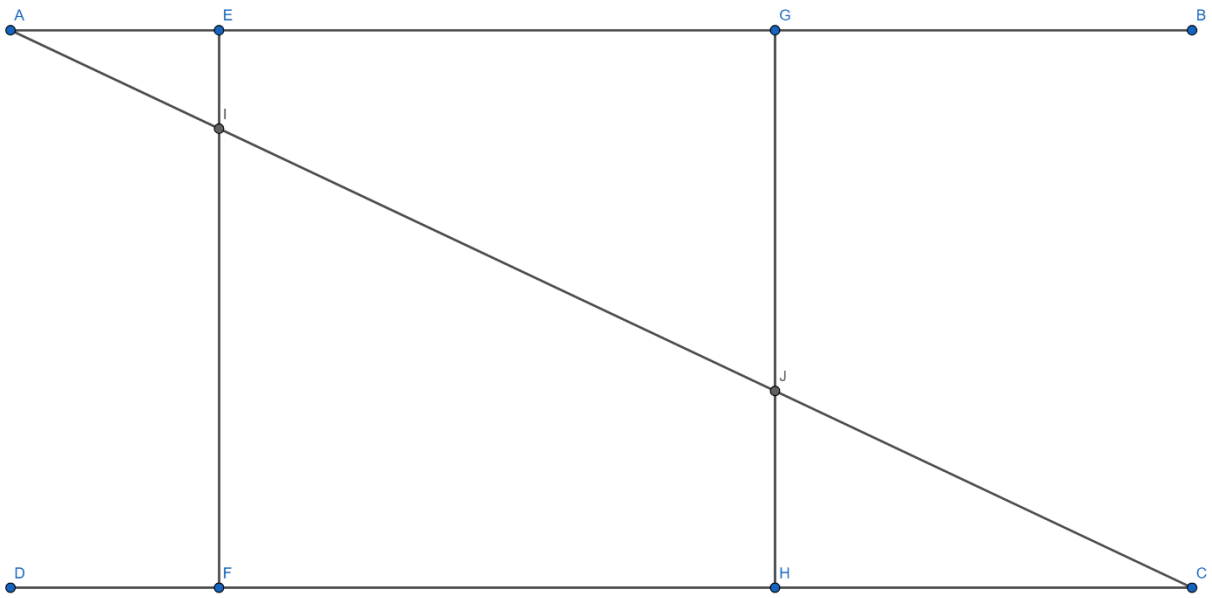
Additional Topics in Math

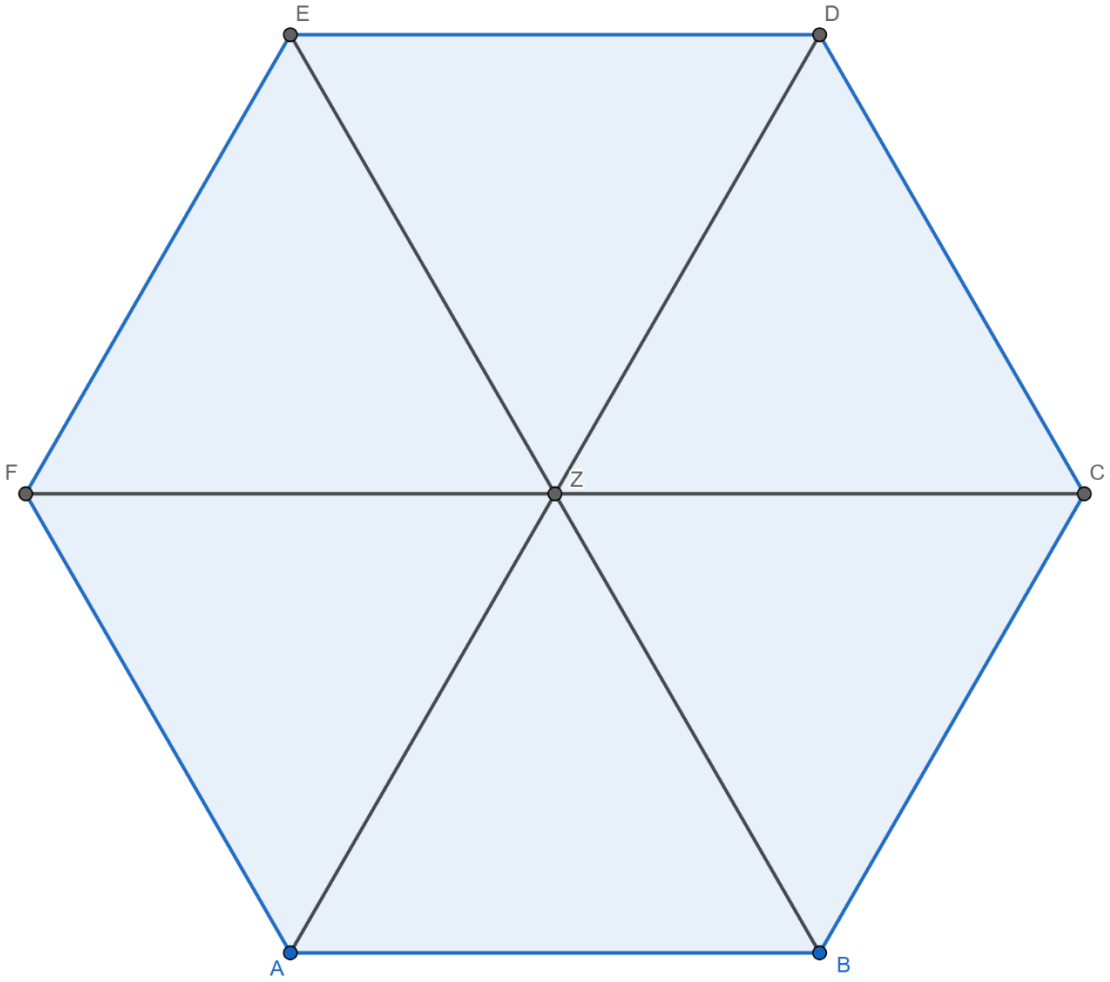
Lines & Angles (Congruence & Similarity)

1. 

In the figure above, line segment FH is 8 units long, line segment IF is 9 units long and line segment IJ is 10 units long. If line segment AE is 2 units long and line segment HC is 6 units long, what is the area of triangle AEI, in units cubed? (Note: Figure not drawn to scale)

Polygons (Congruence & Similarity)

2.

