Question ID f7dbde16

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Lines, angles, and triangles	

ID: f7dbde16

In triangles LMN and RST, angles L and R each have measure 60°, $LN = 10$, and $RT = 30$. Which additional piece of information is sufficient to prove that triangle LMN is similar to triangle RST?

A. $MN = 7$ and $ST = 7$

B. $MN = 7$ and $ST = 21$

C. The measures of angles M and S are 70° and 60°, respectively.

D. The measures of angles M and T are 70° and 50°, respectively.

ID: f7dbde16 Answer

Correct Answer:
D

Rationale

Choice D is correct. Two triangles are similar if they have three pairs of congruent corresponding angles. It's given that angles L and R each measure 60°, and so these corresponding angles are congruent. If angle M is 70°, then angle N must be 50° so that the sum of the angles in triangle LMN is 180°. If angle T is 50°, then angle S must be 70° so that the sum of the angles in triangle RST is 180°. Therefore, if the measures of angles M and T are 70° and 50°, respectively, then corresponding angles M and S are both 70°, and corresponding angles N and T are both 50°. It follows that triangles LMN and RST have three pairs of congruent corresponding angles, and so the triangles are similar. Therefore, the additional piece of information that is sufficient to prove that triangle LMN is similar to triangle RST is that the measures of angles M and T are 70° and 50°, respectively.

Choice A is incorrect. If the measures of two sides in one triangle are proportional to the corresponding sides in another triangle and the included angles are congruent, then the triangles are similar. However, the two sides given are not proportional and the angle given is not included by the given sides.

Choice B is incorrect. If the measures of two sides in one triangle are proportional to the corresponding sides in another triangle and the included angles are congruent, then the triangles are similar. However, the angle given is not included between the proportional sides.

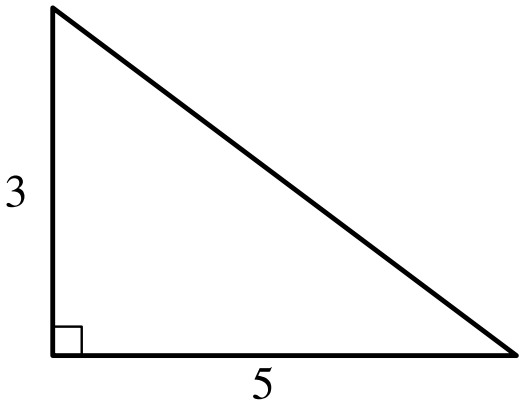
Choice C is incorrect and may result from conceptual or calculation errors.

Question Difficulty:
Hard

Question ID a4ed5285

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

ID: a4ed5285



Note: Figure not drawn to scale.

The figure shows the lengths, in inches, of two sides of a right triangle. What is the area of the triangle, in square inches?

ID: a4ed5285 Answer

Correct Answer:
7.5, 15/2

Rationale

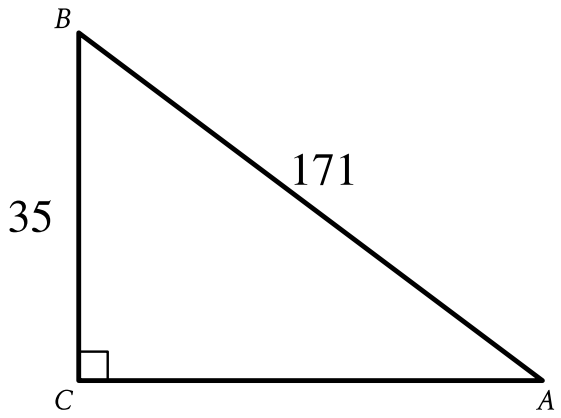
The correct answer is $\frac{15}{2}$. The area, A, of a triangle is given by the formula $A = \frac{1}{2}bh$, where b is the length of the base of the triangle and h is the height of the triangle. In the right triangle shown, the length of the base of the triangle is 5 inches, and the height is 3 inches. It follows that $b = 5$ and $h = 3$. Substituting 5 for b and 3 for h in the formula $A = \frac{1}{2}bh$ yields $A = \frac{1}{2}(5)(3)$, which is equivalent to $A = \frac{1}{2}(15)$, or $A = \frac{15}{2}$. Therefore, the area of the triangle, in square inches, is $\frac{15}{2}$. Note that 15/2 and 7.5 are examples of ways to enter a correct answer.

Question Difficulty:
Medium

Question ID 87a9a2d4

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Right triangles and trigonometry	

ID: 87a9a2d4



Note: Figure not drawn to scale.

In the right triangle shown, what is the value of $\sin A$?

A. $\frac{1}{171}$

B. $\frac{35}{171}$

C. $\frac{171}{35}$

D. 171

ID: 87a9a2d4 Answer

Correct Answer:
B

Rationale

Choice B is correct. The sine of an acute angle in a right triangle is the ratio of the length of the side opposite that angle to the length of the hypotenuse. The hypotenuse of a right triangle is the side opposite the right angle. In right triangle ABC, side BC is the side opposite angle A and side AB is the hypotenuse. It's given that the length of side BC is 35 units and the length of side AB is 171 units. Therefore, the value of $\sin A$ is $\frac{35}{171}$.

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

Choice C is incorrect. This is the ratio of the length of the hypotenuse to the length of the side opposite angle A rather than the ratio of the length of the side opposite angle A to the length of the hypotenuse.

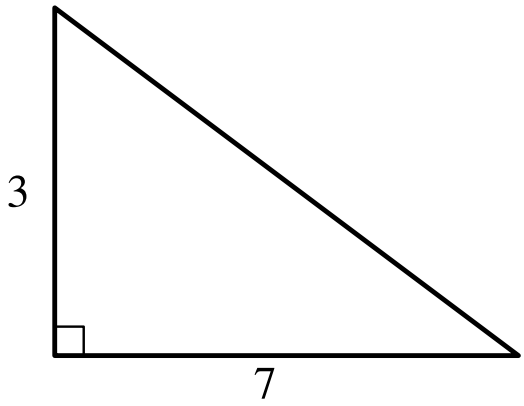
Choice D is incorrect. This is the length of the hypotenuse rather than $\sin A$.

Question Difficulty:
Easy

Question ID e6f2ace7

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Right triangles and trigonometry	

ID: e6f2ace7



Note: Figure not drawn to scale.

The lengths of the legs of a right triangle are shown. Which of the following is closest to the length of the triangle's hypotenuse?

A. 3.2

B. 5

C. 7.6

D. 20

ID: e6f2ace7 Answer

Correct Answer:
C

Rationale

Choice C is correct. The Pythagorean theorem states that for a right triangle, $a^2 + b^2 = c^2$, where a and b represent the lengths of the legs of the triangle and c represents the length of its hypotenuse. In the triangle shown, the legs have lengths of 3 and 7. Substituting 3 for a and 7 for b in the equation $a^2 + b^2 = c^2$ yields $3^2 + 7^2 = c^2$, which is equivalent to $9 + 49 = c^2$, or $58 = c^2$. Taking the positive square root of both sides of this equation yields $\sqrt{58} = c$. Thus, the value of c is approximately 7.6. Therefore, of the given choices, 7.6 is the closest to the length of the triangle's hypotenuse.

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

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

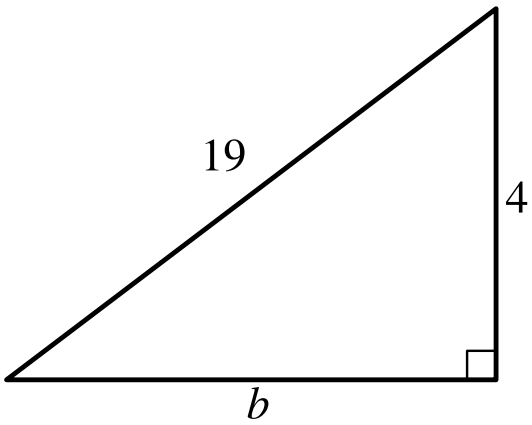
Choice D is incorrect and may result from conceptual or calculation errors.

Question Difficulty:
Easy

Question ID b0c5ece5

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Right triangles and trigonometry	

ID: b0c5ece5



Note: Figure not drawn to scale.

Which equation shows the relationship between the side lengths of the given triangle?

A. $4b = 19$

B. $4 + b = 19$

C. $4^2 + b^2 = 19^2$

D. $4^2 - b^2 = 19^2$

ID: b0c5ece5 Answer

Correct Answer:
C

Rationale

Choice C is correct. The Pythagorean theorem states that in a right triangle, the sum of the squares of the lengths of the two legs is equal to the square of the length of the hypotenuse. Therefore, $a^2 + b^2 = c^2$, where a and b are the lengths of the legs and c is the length of the hypotenuse. For the given right triangle, the lengths of the legs are 4 and b, and the length of the hypotenuse is 19. Substituting 4 for a and 19 for c in the equation $a^2 + b^2 = c^2$ yields $4^2 + b^2 = 19^2$. Thus, the relationship between the side lengths of the given triangle is $4^2 + b^2 = 19^2$.

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

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

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

Question Difficulty:
Easy

Question ID 76c73dbf

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Circles	

ID: 76c73dbf

The graph of $x^2 + x + y^2 + y = \frac{199}{2}$ in the *xy*-plane is a circle. What is the length of the circle's radius?

ID: 76c73dbf Answer

Correct Answer:
10

Rationale

The correct answer is 10. It's given that the graph of $x^2 + x + y^2 + y = \frac{199}{2}$ in the *xy*-plane is a circle. The equation of a circle in the *xy*-plane can be written in the form $(x - h)^2 + (y - k)^2 = r^2$, where the coordinates of the center of the circle are (h, k) and the length of the radius of the circle is r. The term $(x - h)^2$ in this equation can be obtained by adding the square of half the coefficient of x to both sides of the given equation to complete the square. The coefficient of x is 1. Half the coefficient of x is $\frac{1}{2}$. The square of half the coefficient of x is $\frac{1}{4}$. Adding $\frac{1}{4}$ to each side of $(x^2 + x) + (y^2 + y) = \frac{199}{2}$ yields $(x^2 + x + \frac{1}{4}) + (y^2 + y) = \frac{199}{2} + \frac{1}{4}$, or $(x + \frac{1}{2})^2 + (y^2 + y) = \frac{199}{2} + \frac{1}{4}$. Similarly, the term $(y - k)^2$ can be obtained by adding the square of half the coefficient of y to both sides of this equation, which yields $(x + \frac{1}{2})^2 + (y^2 + y + \frac{1}{4}) = \frac{199}{2} + \frac{1}{4} + \frac{1}{4}$, or $(x + \frac{1}{2})^2 + (y + \frac{1}{2})^2 = \frac{199}{2} + \frac{1}{4} + \frac{1}{4}$. This equation is equivalent to $(x + \frac{1}{2})^2 + (y + \frac{1}{2})^2 = 100$, or $(x + \frac{1}{2})^2 + (y + \frac{1}{2})^2 = 10^2$. Therefore, the length of the circle's radius is 10.

Question Difficulty:
Hard

Question ID 58c26db8

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Right triangles and trigonometry	

ID: 58c26db8

The perimeter of an isosceles right triangle is $18 + 18\sqrt{2}$ inches. What is the length, in inches, of the hypotenuse of this triangle?

A. 9

B. $9\sqrt{2}$

C. 18

D. $18\sqrt{2}$

ID: 58c26db8 Answer

Correct Answer:
C

Rationale

Choice C is correct. The perimeter of a triangle is the sum of the lengths of its sides. Since the given triangle is an isosceles right triangle, the length of each leg is the same and the length of the hypotenuse is equal to $\sqrt{2}$ times the length of a leg. Let x represent the length, in inches, of a leg of this isosceles right triangle. Therefore, the perimeter, in inches, of the triangle is $x + x + x\sqrt{2}$, or $2x + x\sqrt{2}$, which is equivalent to $x\left(2 + \sqrt{2}\right)$. It's given that the perimeter of this triangle is $18 + 18\sqrt{2}$ inches. Thus, $x\left(2 + \sqrt{2}\right) = 18 + 18\sqrt{2}$. Dividing both sides of this equation by $2 + \sqrt{2}$ yields $x = \frac{18+18\sqrt{2}}{2+\sqrt{2}}$. Multiplying the right-hand side of this equation by $\frac{2-\sqrt{2}}{2-\sqrt{2}}$ yields $x = \frac{36+36\sqrt{2}-18\sqrt{2}-36}{2}$, or $x = 9\sqrt{2}$. It follows that the length, in inches, of a leg of this isosceles right triangle is $9\sqrt{2}$. Therefore, the length, in inches, of the hypotenuse of this isosceles right triangle is $\left(9\sqrt{2}\right)\left(\sqrt{2}\right)$, or 18.

Choice A is incorrect. If this were the length of the hypotenuse, the perimeter would be $9 + 9\sqrt{2}$ inches.

Choice B is incorrect. This is the length, in inches, of a leg of this triangle, not the hypotenuse.

Choice D is incorrect. If this were the length of the hypotenuse, the perimeter would be $36 + 18\sqrt{2}$ inches.

Question Difficulty:
Hard

Question ID e336a1d2

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

ID: e336a1d2

A cube has an edge length of 41 inches. What is the volume, in cubic inches, of the cube?

A. 164

B. $1{,}681$

C. $10{,}086$

D. $68{,}921$

ID: e336a1d2 Answer

Correct Answer:
D

Rationale

Choice D is correct. The volume, V, of a cube can be found using the formula $V = s^3$, where s is the edge length of the cube. It's given that a cube has an edge length of 41 inches. Substituting 41 inches for s in this equation yields $V = 41^3$ cubic inches, or $V = 68{,}921$ cubic inches. Therefore, the volume of the cube is $68{,}921$ cubic inches.

Choice A is incorrect. This is the perimeter, in inches, of the cube.

Choice B is incorrect. This is the area, in square inches, of a face of the cube.

Choice C is incorrect. This is the surface area, in square inches, of the cube.

Question Difficulty:
Medium

Question ID e4b4e9ea

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

ID: e4b4e9ea

The length of the edge of the base of a right square prism is 6 units. The volume of the prism is $2{,}880$ cubic units. What is the height, in units, of the prism?

A. $4\sqrt{30}$

B. 36

C. $24\sqrt{5}$

D. 80

ID: e4b4e9ea Answer

Correct Answer:
D

Rationale

Choice D is correct. The volume, V, of a right square prism is given by the formula $V = s^2h$, where s represents the length of the edge of the base and h represents the height of the prism. It's given that the volume of a right square prism is $2{,}880$ cubic units and the length of the edge of the base is 6 units. Substituting $2{,}880$ for V and 6 for s in the formula $V = s^2h$ yields $2{,}880 = (6^2)h$, or $2{,}880 = 36h$. Dividing both sides of this equation by 36 yields $80 = h$. Therefore, the height, in units, of the prism is 80.

Choice A is incorrect. This is the height, in units, of a right square prism where the length of the edge of the base is 6 units and the volume of the prism is $144\sqrt{30}$, not $2{,}880$, units.

Choice B is incorrect. This is the area, in square units, of the base, not the height, in units, of the prism.

Choice C is incorrect. This is the height, in units, of a right square prism where the length of the edge of the base is 6 units and the volume of the prism is $864\sqrt{5}$, not $2{,}880$, units.

Question Difficulty:
Medium

Question ID c0586eb5

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

ID: c0586eb5

A cylinder has a diameter of 8 inches and a height of 12 inches. What is the volume, in cubic inches, of the cylinder?

A. 16π

B. 96π

C. 192π

D. 768π

ID: c0586eb5 Answer

Correct Answer:
C

Rationale

Choice C is correct. The base of a cylinder is a circle with a diameter equal to the diameter of the cylinder. The volume, V, of a cylinder can be found by multiplying the area of the circular base, A, by the height of the cylinder, h, or $V = Ah$. The area of a circle can be found using the formula $A = \pi r^2$, where r is the radius of the circle. It's given that the diameter of the cylinder is 8 inches. Thus, the radius of this circle is 4 inches. Therefore, the area of the circular base of the cylinder is $A = \pi(4)^2$, or 16π square inches. It's given that the height h of the cylinder is 12 inches. Substituting 16π for A and 12 for h in the formula $V = Ah$ gives $V = 16\pi(12)$, or 192π cubic inches.

Choice A is incorrect. This is the area of the circular base of the cylinder.

Choice B is incorrect and may result from using 8, instead of 16, as the value of r^2 in the formula for the area of a circle.

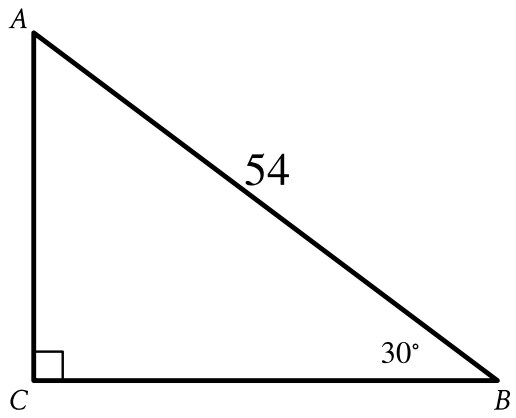
Choice D is incorrect and may result from using 8, instead of 4, for the radius of the circular base.

Question Difficulty:
Medium

Question ID 52f7b898

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Right triangles and trigonometry	

ID: 52f7b898



Note: Figure not drawn to scale.

Right triangle ABC is shown. What is the value of $\tan A$?

A. $\frac{\sqrt{3}}{54}$

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

C. $\sqrt{3}$

D. $27\sqrt{3}$

ID: 52f7b898 Answer

Correct Answer:
C

Rationale

Choice C is correct. In the triangle shown, the measure of angle B is 30° and angle C is a right angle, which means that it has a measure of 90°. Since the sum of the angles in a triangle is equal to 180°, the measure of angle A is equal to $180^\circ - (30 + 90)^\circ$, or 60°. In a right triangle whose acute angles have measures 30° and 60°, the lengths of the legs can be represented by the expressions x, $x\sqrt{3}$, and $2x$, where x is the length of the leg opposite the angle with measure 30°, $x\sqrt{3}$ is the length of the leg opposite the angle with measure 60°, and $2x$ is the length of the hypotenuse. In the triangle shown, the hypotenuse has a length of 54. It follows that $2x = 54$, or $x = 27$. Therefore, the length of the leg opposite angle B is 27 and the length of the leg opposite angle A is $27\sqrt{3}$. The tangent of an acute angle in a right triangle is defined as the ratio of the length of the leg opposite the angle to the length of the leg adjacent to the angle. The length of the leg opposite angle A is $27\sqrt{3}$ and the length of the leg adjacent to angle A is 27. Therefore, the value of $\tan A$ is $\frac{27\sqrt{3}}{27}$, or $\sqrt{3}$.

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

Choice B is incorrect. This is the value of $\frac{1}{\tan A}$, not the value of $\tan A$.

Choice D is incorrect. This is the length of the leg opposite angle A, not the value of $\tan A$.

Question Difficulty:
Hard

Question ID 03c6994f

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

ID: 03c6994f

Square A has side lengths that are 246 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?

A. $60{,}516$

B. 492

C. 246

D. 123

ID: 03c6994f Answer

Correct Answer:
A

Rationale

Choice A is correct. The area of a square is s^2, where s is the side length of the square. Therefore, the area of square B is b^2, where b is the side length of square B. It's given that square A has side lengths that are 246 times the side lengths of square B. Therefore, the side length of square A can be represented by the expression $246b$. It follows that the area of square A is $(246b)^2$, or $60{,}516b^2$. It's given that the area of square A is k times the area of square B, so $60{,}516b^2 = kb^2$. Therefore, the value of k is $60{,}516$.

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:
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 35d37640

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Circles	

ID: 35d37640

Point F lies on a unit circle in the *xy*-plane and has coordinates $(1, 0)$. Point G is the center of the circle and has coordinates $(0, 0)$. Point H also lies on the circle and has coordinates $(-1, y)$, where y is a constant. Which of the following could be the positive measure of angle FGH, in radians?

