a 5 inch diameter?

A. 26.8

B. 78.5

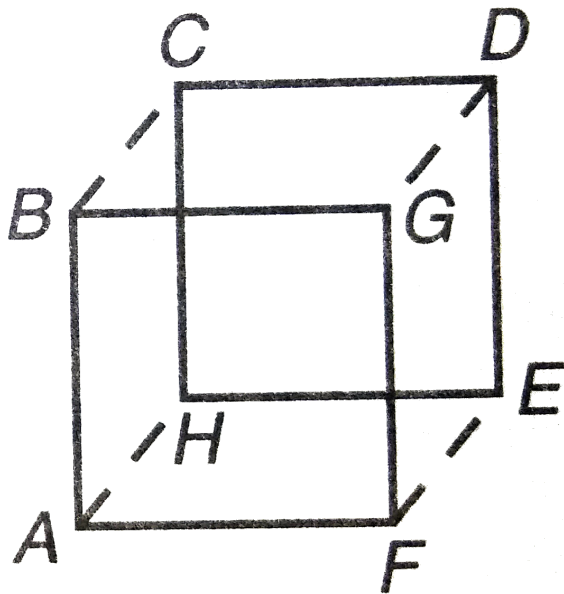
C. 80.4

D. 214.7

Answer: A



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66.

In the figure above, if the edge length of the cube is 4, what is the shortest distance from A to D?

A. $4\sqrt{2}$

B. $4\sqrt{3}$

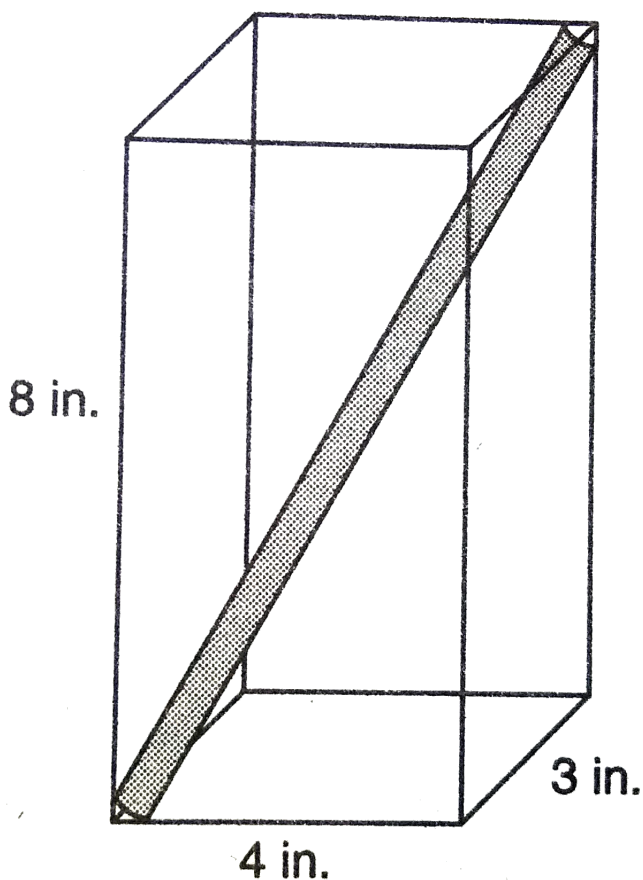
C. 8

D. $4\sqrt{2} \div 4$

Answer: B



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67.

A cylindrical tube with negligible thickness is placed into a rectangular box that is 3 inches by 4 inches by 8 inches, as shown in the

accompanying diagram. If the tube fits exactly into the box diagonally from the bottom left corner to the top right back corner, what is the best approximation of the number of inches in the length of the cube?

A. 3.9

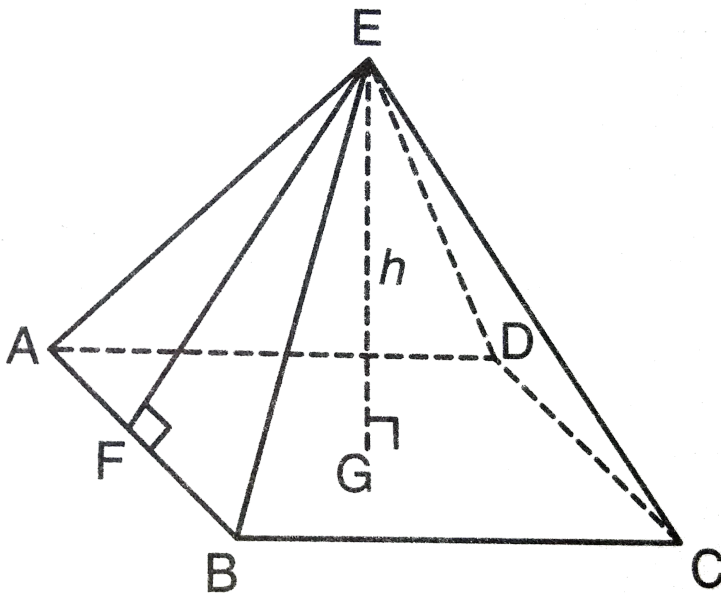
B. 5.5

C. 7.8

D. 9.4

Answer: D





68.

In the pyramid shown in the diagram above G is the center of square base $ABCD$, $\overline{EF} \perp \overline{AB}$ and h height of the pyramid. Which statements must be true?

- I. $EA = EC$

II. $\triangle BFC$ is isosceles

III. $EF=EG$

A. I and II only

B. I and III only

C. I only

D. II only

Answer: A



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69. If pyramid with a square base with side length s and a right cone with radius r have equal heights and equal volumes, then which equation must be true?

A. $s = \sqrt{\pi r}$

B. $s = \frac{\sqrt{r}}{\pi}$

C. $s = \pi\sqrt{r}$

D. $s = r\sqrt{\pi}$

Answer: D



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70. An ice cube has a surface area of 150 square centimeters. If the ice cube melts at a constant rate of 13.0 cubic centimeter per minute, the number of minutes that elapse before the ice cube is completely melted is closest to which of the following?

A. 10

B. 11

C. 12

D. 14

Answer: A



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71. A hot water tank with a capacity of 85.0 gallons of water is being designed to have the shape of a right circular cylinder with diameter a 1.8 feet. Assuming that there are a 7.48 gallons in 1 cubic foot, how high in feet will the tank need to be?

A. 4.50

B. 4.75

C. 5.00

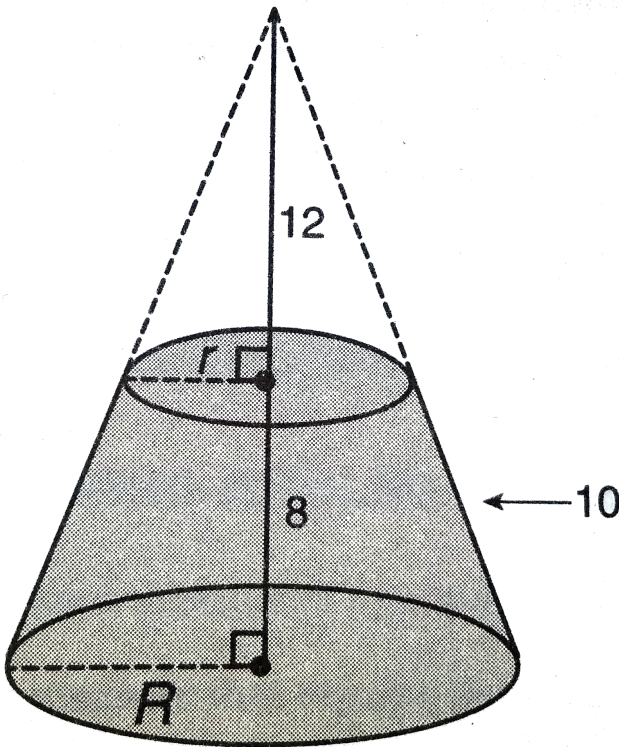
D. 5.25

Answer: A



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72. For Question 19-20 use the figure above



A lamp shade with a circular base is an example of a solid shape called a frustum. In the figure above, the shaded region represents a frustum of a right cone in which

the portion of the original cone that lies 12 inches below its vertex has been cut off by slicing plane (not shown) parallel to the base.

Q. If the height and slant height of the frustum are 8 inches and 10 inches, respectively, what is the number of inches in the radius length, R , of the original cone?

A. 9

B. 12

C. 15

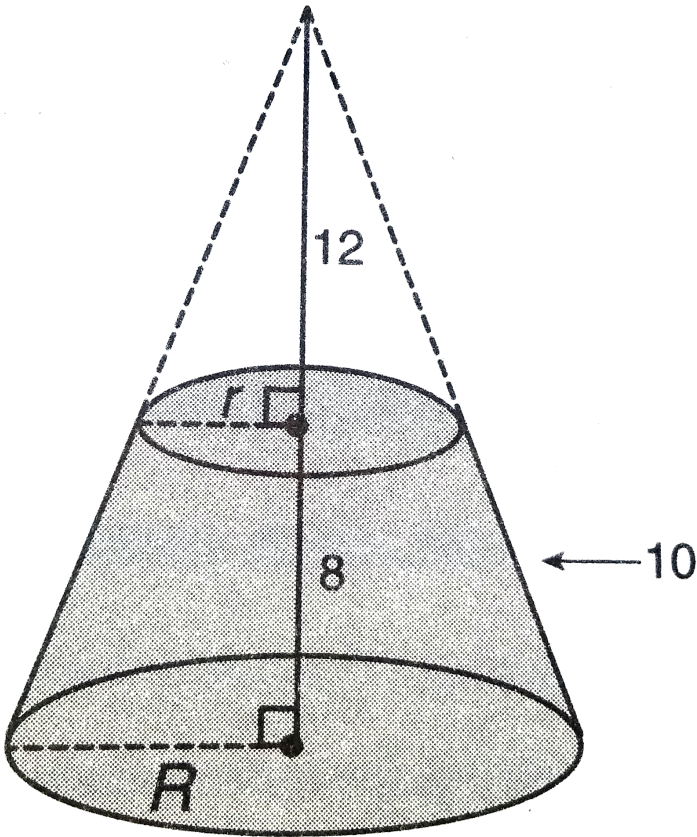
D. 8

Answer: C



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73. For Question 19-20 use the figure above



A lamp shade with a circular base is an example of a solid shape called a frustum. In the figure above, the shaded region

represents a frustrum of a right cone in which the portion of the original cone that lies 12 inches below its vertex has been cut off by slicing plane (not shown) parallel to the base.