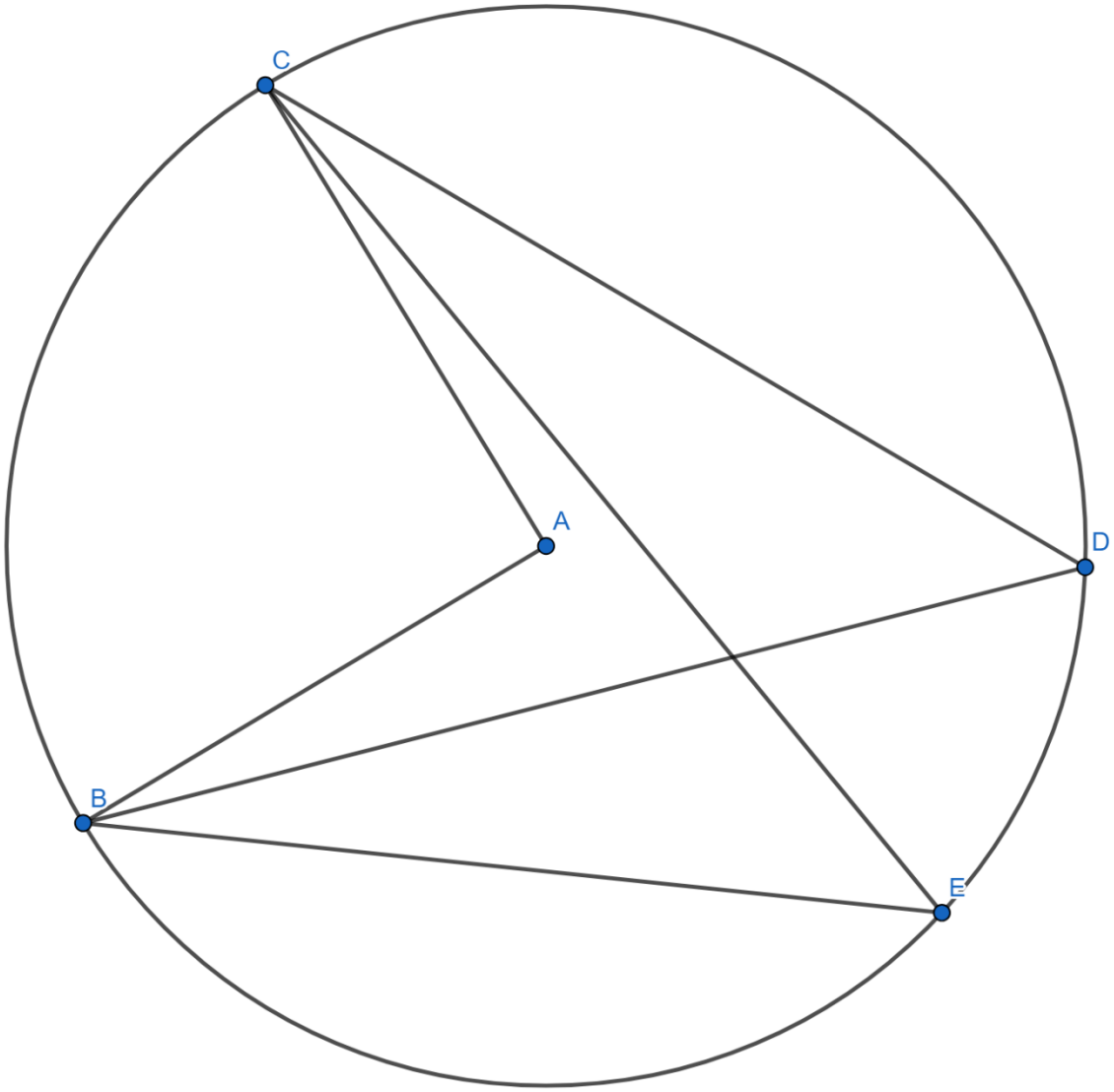


The regular hexagon $EDCBAF$ has been split into 6 congruent triangles as shown above. Line segment AB is 6 units long. What is the area of regular hexagon $EDCBAF$?

Additional Topics in Math

Circle Theorems

3.



If angle $\angle CAB = 80°$, what is the measure of angle $\angle CEB$?

