Question Bank

Math

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Area and Volume (key)

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Question ID 5252e606

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Area and volume	■□□

ID: 5252e606

The side length of a square is 55 centimeters (cm). What is the area, in cm^2, of the square?

A. 110

B. 220

C. $3{,}025$

D. $12{,}100$

ID: 5252e606 Answer

Correct Answer: C

Rationale

Choice C is correct. The area A, in square centimeters (cm^2), of a square with side length s, in cm, is given by the formula $A = s^2$. It's given that the square has a side length of 55 cm. Substituting 55 for s in the formula $A = s^2$ yields $A = 55^2$, or $A = 3{,}025$. Therefore, the area, in cm^2, of the square is $3{,}025$.

Choice A is incorrect and may result from conceptual or calculation errors.

Choice B is incorrect. This is the perimeter, in cm, of the square, not its area, in cm^2.

Choice D is incorrect and may result from conceptual or calculation errors.

Question Difficulty: Easy

Question ID 59cb654c

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Area and volume	■□□

ID: 59cb654c

The area of a square is 64 square inches. What is the side length, in inches, of this square?

A. 8

B. 16

C. 64

D. 128

ID: 59cb654c Answer

Correct Answer: A

Rationale

Choice A is correct. It's given that the area of a square is 64 square inches. The area A, in square inches, of a square is given by the formula $A = s^2$, where s is the side length, in inches, of the square. Substituting 64 for A in this formula yields $64 = s^2$. Taking the positive square root of both sides of this equation yields $8 = s$. Thus, the side length, in inches, of this square is 8.

Choice B is incorrect and may result from conceptual or calculation errors.

Choice C is incorrect. This is the area, in square inches, of the square, not the side length, in inches, of the square.

Choice D is incorrect and may result from conceptual or calculation errors.

Question Difficulty: Easy

Question ID 0837c3b9

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Area and volume	■□□

ID: 0837c3b9

Triangle *ABC* and triangle *DEF* are similar triangles, where $\overline{AB}$ and $\overline{DE}$ are corresponding sides. If $DE = 2AB$ and the perimeter of triangle *ABC* is 20, what is the perimeter of triangle *DEF* ?

A. 10

B. 40

C. 80

D. 120

ID: 0837c3b9 Answer

Correct Answer: B

Rationale

Choice B is correct. Since triangles ABC and DEF are similar and $DE = 2AB$, the length of each side of triangle DEF is two times the length of its corresponding side in triangle ABC. Therefore, the perimeter of triangle DEF is two times the perimeter of triangle ABC. Since the perimeter of triangle ABC is 20, the perimeter of triangle DEF is 40.

Choice A is incorrect. This is half, not two times, the perimeter of triangle ABC. Choice C is incorrect. This is two times the perimeter of triangle DEF rather than two times the perimeter of triangle ABC. Choice D is incorrect. This is six times, not two times, the perimeter of triangle ABC.

Question Difficulty: Easy

Question ID c88183f7

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Area and volume	■□□

ID: c88183f7

A rectangle has a length of 13 and a width of 6. What is the perimeter of the rectangle?

A. 12

B. 26

C. 38

D. 52

ID: c88183f7 Answer

Correct Answer: C

Rationale

Choice C is correct. The perimeter of a quadrilateral is the sum of the lengths of its four sides. It's given that the rectangle has a length of 13 and a width of 6. It follows that the rectangle has two sides with length 13 and two sides with length 6. Therefore, the perimeter of the rectangle is $13 + 13 + 6 + 6$, or 38.

Choice A is incorrect. This is the sum of the lengths of the two sides with length 6, not the sum of the lengths of all four sides of the rectangle.

Choice B is incorrect. This is the sum of the lengths of the two sides with length 13, not the sum of the lengths of all four sides of the rectangle.