Q. What is the volume, in cubie inches, of the frustrum?

A. 324π

B. 812π

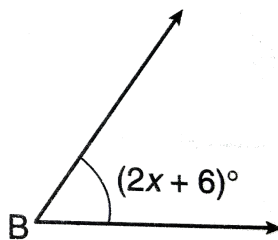
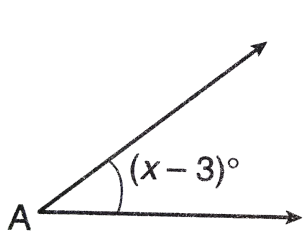
C. $1,089\pi$

D. $1,179\pi$

Answer: D



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74.

If in the figure above $\frac{\sin A}{\cos B} = 1$, then $x =$

A. 6

B. 26

C. 29

D. 59

Answer: C



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75. By law, a wheelchair service ramp may be inclined no more than 4.76° . If the base of a ramp begins 15 feet from the base of a public building, which equation could be used to determine the maximum height, h , of the ramp where it reaches the building's entrance?

A. $h = 15\sin 4.76^\circ$

$$\text{B. } h = \frac{15}{\sin 4.76^\circ}$$

$$\text{C. } h = \frac{\tan 4.76^\circ}{15}$$

$$\text{D. } h = 15 \tan 4.76^\circ$$

Answer: D



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76. What is the number of radians through which the number hand of a clock turns in 24 minutes?

A. 0.2π

B. 0.4π

C. 0.6π

D. 0.8π

Answer: D



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77. If $x = 1.75$ radians, then the value of $\cos x$ is closet in value of which of the following?

A. $-\cos 1.39$

B. $\cos 4.89$

C. $\cos 4.53$

D. $-\cos 0.18$

Answer: A



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78. If $\sin\left(\frac{2}{9}\right)\pi = \cos x$, then $x =$

A. $\frac{7}{9}\pi$

B. $\frac{5}{18}\pi$

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

D. $\frac{13}{18}\pi$

Answer: B



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79. The bottom of a pendulum traces an arc 3 feet in length when the pendulum swings through an angle of $\frac{1}{2}$ radians. What is the number of feet in the length of the pendulum?

A. 1.5

B. 6

C. $\frac{1.5}{\pi}$

D. 6π

Answer: B



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80. What is the radian measure of the smaller angle formed by the hands of a clock at 7 o'clock?

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

B. $\frac{2\pi}{3}$

C. $\frac{5\pi}{6}$

D. $\frac{7\pi}{6}$

Answer: C



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81. A wheel has a radius of 18 inches. The distance, in inches, the wheel travels when it

rotates through an angle of $\frac{2}{3}\pi$ radians is closest to which value?

A. 45

B. 37

C. 13

D. 11

Answer: B



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82. A wedge shaped piece is cut from a circular pizza. The radius of the pizza is 14 inches and the angle of the pointed end of the pizza measures 0.35 radians. The number of inches in the length of the rounded edge of the crust is closest to which values?

A. 4.0

B. 4.9

C. 5.7

D. 7.5

Answer: B



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83. I. $x = y$

II. $9(x + y) = \pi$

III. $\cos x = \cos y$ if $0 < x, y < (\pi)/(2)$, and $\sin x = \cos y$,

then which of the statements above must be true?

A. I and II only

B. I and III only

C. II only

D. III only

Answer: B



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84. If $\cos \theta = -\frac{3}{4}$ and $\tan \theta$ is negative, the value of $\sin \theta$ is

A. $-\frac{4}{5}$

B. $-\frac{\sqrt{7}}{4}$

C. $\frac{4\sqrt{7}}{7}$

D. $\frac{\sqrt{7}}{2}$

Answer: D



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85. If $\cos A = \frac{4}{5}$ and $\angle A$ is not in Quadrant I,

what is the value of $\sin A$?

A. -0.6

B. -0.2

C. 0.6

D. 0.75

Answer: A



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86. If $\sin A = b$, what is the value of product $\sin A \cdot \cos A \cdot \tan A$ in terms of b ?

A. 1

B. $\frac{1}{b}$

C. b

D. b^2

Answer: D



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87. The equatorial diameter of the earth is approximately 8,000 miles. A communications satellite makes a circular orbitals around the earth. If the satellite completes one orbit every

5 hours, how many miles does the satellite travel in 1 hour?

A. $1,120\pi$

B. $1,940\pi$

C. $2,240\pi$

D. $2,560\pi$

Answer: C



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88. A rod 6 inches long is pivoted at a one end. If the free end of the rod makes 165 revolutions per minute, what is the total distance, in inches, traveled by the end of the rod in one second?

A. 14.5π

B. 16.5π

C. 29π

D. 33π

Answer: D



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89. The path traveled by a roller coaster is modeled by the equation $y = 27 \sin 13x + 30$ where y is measured in meters. What is the number of meters in the maximum altitude of the roller coaster?

A. 13

B. 27

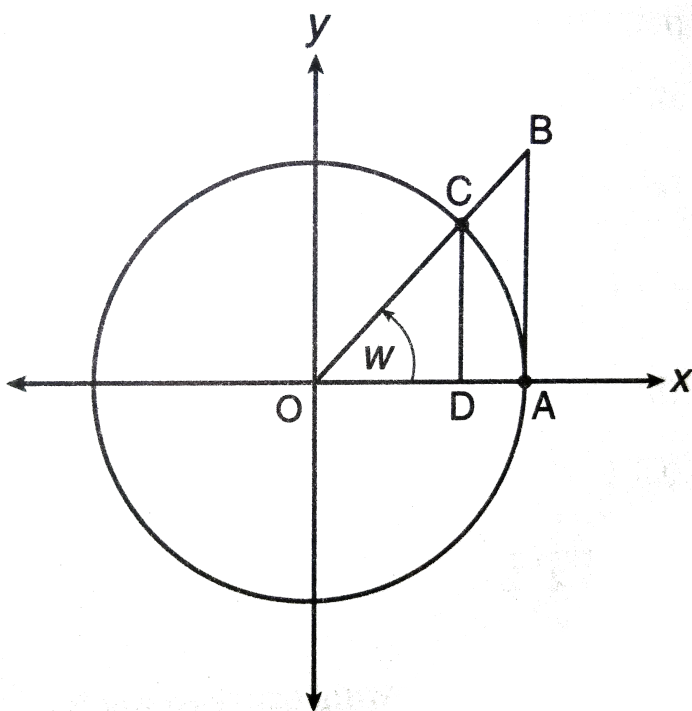
C. 30

D. 57

Answer: D



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90.

The unit circle above has radius \overline{OC} , angle

AOB measures w radians. \overline{BA} is tangent to circle O at A, and \overline{CD} is perpendicular to the x-axis. The length of which the segment represents $\sin w$?

A. \overline{OD}

B. \overline{CD}

C. \overline{AB}

D. \overline{OB}

Answer: B



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91. If x is an acute angle, which expressions is not equivalent to $\cos x$?

A. $-\cos(-x)$

B. $\sin\left(\frac{\pi}{2} - x\right)$

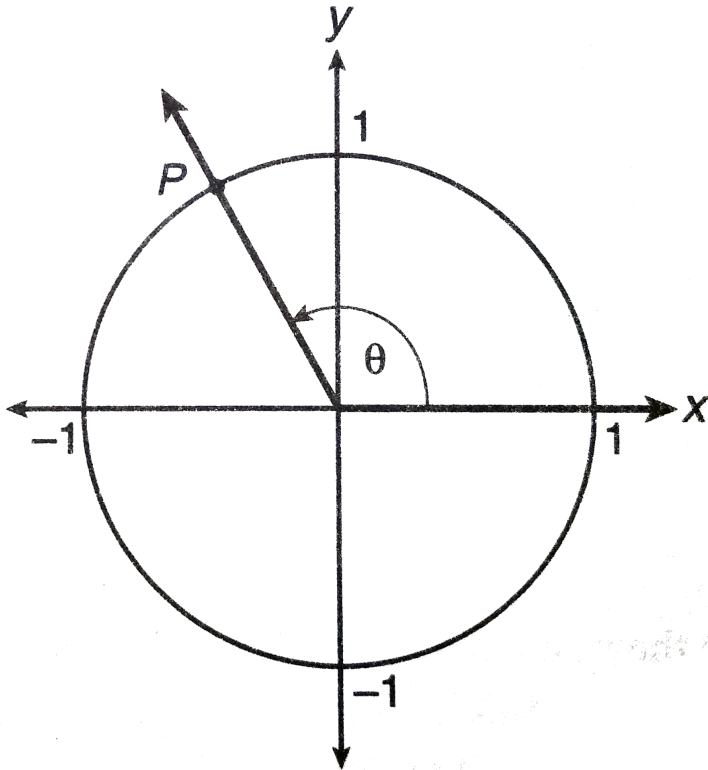
C. $-\cos(2 + \pi)$

D. $\cos(x - 2\pi)$

Answer: A



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92.

In the figure above, θ is an angle in standard position and its terminal side passes through the point P on the unit circle.

the point $P\left(-\frac{1}{2}, \frac{\sqrt{3}}{2}\right)$ on the unit circle.

What is the possible value of θ ?

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

B. $\frac{5}{6}\pi$

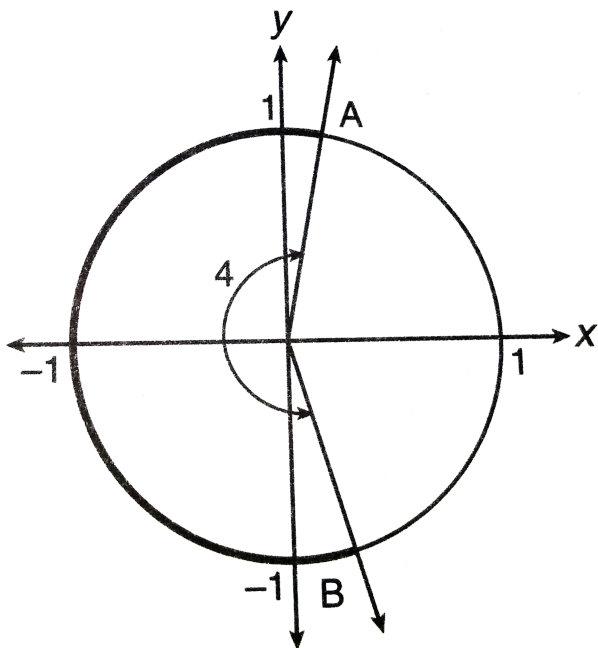
C. $\frac{7}{6}\pi$

D. $\frac{4}{3}\pi$

Answer: A



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93.

In the unit circle above, a angle that measure 4 radians intercepts are AB. What is the length of major arc AB?

