

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Area and volume	<div><div></div><div></div><div></div></div>

ID: f67e4efc

A right circular cylinder has a volume of 45π . If the height of the cylinder is 5, what is the radius of the cylinder?

- A. 3
- B. 4.5
- C. 9
- D. 40

ID: f67e4efc Answer

Correct Answer: A

Rationale

Choice A is correct. The volume of a right circular cylinder with a radius of r is the product of the area of the base, πr^2 , and the height, h . The volume of the right circular cylinder described is 45π and its height is 5. If the radius is r , it follows that $45\pi = \pi(r)^2(5)$. Dividing both sides of this equation by 5π yields $9 = r^2$. Taking the square root of both sides yields $r = 3$ or $r = -3$. Since r represents the radius, the value must be positive. Therefore, the radius is 3.

Choice B is incorrect and may result from finding that the square of the radius is 9, but then from dividing 9 by 2, rather than taking the square root of 9. Choice C is incorrect. This represents the square of the radius. Choice D is incorrect and may result from solving the equation $45\pi = \pi(r)^2(5)$ for r^2 , not r , by dividing by π on both sides and then by subtracting, not dividing, 5 from both sides.

Question Difficulty: Medium

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ID: 5afbdc8e

What is the length of one side of a square that has the same area as a circle with radius 2 ?

- A. 2
- B. $\sqrt{2\pi}$
- C. $2\sqrt{\pi}$
- D. 2π

ID: 5afbdc8e Answer

Correct Answer: C

Rationale

Choice C is correct. The area A of a circle with radius r is given by the formula $A = \pi r^2$. Thus, a circle with radius 2 has area $\pi(2^2)$, which can be rewritten as 4π . The area of a square with side length s is given by the formula $A = s^2$. Thus, if a square has the same area as a circle with radius 2, then $s^2 = 4\pi$. Since the side length of a square must be a positive number, taking the square root of both sides of $s^2 = 4\pi$ gives $s = \sqrt{4\pi}$. Using the properties of square roots, $\sqrt{4\pi}$ can be rewritten as $(\sqrt{4})(\sqrt{\pi})$, which is equivalent to $2\sqrt{\pi}$. Therefore, $s = 2\sqrt{\pi}$.

Choice A is incorrect. The side length of the square isn't equal to the radius of the circle. Choices B and D are incorrect and may result from incorrectly simplifying the expression $\sqrt{4\pi}$.

Question Difficulty: Medium

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ID: ec5d4823

What is the volume, in cubic centimeters, of a right rectangular prism that has a length of 4 centimeters, a width of 9 centimeters, and a height of 10 centimeters?

ID: ec5d4823 Answer

Rationale

The correct answer is 360. The volume of a right rectangular prism is calculated by multiplying its dimensions: length, width, and height. Multiplying the values given for these dimensions yields a volume of $(4)(9)(10) = 360$ cubic centimeters.

Question Difficulty: Medium

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ID: 151eda3c

A manufacturing company produces two sizes of cylindrical containers that each have a height of 50 centimeters. The radius of container A is 16 centimeters, and the radius of container B is 25% longer than the radius of container A. What is the volume, in cubic centimeters, of container B?

- A. $16,000\pi$
- B. $20,000\pi$
- C. $25,000\pi$
- D. $31,250\pi$

ID: 151eda3c Answer

Correct Answer: B

Rationale

Choice B is correct. If the radius of container A is 16 centimeters and the radius of container B is 25% longer than the radius of container A, then the radius of container B is $16 + (0.25)(16) = 20$ centimeters. The volume of a cylinder is $\pi r^2 h$, where r is the radius of the cylinder and h is its height. Substituting $r = 20$ and $h = 50$ into $\pi r^2 h$ yields that the volume of cylinder B is $\pi(20)^2(50) = 20,000\pi$ cubic centimeters.

Choice A is incorrect and may result from multiplying the radius of cylinder B by the radius of cylinder A rather than squaring the radius of cylinder B. Choice C is incorrect and may result from multiplying the radius of cylinder B by 25 rather than squaring it. Choice D is incorrect and may result from taking the radius of cylinder B to be 25 centimeters rather than 20 centimeters.

Question Difficulty: Medium

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ID: 38517165

A circle has a circumference of 31π centimeters. What is the diameter, in centimeters, of the circle?

ID: 38517165 Answer

Correct Answer: 31

Rationale

The correct answer is **31**. The circumference of a circle is equal to $2\pi r$ centimeters, where r represents the radius, in centimeters, of the circle, and the diameter of the circle is equal to $2r$ centimeters. It's given that a circle has a circumference of 31π centimeters. Therefore, $31\pi = 2\pi r$. Dividing both sides of this equation by π yields $31 = 2r$. Since the diameter of the circle is equal to $2r$ centimeters, it follows that the diameter, in centimeters, of the circle is **31**.