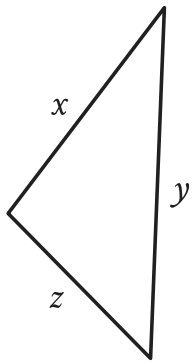
Choice D is incorrect. This is the perimeter of a rectangle that has four sides with length 13, not two sides with length 13 and two sides with length 6.

Question Difficulty: Easy

Question ID 29e9b28c

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Area and volume	■□□

ID: 29e9b28c



Note: Figure not drawn to scale.

The triangle shown has a perimeter of 22 units. If $x = 9$ units and $y = 7$ units, what is the value of z, in units?

A. 6

B. 7

C. 9

D. 16

ID: 29e9b28c Answer

Correct Answer: A

Rationale

Choice A is correct. The perimeter of a triangle is the sum of the lengths of its three sides. The triangle shown has side lengths x, y, and z. It's given that the triangle has a perimeter of 22 units. Therefore, $x + y + z = 22$. If $x = 9$ units and $y = 7$ units, the value of z, in units, can be found by substituting 9 for x and 7 for y in the equation $x + y + z = 22$, which yields $9 + 7 + z = 22$, or $16 + z = 22$. Subtracting 16 from both sides of this equation yields $z = 6$. Therefore, if $x = 9$ units and $y = 7$ units, the value of z, in units, is 6.

Choice B is incorrect. This is the value of y, in units, not the value of z, in units.

Choice C is incorrect. This is the value of x, in units, not the value of z, in units.

Choice D is incorrect. This is the value of $x + y$, in units, not the value of z, in units.

Question Difficulty: Easy

Question ID 3453aafc

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Area and volume	■□□

ID: 3453aafc

What is the area, in square centimeters, of a rectangle with a length of 36 centimeters and a width of 34 centimeters?

A. 70

B. 140

C. $1{,}156$

D. $1{,}224$

ID: 3453aafc Answer

Correct Answer: D

Rationale

Choice D is correct. The area A, in square centimeters, of a rectangle can be found using the formula $A = \ell w$, where ℓ is the length, in centimeters, of the rectangle and w is its width, in centimeters. It's given that the rectangle has a length of 36 centimeters and a width of 34 centimeters. Substituting 36 for ℓ and 34 for w in the formula $A = \ell w$ yields $A = 36(34)$, or $A = 1{,}224$. Therefore, the area, in square centimeters, of this rectangle is $1{,}224$.

Choice A is incorrect and may result from conceptual or calculation errors.

Choice B is incorrect. This is the perimeter, in centimeters, not the area, in square centimeters, of the rectangle.

Choice C is incorrect and may result from conceptual or calculation errors.

Question Difficulty: Easy

Question ID f60bb551

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Area and volume	■□□

ID: f60bb551

The area of a rectangle is 630 square inches. The length of the rectangle is 70 inches. What is the width, in inches, of this rectangle?

A. 9

B. 70

C. 315

D. 560

ID: f60bb551 Answer

Correct Answer: A

Rationale

Choice A is correct. The area A, in square inches, of a rectangle is the product of its length ℓ, in inches, and its width w, in inches; thus, $A = \ell w$. It's given that the area of a rectangle is 630 square inches and the length of the rectangle is 70 inches. Substituting 630 for A and 70 for ℓ in the equation $A = \ell w$ yields $630 = 70w$. Dividing both sides of this equation by 70 yields $9 = w$. Therefore, the width, in inches, of this rectangle is 9.

Choice B is incorrect. This is the length, not the width, in inches, of the rectangle.

Choice C is incorrect. This is half the area, in square inches, not the width, in inches, of the rectangle.

Choice D is incorrect. This is the difference between the area, in square inches, and the length, in inches, of the rectangle, not the width, in inches, of the rectangle.

Question Difficulty: Easy

Question ID 4420e500

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Area and volume	■□□

ID: 4420e500

What is the area of a rectangle with a length of 4 centimeters (cm) and a width of 2 cm?