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

B. 4

C. $\frac{\pi + 2}{4}$

D. $\frac{4}{\pi}$

Answer: B



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94. If θ is an angle in standard position and its terminal side passes through the point $\left(\frac{\sqrt{3}}{2}, -\frac{1}{2}\right)$ on the unit circle, then a possible value of θ is

A. $\frac{7\pi}{6}$

B. $\frac{4\pi}{3}$

C. $\frac{5\pi}{3}$

D. $\frac{11\pi}{6}$

Answer: D



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95. What are the coordinates of the image of the point $(1, 0)$ on the terminal side of an angle after a clockwise rotation of $\frac{\pi}{6}$ radians?

A. $\left(\frac{\sqrt{3}}{2}, -\frac{1}{2}\right)$

B. $\left(\frac{1}{2}, -\frac{\sqrt{3}}{2}\right)$

C. $\left(-\frac{\sqrt{3}}{2}, 1\right)$

D. $\left(\frac{1}{2}, -\frac{1}{2}\right)$

Answer: A



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96. What are the coordinates of the image of the point $(1, 0)$ on the terminal side of an

angle after a counterclockwise rotation of $\frac{\pi}{6}$ radians?

A. $\left(\frac{\sqrt{3}}{2}, -\frac{\sqrt{3}}{2}\right)$

B. $\left(\frac{\sqrt{3}}{2}, \frac{1}{2}\right)$

C. $(-\sqrt{2}, 1)$

D. $\left(-\frac{1}{2}, \frac{1}{2}\right)$

Answer: B



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97. Which of the following expression is equivalent to $\frac{\sin^2 x}{1 + \cos x}$?

A. $1 - \sin x$

B. $1 - \cos x$

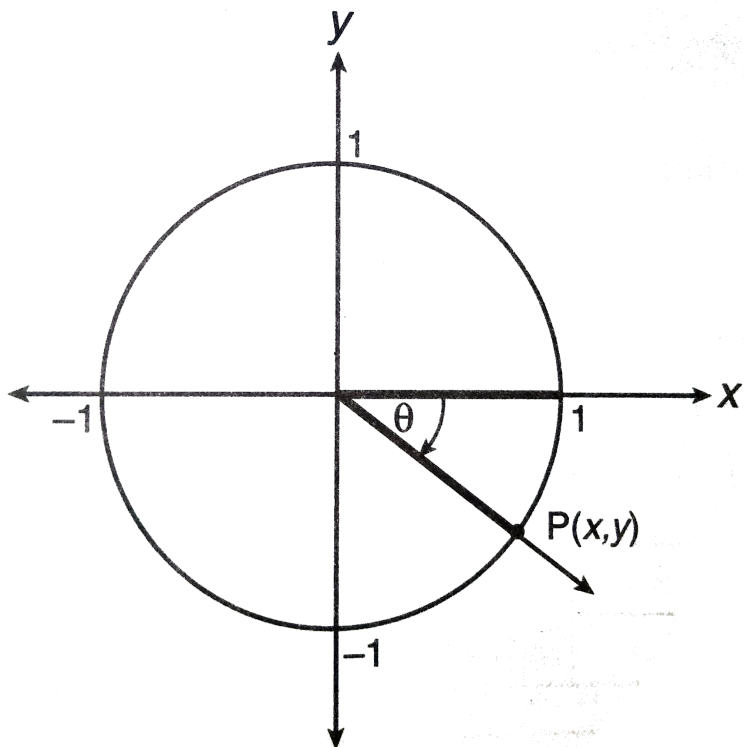
C. $\sin x + \cos x$

D. $\sin x - \cos x$

Answer: B



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98.

In the unit circle above, the ordered pair (x, y) represents a point P where the terminal side intersects the unit circle, as shown in the accompanying figure. If $\theta = \frac{\pi}{3}$ radians, what is the value of y ?

A. $-\frac{\sqrt{3}}{2}$

B. $-\frac{\sqrt{2}}{2}$

C. $-\sqrt{3}$

D. $-\frac{1}{2}$

Answer: A



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99. If x is a positive acute angle and $\cos x = a$, an expression for $\tan x$ in terms of a is

A. $\frac{1 - a}{a}$

B. $\sqrt{1 - a^2}$

C. $\frac{\sqrt{1 - a^2}}{a}$

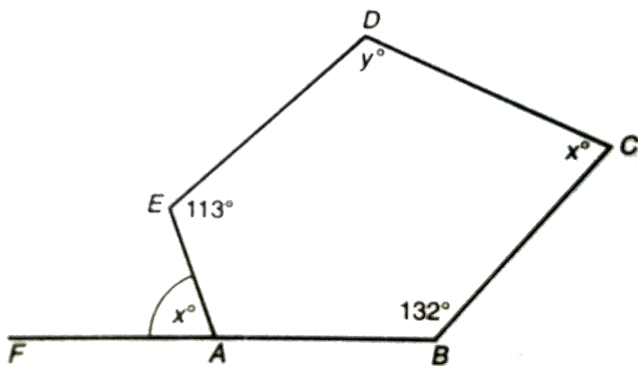
D. $\frac{1}{1 - a}$

Answer: C



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Grib In

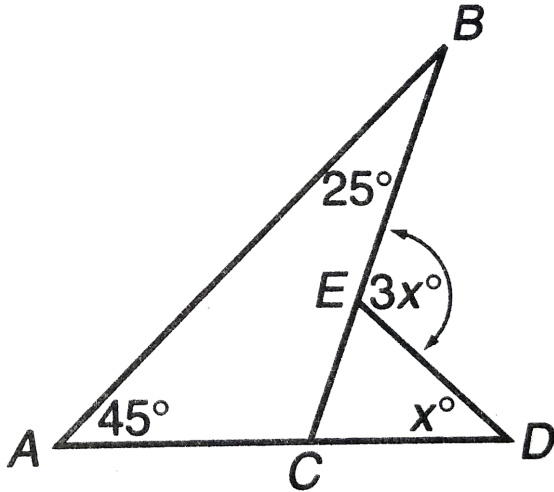


1.

In the accompanying figure of pentagon $ABCDE$, points F , A , and B lie on the same line. What is the value of y ?



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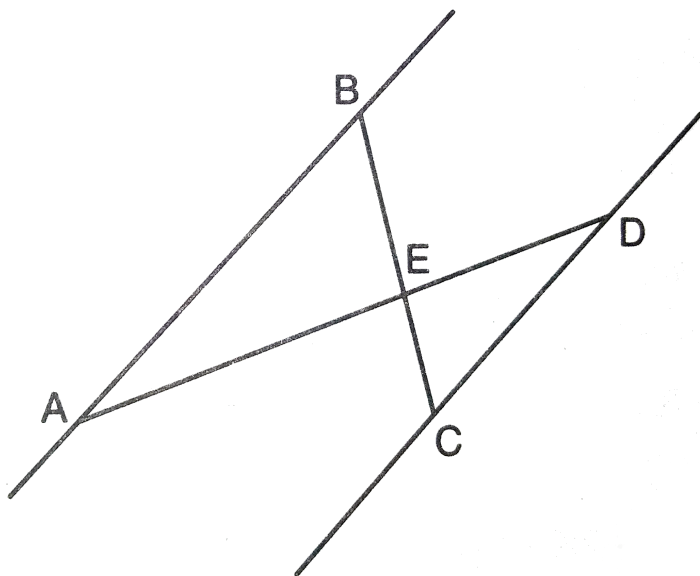


2.

In the figure above, what is the value of x ?



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3.

In the figure above, $\overline{AB} \parallel \overline{CD}$, $AD=30$, $AB=21$, and $CD=15$. What is the length of \overline{DE} ?



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4. In the accompanying diagram of triangle ABC , $AC=BC$, D is point on \overline{AC} , \overline{AB} is extended to E , and \overline{DEF} is drawn so that $\triangle ADE \sim \triangle ABC$. If $m\angle C = 30$, what is the value of x ?



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5. Two hikers started at the same location. One traveled 2 miles east and then 1 mile north. The other traveled 1 mile west and then 3

miles south. At the end of their hikes, how many miles apart were the two hikers?

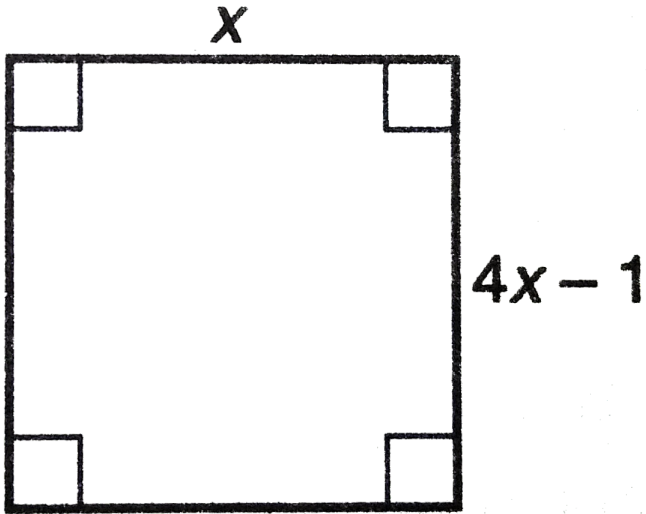


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6. Brand X paint costs \$14 per gallon, and 1 gallon provides coverage of an area of at most 150 square feet. What is the minimum cost of the amount of brand X paint needed to cover the four walls of a rectangular room that is 12 feet wide, 16 feet long, and 8 feet high?



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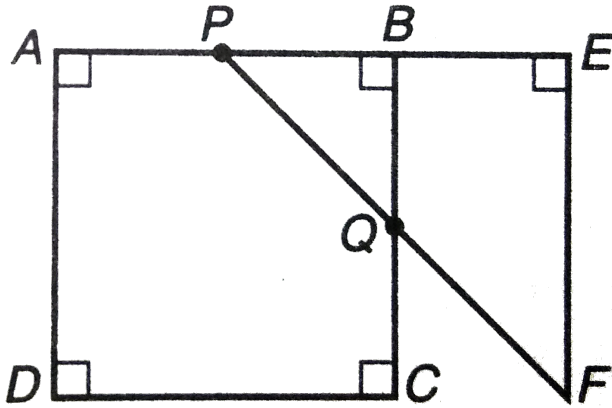


7.

What is the area of the square above?



