Question ID 9eeacc73

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

ID: 9eeacc73

A right rectangular prism has a length of $28 \text{ centimeters (cm)}$, 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: 9eeacc73 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 $(28)(15) \text{ cm}^2$, two faces with area $(28)(16) \text{ cm}^2$, and two faces with area $(15)(16) \text{ cm}^2$. 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 559068d5

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

ID: 559068d5

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: 559068d5 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 012489f9

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

ID: 012489f9

Rectangles $ABCD$ and $EFGH$ are similar. The length of each side of $EFGH$ is 6 times the length of the corresponding side of $ABCD$. The area of $ABCD$ is 54 square units. What is the area, in square units, of $EFGH$?

A. 9

B. 36

C. 324

D. $1{,}944$

ID: 012489f9 Answer

Correct Answer: D

Rationale

Choice D is correct. The area of a rectangle is given by bh, where b is the length of the base of the rectangle and h is its height. Let x represent the length, in units, of the base of rectangle $ABCD$, and let y represent its height, in units. Substituting x for b and y for h in the formula bh yields xy. Therefore, the area, in square units, of $ABCD$ can be represented by the expression xy. It's given that the length of each side of $EFGH$ is 6 times the length of the corresponding side of $ABCD$. Therefore, the length, in units, of the base of $EFGH$ can be represented by the expression $6x$, and its height, in units, can be represented by the expression $6y$. Substituting $6x$ for b and $6y$ for h in the formula bh yields $(6x)(6y)$, which is equivalent to $36xy$. Therefore, the area, in square units, of $EFGH$ can be represented by the expression $36xy$. It's given that the area of $ABCD$ is 54 square units. Since xy represents the area, in square units, of $ABCD$, substituting 54 for xy in the expression $36xy$ yields $36(54)$, or $1{,}944$. Therefore, the area, in square units, of $EFGH$ is $1{,}944$.

Choice A is incorrect. This is the area of a rectangle where the length of each side of the rectangle is $\sqrt{\frac{1}{6}}$, not 6, times the length of the corresponding side of $ABCD$.

Choice B is incorrect. This is the area of a rectangle where the length of each side of the rectangle is $\sqrt{\frac{2}{3}}$, not 6, times the length of the corresponding side of $ABCD$.

Choice C is incorrect. This is the area of a rectangle where the length of each side of the rectangle is $\sqrt{6}$, not 6, times the length of the corresponding side of $ABCD$.

Question Difficulty: Hard

Question ID c5a51dda

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

ID: c5a51dda

A cube has a volume of $474{,}552$ cubic units. What is the surface area, in square units, of the cube?

ID: c5a51dda Answer

Correct Answer: 36504

Rationale

The correct answer is $36{,}504$. The volume of a cube can be found using the formula $V = s^3$, where s represents the edge length of a cube. It's given that this cube has a volume of $474{,}552$ cubic units. Substituting $474{,}552$ for V in $V = s^3$ yields $474{,}552 = s^3$. Taking the cube root of both sides of this equation yields $78 = s$. Thus, the edge length of the cube is 78 units. Since each face of a cube is a square, it follows that each face has an edge length of 78 units. The area of a square can be found using the formula $A = s^2$. Substituting 78 for s in this formula yields $A = 78^2$, or $A = 6{,}084$. Therefore, the area of one face of this cube is $6{,}084$ square units. Since a cube has 6 faces, the surface area, in square units, of this cube is $6(6{,}084)$, or $36{,}504$.

Question Difficulty: Hard

Question ID 429c2a72

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

ID: 429c2a72

A right triangle has sides of length $2\sqrt{2}$, $6\sqrt{2}$, and $\sqrt{80}$ units. What is the area of the triangle, in square units?