A. $6\ \text{cm}^2$

B. $8\ \text{cm}^2$

C. $12\ \text{cm}^2$

D. $36\ \text{cm}^2$

ID: 4420e500 Answer

Correct Answer: B

Rationale

Choice B is correct. The area of a rectangle with length ℓ and width w can be found using the formula $A = \ell w$. It's given that the rectangle has a length of 4 cm and a width of 2 cm. Therefore, the area of this rectangle is $(4\ \text{cm})(2\ \text{cm})$, or $8\ \text{cm}^2$.

Choice A is incorrect. This is the sum, in cm, of the length and width of the rectangle, not the area, in cm^2.

Choice C is incorrect. This is the perimeter, in cm, of the rectangle, not the area, in cm^2.

Choice D is incorrect. This is the sum of the length and width of the rectangle squared, not the area.

Question Difficulty: Easy

Question ID 165c30c4

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Area and volume	■□□

ID: 165c30c4

A rectangle has a length of 64 inches and a width of 32 inches. What is the area, in square inches, of the rectangle?

ID: 165c30c4 Answer

Correct Answer: 2048

Rationale

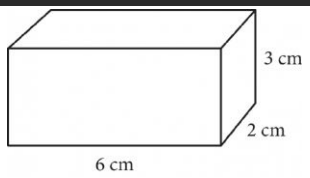
The correct answer is $2{,}048$. The area A, in square inches, of a rectangle is equal to the product of its length ℓ, in inches, and its width w, in inches, or $A = \ell w$. It's given that the rectangle has a length of 64 inches and a width of 32 inches. Substituting 64 for ℓ and 32 for w in the equation $A = \ell w$ yields $A = (64)(32)$, or $A = 2{,}048$. Therefore, the area, in square inches, of the rectangle is $2{,}048$.

Question Difficulty: Easy

Question ID d683a9cc

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Area and volume	■□□

ID: d683a9cc



The figure shows the lengths, in centimeters (cm), of the edges of a right rectangular prism. The volume V of a right rectangular prism is ℓwh, where ℓ is the length of the prism, w is the width of the prism, and h is the height of the prism. What is the volume, in cubic centimeters, of the prism?

A. 36

B. 24

C. 12

D. 11

ID: d683a9cc Answer

Correct Answer: A

Rationale

Choice A is correct. It's given that the volume of a right rectangular prism is ℓwh. The prism shown has a length of 6 cm, a width of 2 cm, and a height of 3 cm. Thus, $\ell wh = (6)(2)(3)$, or 36 cubic centimeters.

Choice B is incorrect. This is the volume of a rectangular prism with edge lengths of 6, 2, and 2. Choice C is incorrect and may result from only finding the product of the length and width of the base of the prism. Choice D is incorrect and may result from finding the sum, not the product, of the edge lengths of the prism.

Question Difficulty: Easy

Question ID f67e4efc

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Area and volume	■■□

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

Question ID 5afbdc8e

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Area and volume	■■□

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

Question ID ec5d4823

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Area and volume	■■□

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

Question ID 151eda3c

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Area and volume	■■□

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

Question ID 38517165

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Area and volume	■■□

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

Question ID 08b7a3f5

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Area and volume	■■□

ID: 08b7a3f5

A triangular prism has a height of 8 $\textbf{centimeters}$ $(\textbf{cm})$ and a volume of 216 $\textbf{cm}^3$. What is the area, $\textbf{in cm}^2$, 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 $\textbf{cubic centimeters}$ $(\textbf{cm}^3)$ 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 $\textbf{cm}$. 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, $\textbf{in cm}^2$, of the base of the prism is 27.

Question Difficulty: Medium

Question ID a2e76b60

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Area and volume	■■□

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 $750 - 110 = 640\ cm^3$.