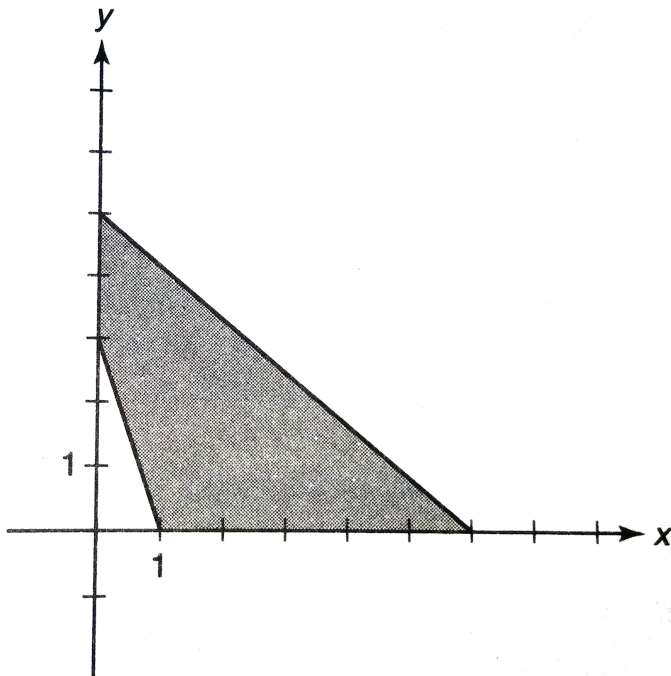
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8.

In the figure above, P and Q are the midpoints of sides AB and BC , respectively, of square $ABCD$. Line segment PB is extended by its own length to point E , and line segment PQ is extended to point F so that $FE \perp PE$. If the area of square $ABCD$ is 9, what is the area of quadrilateral $QBEF$?

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9.

In the figure above, what is the number of square units in the area of the shaded region?

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10. If the coordinates of the endpoints of a diagonal of square are $(-2, -3)$ and $(5, 4)$, what is the number of square units in the area of the square?



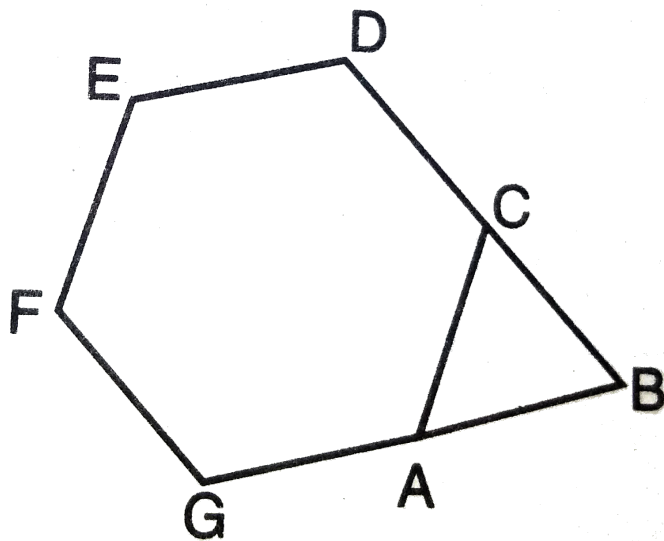
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11. What is the number of square units in the area of the region in the first quadrant of the xy -plane that is bounded by $y = |x| + 2$, the

line $x=5$, the positive x -axis, and the positive y -axis?



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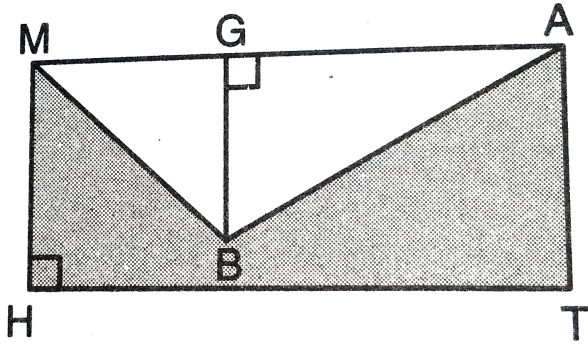
12.

In the figure above, $ABCDEF$ is a regular hexagon. Sides DC and GA are extended such

that A is the midpoint of \overline{BG} and C is the midpoint of \overline{BD} . If the area of $\triangle ABC$ is $9\sqrt{3}$ square centimeters, what is the number of centimeters in the perimeter of polygon $ABCDEFG$?



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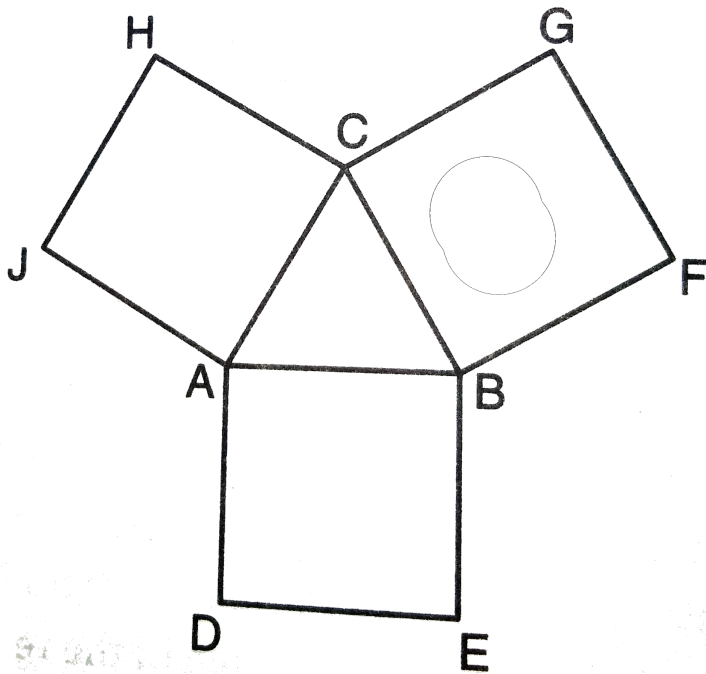


13.

In the figure, $MATH$ is a rectangle, $GB=4.8$, $MH=6$, and $HT=15$. The area of the shaded region is how many times larger than the area of $\triangle MBA$?



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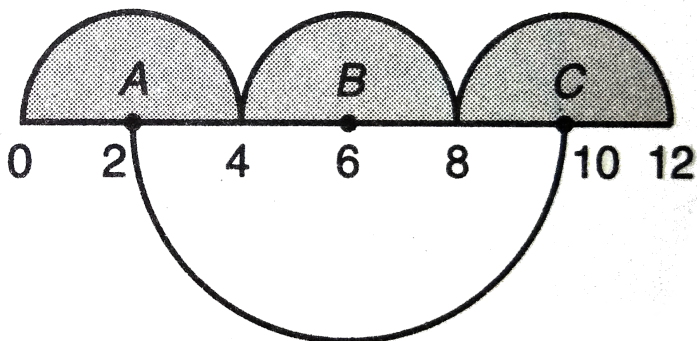


14.

In the figure above, quadrilateral $ABED$, $BFGC$, and $ACHJ$ are square. If the area of equilateral $\triangle ABC$ is $16\sqrt{3}$ square inches, what is the number of inches in the perimeter of polygon $ADEBFGCHJA$?



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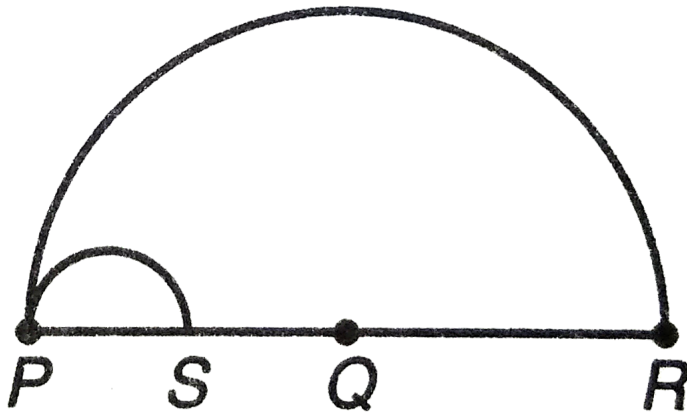


15.

In the figure above, the sum of the area of the three shaded semicircles with centers at A, B, and C is X , and the area of the larger semicircles below the line is Y . If $Y - X = k\pi$, what is the value of k ?



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16.

In the figure above, each arc is a semicircle. If S is the midpoint of PQ and Q is the midpoint of PR , what is the area of semicircles PS to the area of semicircles PR ?

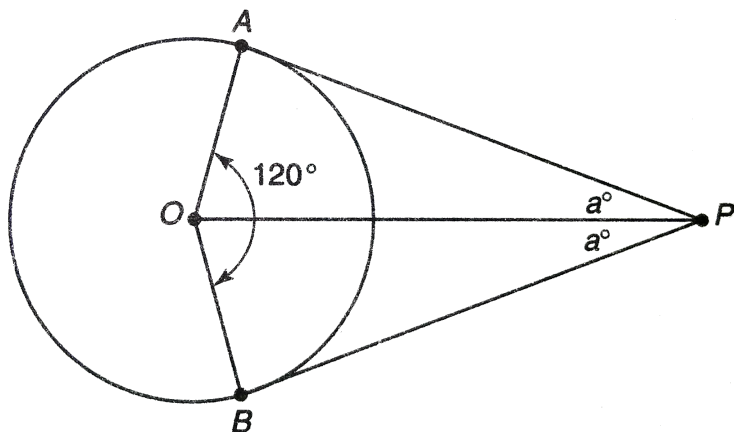


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17. What is the distance in the xy -plane from the point $(3, -6)$ to the center of the circle whose equation is $x(x + 4) + y(y - 12) = 9$?



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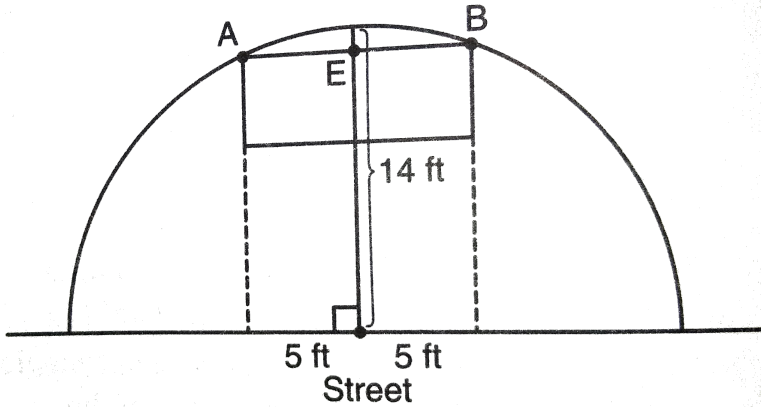
18.

In the figure above, \overline{PA} is tangent to circle O at point A, \overline{PB} is tangent to circle O at point B. Angle AOB measures 120° and $OP = \frac{4}{\pi}$.

What is the length of minor arc AB?



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19.

The diagram above shows a semicircular arch over a street that has a radius of 14 feet. A banner is attached to the arch at points A and B, such that $AE=EB=5$ feet. How many feet above the ground are these points of attachment for the banner, correct to the nearest tenth of a foot?