A. $\frac{27\pi}{2}$

B. $\frac{29\pi}{2}$

C. 24π

D. 25π

ID: 35d37640 Answer

Correct Answer:
D

Rationale

Choice D is correct. It's given that the circle is a unit circle, which means the circle has a radius of 1. It's also given that point G is the center of the circle and has coordinates $(0, 0)$ and that point H lies on the circle and has coordinates $(-1, y)$. Since the radius of the circle is 1, the value of y must be 0, as all other points with an *x*-coordinate of -1 are a distance greater than 1 away from point G. Since F and H are points on the unit circle centered at G, let side FG be the starting side of the angle and side GH be the terminal side of the angle. Since side FG is on the positive *x*-axis and side GH is on the negative *x*-axis, side FG is half of a rotation around the unit circle, or π radians, away from side GH. Therefore, the positive measure of angle FGH, in radians, is equal to π plus an integer multiple of 2π. In other words, the positive measure of angle FGH, in radians, is an odd integer multiple of π. Of the given choices, only 25π is an odd integer multiple of π.

Choice A is incorrect. This could be the positive measure of an angle where the starting side is FG and the terminal side contains the point $(0, -1)$, not $(-1, 0)$.

Choice B is incorrect. This could be the positive measure of an angle where the starting side is FG and the terminal side contains the point $(0, 1)$, not $(-1, 0)$.

Choice C is incorrect. This could be the positive measure of an angle where the starting side is FG and the terminal side contains the point $(1, 0)$, not $(-1, 0)$.

Question Difficulty:
Hard

Question ID e50afdd3

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Circles	

ID: e50afdd3

$$(x+4)^2+(y-19)^2=121$$

The graph of the given equation is a circle in the *xy*-plane. The point (a, b) lies on the circle. Which of the following is a possible value for a?

A. -16

B. -14

C. 11

D. 19

ID: e50afdd3 Answer

Correct Answer:
B

Rationale

Choice B is correct. An equation of the form $(x-h)^2+(y-k)^2=r^2$, where h, k, and r are constants, represents a circle in the *xy*-plane with center (h, k) and radius r. Therefore, the circle represented by the given equation has center $(-4, 19)$ and radius 11. Since the center of the circle has an *x*-coordinate of -4 and the radius of the circle is 11, the least possible *x*-coordinate for any point on the circle is $-4-11$, or -15. Similarly, the greatest possible *x*-coordinate for any point on the circle is $-4+11$, or 7. Therefore, if the point (a, b) lies on the circle, it must be true that $-15 \leq a \leq 7$. Of the given choices, only -14 satisfies this inequality.

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 167aff9e

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

ID: 167aff9e

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

ID: 167aff9e 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 $58\ \text{cm}^2$, 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 $10\ \text{cm}^3$. Thus, the sum of the volumes, in cm^3, of the two prisms is $1{,}250 + 10$, or $1{,}260$.

Question Difficulty:
Hard

Question ID 2266984b

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Circles	

ID: 2266984b

$x^2+20x+y^2+16y=-20$

The equation above defines a circle in the *xy*-plane. What are the coordinates of the center of the circle?

A. $(-20,-16)$

B. $(-10,-8)$

C. $(10,8)$

D. $(20,16)$

ID: 2266984b Answer

Correct Answer:
B

Rationale

Choice B is correct. The standard equation of a circle in the xy-plane is of the form $(x-h)^2+(y-k)^2=r^2$, where (h, k) are the coordinates of the center of the circle and r is the radius. The given equation can be rewritten in standard form by completing the squares. So the sum of the first two terms, x^2+20x, needs a 100 to complete the square, and the sum of the second two terms, y^2+16y, needs a 64 to complete the square. Adding 100 and 64 to both sides of the given equation yields $(x^2+20x+100)+(y^2+16y+64)=-20+100+64$, which is equivalent to $(x+10)^2+(y+8)^2=144$. Therefore, the coordinates of the center of the circle are $(-10, -8)$.

Choices A, C, and D are incorrect and may result from computational errors made when attempting to complete the squares or when identifying the coordinates of the center.

Question Difficulty:
Hard

Question ID d0b6d927

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

ID: d0b6d927

A rectangle has an area of 63 square meters and a length of 9 meters. What is the width, in meters, of the rectangle?

A. 7

B. 54

C. 81

D. 567

ID: d0b6d927 Answer

Correct Answer:
A

Rationale

Choice A is correct. The area A, in square meters, of a rectangle is the product of its length ℓ, in meters, and its width w, in meters; thus, $A = \ell w$. It's given that a rectangle has an area of 63 square meters and a length of 9 meters. Substituting 63 for A and 9 for ℓ in the equation $A = \ell w$ yields $63 = 9w$. Dividing both sides of this equation by 9 yields $7 = w$. Therefore, the width, in meters, of the rectangle is 7.

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

Choice C is incorrect. This is the square of the length, in meters, not the width, in meters, of the rectangle.

Choice D is incorrect. This is the product of the area, in square meters, and the length, in meters, of the rectangle, not the width, in meters, of the rectangle.

Question Difficulty:
Easy

Question ID d621cffb

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

ID: d621cffb

A sphere has a radius of $\frac{17}{5}$ feet. What is the volume, in cubic feet, of the sphere?

A. $\frac{5\pi}{17}$

B. $\frac{68\pi}{15}$

C. $\frac{32\pi}{5}$

D. $\frac{19{,}652\pi}{375}$

ID: d621cffb Answer

Correct Answer:
D

Rationale

Choice D is correct. The volume, V, of a sphere can be found using the formula $V = \frac{4}{3}\pi r^3$, where r is the radius of the sphere. It's given that the sphere has a radius of $\frac{17}{5}$ feet. Substituting $\frac{17}{5}$ for r in the formula $V = \frac{4}{3}\pi r^3$ yields $V = \frac{4}{3}\pi\left(\frac{17}{5}\right)^3$, which is equivalent to $V = \frac{4}{3}\pi\left(\frac{4{,}913}{125}\right)$, or $V = \frac{19{,}652\pi}{375}$. Therefore, the volume, in cubic feet, of the sphere is $\frac{19{,}652\pi}{375}$.

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

Choice B is incorrect. This is the volume, in cubic feet, of a sphere with a radius of $\sqrt[3]{\frac{17}{5}}$ feet.

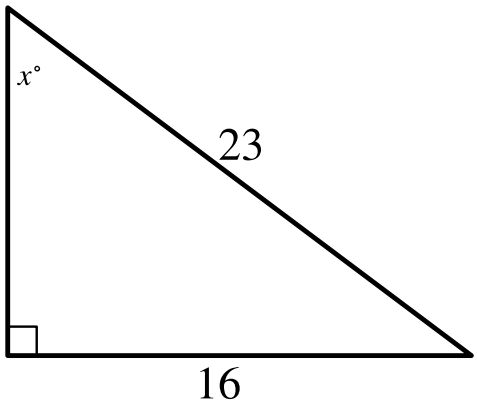
Choice C is incorrect and may result from conceptual or calculation errors.

Question Difficulty:
Medium

Question ID 1429dcdf

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Right triangles and trigonometry	

ID: 1429dcdf



Note: Figure not drawn to scale.

In the triangle shown, what is the value of $\sin x^\circ$?

ID: 1429dcdf Answer

Correct Answer:
.6956, .6957, 16/23

Rationale

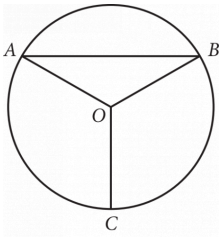
The correct answer is $\frac{16}{23}$. In a right triangle, the sine of an acute angle is defined as the ratio of the length of the side opposite the angle to the length of the hypotenuse. In the triangle shown, the length of the side opposite the angle with measure x° is 16 units and the length of the hypotenuse is 23 units. Therefore, the value of $\sin x^\circ$ is $\frac{16}{23}$. Note that 16/23, .6956, .6957, 0.695, and 0.696 are examples of ways to enter a correct answer.

Question Difficulty:
Hard

Question ID 69b0d79d

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Circles	

ID: 69b0d79d



Point O is the center of the circle above, and the measure of $\angle OAB$ is $30°$. If the length of $\overline{OC}$ is 18, what is the length of arc $\overset{\frown}{AB}$?

A. 9π

B. 12π

C. 15π

D. 18π

ID: 69b0d79d Answer

Correct Answer:
B

Rationale

Choice B is correct. Because segments OA and OB are radii of the circle centered at point O, these segments have equal lengths. Therefore, triangle AOB is an isosceles triangle, where angles OAB and OBA are congruent base angles of the triangle. It's given that angle OAB measures $30°$. Therefore, angle OBA also measures $30°$. Let $x°$ represent the measure of angle AOB. Since the sum of the measures of the three angles of any triangle is $180°$, it follows that $30° + 30° + x° = 180°$, or $60° + x° = 180°$. Subtracting $60°$ from both sides of this equation yields $x° = 120°$, or $\frac{2\pi}{3}$ radians. Therefore, the measure of angle AOB, and thus the measure of arc $\overset{\frown}{AB}$, is $\frac{2\pi}{3}$ radians. Since $\overline{OC}$ is a radius of the given circle and its length is 18, the length of the radius of the circle is 18. Therefore, the length of arc $\overset{\frown}{AB}$ can be calculated as $\left(\frac{2\pi}{3}\right)(18)$, or 12π.

Choices A, C, and D are incorrect and may result from conceptual or computational errors.

Question Difficulty:
Hard

Question ID 5a7e3b46

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Right triangles and trigonometry	

ID: 5a7e3b46

In $\triangle ABC$, $\angle B$ is a right angle and the length of $\overline{BC}$ is 136 millimeters. If $\cos A = \frac{3}{5}$, what is the length, in millimeters, of $\overline{AB}$?

A. 34

B. 102

C. 136

D. 170

ID: 5a7e3b46 Answer

Correct Answer:
B

Rationale

Choice B is correct. It's given that in $\triangle ABC$, $\angle B$ is a right angle. Therefore, $\triangle ABC$ is a right triangle, and $\overline{AC}$ is the hypotenuse of the triangle. It's also given that $\cos A = \frac{3}{5}$. Since the cosine of an acute angle in a right triangle is defined as the ratio of the length of the side adjacent to the angle to the length of the hypotenuse, the ratio of the length of $\overline{AB}$ to the length of $\overline{AC}$ is 3 to 5. It follows that the length of $\overline{AB}$ can be represented as $3a$ and the length of $\overline{AC}$ can be represented as $5a$, where a is a constant. The Pythagorean theorem states that the sum of the squares of the length of the legs of a right triangle is equal to the square of the length of its hypotenuse, so it follows that $AB^2 + BC^2 = AC^2$. Substituting $3a$ for AB and $5a$ for AC in this equation yields $(3a)^2 + BC^2 = (5a)^2$, or $9a^2 + BC^2 = 25a^2$. Subtracting $9a^2$ from both sides of this equation yields $BC^2 = 16a^2$, or $BC = 4a$. It follows that the ratio of the length of $\overline{AB}$ to the length of $\overline{BC}$ is 3 to 4. Let x represent the length, in millimeters, of $\overline{AB}$. It's given that the length of $\overline{BC}$ is 136 millimeters. Since the ratio of the length of $\overline{AB}$ to the length of $\overline{BC}$ is 3 to 4, $\frac{x}{136} = \frac{3}{4}$. Multiplying both sides of this equation by 136 yields $x = \frac{3(136)}{4}$, or $x = 102$. Therefore, the length of $\overline{AB}$ is 102 millimeters.

Choice A is incorrect. This is the scale factor by which the 3 to 4 to 5 ratio is multiplied that results in the side lengths of $\triangle ABC$.

Choice C is incorrect. This is the length of $\overline{BC}$, not the length of $\overline{AB}$.

Choice D is incorrect. This is the length of $\overline{AC}$, not the length of $\overline{AB}$.

Question Difficulty:
Medium

Question ID ebbf23ae

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Circles	

ID: ebbf23ae

A circle in the *xy*-plane has a diameter with endpoints $(2, 4)$ and $(2, 14)$. An equation of this circle is $(x - 2)^2 + (y - 9)^2 = r^2$, where r is a positive constant. What is the value of r?

ID: ebbf23ae Answer

Correct Answer:
5

Rationale

The correct answer is 5. The standard form of an equation of a circle in the *xy*-plane is $(x - h)^2 + (y - k)^2 = r^2$, where h, k, and r are constants, the coordinates of the center of the circle are (h, k), and the length of the radius of the circle is r. It's given that an equation of the circle is $(x - 2)^2 + (y - 9)^2 = r^2$. Therefore, the center of this circle is $(2, 9)$. It's given that the endpoints of a diameter of the circle are $(2, 4)$ and $(2, 14)$. The length of the radius is the distance from the center of the circle to an endpoint of a diameter of the circle, which can be found using the distance formula, $\sqrt{(x_1 - x_2)^2 + (y_1 - y_2)^2}$. Substituting the center of the circle $(2, 9)$ and one endpoint of the diameter $(2, 4)$ in this formula gives a distance of $\sqrt{(2 - 2)^2 + (9 - 4)^2}$, or $\sqrt{0^2 + 5^2}$, which is equivalent to 5. Since the distance from the center of the circle to an endpoint of a diameter is 5, the value of r is 5.

Question Difficulty:
Hard

Question ID d7a8aa9c

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Lines, angles, and triangles	

ID: d7a8aa9c

Each side of equilateral triangle S is multiplied by a scale factor of k to create equilateral triangle T. The length of each side of triangle T is greater than the length of each side of triangle S. Which of the following could be the value of k?

A. $\frac{29}{28}$

B. 1

C. $\frac{28}{29}$

D. 0

ID: d7a8aa9c Answer

Correct Answer:
A

Rationale

Choice A is correct. It's given that each side of equilateral triangle S is multiplied by a scale factor of k to create equilateral triangle T. Since the length of each side of triangle T is greater than the length of each side of triangle S, the scale factor of k must be greater than 1. Of the given choices, only $\frac{29}{28}$ is greater than 1.

Choice B is incorrect. If each side of equilateral triangle S is multiplied by a scale factor of 1, the length of each side of triangle T would be equal to the length of each side of triangle S.

Choice C is incorrect. If each side of equilateral triangle S is multiplied by a scale factor of $\frac{28}{29}$, the length of each side of triangle T would be less than the length of each side of triangle S.

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

Question Difficulty:
Medium

Question ID a2659088

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

ID: a2659088

A right circular cylinder has a height of 8 meters (m) and a base with a radius of 12 m. What is the volume, $\text{in } \text{m}^3$, of the cylinder?

A. 8π

B. 20π

C. 768π

D. $1{,}152\pi$

ID: a2659088 Answer

Correct Answer:
D

Rationale

Choice D is correct. The volume, V, of a right circular cylinder is given by $V = \pi r^2 h$, where r is the radius of the circular base and h is the height of the cylinder. It's given that the cylinder has a height of 8 meters and a base with a radius of 12 meters. Substituting 12 for r and 8 for h in $V = \pi r^2 h$ yields $V = \pi(12)^2(8)$, or $V = 1{,}152\pi$. Therefore, the volume, in m^3, of the cylinder is $1{,}152\pi$.

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

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

Choice C is incorrect. This is the volume, in m^3, of a cylinder with a radius of 8 meters and a height of 12 meters.

Question Difficulty:
Medium

Question ID 502d9690

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

ID: 502d9690

Rectangle $ABCD$ is similar to rectangle $EFGH$. The area of rectangle $ABCD$ is 648 square inches, and the area of rectangle $EFGH$ is 72 square inches. The length of the longest side of rectangle $ABCD$ is 36 inches. What is the length, in inches, of the longest side of rectangle $EFGH$?

A. 4

B. 9

C. 12

D. 36

ID: 502d9690 Answer

Correct Answer:
C

Rationale

Choice C is correct. It's given that rectangle $ABCD$ is similar to rectangle $EFGH$. Therefore, if the length of each side of rectangle $ABCD$ is k times the length of the corresponding side of rectangle $EFGH$, then the area of rectangle $ABCD$ is k^2 times the area of rectangle $EFGH$. It's given that the area of rectangle $ABCD$ is 648 square inches and the area of rectangle $EFGH$ is 72 square inches. It follows that $k^2 = \frac{648}{72}$, or $k^2 = 9$. Taking the square root of each side of this equation yields $k = \sqrt{9}$, or $k = 3$. It follows that the length of each side of rectangle $ABCD$ is 3 times the length of the corresponding side of rectangle $EFGH$. It's given that the length of the longest side of rectangle $ABCD$ is 36 inches. Therefore, 36 inches is 3 times the length of the longest side of rectangle $EFGH$, and the longest side of rectangle $EFGH$ is equal to $\frac{36}{3}$, or 12, inches.

Choice A is incorrect. This is the length, in inches, of the longest side of a rectangle with side lengths that are $\frac{1}{9}$ the corresponding side lengths of rectangle $ABCD$, rather than a rectangle with an area that is $\frac{1}{9}$ the area of rectangle $ABCD$.

Choice B is incorrect. This is the factor by which the area of rectangle $ABCD$ is larger than the area of rectangle $EFGH$, not the length, in inches, of the longest side of rectangle $EFGH$.

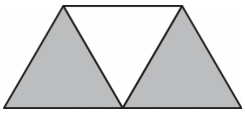
Choice D is incorrect. This is the length, in inches, of the longest side of rectangle $ABCD$, not rectangle $EFGH$.

Question Difficulty:
Hard

Question ID 4c95c7d4

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Right triangles and trigonometry	

ID: 4c95c7d4



A graphic designer is creating a logo for a company. The logo is shown in the figure above. The logo is in the shape of a trapezoid and consists of three congruent equilateral triangles. If the perimeter of the logo is 20 centimeters, what is the combined area of the shaded regions, in square centimeters, of the logo?

A. $2\sqrt{3}$

B. $4\sqrt{3}$

C. $8\sqrt{3}$

D. 16

ID: 4c95c7d4 Answer

Correct Answer:
C

Rationale

Choice C is correct. It's given that the logo is in the shape of a trapezoid that consists of three congruent equilateral triangles, and that the perimeter of the trapezoid is 20 centimeters (cm). Since the perimeter of the trapezoid is the sum of the lengths of 5 of the sides of the triangles, the length of each side of an equilateral triangle is $\frac{20}{5} = 4$ cm. Dividing up one equilateral triangle into two right triangles yields a pair of congruent 30°-60°-90° triangles. The shorter leg of each right triangle is half the length of the side of an equilateral triangle, or 2 cm. Using the Pythagorean Theorem, $a^2 + b^2 = c^2$, the height of the equilateral triangle can be found. Substituting $a = 2$ and $c = 4$ and solving for b yields $\sqrt{4^2 - 2^2} = \sqrt{12} = 2\sqrt{3}$ cm. The area of one equilateral triangle is $\frac{1}{2}bh$, where $b = 2$ and $h = 2\sqrt{3}$. Therefore, the area of one equilateral triangle is $\frac{1}{2}(4)(2\sqrt{3}) = 4\sqrt{3}$ cm^2. The shaded area consists of two such triangles, so its area is $(2)(4)\sqrt{3} = 8\sqrt{3}$ cm^2.

Alternate approach: The area of a trapezoid can be found by evaluating the expression $\frac{1}{2}(b_1 + b_2)h$, where b_1 is the length of one base, b_2 is the length of the other base, and h is the height of the trapezoid. Substituting $b_1 = 8$, $b_2 = 4$, and $h = 2\sqrt{3}$ yields the expression $\frac{1}{2}(8+4)(2\sqrt{3})$, or $\frac{1}{2}(12)(2\sqrt{3})$, which gives an area of $12\sqrt{3}$ cm^2 for the trapezoid. Since two-thirds of the trapezoid is shaded, the area of the shaded region is $\frac{2}{3} \times 12\sqrt{3} = 8\sqrt{3}$.

Choice A is incorrect. This is the height of the trapezoid. Choice B is incorrect. This is the area of one of the equilateral triangles, not two. Choice D is incorrect and may result from using a height of 4 for each triangle rather than the height of $2\sqrt{3}$.