A. $8\sqrt{2} + \sqrt{80}$

B. 12

C. $24\sqrt{80}$

D. 24

ID: 429c2a72 Answer

Correct Answer: B

Rationale

Choice B is correct. The area, A, of a triangle can be found using the formula $A = \frac{1}{2}bh$, where b is the length of the base of the triangle and h is the height of the triangle. It's given that the triangle is a right triangle. Therefore, its base and height can be represented by the two legs. It's also given that the triangle has sides of length $2\sqrt{2}$, $6\sqrt{2}$, and $\sqrt{80}$ units. Since $\sqrt{80}$ units is the greatest of these lengths, it's the length of the hypotenuse. Therefore, the two legs have lengths $2\sqrt{2}$ and $6\sqrt{2}$ units. Substituting these values for b and h in the formula $A = \frac{1}{2}bh$ gives $A = \frac{1}{2}\left(2\sqrt{2}\right)\left(6\sqrt{2}\right)$, which is equivalent to $A = 6\sqrt{4}$ square units, or $A = 12$ square units.

Choice A is incorrect. This expression represents the perimeter, rather than the area, of the triangle.

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

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

Question Difficulty: Hard

Question ID 76465540

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

ID: 76465540

The floor of a ballroom has an area of 600 square meters. An architect creates a scale model of the floor of the ballroom, where the length of each side of the model is $\frac{1}{10}$ times the length of the corresponding side of the actual floor of the ballroom. What is the area, in square meters, of the scale model?

A. 6

B. 10

C. 60

D. 150

ID: 76465540 Answer

Correct Answer: A

Rationale

Choice A is correct. It's given that the length of each side of a scale model is $\frac{1}{10}$ times the length of the corresponding side of the actual floor of a ballroom. Therefore, the area of the scale model is $\left(\frac{1}{10}\right)^2$, or $\frac{1}{100}$, times the area of the actual floor of the ballroom. It's given that the area of the floor of the ballroom is 600 square meters. Therefore, the area, in square meters, of the scale model is $\left(\frac{1}{100}\right)(600)$, or 6.

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

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

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

Question Difficulty: Hard

Question ID 31926070

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

ID: 31926070

A right circular cone has a volume of $71{,}148\pi$ cubic centimeters and the area of its base is $5{,}929\pi$ square centimeters. What is the slant height, in centimeters, of this cone?

A. 12

B. 36

C. 77

D. 85

ID: 31926070 Answer

Correct Answer: D

Rationale

Choice D is correct. The volume, V, of a right circular cone is given by the formula $V = \frac{1}{3}\pi r^2 h$, where πr^2 is the area of the circular base of the cone and h is the height. It's given that this right circular cone has a volume of $71{,}148\pi$ cubic centimeters and the area of its base is $5{,}929\pi$ square centimeters. Substituting $71{,}148\pi$ for V and $5{,}929\pi$ for πr^2 in the formula $V = \frac{1}{3}\pi r^2 h$ yields $71{,}148\pi = \left(\frac{1}{3}\right)(5{,}929\pi)(h)$. Dividing each side of this equation by $5{,}929\pi$ yields $12 = \frac{h}{3}$. Multiplying each side of this equation by 3 yields $36 = h$. Let s represent the slant height, in centimeters, of this cone. A right triangle is formed by the radius, r, height, h, and slant height, s, of this cone, where r and h are the legs of the triangle and s is the hypotenuse. Using the Pythagorean theorem, the equation $r^2 + h^2 = s^2$ represents this relationship. Because $5{,}929\pi$ is the area of the base and the area of the base is πr^2, it follows that $5{,}929\pi = \pi r^2$. Dividing both sides of this equation by π yields $5{,}929 = r^2$. Substituting $5{,}929$ for r^2 and 36 for h in the equation $r^2 + h^2 = s^2$ yields $5{,}929 + 36^2 = s^2$, which is equivalent to $5{,}929 + 1{,}296 = s^2$, or $7{,}225 = s^2$. Taking the positive square root of both sides of this equation yields $85 = s$. Therefore, the slant height of the cone is 85 centimeters.

Choice A is incorrect. This is one-third of the height, in centimeters, not the slant height, in centimeters, of this cone.