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20. The dimensions of a rectangular box are integers greater than 1. If the area of one side of this box is 12 and the area of another side 15, what is the volume of the box?



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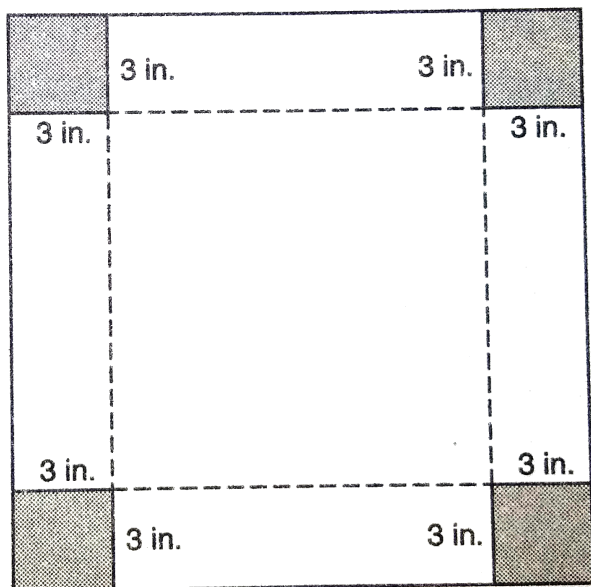
21. The Partside Packing Company needs a rectangular shipping box. The box must have a length of 1 foot, a width of 8 inches, and a

volume of at least 700 cubic inches. What is the least number of inches in height of the box such that the height is a whole number?



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22. A planned building was going to be 100 feet long, 75 feet deep, and 300 feet high. The owner decides to increase the volume of the building by 10% without changing the dimensions of the depth and the height. What will be the new length of this building in feet?



23.

A box is constructed by cutting 3-inche square from the corner of a square sheet of cardboard, as shown in the accompanying diagram, and then folding the sides up. If the

volume of the box is 75 inches, find the number of square inches in the area of the original sheet of cardboard?



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24. Two spheres that are tangent to each other have volumes of 36π cubic centimeters and 972π cubic centimeters. What is the greatest possible distance, in centimeters, between a point on one sphere and a second point on the other sphere?

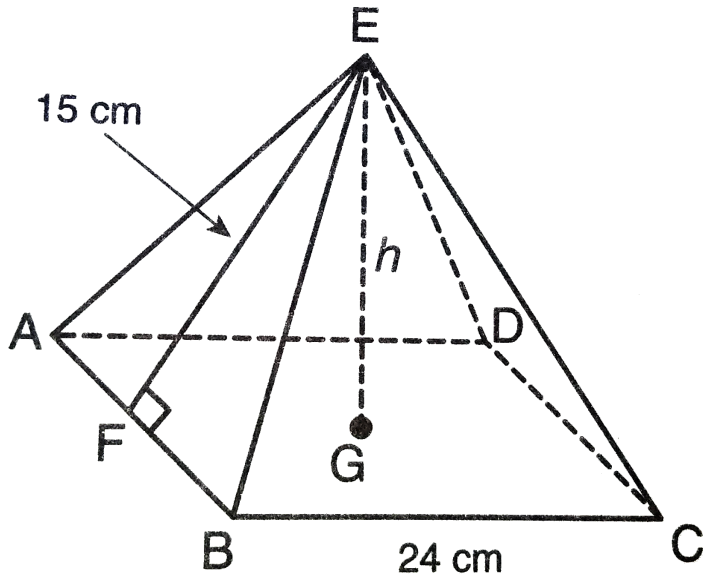


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25. A sealed cylindrical can holds three tennis balls each with diameter of 2.5 inches. If the can is designed to have the smallest possible volume, find the number of cubic inches of unoccupied space inside the can correct to the nearest tenth of a cubic inch.



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26.

The slant height of a pyramid is the perpendicular distance from the vertex of the pyramid to the base of a figure above, the height is labeled h , the length of a side of the square base is 24 cm , and the slant height is 15

cm, What is the volume , in cubic centimeters, of the pyramid?

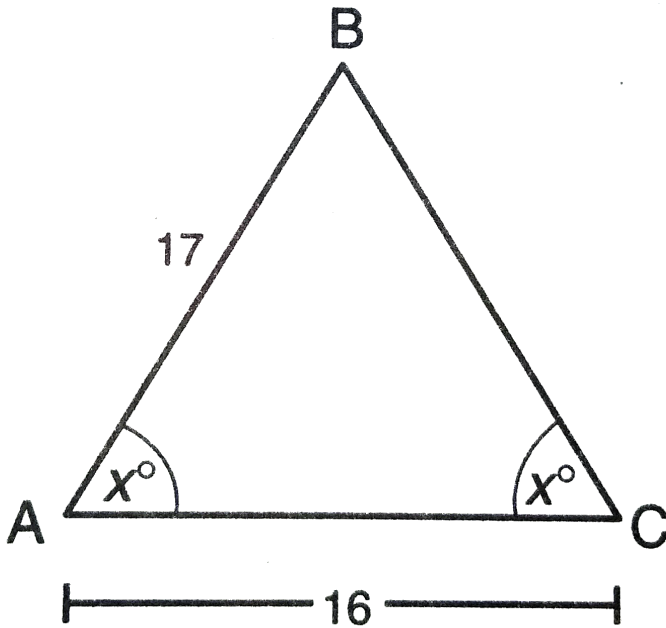


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27. A bookend that weights 0.24 pounds is shaped like a pyramid with square base. How many pounds does a larger similar pyramid-shaped bookend weigh if it is made of the same material and each corresponding dimensions is $2\frac{1}{2}$ times as large?



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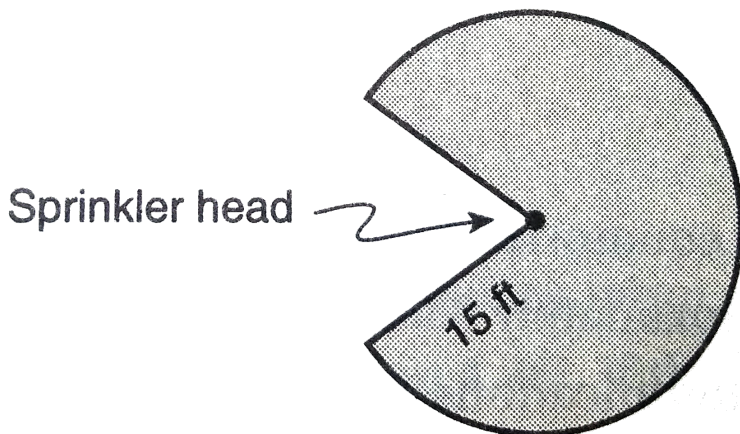


28.

In the figure above, what is the value of $\sin A - \cos A$?



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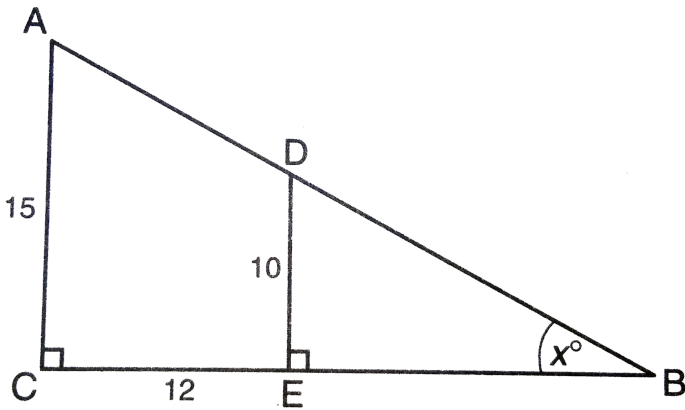


29.

A lawn sprinkler sprays water in a circular pattern at a distance of 15 feet from the sprinkler head which rotates through the angle of $\frac{5\pi}{3}$ radians, as shown by the shaded area in the diagram above. What is the area of the lawn, to the nearest square foot, that receives water from this sprinkler?



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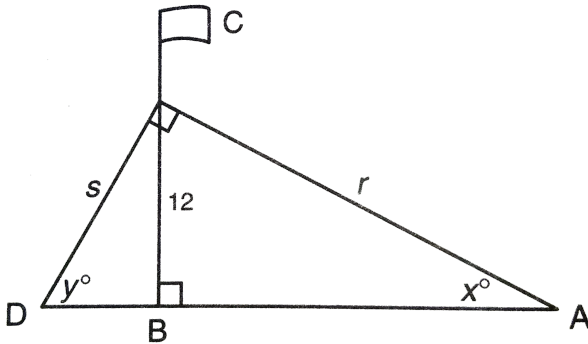
30.

In figure above, angles ACB and DEB are right angles, $AC=15$, $CE=12$, and $DE=10$. What is the value of $\cos x$?



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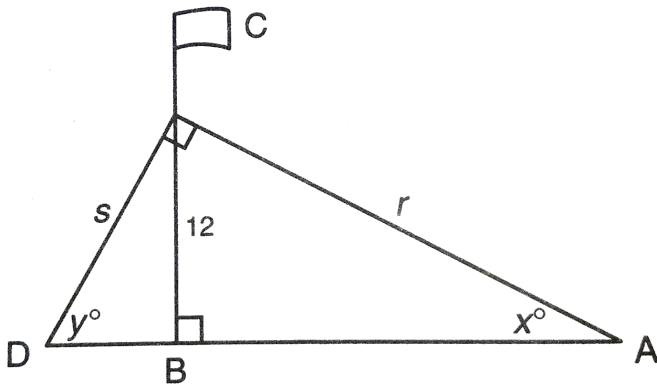
31. For Question 4 and 5 refer to the diagram



A flagpole that stands on level ground. Two cables, r and s , are attached to the pole at a point 12 feet above the ground and form a right angle with each other. Cable r is attached to the ground to the ground at a point that makes $\tan x = 0.75$.

Q. What is the value of $\cos x$?

32. For Question 4 and 5 refer to the diagram



A flagpole that stands on level ground. Two cables, r and s , are attached to the pole at a point 12 feet above the ground and form a right angle with each other. Cable r is attached to the ground to the ground at a point that

makes $\tan x = 0.75$.