Question Difficulty: Medium

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ID: 08b7a3f5

A triangular prism has a height of **8 centimeters (cm)** and a volume of **216 cm³**. What is the area, **in cm²**, of the base of the prism? (The volume of a triangular prism is equal to Bh , where B is the area of the base and h is the height of the prism.)

ID: 08b7a3f5 Answer

Correct Answer: 27

Rationale

The correct answer is **27**. It's given that a triangular prism has a volume of **216 cubic centimeters (cm³)** and the volume of a triangular prism is equal to Bh , where B is the area of the base and h is the height of the prism. Therefore, $216 = Bh$. It's also given that the triangular prism has a height of **8 cm**. Therefore, $h = 8$. Substituting **8** for h in the equation $216 = Bh$ yields $216 = B(8)$. Dividing both sides of this equation by **8** yields $27 = B$. Therefore, the area, **in cm²**, of the base of the prism is **27**.

Question Difficulty: Medium

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ID: a2e76b60

A cylindrical can containing pieces of fruit is filled to the top with syrup before being sealed. The base of the can has an area of 75 cm^2 , and the height of the can is 10 cm. If 110 cm^3 of syrup is needed to fill the can to the top, which of the following is closest to the total volume of the pieces of fruit in the can?

- A. 7.5 cm^3
- B. 185 cm^3
- C. 640 cm^3
- D. 750 cm^3

ID: a2e76b60 Answer

Correct Answer: C

Rationale

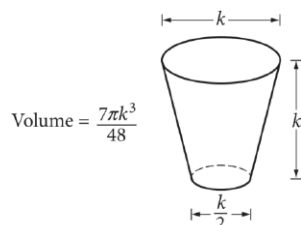
Choice C is correct. The total volume of the cylindrical can is found by multiplying the area of the base of the can, 75 cm^2 , by the height of the can, 10 cm, which yields 750 cm^3 . If the syrup needed to fill the can has a volume of 110 cm^3 , then the remaining volume for the pieces of fruit is $750 - 110 = 640 \text{ cm}^3$.

Choice A is incorrect because if the fruit had a volume of 7.5 cm^3 , there would be $750 - 7.5 = 742.5 \text{ cm}^3$ of syrup needed to fill the can to the top. Choice B is incorrect because if the fruit had a volume of 185 cm^3 , there would be $750 - 185 = 565 \text{ cm}^3$ of syrup needed to fill the can to the top. Choice D is incorrect because it is the total volume of the can, not just of the pieces of fruit.

Question Difficulty: Medium

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ID: 37dde49f



The glass pictured above can hold a maximum volume of 473 cubic centimeters, which is approximately 16 fluid ounces. What is the value of k , in centimeters?

- A. 2.52
- B. 7.67
- C. 7.79
- D. 10.11

ID: 37dde49f Answer

Correct Answer: D

Rationale

Choice D is correct. Using the volume formula $V = \frac{7\pi k^3}{48}$ and the given information that the volume of the glass is 473 cubic centimeters, the value of k can be found as follows:

$$473 = \frac{7\pi k^3}{48}$$

$$k^3 = \frac{473(48)}{7\pi}$$

$$k = \sqrt[3]{\frac{473(48)}{7\pi}} \approx 10.10690$$

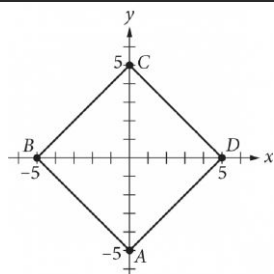
Therefore, the value of k is approximately 10.11 centimeters.

Choices A, B, and C are incorrect. Substituting the values of k from these choices in the formula results in volumes of approximately 7 cubic centimeters, 207 cubic centimeters, and 217 cubic centimeters, respectively, all of which contradict the given information that the volume of the glass is 473 cubic centimeters.

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ID: cf53cb56



In the xy -plane shown, square $ABCD$ has its diagonals on the x - and y -axes. What is the area, in square units, of the square?

- A. 20
- B. 25
- C. 50
- D. 100

ID: cf53cb56 Answer

Correct Answer: C

Rationale

Choice C is correct. The two diagonals of square $ABCD$ divide the square into 4 congruent right triangles, where each triangle has a vertex at the origin of the graph shown. The formula for the area of a triangle is $A = \frac{1}{2}bh$, where b is the base length of the triangle and h is the height of the triangle. Each of the 4 congruent right triangles has a height of 5 units and a base length of 5 units. Therefore, the area of each triangle is $A = \frac{1}{2}(5)(5)$, or 12.5 square units. Since the 4 right triangles are congruent, the area of each is $\frac{1}{4}$ of the area of square $ABCD$. It follows that the area of the square $ABCD$ is equal to 4×12.5 , or 50 square units.

Choices A and D are incorrect and may result from using 5 or 25, respectively, as the area of one of the 4 congruent right triangles formed by diagonals of square $ABCD$. However, the area of these triangles is 12.5. Choice B is incorrect and may result from using 5 as the length of one side of square $ABCD$. However, the length of a side of square $ABCD$ is $5\sqrt{2}$.

Question Difficulty: Medium