Choice B is incorrect. This is the height, in centimeters, not the slant height, in centimeters, of this cone.

Choice C is incorrect. This is the radius, in centimeters, of the base, not the slant height, in centimeters, of this cone.

Question Difficulty: Hard

Question ID 76f470b6

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

ID: 76f470b6

Circle A has a radius of $3n$ and circle B has a radius of $129n$, where n is a positive constant. The area of circle B is how many times the area of circle A?

A. 43

B. 86

C. 129

D. $1{,}849$

ID: 76f470b6 Answer

Correct Answer: D

Rationale

Choice D is correct. The area of a circle can be found by using the formula $A = \pi r^2$, where A is the area and r is the radius of the circle. It's given that the radius of circle *A* is $3n$. Substituting this value for r into the formula $A = \pi r^2$ gives $A = \pi(3n)^2$, or $9\pi n^2$. It's also given that the radius of circle *B* is $129n$. Substituting this value for r into the formula $A = \pi r^2$ gives $A = \pi(129n)^2$, or $16{,}641\pi n^2$. Dividing the area of circle *B* by the area of circle *A* gives $\frac{16{,}641\pi n^2}{9\pi n^2}$, which simplifies to $1{,}849$. Therefore, the area of circle *B* is $1{,}849$ times the area of circle *A*.

Choice A is incorrect. This is how many times greater the radius of circle *B* is than the radius of circle *A*.

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

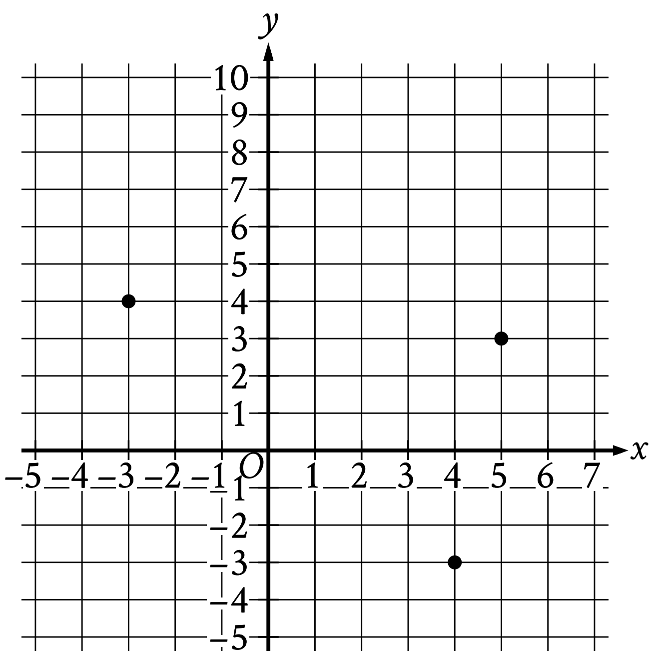
Choice C is incorrect. This is the coefficient on the term that describes the radius of circle *B*.

Question Difficulty: Hard

Question ID 530b2e84

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

ID: 530b2e84



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

ID: 530b2e84 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 02545fec

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

ID: 02545fec

A cube has an edge length of 68 inches. A solid sphere with a radius of 34 inches is inside the cube, such that the sphere touches the center of each face of the cube. To the nearest cubic inch, what is the volume of the space in the cube <u>not</u> taken up by the sphere?

A. $149{,}796$

B. $164{,}500$

C. $190{,}955$

D. $310{,}800$

ID: 02545fec Answer

Correct Answer: A

Rationale

Choice A is correct. The volume of a cube can be found by using the formula $V = s^3$, where V is the volume and s is the edge length of the cube. Therefore, the volume of the given cube is $V = 68^3$, or $314{,}432$ cubic inches. The volume of a sphere can be found by using the formula $V = \frac{4}{3}\pi r^3$, where V is the volume and r is the radius of the sphere. Therefore, the volume of the given sphere is $V = \frac{4}{3}\pi(34)^3$, or approximately $164{,}636$ cubic inches. The volume of the space in the cube not taken up by the sphere is the difference between the volume of the cube and volume of the sphere. Subtracting the approximate volume of the sphere from the volume of the cube gives $314{,}432 - 164{,}636 = 149{,}796$ cubic inches.