A) $\angle CEB = 80°$

B) $\angle CEB = 40°$

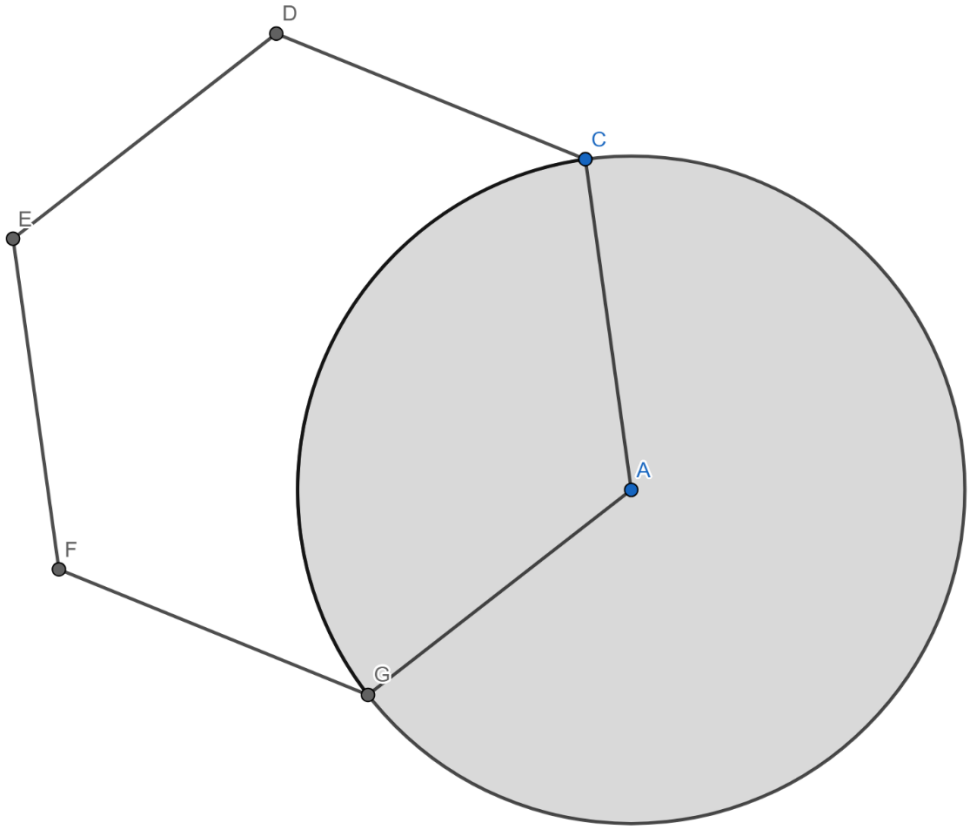
C) $\angle CEB = 160°$

D) $\angle CEB = 20°$

Additional Topics in Math

Circle Theorems / Polygons

4.



If the length of segment CA is 4 units, what is the area of the non-shaded section of the regular hexagon $DCAGFE$?