Q. What is the sum of the lengths of cables r and s ?



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Exercise

1. A solid cube is put in a sphere. What is the least percentage of the volume of the sphere not occupied by the cube ?

A. 44.44 %

B. 50 %

C. 57.66%

D. 63.24%

Answer: D



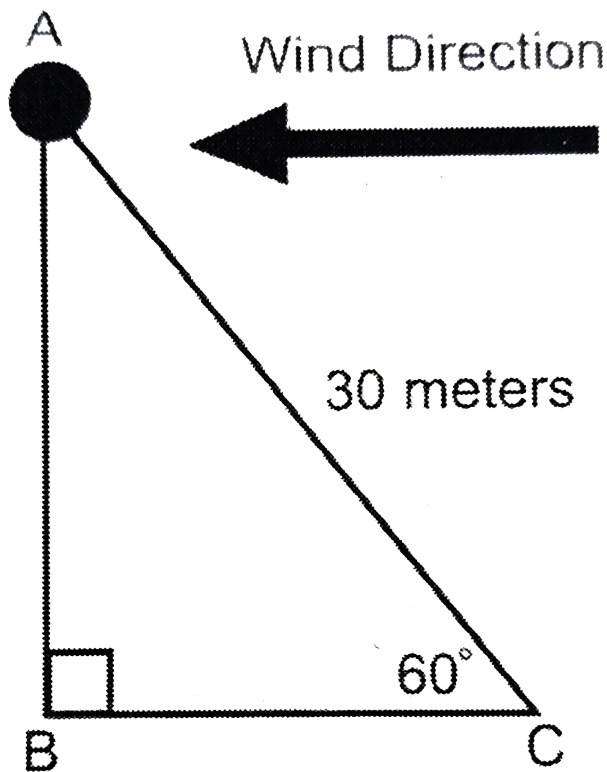
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2. A circle intersects the X axis at $(1,0)$ and $(7,0)$.

If the radius of the circle is 5, what is the sum of the coordinates of the center?



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3.

A hot air balloon was tied to a point on the ground using a rope 60m long. If the rope

makes an angle of 60° with the ground, how high, in meters, is the balloon above the ground level?

A. $\frac{30}{\sqrt{3}}$

B. 30

C. $\frac{60}{\sqrt{3}}$

D. $30\sqrt{3}$

Answer: D



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4. How many points with integer coordinates lie on or inside a circle of radius three units centered at the origin?

A. 16

B. 28

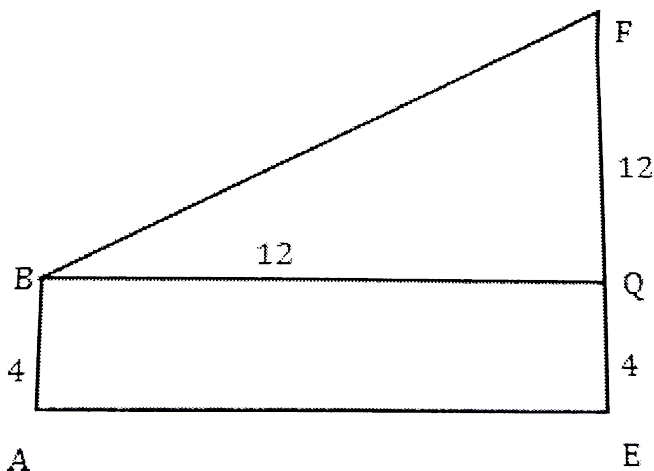
C. 29

D. 30

Answer: C



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5.

In the figure shown above, AB and EF are parallel and measure 4 and 24, respectively. If AB is perpendicular to AE and AE measures 12, what is the perimeter of the figure to the nearest integer?



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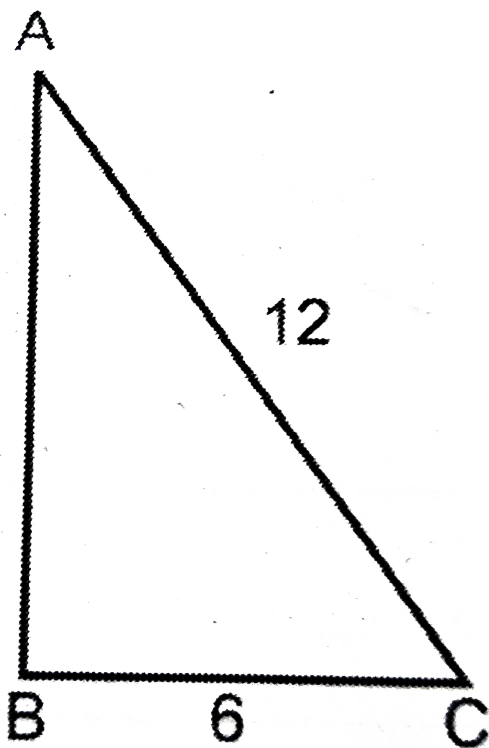
6. The imaginary number "i" is such that $i^2 = -1$. Which of the following statements is true about the complex number equivalent to $(4 - i) \times (1 + 2i) + (1 - i) \times (2 - 3i)$?

- A. It lies on the real axis
- B. It lies in the first quadrant
- C. It lies in the second quadrant
- D. It lies in the third quadrant

Answer: B



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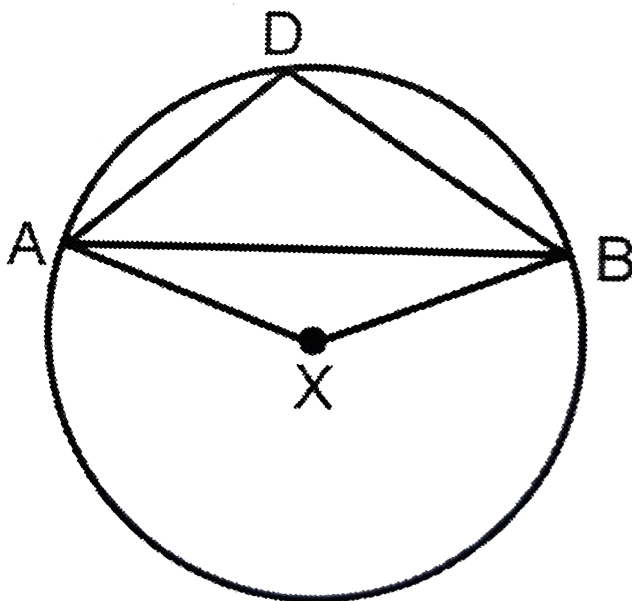


7.

In the figure shown above, ABC is a triangle right angled at B . What is the value of angle A , in degrees?



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8.

Angle ADB equals 110° . What is the value of angle BAX if X is the centre of the circle?

A. 20°

B. 35°

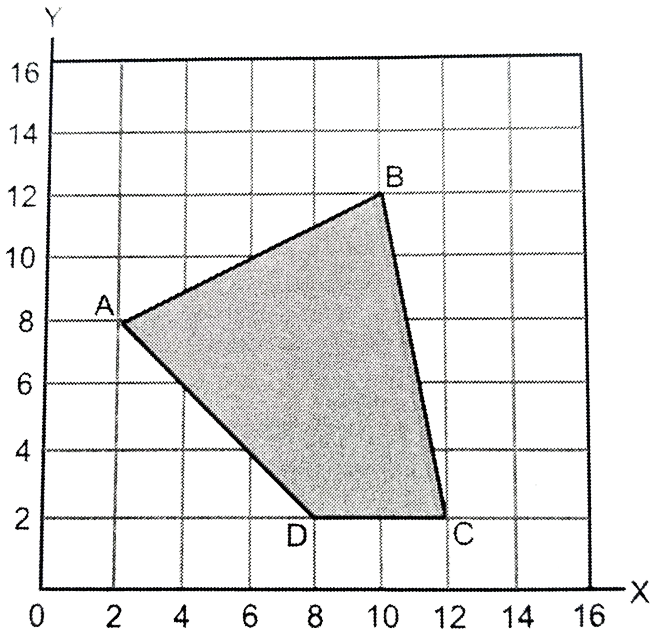
C. 40°

D. 70°

Answer: A



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9.

What is the area of the quadrilateral ABCD as shown in the figure above?

A. 74

B. 72

C. 56

D. 28

Answer: C



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10. Which of the following statements is/are correct about the angle $\frac{10\pi}{3}$ radians?

I. It is equivalent to 600° .

II. The angle falls in the third quadrant.

III. $(\cos) \frac{10\pi}{3}$ is positive.

A. Only I

B. Only II

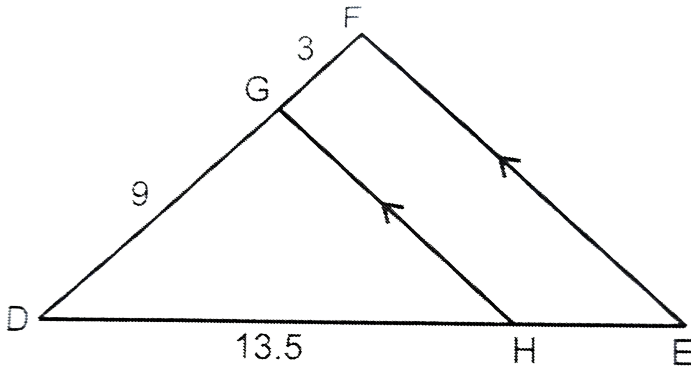
C. Both I and III

D. Both I and II

Answer: D



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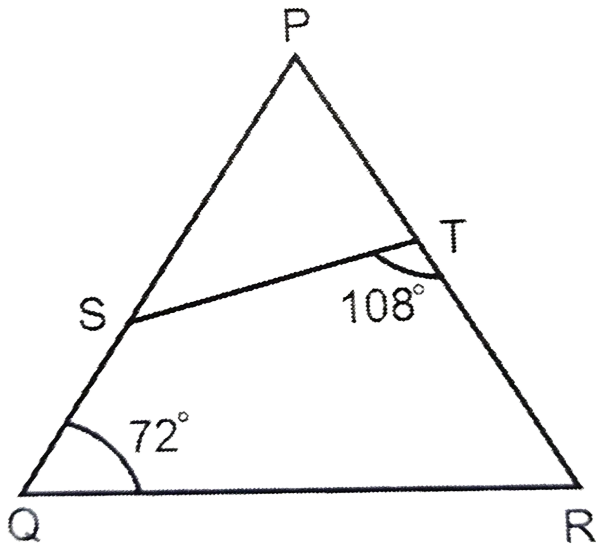


11.

In the figure $GH \parallel FE$. What is the length of HE ?



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12.

If $\frac{PS}{PR} = \frac{1}{2}$, $PT=6$ and $QS=4$, what is the length of PS?

A. 12

B. 10

C. 9

D. 8

Answer: D



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13. The imaginary number " i " is such that $i^2 = -1$. Which of the following options is equivalent to $\left(\frac{1 - 2i}{2 + 3i}\right)$?

A. $-\frac{4}{13} - \frac{i}{13}$

B. $\frac{4}{13} + \frac{i}{13}$

C. $8-7i$

D. $\frac{8}{13} + i$

Answer: A



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14. Matt has a garden in the shape of a right-angled triangle with one of the acute angles as 30° . If the longest side of the triangle is 4 m long, what is the perimeter, in meters, of the garden?