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

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

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

Question Difficulty: Hard

Question ID 21f787ad

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

ID: 21f787ad

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 $n\pi\text{ cm}^3$. What is the value of n?

ID: 21f787ad 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 $V=\frac{1}{3}\pi r^2h$, 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 $66\pi\text{ cm}^3$. It's given that the volume of the cone is $n\pi\text{ cm}^3$. Therefore, the value of n is 66.

Question Difficulty: Hard

Question ID 2994adbe

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

ID: 2994adbe

A right square prism has a height of 14 units. The volume of the prism is $2{,}016$ cubic units. What is the length, in units, of an edge of the base?

ID: 2994adbe Answer

Correct Answer: 12

Rationale

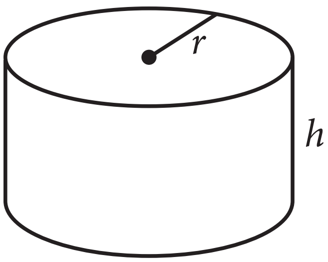
The correct answer is 12. The volume, V, of a right square prism can be calculated using the formula $V = s^2h$, where s represents the length of an edge of the base and h represents the height of the prism. It's given that the volume of the prism is $2{,}016$ cubic units and the height is 14 units. Substituting $2{,}016$ for V and 14 for h in the formula $V = s^2h$ yields $2{,}016 = \left(s^2\right)(14)$. Dividing both sides of this equation by 14 yields $144 = s^2$. Taking the square root of both sides of this equation yields two solutions: $-12 = s$ and $12 = s$. The length can't be negative, so $12 = s$. Therefore, the length, in units, of an edge of the base is 12.

Question Difficulty: Hard

Question ID c3d0a7fb

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

ID: c3d0a7fb



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: c3d0a7fb 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 $\pi\left(49r^2\right)(8h)$, which is equivalent to $\pi\left(392r^2h\right)$, or $392\left(\pi r^2 h\right)$. 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 $\pi\left(64r^2\right)(7h)$, which is equivalent to $\pi\left(448r^2h\right)$, or $448\left(\pi r^2 h\right)$. 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 $\pi\left(64r^2\right)(49h)$, which is equivalent to $\pi\left(3{,}136r^2h\right)$, or $3{,}136\left(\pi r^2 h\right)$. 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 675148a3

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

ID: 675148a3

Two identical rectangular prisms each have a height of 90 centimeters (cm). The base of each prism is a square, and the surface area of each prism is $K\text{ cm}^2$. If the prisms are glued together along a square base, the resulting prism has a surface area of $\frac{92}{47}K\text{ cm}^2$. What is the side length, in cm, of each square base?