Question Difficulty:
Hard

Question ID b8a225ff

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Circles	

ID: b8a225ff

Circle A in the *xy*-plane has the equation $(x+5)^2+(y-5)^2=4$. Circle B has the same center as circle A. The radius of circle B is two times the radius of circle A. The equation defining circle B in the *xy*-plane is $(x+5)^2+(y-5)^2=k$, where k is a constant. What is the value of k?

ID: b8a225ff Answer

Correct Answer:
16

Rationale

The correct answer is 16. An equation of a circle in the *xy*-plane can be written as $(x-t)^2+(y-u)^2=r^2$, where the center of the circle is (t, u) , the radius of the circle is r, and where t, u, and r are constants. It's given that the equation of circle A is $(x+5)^2+(y-5)^2=4$, which is equivalent to $(x+5)^2+(y-5)^2=2^2$. Therefore, the center of circle A is $(-5, 5)$ and the radius of circle A is 2. It's given that circle B has the same center as circle A and that the radius of circle B is two times the radius of circle A. Therefore, the center of circle B is $(-5, 5)$ and the radius of circle B is $2(2)$, or 4. Substituting -5 for t, 5 for u, and 4 for r into the equation $(x-t)^2+(y-u)^2=r^2$ yields $(x+5)^2+(y-5)^2=4^2$, which is equivalent to $(x+5)^2+(y-5)^2=16$. It follows that the equation of circle B in the *xy*-plane is $(x+5)^2+(y-5)^2=16$. Therefore, the value of k is 16.

Question Difficulty:
Hard

Question ID b0a72bdc

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Circles	

ID: b0a72bdc

What is the diameter of the circle in the *xy*-plane with equation $(x-5)^2+(y-3)^2=16$?

A. 4

B. 8

C. 16

D. 32

ID: b0a72bdc Answer

Correct Answer:
B

Rationale

Choice B is correct. The standard form of an equation of a circle in the *xy*-plane is $(x-h)^2+(y-k)^2=r^2$, where the coordinates of the center of the circle are (h, k) and the length of the radius of the circle is r. For the circle in the *xy*-plane with equation $(x-5)^2+(y-3)^2=16$, it follows that $r^2=16$. Taking the square root of both sides of this equation yields $r=4$ or $r=-4$. Because r represents the length of the radius of the circle and this length must be positive, $r=4$. Therefore, the radius of the circle is 4. The diameter of a circle is twice the length of the radius of the circle. Thus, $2(4)$ yields 8. Therefore, the diameter of the circle is 8.

Choice A is incorrect. This is the radius of the circle.

Choice C is incorrect. This is the square of the radius of the circle.

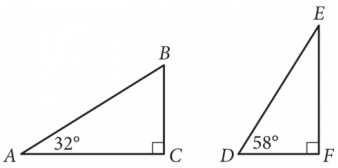
Choice D is incorrect and may result from conceptual or calculation errors.

Question Difficulty:
Hard

Question ID 933fee1a

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Lines, angles, and triangles	

ID: 933fee1a



Triangles *ABC* and *DEF* are shown above. Which of the following is equal to the ratio $\frac{BC}{AB}$?

A. $\frac{DE}{DF}$

B. $\frac{DF}{DE}$

C. $\frac{DF}{EF}$

D. $\frac{EF}{DE}$

ID: 933fee1a Answer

Correct Answer:
B

Rationale

Choice B is correct. In right triangle ABC, the measure of angle B must be 58° because the sum of the measure of angle A, which is 32°, and the measure of angle B is 90°. Angle D in the right triangle DEF has measure 58°. Hence, triangles ABC and DEF are similar (by angle-angle similarity). Since $\overline{BC}$ is the side opposite to the angle with measure 32° and AB is the hypotenuse in right triangle ABC, the ratio $\frac{BC}{AB}$ is equal to $\frac{DF}{DE}$.

Alternate approach: The trigonometric ratios can be used to answer this question. In right triangle ABC, the ratio $\frac{BC}{AB} = \sin(32°)$.

The angle E in triangle DEF has measure 32° because $M(\angle D) + M(\angle E) = 90°$. In triangle DEF, the ratio $\frac{DF}{DE} = \sin(32°)$.

Therefore, $\frac{DF}{DE} = \frac{BC}{AB}$.

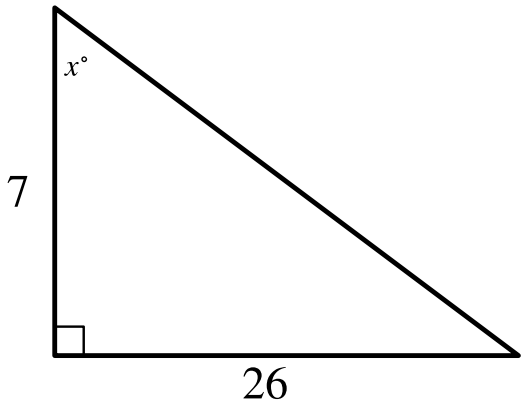
Choice A is incorrect because $\frac{DE}{DF}$ is the reciprocal of the ratio $\frac{BC}{AB}$. Choice C is incorrect because $\frac{DF}{EF} = \frac{BC}{AC}$, not $\frac{BC}{AB}$. Choice D is incorrect because $\frac{EF}{DE} = \frac{AC}{AB}$, not $\frac{BC}{AB}$.

Question Difficulty:
Medium

Question ID 64c1f044

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Right triangles and trigonometry	

ID: 64c1f044



Note: Figure not drawn to scale.

In the triangle shown, what is the value of $\tan x^\circ$?

A. $\frac{1}{26}$

B. $\frac{19}{26}$

C. $\frac{26}{7}$

D. $\frac{33}{7}$

ID: 64c1f044 Answer

Correct Answer:
C

Rationale

Choice C is correct. The tangent of an acute angle in a right triangle is defined as the ratio of the length of the side opposite the angle to the length of the shorter side adjacent to the angle. In the triangle shown, the length of the side opposite the angle with measure x° is 26 units and the length of the side adjacent to the angle with measure x° is 7 units. Therefore, the value of $\tan x^\circ$ is $\frac{26}{7}$.

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

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

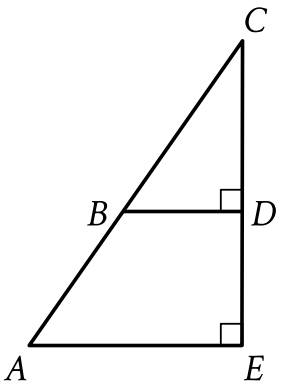
Choice D is incorrect and may result from conceptual or calculation errors.

Question Difficulty:
Easy

Question ID 2f7c92ad

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Lines, angles, and triangles	

ID: 2f7c92ad



Note: Figure not drawn to scale.

In the figure shown, triangle CAE is similar to triangle CBD. The measure of angle CBD is 57°, and $AE = 26(BD)$. What is the measure of angle CAE?

A. $(26 \cdot 57)^\circ$

B. $(26 + 57)^\circ$

C. 57°

D. 26°

ID: 2f7c92ad Answer

Correct Answer:
C

Rationale

Choice C is correct. It's given that triangle CAE is similar to triangle CBD. Corresponding angles in similar triangles have equal measure. Angle BCD and angle ACE represent the same angle. It follows that angle BCD and angle ACE have equal measure and are corresponding angles. It's given in the figure that angle BDC and angle AEC are right angles and therefore have equal measure. It follows that angle BDC and angle AEC are corresponding angles. Therefore, angle CBD and angle CAE are corresponding angles and have equal measure. It's given that the measure of angle CBD is 57°, so the measure of angle CAE is 57°.

Choice A is incorrect and may result from conceptual errors.

Choice B is incorrect and may result from conceptual errors.

Choice D is incorrect and may result from conceptual errors.

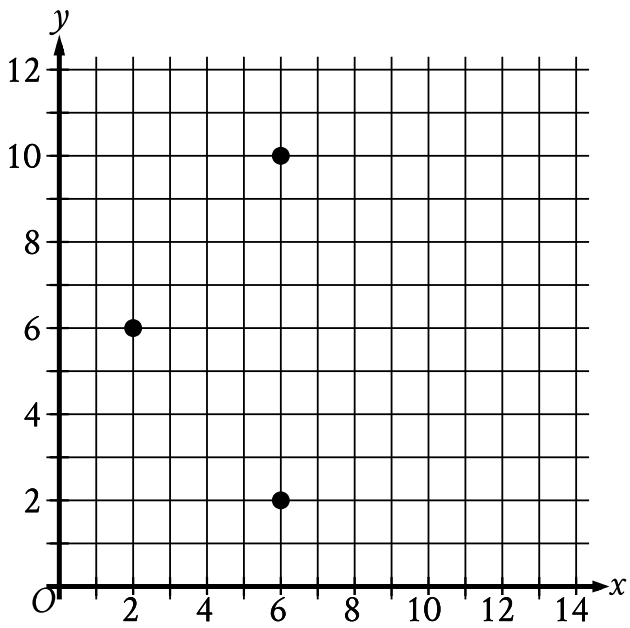
Question Difficulty:

Medium

Question ID b2528e6b

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

ID: b2528e6b



The three points shown define a circle. The circumference of this circle is $k\pi$, where k is a constant. What is the value of k?

ID: b2528e6b Answer

Correct Answer:
8

Rationale

The correct answer is 8. It's given that the three points shown define a circle, so the center of that circle is an equal distance from each of the three points. The point $(6, 6)$ is halfway between the points $(6, 2)$ and $(6, 10)$, and is a distance of 4 units from each of those two points. The point $(6, 6)$ is also a distance of 4 units from $(2, 6)$. Because the point $(6, 6)$ is the same distance from all three points shown, it must be the center of the circle. Since that distance is 4, it follows that the radius of the circle is 4. The circumference of a circle with radius r is equal to $2\pi r$. It follows that the circumference of the given circle is $2\pi(4)$, or 8π. It's given that the circumference of the circle is $k\pi$. Therefore, the value of k is 8.

Question Difficulty:
Hard

Question ID 9fec9d49

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

ID: 9fec9d49

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: 9fec9d49 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 ba8ca563

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

ID: ba8ca563

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

ID: ba8ca563 Answer

Correct Answer:
36504

Rationale

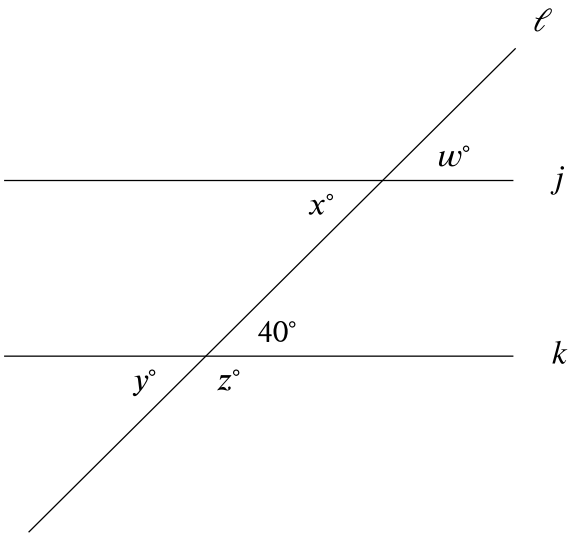
The correct answer is $36{,}504$. The volume of a cube can be found using the formula $V = s^3$, where s represents the edge length of a cube. It's given that this cube has a volume of $474{,}552$ cubic units. Substituting $474{,}552$ for V in $V = s^3$ yields $474{,}552 = s^3$. Taking the cube root 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 9d078710

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Lines, angles, and triangles	

ID: 9d078710



Note: Figure not drawn to scale.

In the figure shown, line ℓ intersects lines j and k. Which additional piece of information is sufficient to prove that lines j and k are parallel?

A. $w = 40$

B. $x = 140$

C. $y = 40$

D. $z = 140$

ID: 9d078710 Answer

Correct Answer:
A

Rationale

Choice A is correct. In the figure shown, lines j and k are parallel if and only if a pair of corresponding angles are congruent. It's given that one angle has a measure of 40° and that the corresponding angle has a measure of w°. Therefore, $w = 40$ is sufficient to prove that lines j and k are parallel.

Choice B is incorrect. The angle measuring x° and the angle measuring 40° are alternate interior angles. Thus, if lines j and k are parallel, x is equal to 40, not 140.

Choice C is incorrect. The angle measuring y° and the angle measuring 40° are vertical angles. Thus, $y = 40$, whether lines j and k are parallel or not.

Choice D is incorrect. The angle measuring z° is supplementary to the angle measuring 40°. Thus, $z = 180 - 40$, or $z = 140$, whether lines j and k are parallel or not.

Question Difficulty:
Easy

Question ID b1e1c2f5

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Lines, angles, and triangles	

ID: b1e1c2f5

In right triangle ABC, angle C is the right angle and $BC = 162$. Point D on side AB is connected by a line segment with point E on side AC such that line segment DE is parallel to side BC and $CE = 2AE$. What is the length of line segment DE?

ID: b1e1c2f5 Answer

Correct Answer:
54

Rationale

The correct answer is 54. It's given that in triangle ABC, point D on side AB is connected by a line segment with point E on side AC such that line segment DE is parallel to side BC. It follows that parallel segments DE and BC are intersected by sides AB and AC. If two parallel segments are intersected by a third segment, corresponding angles are congruent. Thus, corresponding angles C and AED are congruent and corresponding angles B and ADE are congruent. Since triangle ADE has two angles that are each congruent to an angle in triangle ABC, triangle ADE is similar to triangle ABC by the angle-angle similarity postulate, where side DE corresponds to side BC, and side AE corresponds to side AC. Since the lengths of corresponding sides in similar triangles are proportional, it follows that $\frac{DE}{BC} = \frac{AE}{AC}$. Since point E lies on side AC, $AE + CE = AC$. It's given that $CE = 2AE$. Substituting $2AE$ for CE in the equation $AE + CE = AC$ yields $AE + 2AE = AC$, or $3AE = AC$. It's given that $BC = 162$. Substituting 162 for BC and $3AE$ for AC in the equation $\frac{DE}{BC} = \frac{AE}{AC}$ yields $\frac{DE}{162} = \frac{AE}{3AE}$, or $\frac{DE}{162} = \frac{1}{3}$. Multiplying both sides of this equation by 162 yields $DE = 54$. Thus, the length of line segment DE is 54.

Question Difficulty:
Hard

Question ID 0d43db90

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

ID: 0d43db90

The perimeter of triangle ABC is 17 inches, the length of side AB is 4 inches, and the length of side AC is 7 inches. What is the length, in inches, of side BC?

A. 4

B. 6

C. 7

D. 11

ID: 0d43db90 Answer

Correct Answer:
B

Rationale

Choice B is correct. The perimeter of a triangle is the sum of the lengths of all three sides of the triangle. It's given that the lengths of side AB and side AC are 4 inches and 7 inches, respectively. Let x represent the length, in inches, of side BC. The sum of the lengths, in inches, of all three sides of triangle ABC can be represented by the expression $4 + 7 + x$. Since it's given that the perimeter of triangle ABC is 17 inches, it follows that $17 = 4 + 7 + x$, or $17 = 11 + x$. Subtracting 11 from both sides of this equation yields $6 = x$. Therefore, the length, in inches, of side BC is 6.

Choice A is incorrect. This is the length, in inches, of side AB.

Choice C is incorrect. This is the length, in inches, of side AC.

Choice D is incorrect. This is the sum of the lengths, in inches, of sides AB and AC.

Question Difficulty:
Easy

Question ID e0874bc2

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

ID: e0874bc2

The table gives the perimeters of similar triangles TUV and XYZ, where $\overline{TU}$ corresponds to $\overline{XY}$. The length of $\overline{TU}$ is 18.

	Perimeter
Triangle TUV	37
Triangle XYZ	333

What is the length of $\overline{XY}$?

A. 2

B. 18

C. 55

D. 162

ID: e0874bc2 Answer

Correct Answer:
D

Rationale

Choice D is correct. It's given that triangle XYZ is similar to triangle TUV. Therefore, each side of triangle XYZ is k times its corresponding side of triangle TUV, where k is a constant. It follows that the perimeter of triangle XYZ is k times the perimeter of triangle TUV. It's also given that $\overline{TU}$ corresponds to $\overline{XY}$ and the length of $\overline{TU}$ is 18. Let x represent the length of $\overline{XY}$. It follows that $x = 18k$. The table shows that the perimeters of triangles TUV and XYZ are 37 and 333, respectively. It follows that $333 = 37k$, or $9 = k$. Substituting 9 for k in the equation $x = 18k$ yields $x = (18)(9)$, or $x = 162$. Therefore, the length of $\overline{XY}$ is 162.

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

Choice B is incorrect. This is the length of $\overline{TU}$, not the length of $\overline{XY}$.

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

Question Difficulty:
Medium

Question ID a4bd60a3

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Right triangles and trigonometry	

ID: a4bd60a3

The perimeter of an equilateral triangle is 624 centimeters. The height of this triangle is $k\sqrt{3}$ centimeters, where k is a constant. What is the value of k?

ID: a4bd60a3 Answer

Correct Answer:
104

Rationale

The correct answer is 104. An equilateral triangle is a triangle in which all three sides have the same length and all three angles have a measure of 60°. The height of the triangle, $k\sqrt{3}$, is the length of the altitude from one vertex. The altitude divides the equilateral triangle into two congruent 30-60-90 right triangles, where the altitude is the side across from the 60° angle in each 30-60-90 right triangle. Since the altitude has a length of $k\sqrt{3}$, it follows from the properties of 30-60-90 right triangles that the side across from each 30° angle has a length of k and each hypotenuse has a length of $2k$. In this case, the hypotenuse of each 30-60-90 right triangle is a side of the equilateral triangle; therefore, each side length of the equilateral triangle is $2k$. The perimeter of a triangle is the sum of the lengths of each side. It's given that the perimeter of the equilateral triangle is 624; therefore, $2k + 2k + 2k = 624$, or $6k = 624$. Dividing both sides of this equation by 6 yields $k = 104$.

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 498d6795

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Right triangles and trigonometry	

ID: 498d6795

In triangle ABC, angle B is a right angle. The length of side AB is $10\sqrt{37}$ and the length of side BC is $24\sqrt{37}$. What is the length of side AC?

A. $14\sqrt{37}$

B. $26\sqrt{37}$

C. $34\sqrt{37}$

D. $\sqrt{34 \cdot 37}$

ID: 498d6795 Answer

Correct Answer:
B

Rationale

Choice B is correct. The Pythagorean theorem states that for a right triangle, $c^2 = a^2 + b^2$, where c represents the length of the hypotenuse and a and b represent the lengths of the legs. It's given that in triangle ABC, angle B is a right angle. Therefore, triangle ABC is a right triangle, where the hypotenuse is side AC and the legs are sides AB and BC. It's given that the lengths of sides AB and BC are $10\sqrt{37}$ and $24\sqrt{37}$, respectively. Substituting these values for a and b in the formula $c^2 = a^2 + b^2$ yields $c^2 = \left(10\sqrt{37}\right)^2 + \left(24\sqrt{37}\right)^2$, which is equivalent to $c^2 = 100(37) + 576(37)$, or $c^2 = 676(37)$. Taking the square root of both sides of this equation yields $c = \pm 26\sqrt{37}$. Since c represents the length of the hypotenuse, side AC, c must be positive. Therefore, the length of side AC is $26\sqrt{37}$.

Choice A is incorrect. This is the result of solving the equation $c = 24\sqrt{37} - 10\sqrt{37}$, not $c^2 = \left(10\sqrt{37}\right)^2 + \left(24\sqrt{37}\right)^2$.

Choice C is incorrect. This is the result of solving the equation $c = 10\sqrt{37} + 24\sqrt{37}$, not $c^2 = \left(10\sqrt{37}\right)^2 + \left(24\sqrt{37}\right)^2$.

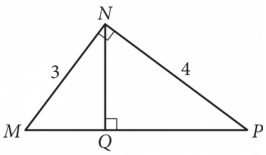
Choice D is incorrect and may result from conceptual or calculation errors.