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15. The angular elevations of a tower CD at a place A due south of it is 60° , and at a place B due west of A, the elevation is 30° . If $AB=300\text{m}$, what is the height, in meters, of the tower?

A. 30

B. $30\sqrt{6}$

C. $30\sqrt{10}$

D. $30\sqrt{30}$

Answer: D



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16. What is the perimeter, to the nearest integer, of an equilateral triangle inscribed in circle whose circumference is 6π units?



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17. What is the area bounded by

$$x^2 + y^2 - 8x - 6y = 25, x \geq 4 \text{ and } y \geq 3?$$

A. 39.3

B. 78.6

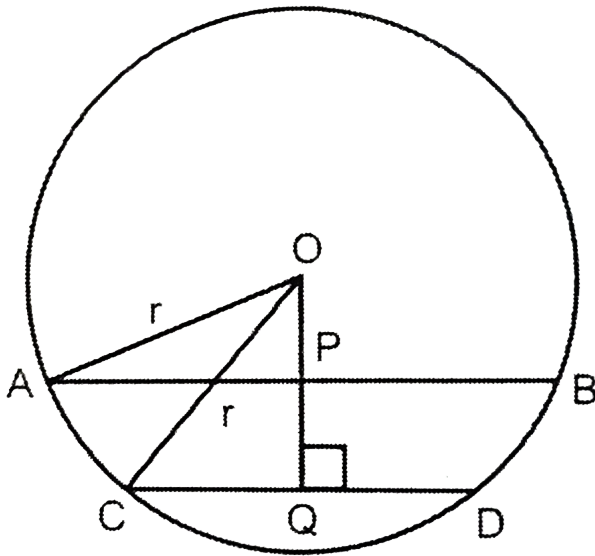
C. 123.4

D. 157

Answer: A



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18.

2 parallel chords 24 cm, and 18 cm, are on the same side of the centre of a circle. If the distance between the chords is 3 cm, calculate the radius of the circle.

A. 15 cm

B. 14 cm

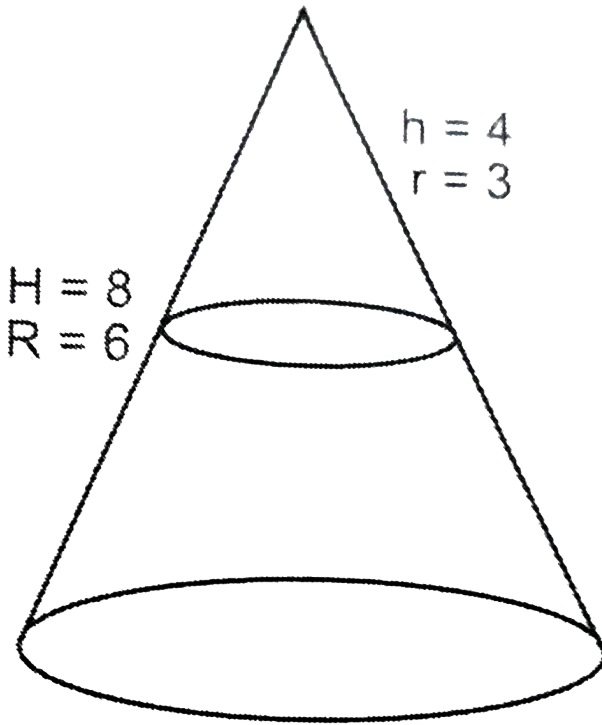
C. 13 cm

D. 12 cm

Answer: A



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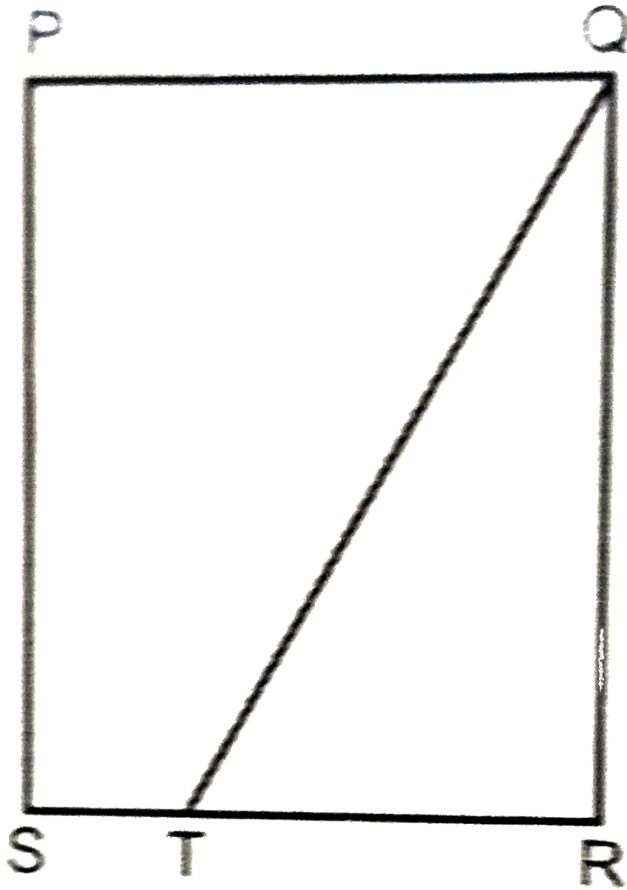
19.

A right circular cone, with radius and height 8 and 6 respectively, is cut parallel at the middle of the height to get a smaller cone and a frustum. By what percentage, to the nearest

integer, is the combined total surface area of the smaller cone less than of the frustum?



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20.

PQRS is a rectangle. T is a point on RS such that $ST=2$. If the area of the triangle QRT is 24 and $QR : RS=2 : 1$, what is the measure of QR?

A. 12

B. 14

C. 15

D. 16

Answer: A



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21. What is the value of

$\left(\frac{3\pi^c}{4} + \frac{11\pi^c}{5} + \frac{7\pi^c}{10} \right)$, when converted to

degrees?

A. 135°

B. 245°

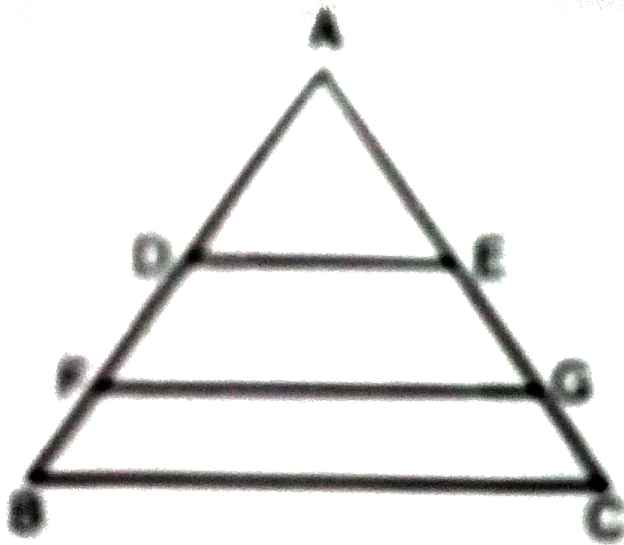
C. 657°

D. 810°

Answer: C



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22.

In

$\triangle ABC$, D and E are the mid-points of AB and AC. Again, F and G are the mid-points of DB and EC. What is the ratio of areas of FDEG and BFGC?

A. 5 : 7

B. 3 : 5

C. 2: 3

D. Data insufficient to answer

Answer: C



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23. A car is being driven, in a straight line and at a uniform speed, towards the base of a vertical tower of height 30 feet. The top of the tower is observed from the car and, in the process, the angle of elevation changes from

45° at B to 60° at A. What is the distance, in feet, to the nearest integer, between the points A and B?



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24. The biggest possible cube is taken out of a right solid cylinder of radius 4 and height 5 respectively. What is the volume of the cube?

A. 64

B. 125

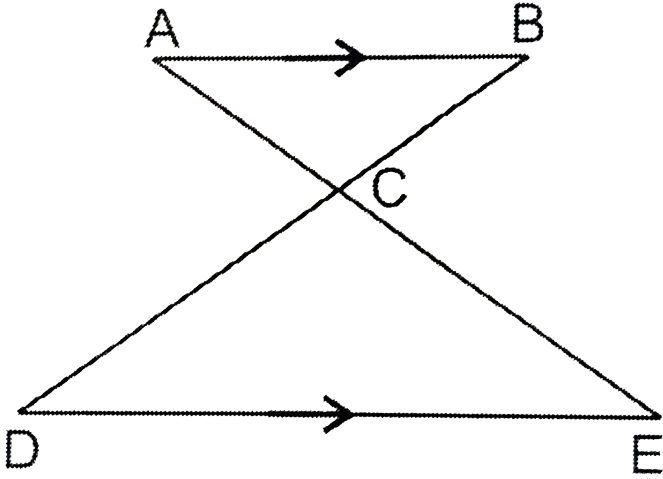
C. $128\sqrt{2}$

D. $256\sqrt{2}$

Answer: B



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25.

In the figure $AB \parallel DE$, $AC=6$, $CE=15$ and $DB=28$. What is the length of CD ?



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26. The imaginary number i is defined such that $i^2 = -1$. Which of the following options is equivalent to $\left(\frac{1}{i} + \frac{1}{i^2} + \frac{1}{i^3} + \frac{1}{i^4}\right)$?

A. -1

B. 0

C. 1

D. $-i$

Answer: B



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27. The imaginary number i is such that $i^2 = -1$.

Which of the following options is equivalent

to $\sqrt{5 + 12i}$?

A. $1 - i$

B. $3 + i$

C. $3 - 2i$

D. $3 + 2i$

Answer: D



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28. A right angled triangle ABC of sides $AB=6$, $BC=8$ and $AC=10$ is spun once about AB and once about BC. What is the difference in volumes of the two solids formed?

A. 24π

B. 32π

C. 64π

D. 96π

Answer: B



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29. If $a + ib = \sqrt{5 + 12i}$ where $a > 0$, $b > 0$, which of the following is a possible value of (a^2b^2) ?

A. 36

B. 9

C. 45

D. 18

Answer: A



30. Two friends, Amy and Bob, are standing in line with a lamp post. The shadows of both friends meet at the same point on the ground. If the heights of the lamp post, Amy and Bob are 6 meters, 1.8 meters and 0.9 meters respectively, and Amy is standing 2 meters away from the post, then how far (in meters) is Bob standing from Amy?