A. 4

B. 8

C. 9

D. 16

ID: 675148a3 Answer

Correct Answer: B

Rationale

Choice B is correct. Let x represent the side length, in cm, of each square base. If the two prisms are glued together along a square base, the resulting prism has a surface area equal to twice the surface area of one of the prisms, minus the area of the two square bases that are being glued together, which yields $2K-2x^2\text{ cm}^2$. It's given that this resulting surface area is equal to $\frac{92}{47}K\text{ cm}^2$, so $2K-2x^2=\frac{92}{47}K$. Subtracting $\frac{92}{47}K$ from both sides of this equation yields $2K-\frac{92}{47}K-2x^2=0$. This equation can be rewritten by multiplying $2K$ on the left-hand side by $\frac{47}{47}$, which yields $\frac{94}{47}K-\frac{92}{47}K-2x^2=0$, or $\frac{2}{47}K-2x^2=0$. Adding $2x^2$ to both sides of this equation yields $\frac{2}{47}K=2x^2$. Multiplying both sides of this equation by $\frac{47}{2}$ yields $K=47x^2$. The surface area K, in cm^2, of each rectangular prism is equivalent to the sum of the areas of the two square bases and the areas of the four lateral faces. Since the height of each rectangular prism is 90 cm and the side length of each square base is $x\text{ cm}$, it follows that the area of each square base is $x^2\text{ cm}^2$ and the area of each lateral face is $90x\text{ cm}^2$. Therefore, the surface area of each rectangular prism can be represented by the expression $2x^2+4(90x)$, or $2x^2+360x$. Substituting this expression for K in the equation $K=47x^2$ yields $2x^2+360x=47x^2$. Subtracting $2x^2$ and $360x$ from both sides of this equation yields $0=45x^2-360x$. Factoring x from the right-hand side of this equation yields $0=x(45x-360)$. Applying the zero product property, it follows that $x=0$ and $45x-360=0$. Adding 360 to both sides of the equation $45x-360=0$ yields $45x=360$. Dividing both sides of this equation by 45 yields $x=8$. Since a side length of a rectangular prism can't be 0, the length of each square base is 8 cm.

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

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

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

Question Difficulty: Hard

Question ID deb47fce

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

ID: deb47fce

Square A has side lengths that are 166 times the side lengths of square B. The area of square A is k times the area of square B. What is the value of k?

ID: deb47fce Answer

Correct Answer: 27556

Rationale

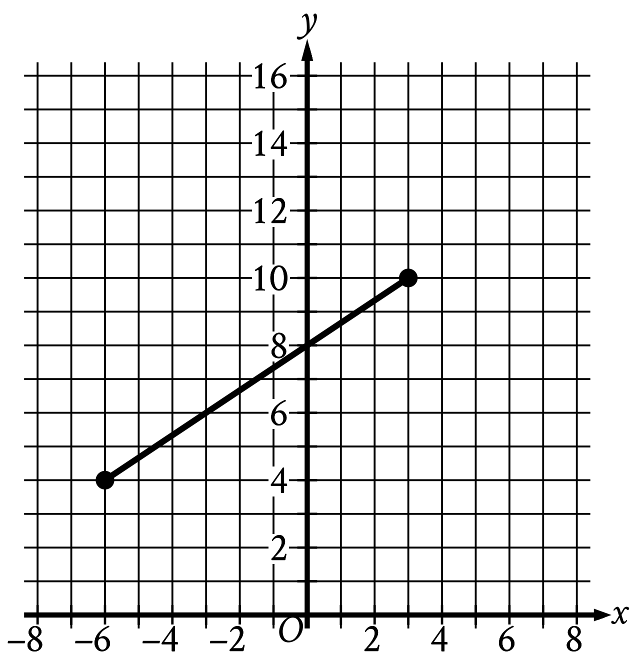
The correct answer is $27{,}556$. The area of a square is s^2, where s is the side length of the square. Let x represent the length of each side of square B. Substituting x for s in s^2 yields x^2. It follows that the area of square B is x^2. It's given that square A has side lengths that are 166 times the side lengths of square B. Since x represents the length of each side of square B, the length of each side of square A can be represented by the expression $166x$. It follows that the area of square A is $(166x)^2$, or $27{,}556x^2$. It's given that the area of square A is k times the area of square B. Since the area of square A is equal to $27{,}556x^2$, and the area of square B is equal to x^2, an equation representing the given statement is $27{,}556x^2 = kx^2$. Since x represents the length of each side of square B, the value of x must be positive. Therefore, the value of x^2 is also positive, so it does not equal 0. Dividing by x^2 on both sides of the equation $27{,}556x^2 = kx^2$ yields $27{,}556 = k$. Therefore, the value of k is $27{,}556$.

Question Difficulty: Hard

Question ID 220e72c1

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

ID: 220e72c1



The line segment shown in the *xy*-plane represents one of the legs of a right triangle. The area of this triangle is $36\sqrt{13}$ square units. What is the length, in units, of the other leg of this triangle?