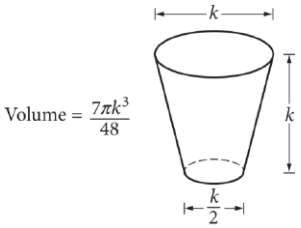
Choice A is incorrect because if the fruit had a volume of $7.5\ cm^3$, there would be $750 - 7.5 = 742.5\ cm^3$ of syrup needed to fill the can to the top. Choice B is incorrect because if the fruit had a volume of $185\ cm^3$, there would be $750 - 185 = 565\ cm^3$ of syrup needed to fill the can to 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

Question ID 37dde49f

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Area and volume	■■□

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:

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

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

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

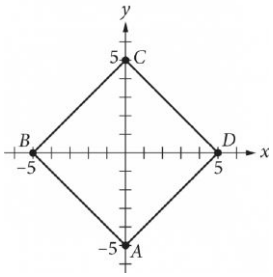
Therefore, the value of k is approximately 10.11 centimeters.

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.

Question ID cf53cb56

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Area and volume	■■□

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.

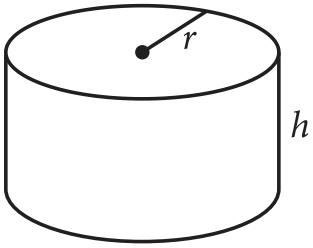
Choices A and D are incorrect and may result from using 5 or 25, respectively, as the area of one of the 4 congruent right triangles formed by diagonals of square ABCD. However, the area of these triangles is 12.5. Choice B is incorrect and may result from using 5 as the length of one side of square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

Question Difficulty: Medium

Question ID a07ed090

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Area and volume	■■■

ID: a07ed090



The figure shown is a right circular cylinder with a radius of r and height of h. A second right circular cylinder (not shown) has a volume that is 392 times as large as the volume of the cylinder shown. Which of the following could represent the radius R, in terms of r, and the height H, in terms of h, of the second cylinder?

A. $R = 8r$ and $H = 7h$

B. $R = 8r$ and $H = 49h$

C. $R = 7r$ and $H = 8h$

D. $R = 49r$ and $H = 8h$

ID: a07ed090 Answer

Correct Answer: C

Rationale

Choice C is correct. The volume of a right circular cylinder is equal to $\pi a^2 b$, where a is the radius of a base of the cylinder and b is the height of the cylinder. It's given that the cylinder shown has a radius of r and a height of h. It follows that the volume of the cylinder shown is equal to $\pi r^2 h$. It's given that the second right circular cylinder has a radius of R and a height of H. It follows that the volume of the second cylinder is equal to $\pi R^2 H$. Choice C gives $R = 7r$ and $H = 8h$. Substituting $7r$ for R and $8h$ for H in the expression that represents the volume of the second cylinder yields $\pi(7r)^2(8h)$, or $\pi(49r^2)(8h)$, which is equivalent to $\pi(392r^2h)$, or $392(\pi r^2 h)$. This expression is equal to 392 times the volume of the cylinder shown, $\pi r^2 h$. Therefore, $R = 7r$ and $H = 8h$ could represent the radius R, in terms of r, and the height H, in terms of h, of the second cylinder.

Choice A is incorrect. Substituting $8r$ for R and $7h$ for H in the expression that represents the volume of the second cylinder yields $\pi(8r)^2(7h)$, or $\pi(64r^2)(7h)$, which is equivalent to $\pi(448r^2h)$, or $448(\pi r^2 h)$. This expression is equal to 448, not 392, times the volume of the cylinder shown.

Choice B is incorrect. Substituting $8r$ for R and $49h$ for H in the expression that represents the volume of the second cylinder yields $\pi(8r)^2(49h)$, or $\pi(64r^2)(49h)$, which is equivalent to $\pi(3{,}136r^2h)$, or $3{,}136(\pi r^2 h)$. This expression is equal to $3{,}136$, not 392, times the volume of the cylinder shown.

Choice D is incorrect. Substituting $49r$ for R and $8h$ for H in the expression that represents the volume of the second cylinder yields $\pi(49r)^2(8h)$, or $\pi(2{,}401r^2)(8h)$, which is equivalent to $\pi(19{,}208r^2h)$, or $19{,}208(\pi r^2h)$. This expression is equal to $19{,}208$, not 392, times the volume of the cylinder shown.