A. 0.43

B. 0.9

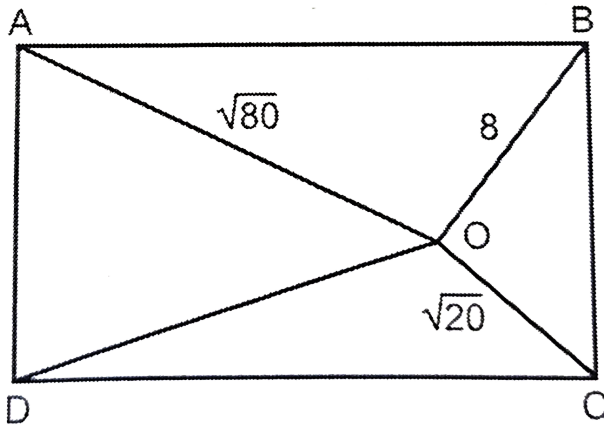
C. 1.8

D. 2

Answer: A



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31.

In the figure $OA = \sqrt{80}$, $OB=8$, $OC = \sqrt{20}$.

What is the length of OD?

A. 5

B. 6

C. 7

D. 8

Answer: B



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32. In a right-angled triangle ABC, right angled at B, an altitude BD is dropped on AC. If $AB=8$ and $BC=6$, what is the length of AD?

A. 2.4

B. 3.6

C. 4.8

D. 6.4

Answer: D



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33. If the equation of the circle having the coordinates of the ends of its diameter as (3,5) and (5,1) is $(x - a)^2 + (y - b)^2 = r^2$, what is the value of $(a+b+r)$ to the nearest tenth?



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34. If $a + ib = (5 + 3i)(6i + 1)$, what is the value of $a^2 + b^2$?

A. 1258

B. 1528

C. 2158

D. 3168

Answer: A



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35. A well, 2m radius and 40m deep, is being dug. The excavated soil is transported using a truck of size $5m \times 2m \times \pi m$. How many trips will the truck have to clear the excavated soil if it can be filled to 80% of its height?

A. 10

B. 12

C. 20

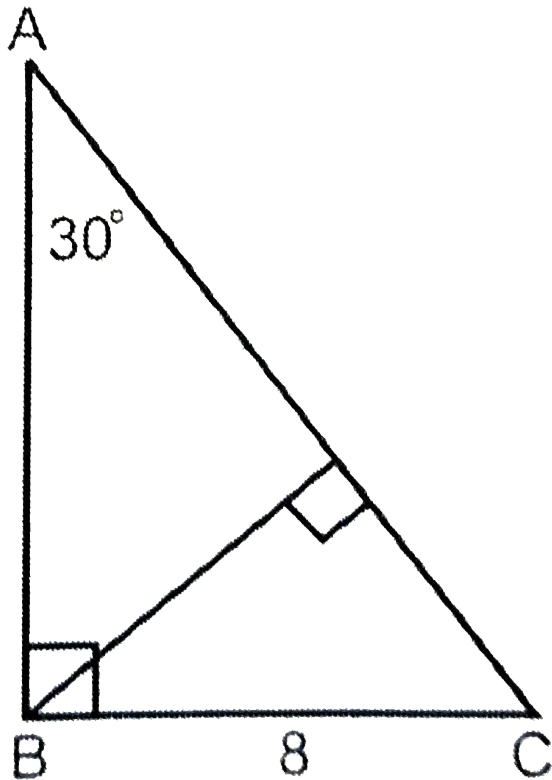
D. 24

Answer: C





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36.

In the figure shown, ABC is a triangle, right angled at B . Through B , a line is drawn

perpendicular to AC which meets AC in D.

What is the length of BD?

A. $\frac{4}{\sqrt{3}}$

B. $\frac{8}{\sqrt{3}}$

C. $2\sqrt{3}$

D. $4\sqrt{3}$

Answer: D

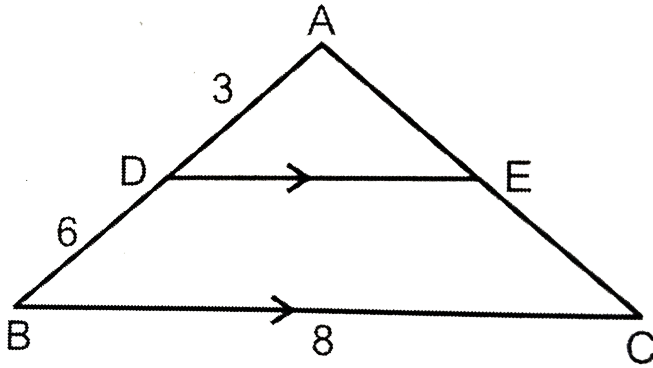


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37. From a cuboid of dimension $4m \times 6m \times 8m$, largest possible cube is cut out. What is the minimum possible number of cubes, all of equal size, into which remaining part of the solid can be cut, ensuring that no part of the solid remains?



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38.

In the $\triangle ABC$, $DE \parallel BC$, $AD=3$, $BD=6$, and $BC=8$.

What is the ratio of the areas of triangle ADE and trapezium BDEC?

A. 1 : 3

B. 1 : 4

C. 1 : 8

D. 1:9

Answer: C



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39. A vertical tower, OP stands at the center O of a square $ABCD$. Let h and b denote the length OP and AB respectively. If $\angle APB = 60^\circ$, what is the relationship between h and b ?

A. $2b^2 = h^2$

B. $2h^2 = b^2$

C. $3b^2 = 2h^2$

D. $3h^2 = 2b^2$

Answer: B



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40. What is the shortest distance between the circle $x^2 + y^2 - 2x - 2y = 0$ and the line $x=4$?

A. 1.23

B. 1.59

C. 2.56

D. 3.25

Answer: B



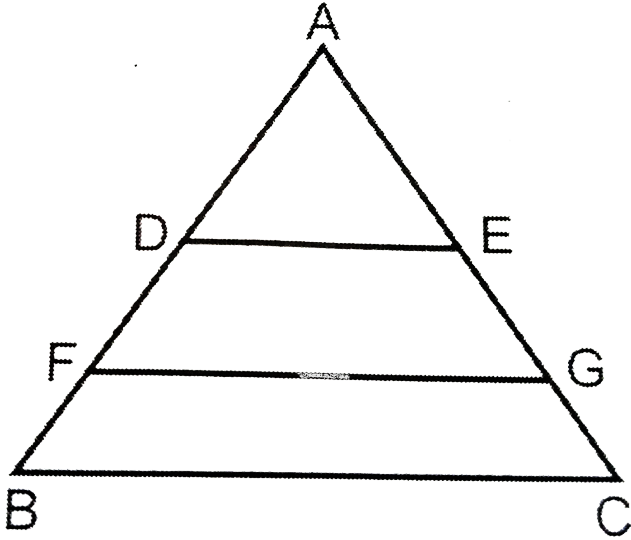
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41. A balloon leaves the earth and rises at a uniform velocity. At the end of 2 min, an observer situated at 200m from the point the

balloon was released, finds the regular elevation of the balloon to be 60° . What is the speed in meters per second, to the nearest integer, of the balloon?



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42.

In $\triangle ABC$, D and E are the mid-points of AB and AC. Again, F and G are the mid-points of DB and EC, If $BC=12$, what is the length of FG?

A. 4

B. 6

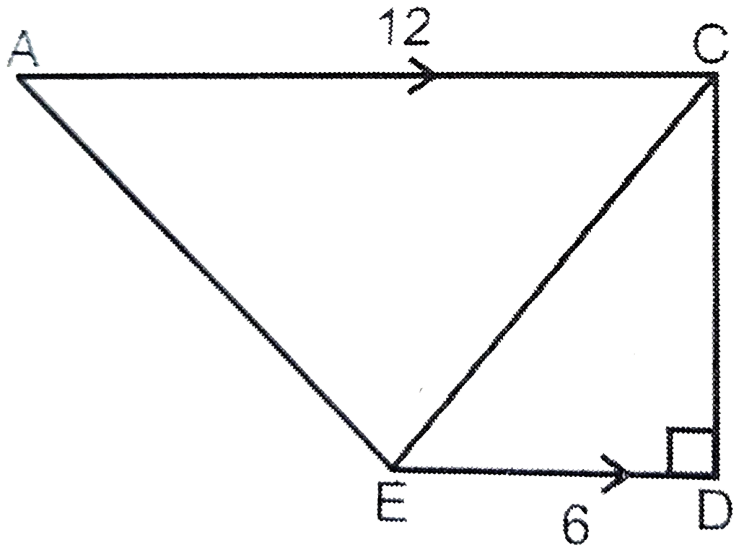
C. 8

D. 9

Answer: D



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43.

In the figure shown, area of triangle ACE is 48.

If AC is parallel to DE , what is the length CE ?

A. 6

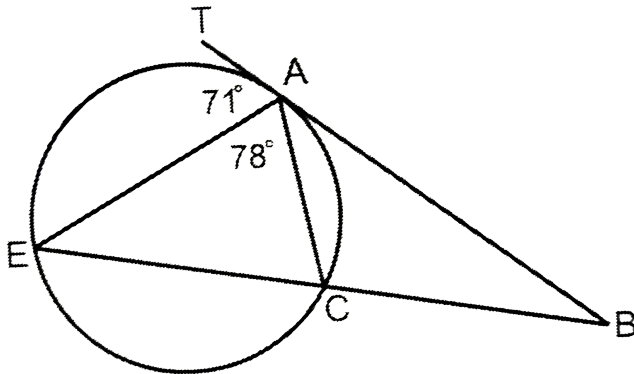
B. 8

C. 10

D. 11

Answer: C

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44.

In the figure above, the line TAB is tangent to the given circle. If $\angle EAC = 78^\circ$ and

$\angle TAE = 71^\circ$, what is the measure, in degrees, of $\angle ABC$?

A. 21°

B. 25°

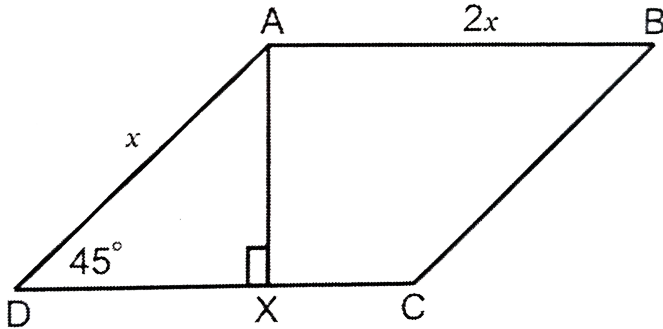
C. 31°

D. 40°

Answer: D



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45.

In a parallelogram, the ratio of the two adjacent sides is $1 : 2$. If the area of the parallelogram is 20 square units and the angle between the two sides is 45° , what is the area, to the nearest integer, of the rectangle having the sides equal to that of the parallelogram?



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