A) $24\sqrt{3} - 16\pi$

B) $24\sqrt{3} - \frac{16}{3}\pi$

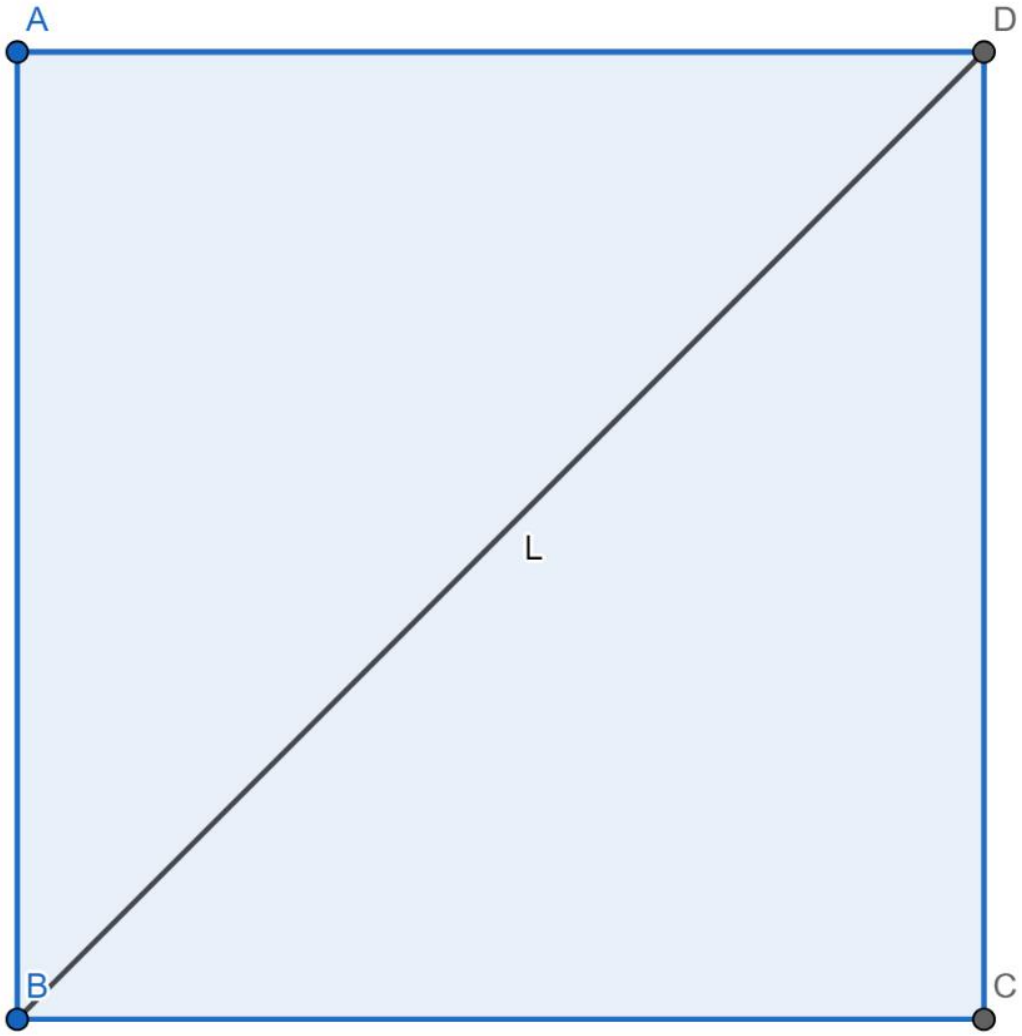
C) $16\sqrt{3} - \frac{4}{3}\pi$

D) $16\sqrt{3} - \frac{16}{3}\pi$

Additional Topics in Math

Polygons (Not Covered in Khan Academy)

5.