Question Difficulty: Hard

Question ID 899c6042

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Area and volume	■■■

ID: 899c6042

A right circular cone has a height of 22 centimeters (cm) and a base with a diameter of 6 cm. The volume of this cone is $n\pi$ cm^3. What is the value of n?

ID: 899c6042 Answer

Correct Answer: 66

Rationale

The correct answer is 66. It's given that the right circular cone has a height of 22 centimeters (cm) and a base with a diameter of 6 cm. Since the diameter of the base of the cone is 6 cm, the radius of the base is 3 cm. The volume V, in cm^3, of a right circular cone can be found using the formula $V = \frac{1}{3}\pi r^2 h$, where h is the height, in cm, and r is the radius, in cm, of the base of the cone. Substituting 22 for h and 3 for r in this formula yields $V = \frac{1}{3}\pi(3)^2(22)$, or $V = 66\pi$. Therefore, the volume of the cone is 66π cm^3. It's given that the volume of the cone is $n\pi$ cm^3. Therefore, the value of n is 66.

Question Difficulty: Hard

Question ID b0dc920d

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Area and volume	■■■

ID: b0dc920d

A manufacturer determined that right cylindrical containers with a height that is 4 inches longer than the radius offer the optimal number of containers to be displayed on a shelf. Which of the following expresses the volume, *V*, in cubic inches, of such containers, where *r* is the radius, in inches?

A. $V = 4\pi r^3$

B. $V = \pi(2r)^3$

C. $V = \pi r^2 + 4\pi r$

D. $V = \pi r^3 + 4\pi r^2$

ID: b0dc920d Answer

Correct Answer: D

Rationale

Choice D is correct. The volume, V, of a right cylinder is given by the formula $V = \pi r^2 h$, where r represents the radius of the base of the cylinder and h represents the height. Since the height is 4 inches longer than the radius, the expression $r + 4$ represents the height of each cylindrical container. It follows that the volume of each container is represented by the equation $V = \pi r^2(r + 4)$. Distributing the expression πr^2 into each term in the parentheses yields $V = \pi r^3 + 4\pi r^2$.

Choice A is incorrect and may result from representing the height as $4r$ instead of $r + 4$. Choice B is incorrect and may result from representing the height as $2r$ instead of $r + 4$. Choice C is incorrect and may result from representing the volume of a right cylinder as $V = \pi rh$ instead of $V = \pi r^2 h$.

Question Difficulty: Hard

Question ID 5b2b8866

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Area and volume	■■■

ID: 5b2b8866

A rectangular poster has an area of 360 square inches. A copy of the poster is made in which the length and width of the original poster are each increased by 20%. What is the area of the copy, in square inches?

ID: 5b2b8866 Answer

Correct Answer: 2592/5, 518.4

Rationale

The correct answer is 518.4. It's given that the area of the original poster is 360 square inches. Let ℓ represent the length, in inches, of the original poster, and let w represent the width, in inches, of the original poster. Since the area of a rectangle is equal to its length times its width, it follows that $360 = \ell w$. It's also given that a copy of the poster is made in which the length and width of the original poster are each increased by 20%. It follows that the length of the copy is the length of the original poster plus 20% of the length of the original poster, which is equivalent to $\ell + \frac{20}{100}\ell$ inches. This length can be rewritten as $\ell + 0.2\ell$ inches, or 1.2ℓ inches. Similarly, the width of the copy is the width of the original poster plus 20% of the width of the original poster, which is equivalent to $w + \frac{20}{100}w$ inches. This width can be rewritten as $w + 0.2w$ inches, or $1.2w$ inches. Since the area of a rectangle is equal to its length times its width, it follows that the area, in square inches, of the copy is equal to $(1.2\ell)(1.2w)$, which can be rewritten as $(1.2)(1.2)(\ell w)$. Since $360 = \ell w$, the area, in square inches, of the copy can be found by substituting 360 for ℓw in the expression $(1.2)(1.2)(\ell w)$, which yields $(1.2)(1.2)(360)$, or 518.4. Therefore, the area of the copy, in square inches, is 518.4.