Question Difficulty:
Hard

Question ID 740bf79f

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Lines, angles, and triangles	

ID: 740bf79f



In the figure above, what is the length of $\overline{NQ}$?

A. 2.2

B. 2.3

C. 2.4

D. 2.5

ID: 740bf79f Answer

Correct Answer:
C

Rationale

Choice C is correct. First, $\overline{MP}$ is the hypotenuse of right $\triangle MNP$, whose legs have lengths 3 and 4. Therefore, $(MP)^2 = 3^2 + 4^2$, so $(MP)^2 = 25$ and $MP = 5$. Second, because $\angle MNP$ corresponds to $\angle NQP$ and because $\angle MPN$ corresponds to $\angle NPQ$, $\triangle MNP$ is similar to $\triangle NQP$. The ratio of corresponding sides of similar triangles is constant, so $\frac{NQ}{MN} = \frac{NP}{MP}$. Since $MP = 5$ and it's given that $MN = 3$ and $NP = 4$, $\frac{NQ}{3} = \frac{4}{5}$. Solving for NQ results in $NQ = \frac{12}{5}$, or 2.4.

Choices A, B, and D are incorrect and may result from setting up incorrect ratios.

Question Difficulty:
Hard

Question ID 0e40dfb0

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

ID: 0e40dfb0

A rectangle has a length of 3 units and a width of 39 units. Which expression gives the area, in square units, of this rectangle?

A. $2(3 + 39)$

B. $2(3 \cdot 39)$

C. $3 + 39$

D. $3 \cdot 39$

ID: 0e40dfb0 Answer

Correct Answer:
D

Rationale

Choice D is correct. The area of a rectangle is given by ℓw, where ℓ is the length of the rectangle and w is the width of the rectangle. It's given that a rectangle has a length of 3 units and a width of 39 units. It follows that the area of the rectangle is $3 \cdot 39$ square units. Therefore, the expression that gives the area, in square units, of this rectangle, is $3 \cdot 39$.

Choice A is incorrect. This expression gives the perimeter, in units, of this rectangle.

Choice B is incorrect and may result from conceptual errors.

Choice C is incorrect and may result from conceptual errors.

Question Difficulty:
Easy

Question ID 3b225698

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Lines, angles, and triangles	

ID: 3b225698

Triangle XYZ is similar to triangle RST such that X, Y, and Z correspond to R, S, and T, respectively. The measure of $\angle Z$ is 20° and $2XY = RS$. What is the measure of $\angle T$?

A. 2°

B. 10°

C. 20°

D. 40°

ID: 3b225698 Answer

Correct Answer:
C

Rationale

Choice C is correct. It's given that triangle XYZ is similar to triangle RST, such that X, Y, and Z correspond to R, S, and T, respectively. Since corresponding angles of similar triangles are congruent, it follows that the measure of $\angle Z$ is congruent to the measure of $\angle T$. It's given that the measure of $\angle Z$ is 20°. Therefore, the measure of $\angle T$ is 20°.

Choice A is incorrect and may result from a conceptual error.

Choice B is incorrect. This is half the measure of $\angle Z$.

Choice D is incorrect. This is twice the measure of $\angle Z$.

Question Difficulty:
Hard

Question ID 249d3f80

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Circles	

ID: 249d3f80

Point O is the center of a circle. The measure of arc RS on this circle is 100°. What is the measure, in degrees, of its associated angle ROS?

ID: 249d3f80 Answer

Correct Answer:
100

Rationale

The correct answer is 100. It's given that point O is the center of a circle and the measure of arc RS on the circle is 100°. It follows that points R and S lie on the circle. Therefore, $\overline{OR}$ and $\overline{OS}$ are radii of the circle. A central angle is an angle formed by two radii of a circle, with its vertex at the center of the circle. Therefore, $\angle ROS$ is a central angle. Because the degree measure of an arc is equal to the measure of its associated central angle, it follows that the measure, in degrees, of $\angle ROS$ is 100.

Question Difficulty:
Hard

Question ID fc5ef8d3

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

ID: fc5ef8d3

The table gives the perimeters of similar triangles TUV and XYZ, where $\overline{TU}$ corresponds to $\overline{XY}$. The length of $\overline{TU}$ is 6.

	Perimeter
Triangle TUV	50
Triangle XYZ	150

What is the length of $\overline{XY}$?

A. 2

B. 6

C. 18

D. 56

ID: fc5ef8d3 Answer

Correct Answer:
C

Rationale

Choice C is correct. It's given that triangle TUV is similar to triangle XYZ, and $\overline{TU}$ corresponds to $\overline{XY}$. If two triangles are similar, then the ratio of their perimeters is equal to the ratio of their corresponding sides. It's given that the perimeter of triangle TUV is 50, the perimeter of triangle XYZ is 150, and the length of $\overline{TU}$ is 6. Let n represent the length of $\overline{XY}$. It follows that $\frac{50}{150} = \frac{6}{n}$, or $\frac{1}{3} = \frac{6}{n}$. Multiplying each side of this equation by n yields $\frac{n}{3} = 6$. Multiplying each side of this equation by 3 yields $n = 18$. Therefore, the length of $\overline{XY}$ is 18.

Choice A is incorrect. This is the solution to $\frac{3}{1} = \frac{6}{n}$, not $\frac{1}{3} = \frac{6}{n}$.

Choice B is incorrect. This is the length of $\overline{TU}$, not $\overline{XY}$.

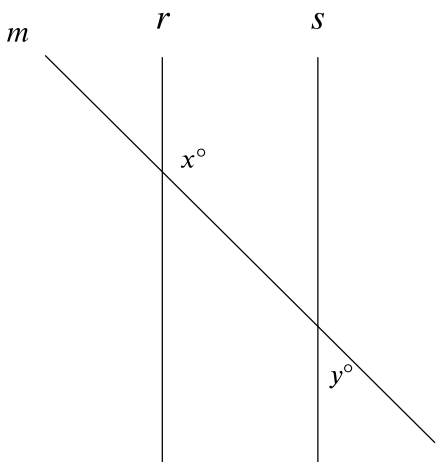
Choice D is incorrect. This is the sum of the length of $\overline{TU}$ and the perimeter of triangle TUV, not the length of $\overline{XY}$.

Question Difficulty:
Easy

Question ID a4c05a1b

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Lines, angles, and triangles	

ID: a4c05a1b



Note: Figure not drawn to scale.

In the figure shown, lines r and s are parallel, and line m intersects both lines. If $y < 65$, which of the following must be true?

A. $x < 115$

B. $x > 115$

C. $x + y < 180$

D. $x + y > 180$

ID: a4c05a1b Answer

Correct Answer:
B

Rationale

Choice B is correct. In the figure shown, the angle measuring y° is congruent to its vertical angle formed by lines s and m, so the measure of the vertical angle is also y°. The vertical angle forms a same-side interior angle pair with the angle measuring x°. It's given that lines r and s are parallel. Therefore, same-side interior angles in the figure are supplementary, which means the sum of the measure of the vertical angle and the measure of the angle measuring x° is 180°, or $x + y = 180$. Subtracting x from both sides of this equation yields $y = 180 - x$. Substituting $180 - x$ for y in the inequality $y < 65$ yields $180 - x < 65$. Adding x to both sides of this inequality yields $180 < 65 + x$. Subtracting 65 from both sides of this inequality yields $115 < x$, or $x > 115$. Thus, if $y < 65$, it must be true that $x > 115$.

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

Choice C is incorrect. $x + y$ must be equal to, not less than, 180.

Choice D is incorrect. $x + y$ must be equal to, not greater than, 180.

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 ab176ad6

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Circles	

ID: ab176ad6

The equation $(x+6)^2+(y+3)^2=121$ defines a circle in the *xy*-plane. What is the radius of the circle?

ID: ab176ad6 Answer

Rationale

The correct answer is 11. A circle with equation $(x-a)^2+(y-b)^2=r^2$, where a, b, and r are constants, has center (a,b) and radius r. Therefore, the radius of the given circle is $\sqrt{121}$, or 11.

Question Difficulty:
Hard

Question ID 98c12e38

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

ID: 98c12e38

Circle K has a radius of 4 millimeters (mm). Circle L has an area of 100π mm^2. What is the total area, in mm^2, of circles K and L?

A. 14π

B. 28π

C. 56π

D. 116π

ID: 98c12e38 Answer

Correct Answer:
D

Rationale

Choice D is correct. The area, A, of a circle is given by the formula $A = \pi r^2$, where r represents the radius of the circle. It's given that circle K has a radius of 4 millimeters (mm). Substituting 4 for r in the formula $A = \pi r^2$ yields $A = \pi(4)^2$, or $A = 16\pi$. Therefore, the area of circle K is 16π mm^2. It's given that circle L has an area of 100π mm^2. Therefore, the total area, in mm^2, of circles K and L is $16\pi + 100\pi$, or 116π.

Choice A is incorrect. This is the sum of the radii, in mm, of circles K and L multiplied by π, not the total area, in mm^2, of the circles.

Choice B is incorrect. This is the sum of the diameters, in mm, of circles K and L multiplied by π, not the total area, in mm^2, of the circles.

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

Question Difficulty:
Medium

Question ID aa2d36fe

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Circles	

ID: aa2d36fe

A circle in the *xy*-plane has the equation $(x-13)^2+(y-k)^2=64$. Which of the following gives the center of the circle and its radius?

A. The center is at $(13, k)$ and the radius is 8.

B. The center is at $(k, 13)$ and the radius is 8.

C. The center is at $(k, 13)$ and the radius is 64.

D. The center is at $(13, k)$ and the radius is 64.

ID: aa2d36fe Answer

Correct Answer:
A

Rationale

Choice A is correct. For a circle in the *xy*-plane that has the equation $(x-h)^2+(y-k)^2=r^2$, where h, k, and r are constants, (h, k) is the center of the circle and the positive value of r is the radius of the circle. In the given equation, $h=13$ and $r^2=64$. Taking the square root of each side of $r^2=64$ yields $r=\pm 8$. Therefore, the center of the circle is at $(13, k)$ and the radius is 8.

Choice B is incorrect. This gives the center and radius of a circle with equation $(x-k)^2+(y-13)^2=64$, not $(x-13)^2+(y-k)^2=64$.

Choice C is incorrect. This gives the center and radius of a circle with equation $(x-k)^2+(y-13)^2=4{,}096$, not $(x-13)^2+(y-k)^2=64$.

Choice D is incorrect. This gives the center and radius of a circle with equation $(x-13)^2+(y-k)^2=4{,}096$, not $(x-13)^2+(y-k)^2=64$.

Question Difficulty:
Medium

Question ID d3fe472f

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Lines, angles, and triangles	

ID: d3fe472f

Triangle ABC is similar to triangle XYZ, such that A, B, and C correspond to X, Y, and Z respectively. The length of each side of triangle XYZ is 2 times the length of its corresponding side in triangle ABC. The measure of side AB is 16. What is the measure of side XY?

A. 14

B. 16

C. 18

D. 32

ID: d3fe472f Answer

Correct Answer:
D

Rationale

Choice D is correct. It's given that triangle ABC is similar to triangle XYZ, such that A, B, and C correspond to X, Y, and Z, respectively. Therefore, side AB corresponds to side XY. Since the length of each side of triangle XYZ is 2 times the length of its corresponding side in triangle ABC, it follows that the measure of side XY is 2 times the measure of side AB. Thus, since the measure of side AB is 16, then the measure of side XY is $2(16)$, or 32.

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

Choice B is incorrect. This is the measure of side AB, not side XY.

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

Question Difficulty:
Medium

Question ID f9d40000

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Lines, angles, and triangles	

ID: f9d40000

In $\triangle XYZ$, the measure of $\angle X$ is 23° and the measure of $\angle Y$ is 66°. What is the measure of $\angle Z$?

A. 43°

B. 89°

C. 91°

D. 179°

ID: f9d40000 Answer

Correct Answer:
C

Rationale

Choice C is correct. The triangle angle sum theorem states that the sum of the measures of the interior angles of a triangle is 180°. It's given that in $\triangle XYZ$, the measure of $\angle X$ is 23° and the measure of $\angle Y$ is 66°. It follows that the measure of $\angle Z$ is $(180 - 23 - 66)^\circ$, or 91°.

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

Choice B is incorrect. This is the sum of the measures of $\angle X$ and $\angle Y$, not the measure of $\angle Z$.

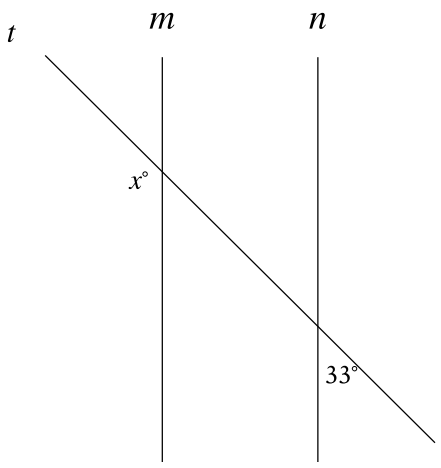
Choice D is incorrect and may result from conceptual or calculation errors.

Question Difficulty:
Easy

Question ID 0d3f51dc

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Lines, angles, and triangles	

ID: 0d3f51dc



Note: Figure not drawn to scale.

In the figure, line m is parallel to line n, and line t intersects both lines. What is the value of x?

A. 33

B. 57

C. 123

D. 147

ID: 0d3f51dc Answer

Correct Answer:
D

Rationale

Choice D is correct. It's given that line m is parallel to line n, and line t intersects both lines. It follows that line t is a transversal. When two lines are parallel and intersected by a transversal, exterior angles on the same side of the transversal are supplementary. Thus, $x + 33 = 180$. Subtracting 33 from both sides of this equation yields $x = 147$. Therefore, the value of x is 147.

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

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

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

Question Difficulty:
Easy

Question ID fd8745fc

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Lines, angles, and triangles	

ID: fd8745fc

In triangle JKL, the measures of $\angle K$ and $\angle L$ are each 48°. What is the measure of $\angle J$, in degrees? (Disregard the degree symbol when entering your answer.)

ID: fd8745fc Answer

Correct Answer:
84

Rationale

The correct answer is 84. The sum of the measures of the interior angles of a triangle is 180°. It's given that in triangle JKL, the measures of $\angle K$ and $\angle L$ are each 48°. Adding the measures, in degrees, of $\angle K$ and $\angle L$ gives $48 + 48$, or 96. Therefore, the measure of $\angle J$, in degrees, is $180 - 96$, or 84.

Question Difficulty:
Medium

Question ID b434e103

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Lines, angles, and triangles	

ID: b434e103

In $\triangle RST$, the measure of $\angle R$ is 63°. Which of the following could be the measure, in degrees, of $\angle S$?

A. 116

B. 118

C. 126

D. 180

ID: b434e103 Answer

Correct Answer:
A

Rationale

Choice A is correct. The sum of the measures of the angles of a triangle is 180°. Therefore, the sum of the measures of $\angle R$, $\angle S$, and $\angle T$ is 180°. It's given that the measure of $\angle R$ is 63°. It follows that the sum of the measures of $\angle S$ and $\angle T$ is $(180 - 63)^\circ$, or 117°. Therefore, the measure of $\angle S$, in degrees, must be less than 117. Of the given choices, only 116 is less than 117. Thus, the measure, in degrees, of $\angle S$ could be 116.

Choice B is incorrect. If the measure of $\angle S$ is 118°, then the sum of the measures of the angles of the triangle is greater than, not equal to, 180°.

Choice C is incorrect. If the measure of $\angle S$ is 126°, then the sum of the measures of the angles of the triangle is greater than, not equal to, 180°.

Choice D is incorrect. This is the sum of the measures of the angles of a triangle, in degrees.

Question Difficulty:
Easy

Question ID 3e577e4a

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Circles	

ID: 3e577e4a

A circle in the *xy*-plane has its center at $(-4, -6)$. Line k is tangent to this circle at the point $(-7, -7)$. What is the slope of line k ?

A. -3

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

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

D. 3

ID: 3e577e4a Answer

Correct Answer:
A

Rationale

Choice A is correct. A line that's tangent to a circle is perpendicular to the radius of the circle at the point of tangency. It's given that the circle has its center at $(-4, -6)$ and line k is tangent to the circle at the point $(-7, -7)$. The slope of a radius defined by the points (q, r) and (s, t) can be calculated as $\frac{t-r}{s-q}$. The points $(-7, -7)$ and $(-4, -6)$ define the radius of the circle at the point of tangency. Therefore, the slope of this radius can be calculated as $\frac{(-6)-(-7)}{(-4)-(-7)}$, or $\frac{1}{3}$. If a line and a radius are perpendicular, the slope of the line must be the negative reciprocal of the slope of the radius. The negative reciprocal of $\frac{1}{3}$ is -3. Thus, the slope of line k is -3.

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

Choice C is incorrect. This is the slope of the radius of the circle at the point of tangency, not the slope of line k.

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

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 2085e10e

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Lines, angles, and triangles	

ID: 2085e10e

In triangle DEF, the measure of angle D is 47° and the measure of angle E is 97°. In triangle RST, the measure of angle R is 47° and the measure of angle S is 97°. Which of the following additional pieces of information is needed to determine whether triangle DEF is similar to triangle RST?

A. The measure of angle F

B. The measure of angle T

C. The measure of angle F and the measure of angle T

D. No additional information is needed.

ID: 2085e10e Answer

Correct Answer:
D

Rationale

Choice D is correct. When two angles of one triangle are congruent to two angles of another triangle, the triangles are similar. It's given that in triangle DEF, the measure of angle D is 47° and the measure of angle E is 97°. It's also given that in triangle RST, the measure of angle R is 47° and the measure of angle S is 97°. It follows that angle D is congruent to angle R and that angle E is congruent to angle S. Therefore, triangle DEF is similar to triangle RST and no additional information is needed.

Choice A is incorrect and may result from conceptual errors.

Choice B is incorrect and may result from conceptual errors.

Choice C is incorrect and may result from conceptual errors.

Question Difficulty:
Medium

Question ID 689abc2a

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

ID: 689abc2a

Rectangle P has an area of 72 square inches. If a rectangle with an area of 20 square inches is removed from rectangle P, what is the area, in square inches, of the resulting figure?

A. 92

B. 84

C. 80

D. 52

ID: 689abc2a Answer

Correct Answer:
D

Rationale

Choice D is correct. It's given that rectangle P has an area of 72 square inches. If a rectangle with an area of 20 square inches is removed from rectangle P, the area, in square inches, of the resulting figure is $72 - 20$, or 52.

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

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

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

Question Difficulty:
Easy

Question ID fa2771d5

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Circles	

ID: fa2771d5

Circle A has equation $(x-7)^2+(y+3)^2=1$. In the xy-plane, circle B is obtained by translating circle A to the right 4 units. Which equation represents circle B?

A. $(x-7)^2+(y+7)^2=1$

B. $(x-3)^2+(y+3)^2=1$

C. $(x-11)^2+(y+3)^2=1$

D. $(x-7)^2+(y-1)^2=1$

ID: fa2771d5 Answer

Correct Answer:
C

Rationale

Choice C is correct. The equation of a circle in the *xy*-plane can be written as $(x-h)^2+(y-k)^2=r^2$, where the center of the circle is (h, k) and the radius of the circle is r units. It's given that circle A has the equation $(x-7)^2+(y+3)^2=1$, which can be written as $(x-7)^2+\big(y-(-3)\big)^2=1^2$. It follows that $h=7$, $k=-3$, and $r=1$. Therefore, the center of circle A is $(7,-3)$ and its radius is 1 unit. If circle A is translated 4 units to the right, the *x*-coordinate of the center will increase by 4, while the *y*-coordinate and the radius of the circle will remain unchanged. Translating the center of circle A to the right 4 units yields $(7+4,-3)$, or $(11,-3)$. Therefore, the center of circle B is $(11,-3)$. Substituting 11 for h, -3 for k, and 1 for r into the equation $(x-h)^2+(y-k)^2=r^2$ yields $(x-11)^2+\big(y-(-3)\big)^2=1$, or $(x-11)^2+(y+3)^2=1$. Therefore, the equation $(x-11)^2+(y+3)^2=1$ represents circle B.