A. 12

B. 24

C. $3\sqrt{13}$

D. $18\sqrt{13}$

ID: 220e72c1 Answer

Correct Answer: B

Rationale

Choice B is correct. The length of a segment in the *xy*-plane can be found using the distance formula, $\sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$, where (x_1, y_1) and (x_2, y_2) are the endpoints of the segment. The segment shown has endpoints at $(-6, 4)$ and $(3, 10)$. Substituting $(-6, 4)$ and $(3, 10)$ for (x_1, y_1) and (x_2, y_2), respectively, in the distance formula yields $\sqrt{(3-(-6))^2 + (10-4)^2}$, or $\sqrt{9^2 + 6^2}$, which is equivalent to $\sqrt{81 + 36}$, or $\sqrt{117}$. Let x represent the length, in units, of the other leg of this triangle. The area, A, of a right triangle can be calculated using the formula $A = \frac{1}{2}bh$, where b and h are the lengths of the legs of the triangle. It's given that the area of the triangle is $36\sqrt{13}$ square units. Substituting $36\sqrt{13}$ for A, $\sqrt{117}$ for b, and x for h in the formula $A = \frac{1}{2}bh$ yields $36\sqrt{13} = \frac{1}{2}\left(\sqrt{117}\right)(x)$. Multiplying both sides of this equation by 2 yields $72\sqrt{13} = x\sqrt{117}$. Dividing both sides of this equation by $\sqrt{117}$ yields $\frac{72\sqrt{13}}{\sqrt{117}} = x$. Multiplying the numerator and denominator on the left-hand side of this equation by $\sqrt{117}$ yields $\frac{72\sqrt{1{,}521}}{117} = x$, or $\frac{72(39)}{117} = x$, which is equivalent to $\frac{2{,}808}{117} = x$, or $24 = x$. Therefore, the length, in units, of the other leg of this triangle is 24.

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

Choice C is incorrect. $3\sqrt{13}$ is equivalent to $\sqrt{117}$, which is the length, in units, of the line segment shown in the *xy*-plane, not the length, in units, of the other leg of the triangle.

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

Question Difficulty: Hard

Question ID 8235af09

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

ID: 8235af09

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: 8235af09 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 9864d5cf

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

ID: 9864d5cf

Right rectangular prism X is similar to right rectangular prism Y. The surface area of right rectangular prism X is $58 \text{ square centimeters } (\text{cm}^2)$, and the surface area of right rectangular prism Y is $1{,}450 \text{ cm}^2$. The volume of right rectangular prism Y is $1{,}250 \text{ cubic centimeters } (\text{cm}^3)$. What is the sum of the volumes, in cm^3, of right rectangular prism X and right rectangular prism Y?

ID: 9864d5cf Answer

Correct Answer: 1260

Rationale

The correct answer is $1{,}260$. Since it's given that prisms X and Y are similar, all the linear measurements of prism Y are k times the respective linear measurements of prism X, where k is a positive constant. Therefore, the surface area of prism Y is k^2 times the surface area of prism X and the volume of prism Y is k^3 times the volume of prism X. It's given that the surface area of prism Y is $1{,}450 \text{ cm}^2$, and the surface area of prism X is 58 cm^2, which implies that $1{,}450 = 58k^2$. Dividing both sides of this equation by 58 yields $\frac{1{,}450}{58} = k^2$, or $k^2 = 25$. Since k is a positive constant, $k = 5$. It's given that the volume of prism Y is $1{,}250 \text{ cm}^3$. Therefore, the volume of prism X is equal to $\frac{1{,}250}{k^3} \text{ cm}^3$, which is equivalent to $\frac{1{,}250}{5^3} \text{ cm}^3$, or 10 cm^3. Thus, the sum of the volumes, in cm^3, of the two prisms is $1{,}250 + 10$, or $1{,}260$.

Question Difficulty: Hard