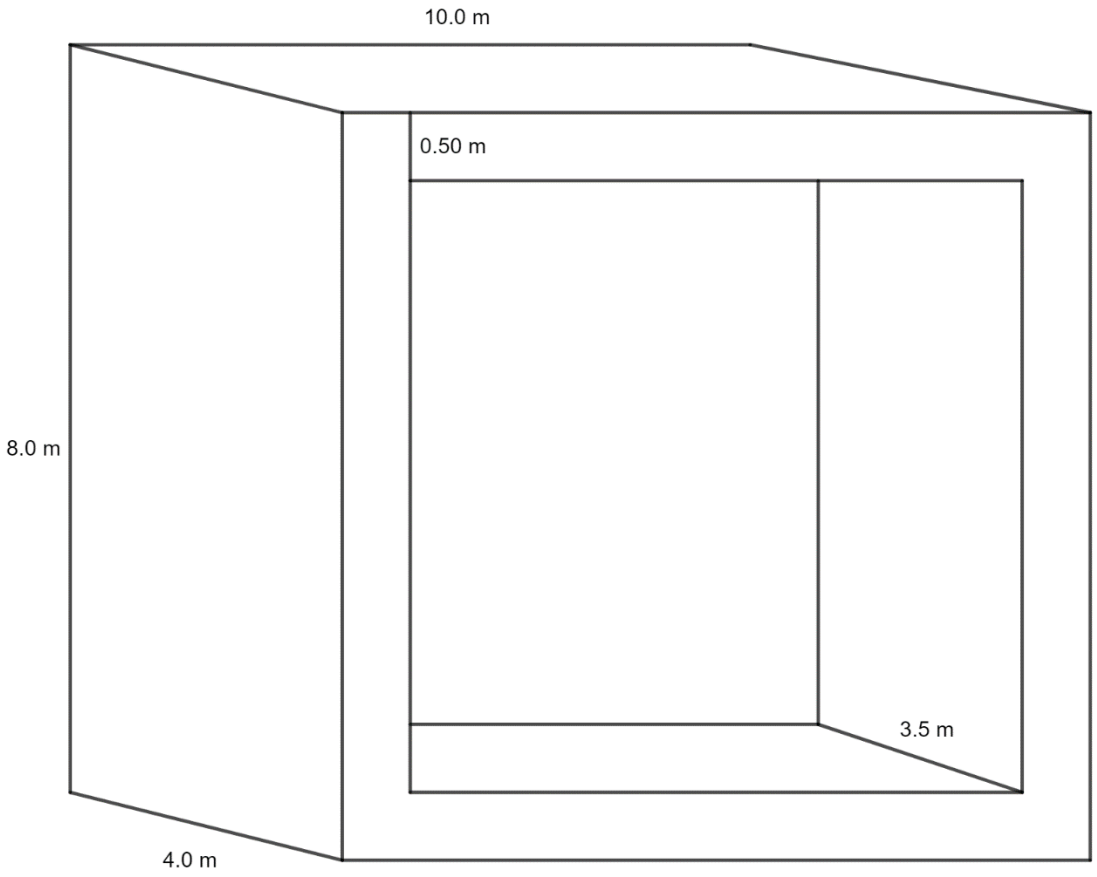
In the square $ABCD$ shown above, line segment AB is 10 units long. If the square $ABCD$ were to be converted into a rhombus $ABCD$ with side lengths equal to those of square $ABCD$ and an internal acute angle $\angle BAD$ equal to $60°$, how much smaller would segment BD become?

A) $10\sqrt{2} + 10$ units smaller
B) $10\sqrt{2}$ units smaller
C) $10\sqrt{2} - 10$ units smaller
D) 10 units smaller

Additional Topics in Math

Volume Word Problems

6.