Choice A is incorrect. This equation represents a circle obtained by shifting circle A down, rather than right, 4 units.

Choice B is incorrect. This equation represents a circle obtained by shifting circle A left, rather than right, 4 units.

Choice D is incorrect. This equation represents a circle obtained by shifting circle A up, rather than right, 4 units.

Question Difficulty:
Hard

Question ID bbaac300

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Right triangles and trigonometry	

ID: bbaac300

Triangle ABC is similar to triangle DEF, where angle A corresponds to angle D, and angles C and F are right angles. If $\cos B = \frac{1}{22}$, what is the value of $\cos E$?

A. $\frac{1}{22}$

B. $\frac{1}{23}$

C. $\frac{21}{22}$

D. $\frac{22}{23}$

ID: bbaac300 Answer

Correct Answer:
A

Rationale

Choice A is correct. The cosine of an acute angle in a right triangle is defined as the ratio of the length of the leg adjacent to that angle to the length of the hypotenuse. It's given that angle C is a right angle in triangle ABC and that angle F is a right angle in triangle DEF. Therefore, $\cos B$ is equal to the ratio of the length of side BC to the length of side AB, and $\cos E$ is equal to the ratio of the length of side EF to the length of side DE. It's also given that triangle ABC is similar to triangle DEF, where angle A corresponds to angle D. Since similar triangles have proportional side lengths, $\frac{BC}{AB} = \frac{EF}{DE}$. Therefore, the value of $\cos B$ is equal to the value of $\cos E$. Since $\cos B = \frac{1}{22}$, the value of $\cos E$ is $\frac{1}{22}$.

Choice B is incorrect and may result from conceptual errors.

Choice C is incorrect and may result from conceptual errors.

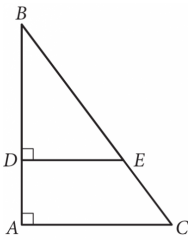
Choice D is incorrect and may result from conceptual errors.

Question Difficulty:
Easy

Question ID 55bb437a

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Right triangles and trigonometry	

ID: 55bb437a



In the figure above, $\tan B = \frac{3}{4}$. If $BC = 15$ and $DA = 4$, what is the length of $\overline{DE}$?

ID: 55bb437a Answer

Rationale

The correct answer is 6. Since $\tan B = \frac{3}{4}$, $\triangle ABC$ and $\triangle DBE$ are both similar to 3-4-5 triangles. This means that they are both similar to the right triangle with sides of lengths 3, 4, and 5. Since $BC = 15$, which is 3 times as long as the hypotenuse of the 3-4-5 triangle, the similarity ratio of $\triangle ABC$ to the 3-4-5 triangle is 3:1. Therefore, the length of $\overline{AC}$ (the side opposite to $\angle B$) is $3 \times 3 = 9$, and the length of $\overline{AB}$ (the side adjacent to $\angle B$) is $4 \times 3 = 12$. It is also given that $DA = 4$. Since $AB = DA + DB$ and $AB = 12$, it follows that $DB = 8$, which means that the similarity ratio of $\triangle DBE$ to the 3-4-5 triangle is 2:1 ($\overline{DB}$ is the side adjacent to $\angle B$). Therefore, the length of $\overline{DE}$, which is the side opposite to $\angle B$, is $3 \times 2 = 6$.

Question Difficulty:
Hard

Question ID c7bed21d

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Lines, angles, and triangles	

ID: c7bed21d

Quadrilateral $P'Q'R'S'$ is similar to quadrilateral $PQRS$, where P, Q, R, and S correspond to P', Q', R', and S', respectively. The measure of angle P is 30°, the measure of angle Q is 50°, and the measure of angle R is 70°. The length of each side of $P'Q'R'S'$ is 3 times the length of each corresponding side of $PQRS$. What is the measure of angle P'?

A. 10°

B. 30°

C. 40°

D. 90°

ID: c7bed21d Answer

Correct Answer:
B

Rationale

Choice B is correct. It's given that quadrilateral $P'Q'R'S'$ is similar to quadrilateral $PQRS$, where P, Q, R, and S correspond to P', Q', R', and S', respectively. Since corresponding angles of similar quadrilaterals are congruent, it follows that the measure of angle P is equal to the measure of angle P'. It's given that the measure of angle P is 30°. Therefore, the measure of angle P' is 30°.

Choice A is incorrect. This is $\frac{1}{3}$ the measure of angle P'.

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

Choice D is incorrect. This is 3 times the measure of angle P'.

Question Difficulty:
Medium

Question ID fecc446d

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Lines, angles, and triangles	

ID: fecc446d

A line intersects two parallel lines, forming four acute angles and four obtuse angles. The measure of one of these eight angles is $(7x - 250)^\circ$. The sum of the measures of four of the eight angles is k°. Which of the following could NOT be equivalent to k, for all values of x?

A. $-14x + 1{,}540$

B. $14x - 320$

C. $-28x + 1{,}720$

D. 360

ID: fecc446d Answer

Correct Answer:
A

Rationale

Choice A is correct. It's given that a line intersects two parallel lines, forming four acute angles and four obtuse angles. Since there are two parallel lines intersected by a transversal, all four acute angles have the same measure and all four obtuse angles have the same measure. Additionally, each acute angle is supplementary to each obtuse angle. It's given that the measure of one of these eight angles is $(7x - 250)^\circ$. It follows that a supplementary angle has measure $(180 - (7x - 250))^\circ$, or $(-7x + 430)^\circ$. It's also given that the sum of the measures of four of the eight angles is k°. It follows that the possible values of k are $4(7x - 250)$; $(7x - 250) + 3(-7x + 430)$; $2(7x - 250) + 2(-7x + 430)$; $3(7x - 250) + (-7x + 430)$; and $4(-7x + 430)$. These values are equivalent to $28x - 1{,}000$; $-14x + 1{,}040$; 360; $14x - 320$; and $-28x + 1{,}720$, respectively. It follows that of the given choices, only $-14x + 1{,}540$ could NOT be equivalent to k, for all values of x.

Choice B is incorrect. This is the sum of three angles with measure $(7x - 250)^\circ$ and one angle with measure $(-7x + 430)^\circ$.

Choice C is incorrect. This is the sum of four angles with measure $(-7x + 430)^\circ$.

Choice D is incorrect. This is the sum of two angles with measure $(7x - 250)^\circ$ and two angles with measure $(-7x + 430)^\circ$.

Question Difficulty:
Hard

Question ID 8e7689e0

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Circles	

ID: 8e7689e0

The number of radians in a 720-degree angle can be written as $a\pi$, where *a* is a constant. What is the value of *a* ?

ID: 8e7689e0 Answer

Rationale

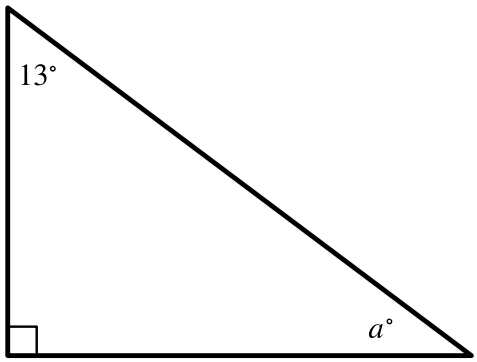
The correct answer is 4. There are π radians in a $180°$ angle. An angle measure of $720°$ is 4 times greater than an angle measure of $180°$. Therefore, the number of radians in a $720°$ angle is 4π.

Question Difficulty:
Medium

Question ID 69f4bbdc

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Lines, angles, and triangles	

ID: 69f4bbdc



Note: Figure not drawn to scale.

In the right triangle shown, what is the value of a?

A. 13

B. 77

C. 90

D. 103

ID: 69f4bbdc Answer

Correct Answer:
B

Rationale

Choice B is correct. The triangle shown is a right triangle, where the interior angle shown with a right angle symbol has a measure of 90°. It's shown that the other two interior angles measure 13° and a°. The sum of the measures of the interior angles of a triangle is 180°; therefore, $90 + 13 + a = 180$. Combining like terms on the left-hand side of this equation yields $103 + a = 180$. Subtracting 103 from both sides of this equation yields $a = 77$.

Choice A is incorrect. This is the measure, in degrees, of the other acute interior angle of the right triangle, not the value of a.

Choice C is incorrect. This is the measure, in degrees, of the right angle of the right triangle, not the value of a.

Choice D is incorrect. This is the sum of the measures, in degrees, of the other two interior angles of the right triangle, not the value of a.

Question Difficulty:
Easy

Question ID 3563d76d

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Lines, angles, and triangles	

ID: 3563d76d

At a certain time and day, the Washington Monument in Washington, DC, casts a shadow that is 300 feet long. At the same time, a nearby cherry tree casts a shadow that is 16 feet long. Given that the Washington Monument is approximately 555 feet tall, which of the following is closest to the height, in feet, of the cherry tree?

A. 10

B. 20

C. 30

D. 35

ID: 3563d76d Answer

Rationale

Choice C is correct. There is a proportional relationship between the height of an object and the length of its shadow. Let c represent the height, in feet, of the cherry tree. The given relationship can be expressed by the proportion $\frac{555}{300} = \frac{c}{16}$. Multiplying both sides of this equation by 16 yields $c = 29.6$. This height is closest to the value given in choice C, 30.

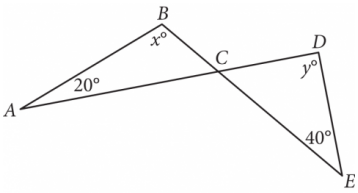
Choices A, B, and D are incorrect and may result from calculation errors.

Question Difficulty:
Easy

Question ID dfc420b2

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Lines, angles, and triangles	

ID: dfc420b2



Note: Figure not drawn to scale.

In the figure above, $\overline{AD}$ intersects $\overline{BE}$ at C. If $x = 100$, what is the value of y ?

A. 100

B. 90

C. 80

D. 60

ID: dfc420b2 Answer

Correct Answer:
C

Rationale

Choice C is correct. It's given that $x = 100$; therefore, substituting 100 for x in triangle ABC gives two known angle measures for this triangle. The sum of the measures of the interior angles of any triangle equals 180°. Subtracting the two known angle measures of triangle ABC from 180° gives the third angle measure: $180° - 100° - 20° = 60°$. This is the measure of angle BCA.

Since vertical angles are congruent, the measure of angle DCE is also 60°. Subtracting the two known angle measures of triangle CDE from 180° gives the third angle measure: $180° - 60° - 40° = 80°$. Therefore, the value of y is 80.

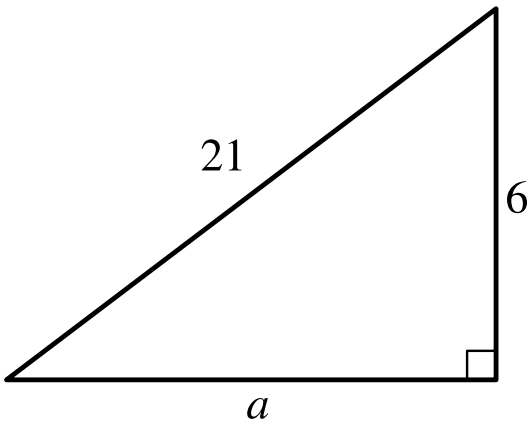
Choice A is incorrect and may result from a calculation error. Choice B is incorrect and may result from classifying angle CDE as a right angle. Choice D is incorrect and may result from finding the measure of angle BCA or DCE instead of the measure of angle CDE.

Question Difficulty:
Easy

Question ID de550be0

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Right triangles and trigonometry	

ID: de550be0



Note: Figure not drawn to scale.

For the triangle shown, which expression represents the value of a?

A. $\sqrt{21^2 - 6^2}$

B. $21^2 - 6^2$

C. $\sqrt{21 - 6}$

D. $21 - 6$

ID: de550be0 Answer

Correct Answer:
A

Rationale

Choice A is correct. For the right triangle shown, the lengths of the legs are a units and 6 units, and the length of the hypotenuse is 21 units. The Pythagorean theorem states that in a right triangle, the sum of the squares of the lengths of the two legs is equal to the square of the length of the hypotenuse. Therefore, $a^2 + 6^2 = 21^2$. Subtracting 6^2 from both sides of this equation yields $a^2 = 21^2 - 6^2$. Taking the square root of both sides of this equation yields $a = \pm\sqrt{21^2 - 6^2}$. Since a is a length, a must be positive. Therefore, $a = \sqrt{21^2 - 6^2}$. Thus, for the triangle shown, $\sqrt{21^2 - 6^2}$ represents the value of a.

Choice B is incorrect. For the triangle shown, this expression represents the value of a^2, not a.

Choice C is incorrect and may result from conceptual errors.

Choice D is incorrect and may result from conceptual errors.

Question Difficulty:
Medium

Question ID f2495de4

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Circles	

ID: f2495de4

What is the value of $\cos \frac{565\pi}{6}$?

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

B. 1

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

D. $\sqrt{3}$

ID: f2495de4 Answer

Correct Answer:
C

Rationale

Choice C is correct. The cosine of an angle is equal to the cosine of $n(2\pi)$ radians more than the angle, where n is an integer constant. Since $\frac{565\pi}{6}$ is equivalent to $47(2\pi) + \frac{\pi}{6}$, $\cos\left(\frac{565\pi}{6}\right)$ can be rewritten as $\cos\left(47(2\pi) + \frac{\pi}{6}\right)$, which is equal to $\cos\left(\frac{\pi}{6}\right)$. Therefore, the value of $\cos\left(\frac{565\pi}{6}\right)$ is equal to the value of $\cos\left(\frac{\pi}{6}\right)$, which is $\frac{\sqrt{3}}{2}$.

Alternate approach: A trigonometric ratio can be found using the unit circle, that is, a circle with radius 1 unit. The cosine of a number t is the *x*-coordinate of the point resulting from traveling a distance of t counterclockwise from the point $(1, 0)$ around a unit circle centered at the origin in the *xy*-plane. A unit circle has a circumference of 2π. It follows that since $\frac{565\pi}{6}$ is equal to $47(2\pi) + \frac{\pi}{6}$, traveling a distance of $\frac{565\pi}{6}$ counterclockwise around a unit circle means traveling around the circle completely 47 times and then another $\frac{\pi}{6}$ beyond that. That is, traveling $\frac{565\pi}{6}$ results in the same point as traveling $\frac{\pi}{6}$. Traveling $\frac{\pi}{6}$ counterclockwise from the point $(1, 0)$ around a unit circle centered at the origin in the *xy*-plane results in the point $\left(\frac{\sqrt{3}}{2}, \frac{1}{2}\right)$. Thus, the value of $\cos \frac{565\pi}{6}$ is the *x*-coordinate of the point $\left(\frac{\sqrt{3}}{2}, \frac{1}{2}\right)$, which is $\frac{\sqrt{3}}{2}$.

Choice A is incorrect. This is the value of $\sin \frac{565\pi}{6}$, not $\cos \frac{565\pi}{6}$.

Choice B is incorrect. This is the value of the cosine of a multiple of 2π, not $\frac{565\pi}{6}$.

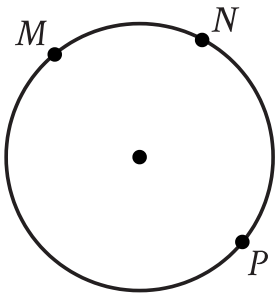
Choice D is incorrect. This is the value of $\frac{1}{\tan \frac{565\pi}{6}}$, not $\cos \frac{565\pi}{6}$.

Question Difficulty:
Easy

Question ID 800e71b8

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Circles	

ID: 800e71b8



Points M, N, and P lie on the circle shown. On this circle, minor arc MN has a length of 39 centimeters and major arc MPN has a length of 195 centimeters. What is the circumference, in centimeters, of the circle shown?

A. 39

B. 156

C. 195

D. 234

ID: 800e71b8 Answer

Correct Answer:
D

Rationale

Choice D is correct. Since the endpoints of minor arc MN and major arc MPN are the same, and the arcs together form a full circle, the sum of the lengths of these two arcs is equal to the circumference of the circle. It's given that the length of minor arc MN is 39 centimeters and the length of major arc MPN is 195 centimeters. Therefore, the circumference of the circle, in centimeters, is $39 + 195$, or 234.

Choice A is incorrect. This is the length, in centimeters, of minor arc MN, not the circumference, in centimeters, of the circle.

Choice B is incorrect. This is the difference of the lengths of major arc MPN and minor arc MN, in centimeters.

Choice C is incorrect. This is the length, in centimeters, of major arc MPN, not the circumference, in centimeters, of the circle.

Question Difficulty:
Medium

Question ID 901e3285

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Lines, angles, and triangles	

ID: 901e3285

In triangle *ABC*, the measure of angle *A* is $50°$. If triangle *ABC* is isosceles, which of the following is NOT a possible measure of angle *B* ?

A. $50°$

B. $65°$

C. $80°$

D. $100°$

ID: 901e3285 Answer

Correct Answer:
D

Rationale

Choice D is correct. The sum of the three interior angles in a triangle is $180°$. It's given that angle A measures $50°$. If angle B measured $100°$, the measure of angle C would be $180° - (50° + 100°) = 30°$. Thus, the measures of the angles in the triangle would be $50°$, $100°$, and $30°$. However, an isosceles triangle has two angles of equal measure. Therefore, angle B can't measure $100°$.

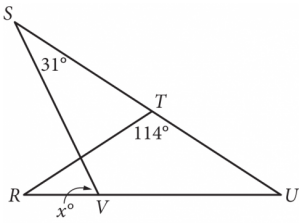
Choice A is incorrect. If angle B has measure $50°$, then angle C would measure $180° - (50° + 50°) = 80°$, and $50°$, $50°$, and $80°$ could be the angle measures of an isosceles triangle. Choice B is incorrect. If angle B has measure $65°$, then angle C would measure $180° - (65° + 50°) = 65°$, and $50°$, $65°$, and $65°$ could be the angle measures of an isosceles triangle. Choice C is incorrect. If angle B has measure $80°$, then angle C would measure $180° - (80° + 50°) = 50°$, and $50°$, $80°$, and $50°$ could be the angle measures of an isosceles triangle.

Question Difficulty:
Medium

Question ID bd7f6e30

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Lines, angles, and triangles	

ID: bd7f6e30



In the figure above, $RT = TU$.

What is the value of x ?

A. 72

B. 66

C. 64

D. 58

ID: bd7f6e30 Answer

Correct Answer:
C

Rationale

Choice C is correct. Since $RT = TU$, it follows that $\triangle RTU$ is an isosceles triangle with base RU. Therefore, $\angle TRU$ and $\angle TUR$ are the base angles of an isosceles triangle and are congruent. Let the measures of both $\angle TRU$ and $\angle TUR$ be $t°$. According to the triangle sum theorem, the sum of the measures of the three angles of a triangle is $180°$. Therefore, $114° + 2t° = 180°$, so $t = 33$.

Note that $\angle TUR$ is the same angle as $\angle SUV$. Thus, the measure of $\angle SUV$ is $33°$. According to the triangle exterior angle theorem, an external angle of a triangle is equal to the sum of the opposite interior angles. Therefore, $x°$ is equal to the sum of the measures of $\angle VSU$ and $\angle SUV$; that is, $31° + 33° = 64°$. Thus, the value of x is 64.

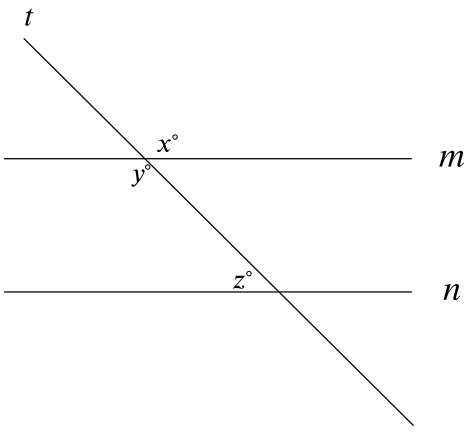
Choice B is incorrect. This is the measure of $\angle STR$, but $\angle STR$ is not congruent to $\angle SVR$. Choices A and D are incorrect and may result from a calculation error.