Question Difficulty: Hard

Question ID 9f934297

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Area and volume	■■■

ID: 9f934297

A right rectangular prism has a length of 28 centimeters (cm), a width of 15 cm, and a height of 16 cm. What is the surface area, in cm^2, of the right rectangular prism?

ID: 9f934297 Answer

Correct Answer: 2216

Rationale

The correct answer is $2{,}216$. The surface area of a prism is the sum of the areas of all its faces. A right rectangular prism consists of six rectangular faces, where opposite faces are congruent. It's given that this prism has a length of 28 cm, a width of 15 cm, and a height of 16 cm. Thus, for this prism, there are two faces with area $(28)(15)$ cm^2, two faces with area $(28)(16)$ cm^2, and two faces with area $(15)(16)$ cm^2. Therefore, the surface area, in cm^2, of the right rectangular prism is $2(28)(15) + 2(28)(16) + 2(15)(16)$, or $2{,}216$.

Question Difficulty: Hard

Question ID dc71597b

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Area and volume	■■■

ID: dc71597b

A right circular cone has a volume of $\frac{1}{3}\pi$ cubic feet and a height of 9 feet.

What is the radius, in feet, of the base of the cone?

A. $\frac{1}{3}$

B. $\frac{1}{\sqrt{3}}$

C. $\sqrt{3}$

D. 3

ID: dc71597b Answer

Correct Answer: A

Rationale

Choice A is correct. The equation for the volume of a right circular cone is $V=\frac{1}{3}\pi r^2 h$. It's given that the volume of the right circular cone is $\frac{1}{3}\pi$ cubic feet and the height is 9 feet. Substituting these values for V and h, respectively, gives $\frac{1}{3}\pi=\frac{1}{3}\pi r^2(9)$. Dividing both sides of the equation by $\frac{1}{3}\pi$ gives $1=r^2(9)$. Dividing both sides of the equation by 9 gives $\frac{1}{9}=r^2$. Taking the square root of both sides results in two possible values for the radius, $\sqrt{\left(\frac{1}{9}\right)}$ or $-\sqrt{\left(\frac{1}{9}\right)}$. Since the radius can't have a negative value, that leaves $\sqrt{\left(\frac{1}{9}\right)}$ as the only possibility. Applying the quotient property of square roots, $\sqrt{\frac{a}{b}}=\frac{\sqrt{a}}{\sqrt{b}}$, results in $r=\frac{\sqrt{1}}{\sqrt{9}}$, or $r=\frac{1}{3}$.

Choices B and C are incorrect and may result from incorrectly evaluating $\sqrt{\left(\frac{1}{9}\right)}$. Choice D is incorrect and may result from solving $r^2=9$ instead of $r^2=\frac{1}{9}$.

Question Difficulty: Hard

Question ID 93de3f84

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Area and volume	■■■

ID: 93de3f84

The volume of right circular cylinder A is 22 cubic centimeters. What is the volume, in cubic centimeters, of a right circular cylinder with twice the radius and half the height of cylinder A?

A. 11

B. 22

C. 44

D. 66

ID: 93de3f84 Answer

Correct Answer: C

Rationale

Choice C is correct. The volume of right circular cylinder A is given by the expression $\pi r^2 h$, where r is the radius of its circular base and h is its height. The volume of a cylinder with twice the radius and half the height of cylinder A is given by $\pi(2r)^2\left(\frac{1}{2}\right)h$, which is equivalent to $4\pi r^2\left(\frac{1}{2}\right)h = 2\pi r^2 h$. Therefore, the volume is twice the volume of cylinder A, or $2 \times 22 = 44$.