A box with one opening on the front face is made from wood. The external length of the box is 10.0 meters, the external width is 8.0 meters and the external height is 4.0 meters. The box is 0.5 meters thick, with an internal height of 3.5 meters. If one tree provides 100 cubic meters of wood, what is the minimum number of trees required to make this box?

A) 1 tree

B) $\frac{1}{2}$ of a tree

C) $\frac{3}{4}$ of a tree

D) 2 trees

Additional Topics in Math

Circle Equations

7. Which of the following is an equation for a circle in the xy coordinate plane with center coordinates of $(4, 9)$ and a radius of $\sqrt{10}$?

   A) $(x-4)^2 + (y-9)^2 = \sqrt{10}$
   B) $(x-4)^2 + (y-9)^2 = 10$
   C) $(x+4)^2 + (y+9)^2 = 10$
   D) $(x+2)^2 + (y+3)^2 = \sqrt{10}$

8. The following equation models a circle in the xy coordinate plane. If the circle's vertex is on the point (h, k), what is the sum of h, k and the radius of the circle?

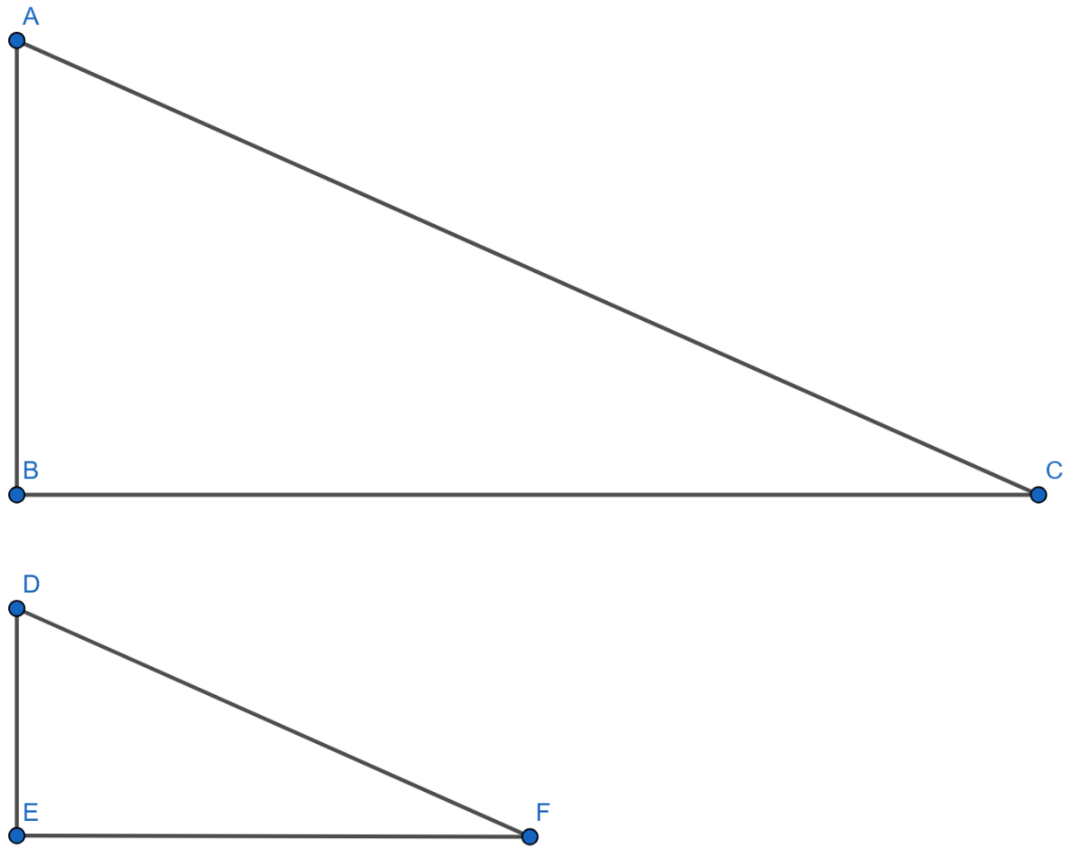
$$9x^2 + 108x + 9y^2 - 36y = 216$$

   A) 4
   B) 12
   C) 60
   D) 16

Additional Topics in Math

Right Triangle Trig

9.