Question Difficulty:
Hard

Question ID 2adbf1b1

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Lines, angles, and triangles	

ID: 2adbf1b1



Note: Figure not drawn to scale.

In the figure, lines m and n are parallel. If $x = 6k + 13$ and $y = 8k - 29$, what is the value of z?

A. 3

B. 21

C. 41

D. 139

ID: 2adbf1b1 Answer

Correct Answer:
C

Rationale

Choice C is correct. Vertical angles, which are angles that are opposite each other when two lines intersect, are congruent. The figure shows that lines t and m intersect. It follows that the angle with measure x° and the angle with measure y° are vertical angles, so $x = y$. It's given that $x = 6k + 13$ and $y = 8k - 29$. Substituting $6k + 13$ for x and $8k - 29$ for y in the equation $x = y$ yields $6k + 13 = 8k - 29$. Subtracting $6k$ from both sides of this equation yields $13 = 2k - 29$. Adding 29 to both sides of this equation yields $42 = 2k$, or $2k = 42$. Dividing both sides of this equation by 2 yields $k = 21$. It's given that lines m and n are parallel, and the figure shows that lines m and n are intersected by a transversal, line t. If two parallel lines are intersected by a transversal, then the same-side interior angles are supplementary. It follows that the same-side interior angles with measures y° and z° are supplementary, so $y + z = 180$. Substituting $8k - 29$ for y in this equation yields $8k - 29 + z = 180$. Substituting 21 for k in this equation yields $8(21) - 29 + z = 180$, or $139 + z = 180$. Subtracting 139 from both sides of this equation yields $z = 41$. Therefore, the value of z is 41.

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

Choice B is incorrect. This is the value of k, not z.

Choice D is incorrect. This is the value of x or y, not z.

Question Difficulty:
Medium

Question ID 6708546e

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

ID: 6708546e

Parallelogram $ABCD$ is similar to parallelogram $PQRS$. The length of each side of parallelogram $PQRS$ is 2 times the length of its corresponding side of parallelogram $ABCD$. The area of parallelogram $ABCD$ is 5 square centimeters. What is the area, in square centimeters, of parallelogram $PQRS$?

A. 7

B. 10

C. 20

D. 25

ID: 6708546e Answer

Correct Answer:
C

Rationale

Choice C is correct. It's given that parallelogram $ABCD$ is similar to parallelogram $PQRS$. When two parallelograms are similar, if the scale factor between their corresponding side lengths is k, the scale factor between their areas is k^2. It's given that the length of each side of parallelogram $PQRS$ is 2 times the length of its corresponding side of parallelogram $ABCD$, so the scale factor between their corresponding side lengths is 2. It follows that the scale factor between their areas is 2^2, or 4. It's given that the area, in square centimeters, of parallelogram $ABCD$ is 5. It follows that the area, in square centimeters, of parallelogram $PQRS$ is $5(4)$, or 20.

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

Choice B 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 ffe862a3

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Right triangles and trigonometry	

ID: ffe862a3

An isosceles right triangle has a hypotenuse of length 58 inches. What is the perimeter, in inches, of this triangle?

A. $29\sqrt{2}$

B. $58\sqrt{2}$

C. $58 + 58\sqrt{2}$

D. $58 + 116\sqrt{2}$

ID: ffe862a3 Answer

Correct Answer:
C

Rationale

Choice C is correct. Since the triangle is an isosceles right triangle, the two sides that form the right angle must be the same length. Let x be the length, in inches, of each of those sides. The Pythagorean theorem states that in a right triangle, $a^2 + b^2 = c^2$, where c is the length of the hypotenuse and a and b are the lengths of the other two sides. Substituting x for a, x for b, and 58 for c in this equation yields $x^2 + x^2 = 58^2$, or $2x^2 = 58^2$. Dividing each side of this equation by 2 yields $x^2 = \frac{58^2}{2}$, or $x^2 = \frac{2 \cdot 58^2}{4}$. Taking the square root of each side of this equation yields two solutions: $x = \frac{58\sqrt{2}}{2}$ and $x = -\frac{58\sqrt{2}}{2}$. The value of x must be positive because it represents a side length. Therefore, $x = \frac{58\sqrt{2}}{2}$, or $x = 29\sqrt{2}$. The perimeter, in inches, of the triangle is $58 + x + x$, or $58 + 2x$. Substituting $29\sqrt{2}$ for x in this expression gives a perimeter, in inches, of $58 + 2\left(29\sqrt{2}\right)$, or $58 + 58\sqrt{2}$.

Choice A is incorrect. This is the length, in inches, of each of the congruent sides of the triangle, not the perimeter, in inches, of the triangle.

Choice B is incorrect. This is the sum of the lengths, in inches, of the congruent sides of the triangle, not the perimeter, in inches, of the triangle.

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

Question Difficulty:
Hard

Question ID 24cec8d1

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Circles	

ID: 24cec8d1

A circle has center O, and points R and S lie on the circle. In triangle ORS, the measure of $\angle ROS$ is 88°. What is the measure of $\angle RSO$, in degrees? (Disregard the degree symbol when entering your answer.)

ID: 24cec8d1 Answer

Correct Answer:
46

Rationale

The correct answer is 46. It's given that O is the center of a circle and that points R and S lie on the circle. Therefore, $\overline{OR}$ and $\overline{OS}$ are radii of the circle. It follows that $OR = OS$. If two sides of a triangle are congruent, then the angles opposite them are congruent. It follows that the angles $\angle RSO$ and $\angle ORS$, which are across from the sides of equal length, are congruent. Let x° represent the measure of $\angle RSO$. It follows that the measure of $\angle ORS$ is also x°. It's given that the measure of $\angle ROS$ is 88°. Because the sum of the measures of the interior angles of a triangle is 180°, the equation $x^\circ + x^\circ + 88^\circ = 180^\circ$, or $2x + 88 = 180$, can be used to find the measure of $\angle RSO$. Subtracting 88 from both sides of this equation yields $2x = 92$. Dividing both sides of this equation by 2 yields $x = 46$. Therefore, the measure of $\angle RSO$, in degrees, is 46.

Question Difficulty:
Hard

Question ID 8c1aa743

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

ID: 8c1aa743

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: 8c1aa743 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 44b2b894

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Right triangles and trigonometry	

ID: 44b2b894

A rectangle is inscribed in a circle, such that each vertex of the rectangle lies on the circumference of the circle. The diagonal of the rectangle is twice the length of the shortest side of the rectangle. The area of the rectangle is $1{,}089\sqrt{3}$ square units. What is the length, in units, of the diameter of the circle?

ID: 44b2b894 Answer

Correct Answer:
66

Rationale

The correct answer is 66. It's given that each vertex of the rectangle lies on the circumference of the circle. Therefore, the length of the diameter of the circle is equal to the length of the diagonal of the rectangle. The diagonal of a rectangle forms a right triangle with the shortest and longest sides of the rectangle, where the shortest side and the longest side of the rectangle are the legs of the triangle and the diagonal of the rectangle is the hypotenuse of the triangle. Let s represent the length, in units, of the shortest side of the rectangle. Since it's given that the diagonal is twice the length of the shortest side, $2s$ represents the length, in units, of the diagonal of the rectangle. By the Pythagorean theorem, if a right triangle has a hypotenuse with length c and legs with lengths a and b, then $a^2 + b^2 = c^2$. Substituting s for a and $2s$ for c in this equation yields $s^2 + b^2 = (2s)^2$, or $s^2 + b^2 = 4s^2$. Subtracting s^2 from both sides of this equation yields $b^2 = 3s^2$. Taking the positive square root of both sides of this equation yields $b = s\sqrt{3}$. Therefore, the length, in units, of the rectangle's longest side is $s\sqrt{3}$. The area of a rectangle is the product of the length of the shortest side and the length of the longest side. The lengths, in units, of the shortest and longest sides of the rectangle are represented by s and $s\sqrt{3}$, and it's given that the area of the rectangle is $1{,}089\sqrt{3}$ square units. It follows that $1{,}089\sqrt{3} = s\left(s\sqrt{3}\right)$, or $1{,}089\sqrt{3} = s^2\sqrt{3}$. Dividing both sides of this equation by $\sqrt{3}$ yields $1{,}089 = s^2$. Taking the positive square root of both sides of this equation yields $33 = s$. Since the length, in units, of the diagonal is represented by $2s$, it follows that the length, in units, of the diagonal is $2(33)$, or 66. Since the length of the diameter of the circle is equal to the length of the diagonal of the rectangle, the length, in units, of the diameter of the circle is 66.

Question Difficulty:
Hard

Question ID 7700d098

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Right triangles and trigonometry	

ID: 7700d098

One leg of a right triangle has a length of 43.2 millimeters. The hypotenuse of the triangle has a length of 196.8 millimeters. What is the length of the other leg of the triangle, in millimeters?

A. 43.2

B. 120

C. 192

D. 201.5

ID: 7700d098 Answer

Correct Answer:
C

Rationale

Choice C is correct. The Pythagorean theorem states that for a right triangle, the sum of the squares of the lengths of the two legs is equal to the square of the length of the hypotenuse. It's given that one leg of a right triangle has a length of 43.2 millimeters. It's also given that the hypotenuse of the triangle has a length of 196.8 millimeters. Let b represent the length of the other leg of the triangle, in millimeters. Therefore, by the Pythagorean theorem, $43.2^2 + b^2 = 196.8^2$, or $1{,}866.24 + b^2 = 38{,}730.24$. Subtracting $1{,}866.24$ from both sides of this equation yields $b^2 = 36{,}864$. Taking the positive square root of both sides of this equation yields $b = 192$. Therefore, the length of the other leg of the triangle, in millimeters, is 192.

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

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

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

Question Difficulty:
Medium

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 9e44284b

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Circles	

ID: 9e44284b

In the *xy*-plane, the graph of $2x^2-6x+2y^2+2y=45$ is a circle. What is the radius of the circle?

A. 5

B. 6.5

C. $\sqrt{40}$

D. $\sqrt{50}$

ID: 9e44284b Answer

Correct Answer:
A

Rationale

Choice A is correct. One way to find the radius of the circle is to rewrite the given equation in standard form, $(x-h)^2+(y-k)^2=r^2$, where (h,k) is the center of the circle and the radius of the circle is r. To do this, divide the original equation, $2x^2-6x+2y^2+2y=45$, by 2 to make the leading coefficients of x^2 and y^2 each equal to 1: $x^2-3x+y^2+y=22.5$. Then complete the square to put the equation in standard form. To do so, first rewrite $x^2-3x+y^2+y=22.5$ as $(x^2-3x+2.25)-2.25+(y^2+y+0.25)-0.25=22.5$. Second, add 2.25 and 0.25 to both sides of the equation: $(x^2-3x+2.25)+(y^2+y+0.25)=25$. Since $x^2-3x+2.25=(x-1.5)^2$, $y^2+y+0.25=(y+0.5)^2$, and $25=5^2$, it follows that $(x-1.5)^2+(y+0.5)^2=5^2$. Therefore, the radius of the circle is 5.

Choices B, C, and D are incorrect and may be the result of errors in manipulating the equation or of a misconception about the standard form of the equation of a circle in the xy-plane.

Question Difficulty:
Hard

Question ID 54df8076

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Right triangles and trigonometry	

ID: 54df8076

The perimeter of an equilateral triangle is 852 centimeters. The three vertices of the triangle lie on a circle. The radius of the circle is $w\sqrt{3}$ centimeters. What is the value of w?

ID: 54df8076 Answer

Correct Answer:
284/3, 94.66, 94.67

Rationale

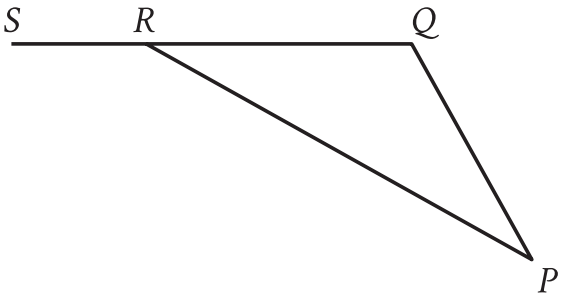
The correct answer is $\frac{284}{3}$. Since the perimeter of a triangle is the sum of the lengths of its sides, and the given triangle is equilateral, the length of each side is $\frac{852}{3}$, or 284, centimeters (cm). Right triangle AMO can be formed, where M is the midpoint of one of the triangle's sides, A is one of this side's endpoints, and O is the center of the circle. It follows that AM is $\frac{284}{2}$, or 142, cm. Additionally, triangle AMO has angles measuring 30°, 60°, and 90°, where the measure of angle OMA is 90° and the measure of angle OAM is 30°. It follows that the length of side MO is half the length of hypotenuse AO, and the length of side AM is $\sqrt{3}$ times the length of side MO. It's given that $AO = w\sqrt{3}$ cm. Therefore, $MO = \frac{w\sqrt{3}}{2}$ cm and $AM = \frac{w\sqrt{3}\sqrt{3}}{2}$ cm, which is equivalent to $AM = \frac{3w}{2}$ cm. Since $AM = 142$ cm, it follows that $\frac{3w}{2} = 142$. Multiplying both sides of this equation by 2 yields $3w = 284$. Dividing both sides of this equation by 3 yields $w = \frac{284}{3}$. Note that 284/3, 94.66, and 94.67 are examples of ways to enter a correct answer.

Question Difficulty:
Hard

Question ID 014edcb7

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Lines, angles, and triangles	

ID: 014edcb7



Note: Figure not drawn to scale.

In triangle PQR, $\overline{QR}$ is extended to point S. The measure of $\angle PQR$ is 132°, and the measure of $\angle PRS$ is 163°. What is the measure of $\angle QPR$?

A. 48°

B. 31°

C. 24°

D. 17°

ID: 014edcb7 Answer

Correct Answer:
B

Rationale

Choice B is correct. In the figure shown, since $\overline{QS}$ is a line segment, the sum of the measures of $\angle PRS$ and $\angle PRQ$ is 180°. It's given that the measure of $\angle PRS$ is 163°. Thus, the measure of $\angle PRQ$ is $(180 - 163)^\circ$, or 17°. The sum of the measures of the interior angles of a triangle is 180°. It's given that the measure of $\angle PQR$ is 132°. Therefore, the measure of $\angle QPR$ is $(180 - 17 - 132)^\circ$, or 31°.

Choice A is incorrect. This is the measure of the supplement of $\angle PQR$, not the measure of $\angle QPR$.

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

Choice D is incorrect. This is the measure of $\angle PRQ$, not the measure of $\angle QPR$.

Question Difficulty:
Medium

Question ID 568d66a7

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Right triangles and trigonometry	

ID: 568d66a7

An isosceles right triangle has a perimeter of $94 + 94\sqrt{2}$ inches. What is the length, in inches, of one leg of this triangle?

A. 47

B. $47\sqrt{2}$

C. 94

D. $94\sqrt{2}$

ID: 568d66a7 Answer

Correct Answer:
B

Rationale

Choice B is correct. It's given that the right triangle is isosceles. In an isosceles right triangle, the two legs have equal lengths, and the length of the hypotenuse is $\sqrt{2}$ times the length of one of the legs. Let ℓ represent the length, in inches, of each leg of the isosceles right triangle. It follows that the length of the hypotenuse is $\ell\sqrt{2}$ inches. The perimeter of a figure is the sum of the lengths of the sides of the figure. Therefore, the perimeter of the isosceles right triangle is $\ell + \ell + \ell\sqrt{2}$ inches. It's given that the perimeter of the triangle is $94 + 94\sqrt{2}$ inches. It follows that $\ell + \ell + \ell\sqrt{2} = 94 + 94\sqrt{2}$. Factoring the left-hand side of this equation yields $\left(1 + 1 + \sqrt{2}\right)\ell = 94 + 94\sqrt{2}$, or $\left(2 + \sqrt{2}\right)\ell = 94 + 94\sqrt{2}$. Dividing both sides of this equation by $2 + \sqrt{2}$ yields $\ell = \frac{94+94\sqrt{2}}{2+\sqrt{2}}$. Rationalizing the denominator of the right-hand side of this equation by multiplying the right-hand side of the equation by $\frac{2-\sqrt{2}}{2-\sqrt{2}}$ yields $\ell = \frac{\left(94+94\sqrt{2}\right)\left(2-\sqrt{2}\right)}{\left(2+\sqrt{2}\right)\left(2-\sqrt{2}\right)}$. Applying the distributive property to the numerator and to the denominator of the right-hand side of this equation yields $\ell = \frac{188-94\sqrt{2}+188\sqrt{2}-94\sqrt{4}}{4-2\sqrt{2}+2\sqrt{2}-\sqrt{4}}$. This is equivalent to $\ell = \frac{94\sqrt{2}}{2}$, or $\ell = 47\sqrt{2}$. Therefore, the length, in inches, of one leg of the isosceles right triangle is $47\sqrt{2}$.

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

Choice C is incorrect. This is the length, in inches, of the hypotenuse.

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

Question Difficulty:
Hard

Question ID 322a6dfe

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Lines, angles, and triangles	

ID: 322a6dfe

Quadrilaterals $PQRS$ and $WXYZ$ are similar, where P, Q, and R correspond to W, X, and Y, respectively. The measure of $\angle S$ is 135°, $PS = 45$, and $WZ = 9$. What is the measure of $\angle Z$?

A. 5°

B. 27°

C. 45°

D. 135°

ID: 322a6dfe Answer

Correct Answer:
D

Rationale

Choice D is correct. Corresponding angles in similar figures have equal measure. It's given that quadrilaterals $PQRS$ and $WXYZ$ are similar and that P, Q, and R correspond to W, X, and Y. It follows that $\angle S$ corresponds to $\angle Z$. It's also given that the measure of $\angle S$ is 135°. Therefore, the measure of $\angle Z$ is 135°.

Choice A is incorrect and may result from conceptual errors.

Choice B is incorrect and may result from conceptual errors.

Choice C is incorrect. This is the supplement of the measure of $\angle Z$, not the measure of $\angle Z$.

Question Difficulty:
Hard

Question ID 0e709a29

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Right triangles and trigonometry	

ID: 0e709a29

$$RS = 440$$
$$ST = 384$$
$$TR = 584$$

The side lengths of right triangle RST are given. Triangle RST is similar to triangle UVW, where S corresponds to V and T corresponds to W. What is the value of $\tan W$?

A. $\frac{48}{73}$

B. $\frac{55}{73}$

C. $\frac{48}{55}$

D. $\frac{55}{48}$

ID: 0e709a29 Answer

Correct Answer:
D

Rationale

Choice D is correct. The hypotenuse of triangle RST is the longest side and is across from the right angle. The longest side length given is 584, which is the length of side TR. Therefore, the hypotenuse of triangle RST is side TR, so the right angle is angle S. The tangent of an acute angle in a right triangle is the ratio of the length of the opposite side, which is the side across from the angle, to the length of the adjacent side, which is the side closest to the angle that is not the hypotenuse. It follows that the opposite side of angle T is side RS and the adjacent side of angle T is side ST. Therefore, $\tan T = \frac{RS}{ST}$. Substituting 440 for RS and 384 for ST in this equation yields $\tan T = \frac{440}{384}$. This is equivalent to $\tan T = \frac{55}{48}$. It's given that triangle RST is similar to triangle UVW, where S corresponds to V and T corresponds to W. It follows that R corresponds to U. Therefore, the hypotenuse of triangle UVW is side WU, which means $\tan W = \frac{UV}{VW}$. Since the lengths of corresponding sides of similar triangles are proportional, $\frac{RS}{ST} = \frac{UV}{VW}$. Therefore, $\tan W = \frac{UV}{VW}$ is equivalent to $\tan W = \frac{RS}{ST}$, or $\tan W = \tan T$. Thus, $\tan W = \frac{55}{48}$.

Choice A is incorrect. This is the value of $\cos W$, not $\tan W$.

Choice B is incorrect. This is the value of $\sin W$, not $\tan W$.