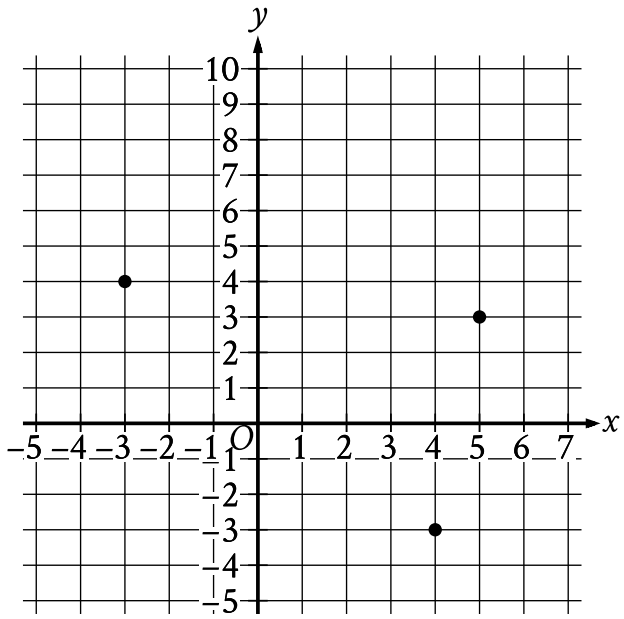
Choice A is incorrect and likely results from not multiplying the radius of cylinder A by 2. Choice B is incorrect and likely results from not squaring the 2 in 2r when applying the volume formula. Choice D is incorrect and likely results from a conceptual error.

Question Difficulty: Hard

Question ID eb70d2d0

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Area and volume	■■■

ID: eb70d2d0



What is the area, in square units, of the triangle formed by connecting the three points shown?

ID: eb70d2d0 Answer

Correct Answer: 24.5, 49/2

Rationale

The correct answer is 24.5. It's given that a triangle is formed by connecting the three points shown, which are $(-3, 4)$, $(5, 3)$, and $(4, -3)$. Let this triangle be triangle A. The area of triangle A can be found by calculating the area of the rectangle that circumscribes it and subtracting the areas of the three triangles that are inside the rectangle but outside triangle A. The rectangle formed by the points $(-3, 4)$, $(5, 4)$, $(5, -3)$, and $(-3, -3)$ circumscribes triangle A. The width, in units, of this rectangle can be found by calculating the distance between the points $(5, 4)$ and $(5, -3)$. This distance is $4 - (-3)$, or 7. The length, in units, of this rectangle can be found by calculating the distance between the points $(5, 4)$ and $(-3, 4)$. This distance is $5 - (-3)$, or 8. It follows that the area, in square units, of the rectangle is $(7)(8)$, or 56. One of the triangles that lies inside the rectangle but outside triangle A is formed by the points $(-3, 4)$, $(5, 4)$, and $(5, 3)$. The length, in units, of a base of this triangle can be found by calculating the distance between the points $(5, 4)$ and $(5, 3)$. This distance is $4 - 3$, or 1. The corresponding height, in units, of this triangle can be found by calculating the distance between the points $(5, 4)$ and $(-3, 4)$. This distance is $5 - (-3)$, or 8. It follows that the area, in square units, of this triangle is $\frac{1}{2}(8)(1)$, or 4. A second triangle that lies inside the rectangle but outside triangle A is formed by the points $(4, -3)$, $(5, 3)$, and $(5, -3)$. The length, in units, of a base of this triangle can be found by calculating the distance between the points $(5, 3)$ and $(5, -3)$. This distance is