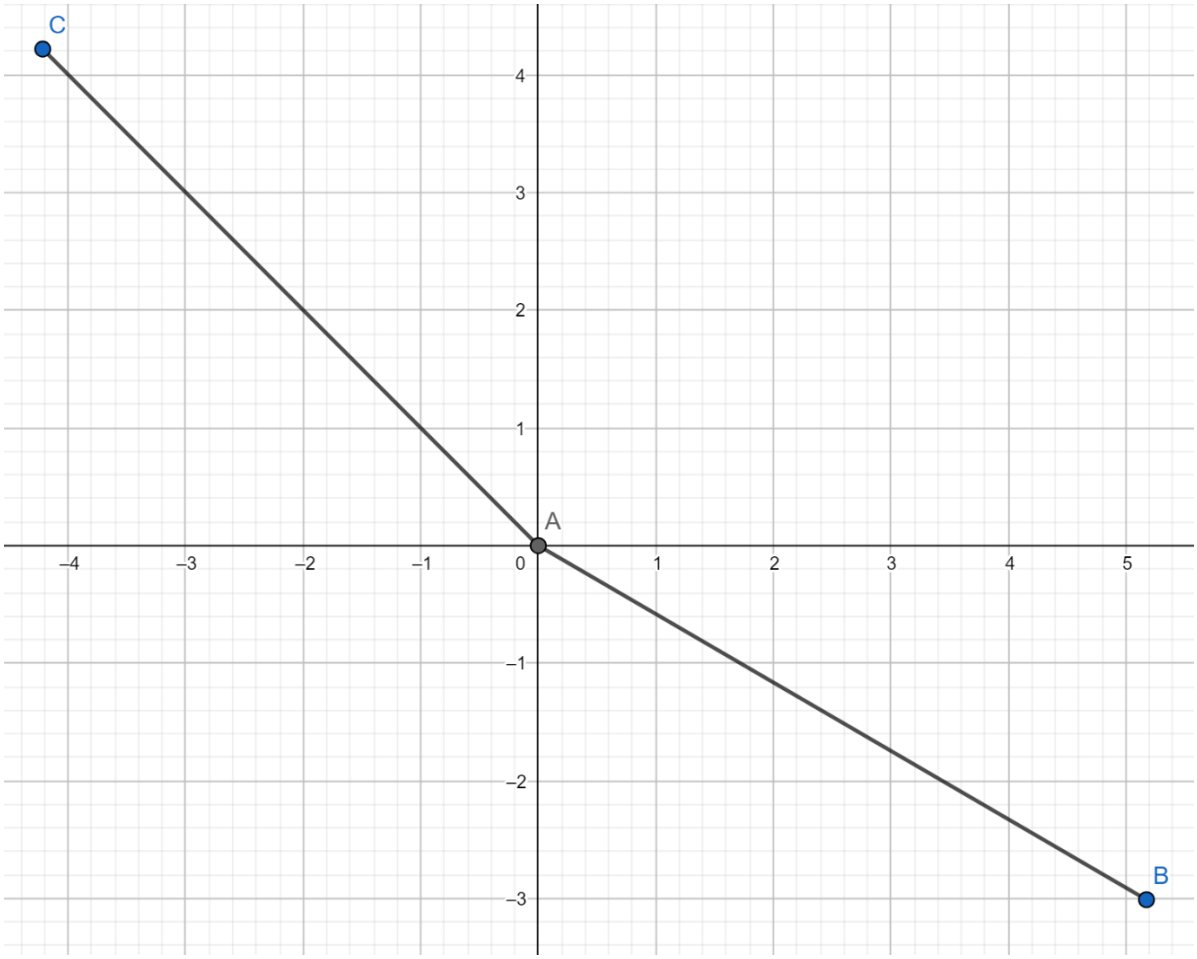


If the above two right triangles ABC and DEF are similar, and the measure of angle $\angle ACB$ is $20°$, what is the value of $\tan^{-1}\left(\frac{EF}{DE}\right)$?