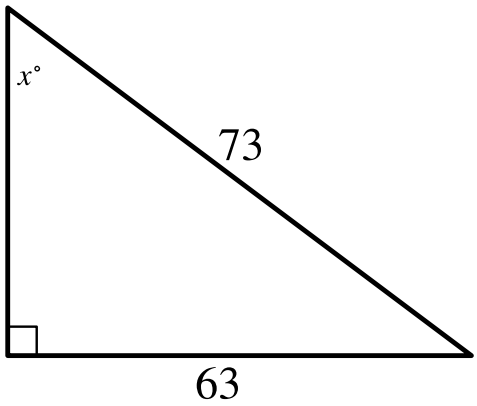
Choice C is incorrect. This is the value of $\frac{1}{\tan W}$, not $\tan W$.

Question Difficulty:
Hard

Question ID a6097ec2

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Right triangles and trigonometry	

ID: a6097ec2



Note: Figure not drawn to scale.

In the right triangle shown, what is the value of $\sin x^\circ$?

A. $\frac{1}{73}$

B. $\frac{10}{73}$

C. $\frac{63}{73}$

D. $\frac{136}{73}$

ID: a6097ec2 Answer

Correct Answer:
C

Rationale

Choice C is correct. The sine of an acute angle in a right triangle is the ratio of the length of the side opposite that angle to the length of the hypotenuse. In the right triangle shown, it's given that the length of the side opposite the angle with measure x° is 63 units and the length of the hypotenuse is 73 units. Therefore, the value of $\sin x^\circ$ is $\frac{63}{73}$.

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

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

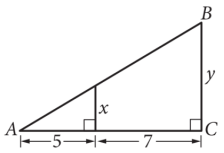
Choice D is incorrect and may result from conceptual or calculation errors.

Question Difficulty:
Easy

Question ID eeb4143c

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Lines, angles, and triangles	

ID: eeb4143c



Note: Figure not drawn to scale.

The area of triangle *ABC* above is at least 48 but no more than 60. If *y* is an integer, what is one possible value of *x* ?

ID: eeb4143c Answer

Rationale

The correct answer is either $\frac{10}{3}$, $\frac{15}{4}$, or $\frac{25}{6}$. The area of triangle ABC can be expressed as $\frac{1}{2}(5+7)y$ or $6y$. It's given that the area of triangle ABC is at least 48 but no more than 60. It follows that $48 \le 6y \le 60$. Dividing by 6 to isolate y in this compound inequality yields $8 \le y \le 10$. Since y is an integer, $y = 8, 9,$ or 10. In the given figure, the two right triangles shown are similar because they have two pairs of congruent angles: their respective right angles and angle A. Therefore, the following proportion is true: $\frac{x}{y} = \frac{5}{12}$. Substituting 8 for y in the proportion results in $\frac{x}{8} = \frac{5}{12}$. Cross multiplying and solving for x yields $\frac{10}{3}$. Substituting 9 for y in the proportion results in $\frac{x}{9} = \frac{5}{12}$. Cross multiplying and solving for x yields $\frac{15}{4}$. Substituting 10 for y in the proportion results in $\frac{x}{10} = \frac{5}{12}$. Cross multiplying and solving for x yields $\frac{25}{6}$. Note that 10/3, 15/4, 25/6, 3.333, 3.75, 4.166, and 4.167 are examples of ways to enter a correct answer.

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 fc8aa563

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Circles	

ID: fc8aa563

What is the center of the circle in the *xy*-plane defined by the equation $(x-1)^2+(y+7)^2=1$?

A. $(-1,-7)$

B. $(-1,7)$

C. $(1,-7)$

D. $(1,7)$

ID: fc8aa563 Answer

Correct Answer:
C

Rationale

Choice C is correct. The equation of a circle in the *xy*-plane can be written as $(x-h)^2+(y-k)^2=r^2$, where the center of the circle is (h,k) and the radius of the circle is r. It's given that the circle in the *xy*-plane is defined by the equation $(x-1)^2+(y+7)^2=1$. This equation can be written as $(x-1)^2+(y-(-7))^2=1$. For this equation, it follows that $h=1$ and $k=-7$. Therefore, the center of the circle in the *xy*-plane defined by the given equation is $(1,-7)$.

Choice A is incorrect. This is the center of the circle in the *xy*-plane that is defined by the equation $(x+1)^2+(y+7)^2=1$, not $(x-1)^2+(y+7)^2=1$.

Choice B is incorrect. This is the center of the circle in the *xy*-plane that is defined by the equation $(x+1)^2+(y-7)^2=1$, not $(x-1)^2+(y+7)^2=1$.

Choice D is incorrect. This is the center of the circle in the *xy*-plane that is defined by the equation $(x-1)^2+(y-7)^2=1$, not $(x-1)^2+(y+7)^2=1$.

Question Difficulty:
Medium

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 2855cb58

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Circles	

ID: 2855cb58

A circle in the *xy*-plane has its center at $(16, 17)$ and has a radius of $7k$. Which equation represents this circle?

A. $(x-16)^2+(y-17)^2=49k$

B. $(x-16)^2+(y-17)^2=49k^2$

C. $(x-16)^2+(y-17)^2=7k$

D. $(x-16)^2+(y-17)^2=7k^2$

ID: 2855cb58 Answer

Correct Answer:
B

Rationale

Choice B is correct. The equation of a circle in the *xy*-plane can be written as $(x-h)^2+(y-k)^2=r^2$, where the center of the circle is (h, k) and the radius of the circle is r. It's given that this circle has a center at $(16, 17)$ and a radius of $7k$. Substituting 16 for h, 17 for k, and $7k$ for r in $(x-h)^2+(y-k)^2=r^2$ yields $(x-16)^2+(y-17)^2=(7k)^2$, or $(x-16)^2+(y-17)^2=49k^2$. Therefore, the equation that represents this circle is $(x-16)^2+(y-17)^2=49k^2$.

Choice A is incorrect. This equation represents a circle with radius $7\sqrt{k}$, not $7k$.

Choice C is incorrect. This equation represents a circle with radius $\sqrt{7k}$, not $7k$.

Choice D is incorrect. This equation represents a circle with radius $\sqrt{7k}$, not $7k$.

Question Difficulty:
Hard

Question ID 575f1e12

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

ID: 575f1e12

What is the area, in square centimeters, of a rectangle with a length of 34 centimeters (cm) and a width of 29 cm?

ID: 575f1e12 Answer

Correct Answer:
986

Rationale

The correct answer is 986. The area, A, of a rectangle is given by $A = \ell w$, where ℓ is the length of the rectangle and w is its width. It's given that the length of the rectangle is 34 centimeters (cm) and the width is 29 cm. Substituting 34 for ℓ and 29 for w in the equation $A = \ell w$ yields $A = (34)(29)$, or $A = 986$. Therefore, the area, in square centimeters, of this rectangle is 986.

Question Difficulty:
Easy

Question ID 74d8b897

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Circles	

ID: 74d8b897

An angle has a measure of $\frac{9\pi}{20}$ radians. What is the measure of the angle in degrees?

ID: 74d8b897 Answer

Correct Answer:
81

Rationale

The correct answer is 81. The measure of an angle, in degrees, can be found by multiplying its measure, in radians, by $\frac{180 \text{ degrees}}{\pi \text{ radians}}$. Multiplying the given angle measure, $\frac{9\pi}{20}$ radians, by $\frac{180 \text{ degrees}}{\pi \text{ radians}}$ yields $\left(\frac{9\pi}{20} \text{ radians}\right)\left(\frac{180 \text{ degrees}}{\pi \text{ radians}}\right)$, which is equivalent to 81 degrees.

Question Difficulty:
Medium

Question ID b4767bef

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

ID: b4767bef

The lengths of two sides of a triangle are 4 centimeters and 6 centimeters. If the perimeter of the triangle is 18 centimeters, what is the length, in centimeters, of the third side of this triangle?

A. 2

B. 8

C. 10

D. 24

ID: b4767bef Answer

Correct Answer:
B

Rationale

Choice B is correct. The perimeter of a triangle is the sum of the lengths of all three of its sides. It's given that the lengths of two sides of a triangle are 4 centimeters and 6 centimeters. Let x represent the length, in centimeters, of the third side of this triangle. The sum of the lengths, in centimeters, of all three sides of the triangle can be represented by the expression $4 + 6 + x$. Since it's given that the perimeter of the triangle is 18 centimeters, it follows that $4 + 6 + x = 18$, or $10 + x = 18$. Subtracting 10 from both sides of this equation yields $x = 8$. Therefore, the length, in centimeters, of the third side of this triangle is 8.

Choice A is incorrect. If the length of the third side of this triangle were 2 centimeters, the perimeter, in centimeters, of the triangle would be $4 + 6 + 2$, or 12, not 18.

Choice C is incorrect. If the length of the third side of this triangle were 10 centimeters, the perimeter, in centimeters, of the triangle would be $4 + 6 + 10$, or 20, not 18.

Choice D is incorrect. If the length of the third side of this triangle were 24 centimeters, the perimeter, in centimeters, of the triangle would be $4 + 6 + 24$, or 34, not 18.

Question Difficulty:
Easy

Question ID ee540927

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Circles	

ID: ee540927

$$x^2 + 58x + y^2 = 0$$

In the *xy*-plane, the graph of the given equation is a circle. What are the coordinates (x, y) of the center of the circle?

A. $(0, 29)$

B. $(0, -29)$

C. $(29, 0)$

D. $(-29, 0)$

ID: ee540927 Answer

Correct Answer:
D

Rationale

Choice D is correct. It's given that in the *xy*-plane, the graph of $x^2 + 58x + y^2 = 0$ is a circle. The equation of a circle in the *xy*-plane can be written as $(x - h)^2 + (y - k)^2 = r^2$, where the coordinates of the center of the circle are (h, k) and the radius of the circle is r. By completing the square, the equation $x^2 + 58x + y^2 = 0$ can be rewritten as $\left(x^2 + 58x + \left(\frac{58}{2}\right)^2\right) + y^2 = 0 + \left(\frac{58}{2}\right)^2$, or $\left(x^2 + 58x + 841\right) + y^2 = 841$. This equation is equivalent to $(x + 29)^2 + y^2 = 841$, or $(x - (-29))^2 + (y - 0)^2 = 841$. Therefore, h is -29 and k is 0, and the coordinates (x, y) of the center of the circle are $(-29, 0)$.

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

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

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

Question Difficulty:
Medium

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 $r^2=\frac{1}{9}$.

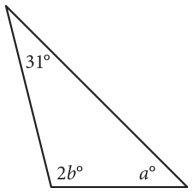
Question Difficulty:

Hard

Question ID 410bdbe6

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Lines, angles, and triangles	

ID: 410bdbe6



In the triangle above, $a = 45$. What is the value of b ?

A. 52

B. 59

C. 76

D. 104

ID: 410bdbe6 Answer

Correct Answer:
A

Rationale

Choice A is correct. The sum of the measures of the three interior angles of a triangle is 180°. Therefore, $31 + 2b + a = 180$. Since it's given that $a = 45$, it follows that $31 + 2b + 45 = 180$, or $2b = 104$. Dividing both sides of this equation by 2 yields $b = 52$.

Choice B is incorrect and may result from a calculation error. Choice C is incorrect. This is the value of $a + 31$. Choice D is incorrect. This is the value of $2b$.

Question Difficulty:
Easy

Question ID a0cacec1

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Circles	

ID: a0cacec1

An angle has a measure of $\frac{16\pi}{15}$ radians. What is the measure of the angle, in degrees?

ID: a0cacec1 Answer

Correct Answer:
192

Rationale

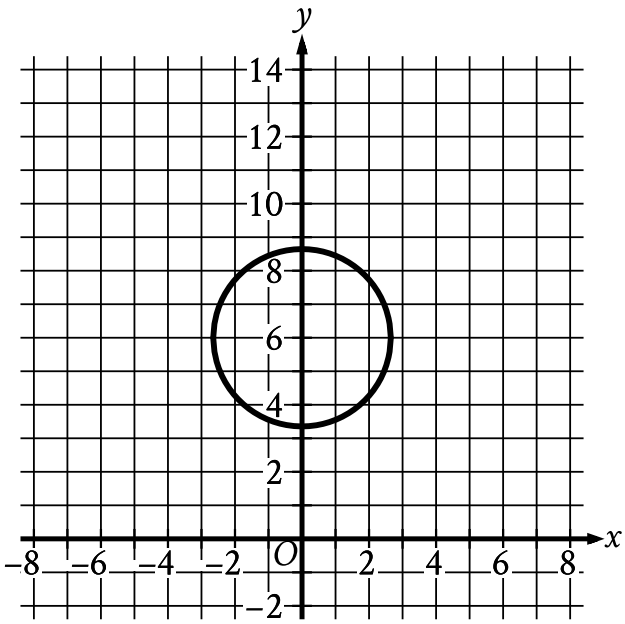
The correct answer is 192. The measure of an angle, in degrees, can be found by multiplying its measure, in radians, by $\frac{180 \text{ degrees}}{\pi \text{ radians}}$. Multiplying the given angle measure, $\frac{16\pi}{15}\text{radians}$, by $\frac{180 \text{ degrees}}{\pi \text{ radians}}$ yields $\left(\frac{16\pi}{15}\text{radians}\right)\left(\frac{180 \text{ degrees}}{\pi \text{ radians}}\right)$, which simplifies to 192 degrees.

Question Difficulty:
Medium

Question ID 1b2b20b9

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Circles	

ID: 1b2b20b9



Circle A shown is defined by the equation $x^2 + (y - 6)^2 = 7$. Circle B (not shown) has the same radius but is translated 96 units to the right. If the equation of circle B is $(x - h)^2 + (y - k)^2 = a$, where h, k, and a are constants, what is the value of $4a$?

ID: 1b2b20b9 Answer

Correct Answer:
28

Rationale

The correct answer is 28. The equation of a circle in the *xy*-plane can be written as $(x - t)^2 + (y - s)^2 = r^2$, where the center of the circle is (t, s) and the radius of the circle is r. It's given that circle A is defined by the equation $x^2 + (y - 6)^2 = 7$, which can be written as $(x - 0)^2 + (y - 6)^2 = \left(\sqrt{7}\right)^2$. It follows that $r = \sqrt{7}$ and the radius of circle A is $\sqrt{7}$. It's also given that circle B has the same radius as circle A. If the equation of circle B is $(x - h)^2 + (y - k)^2 = a$, then $a = r^2$. Substituting $\sqrt{7}$ for r in this equation yields $a = \left(\sqrt{7}\right)^2$, or $a = 7$. It follows that the value of $4a$ is $4(7)$, or 28.

Question Difficulty:
Hard

Question ID f811d345

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Right triangles and trigonometry	

ID: f811d345

A right triangle has legs with lengths of 24 centimeters and 21 centimeters. If the length of this triangle's hypotenuse, in centimeters, can be written in the form $3\sqrt{d}$, where d is an integer, what is the value of d?

ID: f811d345 Answer

Correct Answer:
113

Rationale

The correct answer is 113. It's given that the legs of a right triangle have lengths 24 centimeters and 21 centimeters. In a right triangle, the square of the length of the hypotenuse is equal to the sum of the squares of the lengths of the two legs. It follows that if h represents the length, in centimeters, of the hypotenuse of the right triangle, $h^2 = 24^2 + 21^2$. This equation is equivalent to $h^2 = 1{,}017$. Taking the square root of each side of this equation yields $h = \sqrt{1{,}017}$. This equation can be rewritten as $h = \sqrt{9 \cdot 113}$, or $h = \sqrt{9} \cdot \sqrt{113}$. This equation is equivalent to $h = 3\sqrt{113}$. It's given that the length of the triangle's hypotenuse, in centimeters, can be written in the form $3\sqrt{d}$. It follows that the value of d is 113.

Question Difficulty:
Hard

Question ID c9931030

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Right triangles and trigonometry	

ID: c9931030

$$RS = 20$$
$$ST = 48$$
$$TR = 52$$

The side lengths of right triangle RST are given. Triangle RST is similar to triangle UVW, where S corresponds to V and T corresponds to W. What is the value of $\tan W$?

A. $\frac{5}{13}$

B. $\frac{5}{12}$

C. $\frac{12}{13}$

D. $\frac{12}{5}$

ID: c9931030 Answer

Correct Answer:
B

Rationale

Choice B is correct. It's given that right triangle RST is similar to triangle UVW, where S corresponds to V and T corresponds to W. It's given that the side lengths of the right triangle RST are $RS = 20$, $ST = 48$, and $TR = 52$. Corresponding angles in similar triangles are equal. It follows that the measure of angle T is equal to the measure of angle W. The hypotenuse of a right triangle is the longest side. It follows that the hypotenuse of triangle RST is side TR. The hypotenuse of a right triangle is the side opposite the right angle. Therefore, angle S is a right angle. The adjacent side of an acute angle in a right triangle is the side closest to the angle that is not the hypotenuse. It follows that the adjacent side of angle T is side ST. The opposite side of an acute angle in a right triangle is the side across from the acute angle. It follows that the opposite side of angle T is side RS. The tangent of an acute angle in a right triangle is the ratio of the length of the opposite side to the length of the adjacent side. Therefore, $\tan T = \frac{RS}{ST}$. Substituting 20 for RS and 48 for ST in this equation yields $\tan T = \frac{20}{48}$, or $\tan T = \frac{5}{12}$. The tangents of two acute angles with equal measures are equal. Since the measure of angle T is equal to the measure of angle W, it follows that $\tan T = \tan W$. Substituting $\frac{5}{12}$ for $\tan T$ in this equation yields $\frac{5}{12} = \tan W$. Therefore, the value of $\tan W$ is $\frac{5}{12}$.

Choice A is incorrect. This is the value of $\sin W$.

Choice C is incorrect. This is the value of $\cos W$.

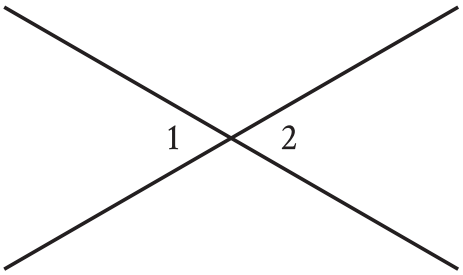
Choice D is incorrect. This is the value of $\frac{1}{\tan W}$.

Question Difficulty:
Hard

Question ID a456f28c

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Lines, angles, and triangles	

ID: a456f28c



Note: Figure not drawn to scale.

In the figure, two lines intersect at a point. Angle 1 and angle 2 are vertical angles. The measure of angle 1 is 72°. What is the measure of angle 2?

A. 72°

B. 108°

C. 144°

D. 288°

ID: a456f28c Answer

Correct Answer:
A

Rationale

Choice A is correct. It's given that angle 1 and angle 2 are vertical angles, and the measure of angle 1 is 72°. Vertical angles have equal measures. Therefore, the measure of angle 2 is 72°.

Choice B is incorrect. This is the measure of an angle that is supplementary, not congruent, to angle 1.

Choice C is incorrect. This is the sum of the measures of angle 1 and angle 2.

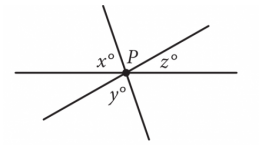
Choice D is incorrect and may result from conceptual or calculation errors.

Question Difficulty:
Easy

Question ID 087cdcfd

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Lines, angles, and triangles	

ID: 087cdcfd



Note: Figure not drawn to scale.

In the figure, three lines intersect at point *P*. If $x = 65$ and $y = 75$, what is the value of *z* ?

A. 140

B. 80

C. 40

D. 20

ID: 087cdcfd Answer

Correct Answer:
C

Rationale

Choice C is correct. The angle that is shown as lying between the y° angle and the z° angle is a vertical angle with the x° angle. Since vertical angles are congruent and $x = 65$, the angle between the y° angle and the z° angle measures 65°. Since the 65° angle, the y° angle, and the z° angle are adjacent and form a straight angle, it follows that the sum of the measures of these three angles is 180°, which is represented by the equation $65° + y° + z° = 180°$. It's given that y = 75. Substituting 75 for y yields $65° + 75° + z° = 180°$, which can be rewritten as $140° + z° = 180°$. Subtracting 140° from both sides of this equation yields $z° = 40°$. Therefore, $z = 40$.