$3 - (-3)$, or 6. The corresponding height, in units, of this triangle can be found by calculating the distance between the points $(5, -3)$ and $(4, -3)$. This distance is $5 - 4$, or 1. It follows that the area, in square units, of this triangle is $\frac{1}{2}(1)(6)$, or 3. The third triangle that lies inside the rectangle but outside triangle A is formed by the points $(-3, 4)$, $(-3, -3)$, and $(4, -3)$. The length, in units, of a base of this triangle can be found by calculating the distance between the points $(4, -3)$ and $(-3, -3)$. This distance is $4 - (-3)$, or 7. The corresponding height, in units, of this triangle can be found by calculating the distance between the points $(-3, 4)$ and $(-3, -3)$. This distance is $4 - (-3)$, or 7. It follows that the area, in square units, of this triangle is $\frac{1}{2}(7)(7)$, or 24.5. Thus, the area, in square units, of the triangle formed by connecting the three points shown is $56 - 4 - 3 - 24.5$, or 24.5. Note that 24.5 and 49/2 are examples of ways to enter a correct answer.

Question Difficulty: Hard

Question ID f7e626b2

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Area and volume	■■■

ID: f7e626b2

The dimensions of a right rectangular prism are 4 inches by 5 inches by 6 inches. What is the surface area, in square inches, of the prism?

A. 30

B. 74

C. 120

D. 148

ID: f7e626b2 Answer

Rationale

Choice D is correct. The surface area is found by summing the area of each face. A right rectangular prism consists of three pairs of congruent rectangles, so the surface area is found by multiplying the areas of three adjacent rectangles by 2 and adding these products. For this prism, the surface area is equal to $2(4\cdot5)+2(5\cdot6)+2(4\cdot6)$, or $2(20)+2(30)+2(24)$, which is equal to 148.

Choice A is incorrect. This is the area of one of the faces of the prism. Choice B is incorrect and may result from adding the areas of three adjacent rectangles without multiplying by 2. Choice C is incorrect. This is the volume, in cubic inches, of the prism.

Question Difficulty: Hard

Question ID 459dd6c5

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Area and volume	■■■

ID: 459dd6c5

Triangles ABC and DEF are similar. Each side length of triangle ABC is 4 times the corresponding side length of triangle DEF. The area of triangle ABC is 270 square inches. What is the area, in square inches, of triangle DEF?

ID: 459dd6c5 Answer

Correct Answer: 135/8, 16.87, 16.88

Rationale

The correct answer is $\frac{135}{8}$. It's given that triangles ABC and DEF are similar and each side length of triangle ABC is 4 times the corresponding side length of triangle DEF. For two similar triangles, if each side length of the first triangle is k times the corresponding side length of the second triangle, then the area of the first triangle is k^2 times the area of the second triangle. Therefore, the area of triangle ABC is 4^2, or 16, times the area of triangle DEF. It's given that the area of triangle ABC is 270 square inches. Let a represent the area, in square inches, of triangle DEF. It follows that 270 is 16 times a, or $270 = 16a$. Dividing both sides of this equation by 16 yields $\frac{270}{16} = a$, which is equivalent to $\frac{135}{8} = a$. Thus, the area, in square inches, of triangle DEF is $\frac{135}{8}$. Note that 135/8, 16.87, and 16.88 are examples of ways to enter a correct answer.

Question Difficulty: Hard

Question ID 310c87fe

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Area and volume	■■■

ID: 310c87fe

A cube has a surface area of 54 square meters. What is the volume, in cubic meters, of the cube?

A. 18

B. 27

C. 36

D. 81

ID: 310c87fe Answer

Correct Answer: B

Rationale

Choice B is correct. The surface area of a cube with side length s is equal to $6s^2$. Since the surface area is given as 54 square meters, the equation $54 = 6s^2$ can be used to solve for s. Dividing both sides of the equation by 6 yields $9 = s^2$. Taking the square root of both sides of this equation yields $3 = s$ and $-3 = s$. Since the side length of a cube must be a positive value, $s = -3$ can be discarded as a possible solution, leaving $s = 3$. The volume of a cube with side length s is equal to s^3. Therefore, the volume of this cube, in cubic meters, is 3^3, or 27.

Choices A, C, and D are incorrect and may result from calculation errors.

Question Difficulty: Hard