A) $40°$
B) $20°$
C) $70°$
D) Cannot be determined

Angles, Arc lengths, and Trig functions

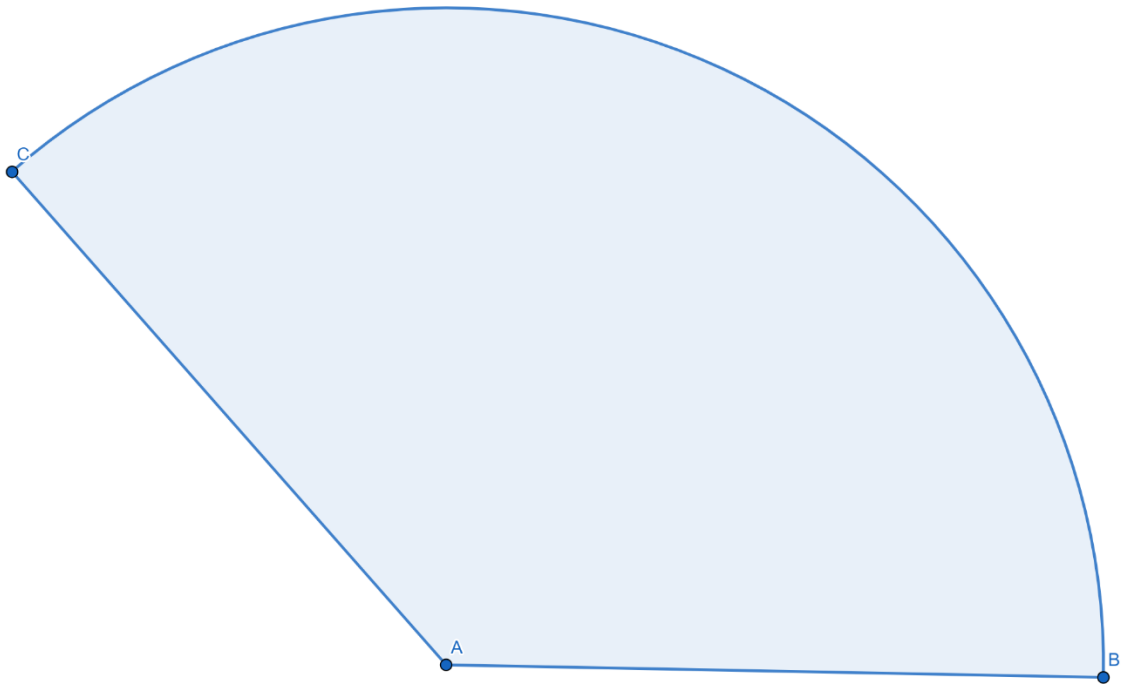
10.



In the above xy coordinate plane, point C has coordinates $(-3\sqrt{2}, 3\sqrt{2})$, and point B has coordinates $(3\sqrt{3}, -3)$. What is the smallest obtuse angle between segment CA and segment AB, in radians?

A) 165π
B) $\frac{11\pi}{12}$
C) $\frac{13\pi}{12}$
D) 195

11.



If the area of circular sector CAB is 6π units squared and the radius of line segment AB is 4 units, what is the measure of $\angle CAB$ in radians?

12. If the length of some arc GHI is 25π, then what is the measure of $\angle CAB$ in degrees multiplied by the measure of $\angle CAB$ in radians?

13. In every one of the statements below, the angle measures are in degrees and x is a constant. Which of the following statements could be true?

    A) $tan(x) = \frac{\sin(x)}{\cos(x)}$

    B) $tan(x) = \frac{\cos(90-x)}{\sin(90-x)}$

    C) $sin(x) = cos(90 - x)$

    D) All of the above

Additional Topics in Math

Complex Numbers

14. Which of the following is equal to $i^4 - 3i^2 + \frac{(i-1)^2}{\sqrt{-4}}$? (Note: $i = \sqrt{-1}$)

A) $4 - i$
B) 3
C) -3
D) $4 + \frac{2+2i}{2i}$

Answers:

1. $1.5\ Units^3$ 2. $54\sqrt{3}$ 3. B 4. B 5. C 6. A 7. B 8. A 9. C 10.B

11. $\frac{3\pi}{4}$ 12. D 13. B 14. B