Choice A is incorrect and may result from finding the value of $x + y$ rather than z. Choices B and D are incorrect and may result from conceptual or computational errors.

Question Difficulty:
Easy

Question ID 6ae1360d

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

ID: 6ae1360d

A circle has a radius of 2.1 inches. The area of the circle is $b\pi$ square inches, where b is a constant. What is the value of b?

ID: 6ae1360d Answer

Correct Answer:
4.41, 441/100

Rationale

The correct answer is 4.41. The area, A, of a circle is given by the formula $A = \pi r^2$, where r is the radius of the circle. It's given that the area of the circle is $b\pi$ square inches, where b is a constant, and the radius of the circle is 2.1 inches. Substituting $b\pi$ for A and 2.1 for r in the formula $A = \pi r^2$ yields $b\pi = \pi(2.1^2)$. Dividing both sides of this equation by π yields $b = 4.41$. Therefore, the value of b is 4.41.

Question Difficulty:
Medium

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.

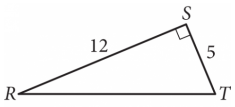
Choice D is incorrect. This is the perimeter of a rectangle that has four sides with length 13, not two sides with length 13 and two sides with length 6.

Question Difficulty:
Easy

Question ID 6933b3d9

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Right triangles and trigonometry	

ID: 6933b3d9



In triangle *RST* above, point *W* (not shown) lies on $\overline{RT}$. What is the value of $\cos(\angle RSW) - \sin(\angle WST)$?

ID: 6933b3d9 Answer

Rationale

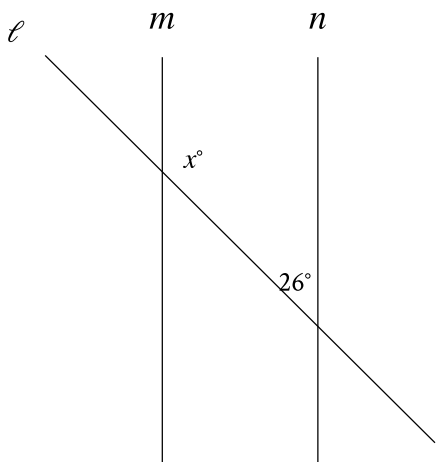
The correct answer is 0. Note that no matter where point W is on $\overline{RT}$, the sum of the measures of $\angle RSW$ and $\angle WST$ is equal to the measure of $\angle RST$, which is $90°$. Thus, $\angle RSW$ and $\angle WST$ are complementary angles. Since the cosine of an angle is equal to the sine of its complementary angle, $\cos(\angle RSW) = \sin(\angle WST)$. Therefore, $\cos(\angle RSW) - \sin(\angle WST) = 0$.

Question Difficulty:
Hard

Question ID afa3c48b

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Lines, angles, and triangles	

ID: afa3c48b



Note: Figure not drawn to scale.

In the figure shown, line m is parallel to line n. What is the value of x?

A. 13

B. 26

C. 52

D. 154

ID: afa3c48b Answer

Correct Answer:
D

Rationale

Choice D is correct. The sum of consecutive interior angles between two parallel lines and on the same side of the transversal is 180 degrees. Since it's given that line m is parallel to line n, it follows that $x + 26 = 180$. Subtracting 26 from both sides of this equation yields 154. Therefore, the value of x is 154.

Choice A is incorrect. This is half of the given angle measure.

Choice B is incorrect. This is the value of the given angle measure.

Choice C is incorrect. This is twice the value of the given angle measure.

Question Difficulty:
Easy

Question ID 9ec76b54

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Right triangles and trigonometry	

ID: 9ec76b54

A right triangle has legs with lengths of 28 centimeters and 20 centimeters. What is the length of this triangle's hypotenuse, in centimeters?

A. $8\sqrt{6}$

B. $4\sqrt{74}$

C. 48

D. $1{,}184$

ID: 9ec76b54 Answer

Correct Answer:
B

Rationale

Choice B is correct. The Pythagorean theorem states that in a right triangle, the sum of the squares of the lengths of the two legs is equal to the square of the length of the hypotenuse. It's given that the right triangle has legs with lengths of 28 centimeters and 20 centimeters. Let c represent the length of this triangle's hypotenuse, in centimeters. Therefore, by the Pythagorean theorem, $28^2 + 20^2 = c^2$, or $1{,}184 = c^2$. Taking the positive square root of both sides of this equation yields $\sqrt{1{,}184} = c$, or $4\sqrt{74} = c$. Therefore, the length of this triangle's hypotenuse, in centimeters, is $4\sqrt{74}$.

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

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

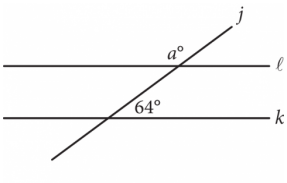
Choice D is incorrect. This is the square of the length of the triangle's hypotenuse.

Question Difficulty:
Medium

Question ID 992f4e93

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Lines, angles, and triangles	

ID: 992f4e93



Note: Figure not drawn to scale.

In the figure above, lines ℓ and k are parallel.

What is the value of a ?

A. 26

B. 64

C. 116

D. 154

ID: 992f4e93 Answer

Correct Answer:
C

Rationale

Choice C is correct. Since lines ℓ and k are parallel, corresponding angles formed by the intersection of line j with lines ℓ and k are congruent. Therefore, the angle with measure a° must be the supplement of the angle with measure 64°. The sum of two supplementary angles is 180°, so a = 180 – 64 = 116.

Choice A is incorrect and likely results from thinking the angle with measure a° is the complement of the angle with measure 64°. Choice B is incorrect and likely results from thinking the angle with measure a° is congruent to the angle with measure 64°. Choice D is incorrect and likely results from a conceptual or computational error.

Question Difficulty:
Easy

Question ID f1747a6a

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Lines, angles, and triangles	

ID: f1747a6a

In triangle ABC, the measure of angle B is 52° and the measure of angle C is 17°. What is the measure of angle A?

A. 21°

B. 35°

C. 69°

D. 111°

ID: f1747a6a Answer

Correct Answer:
D

Rationale

Choice D is correct. The sum of the angle measures of a triangle is 180°. Adding the measures of angles B and C gives $52 + 17 = 69^\circ$. Therefore, the measure of angle A is $180 - 69 = 111^\circ$.

Choice A is incorrect and may result from subtracting the sum of the measures of angles B and C from 90°, instead of from 180°.

Choice B is incorrect and may result from subtracting the measure of angle C from the measure of angle B.

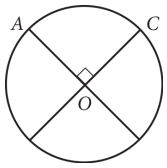
Choice C is incorrect and may result from adding the measures of angles B and C but not subtracting the result from 180°.

Question Difficulty:
Easy

Question ID 23c5fcce

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Circles	

ID: 23c5fcce



The circle above with center *O* has a circumference of 36.
What is the length of minor arc $\overset{\frown}{AC}$?

A. 9

B. 12

C. 18

D. 36

ID: 23c5fcce Answer

Correct Answer:
A

Rationale

Choice A is correct. A circle has 360 degrees of arc. In the circle shown, O is the center of the circle and $\angle AOC$ is a central angle of the circle. From the figure, the two diameters that meet to form $\angle AOC$ are perpendicular, so the measure of $\angle AOC$ is $90°$. Therefore, the length of minor arc $\overset{\frown}{AC}$ is $\frac{90}{360}$ of the circumference of the circle. Since the circumference of the circle is 36, the length of minor arc $\overset{\frown}{AC}$ is $\frac{90}{360} \times 36 = 9$.

Choices B, C, and D are incorrect. The perpendicular diameters divide the circumference of the circle into four equal arcs; therefore, minor arc $\overset{\frown}{AC}$ is $\frac{1}{4}$ of the circumference. However, the lengths in choices B and C are, respectively, $\frac{1}{3}$ and $\frac{1}{2}$ the circumference of the circle, and the length in choice D is the length of the entire circumference. None of these lengths is $\frac{1}{4}$ the circumference.

Question Difficulty:
Easy

Question ID f1c1e971

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Circles	

ID: f1c1e971

The measure of angle R is $\frac{2\pi}{3}$ radians. The measure of angle T is $\frac{5\pi}{12}$ radians greater than the measure of angle R. What is the measure of angle T, in degrees?

A. 75

B. 120

C. 195

D. 390

ID: f1c1e971 Answer

Correct Answer:
C

Rationale

Choice C is correct. It's given that the measure of angle R is $\frac{2\pi}{3}$ radians, and the measure of angle T is $\frac{5\pi}{12}$ radians greater than the measure of angle R. Therefore, the measure of angle T is equal to $\frac{2\pi}{3} + \frac{5\pi}{12}$ radians. Multiplying $\frac{2\pi}{3}$ by $\frac{4}{4}$ to get a common denominator with $\frac{5\pi}{12}$ yields $\frac{8\pi}{12}$. Therefore, $\frac{2\pi}{3} + \frac{5\pi}{12}$ is equivalent to $\frac{8\pi}{12} + \frac{5\pi}{12}$, or $\frac{13\pi}{12}$. Therefore, the measure of angle T is $\frac{13\pi}{12}$ radians. The measure of angle T, in degrees, can be found by multiplying its measure, in radians, by $\frac{180}{\pi}$. This yields $\frac{13\pi}{12} \times \frac{180}{\pi}$, which is equivalent to 195 degrees. Therefore, the measure of angle T is 195 degrees.

Choice A is incorrect. This is the number of degrees that the measure of angle T is greater than the measure of angle R.

Choice B is incorrect. This is the measure of angle R, in degrees.

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

Question Difficulty:
Medium

Question ID 6ab30ce3

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Right triangles and trigonometry	

ID: 6ab30ce3

Triangle ABC is similar to triangle DEF, where A corresponds to D and C corresponds to F. Angles C and F are right angles. If $\tan(A) = \sqrt{3}$ and $DF = 125$, what is the length of $\overline{DE}$?

A. $125\frac{\sqrt{3}}{3}$

B. $125\frac{\sqrt{3}}{2}$

C. $125\sqrt{3}$

D. 250

ID: 6ab30ce3 Answer

Correct Answer:
D

Rationale

Choice D is correct. Corresponding angles in similar triangles have equal measures. It's given that triangle ABC is similar to triangle DEF, where A corresponds to D, so the measure of angle A is equal to the measure of angle D. Therefore, if $\tan(A) = \sqrt{3}$, then $\tan(D) = \sqrt{3}$. It's given that angles C and F are right angles, so triangles ABC and DEF are right triangles. The adjacent side of an acute angle in a right triangle is the side closest to the angle that is not the hypotenuse. It follows that the adjacent side of angle D is side DF. The opposite side of an acute angle in a right triangle is the side across from the acute angle. It follows that the opposite side of angle D is side EF. The tangent of an acute angle in a right triangle is the ratio of the length of the opposite side to the length of the adjacent side. Therefore, $\tan(D) = \frac{EF}{DF}$. If $DF = 125$, the length of side EF can be found by substituting $\sqrt{3}$ for $\tan(D)$ and 125 for DF in the equation $\tan(D) = \frac{EF}{DF}$, which yields $\sqrt{3} = \frac{EF}{125}$. Multiplying both sides of this equation by 125 yields $125\sqrt{3} = EF$. Since the length of side EF is $\sqrt{3}$ times the length of side DF, it follows that triangle DEF is a special right triangle with angle measures 30°, 60°, and 90°. Therefore, the length of the hypotenuse, $\overline{DE}$, is 2 times the length of side DF, or $DE = 2(DF)$. Substituting 125 for DF in this equation yields $DE = 2(125)$, or $DE = 250$. Thus, if $\tan(A) = \sqrt{3}$ and $DF = 125$, the length of $\overline{DE}$ is 250.

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

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

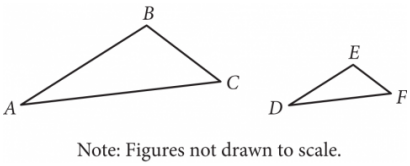
Choice C is incorrect. This is the length of $\overline{EF}$, not $\overline{DE}$.

Question Difficulty:
Hard

Question ID 1c3d613c

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Lines, angles, and triangles	

ID: 1c3d613c



Note: Figures not drawn to scale.

Triangle *ABC* and triangle *DEF* are shown. The relationship between the side lengths of the two triangles is such that $\frac{AB}{DE} = \frac{BC}{EF} = \frac{AC}{DF} = 3$. If the measure of angle *BAC* is 20°, what is the measure, in degrees, of angle *EDF* ? (Disregard the degree symbol when gridding your answer.)

ID: 1c3d613c Answer

Rationale

The correct answer is 20. By the equality given, the three pairs of corresponding sides of the two triangles are in the same proportion. By the side-side-side (SSS) similarity theorem, triangle ABC is similar to triangle DEF. In similar triangles, the measures of corresponding angles are congruent. Since angle BAC corresponds to angle EDF, these two angles are congruent and their measures are equal. It's given that the measure of angle BAC is 20°, so the measure of angle EDF is also 20°.

Question Difficulty:
Medium

Question ID 2d521ca9

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Circles	

ID: 2d521ca9

The measure of angle Z is 60°. What is the measure, in radians, of angle Z?

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

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

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

D. 1π

ID: 2d521ca9 Answer

Correct Answer:
B

Rationale

Choice B is correct. The measure of an angle, in radians, can be found by multiplying its measure, in degrees, by $\frac{\pi}{180}$. It's given that the measure of angle Z is 60°. It follows that the measure, in radians, of angle Z is $60\left(\frac{\pi}{180}\right)$, or $\frac{1}{3}\pi$.

Choice A is incorrect. This is the measure, in radians, of an angle whose measure is 30°, not 60°.

Choice C is incorrect. This is the measure, in radians, of an angle whose measure is 120°, not 60°.

Choice D is incorrect. This is the measure, in radians, of an angle whose measure is 180°, not 60°.

Question Difficulty:
Medium

Question ID 9acd101f

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Circles	

ID: 9acd101f

The equation $x^2 + (y-1)^2 = 49$ represents circle A. Circle B is obtained by shifting circle A down 2 units in the *xy*-plane. Which of the following equations represents circle B?

A. $(x-2)^2 + (y-1)^2 = 49$

B. $x^2 + (y-3)^2 = 49$

C. $(x+2)^2 + (y-1)^2 = 49$

D. $x^2 + (y+1)^2 = 49$

ID: 9acd101f Answer

Correct Answer:
D

Rationale

Choice D is correct. The graph in the *xy*-plane of an equation of the form $(x-h)^2 + (y-k)^2 = r^2$ is a circle with center (h, k) and a radius of length r. It's given that circle A is represented by $x^2 + (y-1)^2 = 49$, which can be rewritten as $x^2 + (y-1)^2 = 7^2$. Therefore, circle A has center $(0, 1)$ and a radius of length 7. Shifting circle A down two units is a rigid vertical translation of circle A that does not change its size or shape. Since circle B is obtained by shifting circle A down two units, it follows that circle B has the same radius as circle A, and for each point (x, y) on circle A, the point $(x, y-2)$ lies on circle B. Moreover, if (h, k) is the center of circle A, then $(h, k-2)$ is the center of circle B. Therefore, circle B has a radius of 7 and the center of circle B is $(0, 1-2)$, or $(0, -1)$. Thus, circle B can be represented by the equation $x^2 + (y+1)^2 = 7^2$, or $x^2 + (y+1)^2 = 49$.

Choice A is incorrect. This is the equation of a circle obtained by shifting circle A right 2 units.

Choice B is incorrect. This is the equation of a circle obtained by shifting circle A up 2 units.

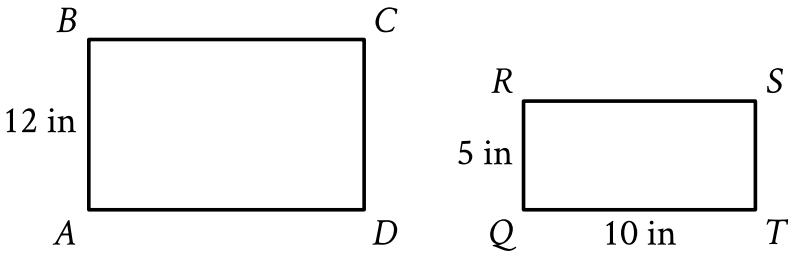
Choice C is incorrect. This is the equation of a circle obtained by shifting circle A left 2 units.

Question Difficulty:
Hard

Question ID e9c5bfb2

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

ID: e9c5bfb2



Note: Figure not drawn to scale.

Rectangles $ABCD$ and $QRST$ shown are similar, where A, B, C, and D correspond to Q, R, S, and T, respectively. What is the length, in inches (in), of $\overline{AD}$?

A. 60

B. 24

C. 17

D. 10

ID: e9c5bfb2 Answer

Correct Answer:
B

Rationale

Choice B is correct. It's given that rectangles $ABCD$ and $QRST$ are similar, where A, B, C, and D correspond to Q, R, S, and T, respectively. It follows that $\overline{AB}$ corresponds to $\overline{QR}$ and $\overline{AD}$ corresponds to $\overline{QT}$. If two rectangles are similar, then the lengths of their corresponding sides are proportional. It's given in the figure that the length of $\overline{AB}$ is 12 inches, the length of $\overline{QR}$ is 5 inches, and the length of $\overline{QT}$ is 10 inches. If x is the length, in inches, of $\overline{AD}$, then $\frac{12}{5}$ is equivalent to $\frac{x}{10}$. Therefore, the value of x can be found using the equation $\frac{12}{5} = \frac{x}{10}$. Multiplying each side of this equation by 10 yields $\frac{120}{5} = x$, or $24 = x$. Therefore, the length, in inches, of $\overline{AD}$ is 24.

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. This is the length, in inches, of $\overline{QT}$, not $\overline{AD}$.

Question Difficulty:
Medium

Question ID 48fb6483

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Lines, angles, and triangles	

ID: 48fb6483

In triangle XYZ, angle Y is a right angle, point P lies on $\overline{XZ}$, and point Q lies on $\overline{YZ}$ such that $\overline{PQ}$ is parallel to $\overline{XY}$. If the measure of angle XZY is 63°, what is the measure, in degrees, of angle XPQ?

ID: 48fb6483 Answer

Correct Answer:
153

Rationale

The correct answer is 153. Since it's given that $\overline{PQ}$ is parallel to $\overline{XY}$ and angle Y is a right angle, angle ZQP is also a right angle. Angle ZPQ is complementary to angle XZY, which means its measure, in degrees, is $90 - 63$, or 27. Since angle XPQ is supplementary to angle ZPQ, its measure, in degrees, is $180 - 27$, or 153.

Question Difficulty:
Hard

Question ID 244ff6c4

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Circles	

ID: 244ff6c4

What is the value of $\tan \frac{92\pi}{3}$?

A. $-\sqrt{3}$

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

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

D. $\sqrt{3}$

ID: 244ff6c4 Answer

Correct Answer:
A

Rationale

Choice A is correct. A trigonometric ratio can be found using the unit circle, that is, a circle with radius 1 unit. If a central angle of a unit circle in the *xy*-plane centered at the origin has its starting side on the positive *x*-axis and its terminal side intersects the circle at a point (x, y), then the value of the tangent of the central angle is equal to the *y*-coordinate divided by the *x*-coordinate. There are 2π radians in a circle. Dividing $\frac{92\pi}{3}$ by 2π yields $\frac{92}{6}$, which is equivalent to $15 + \frac{2}{3}$. It follows that on the unit circle centered at the origin in the *xy*-plane, the angle $\frac{92\pi}{3}$ is the result of 15 revolutions from its starting side on the positive *x*-axis followed by a rotation through $\frac{2\pi}{3}$ radians. Therefore, the angles $\frac{92\pi}{3}$ and $\frac{2\pi}{3}$ are coterminal angles and $\tan\left(\frac{92\pi}{3}\right)$ is equal to $\tan\left(\frac{2\pi}{3}\right)$. Since $\frac{2\pi}{3}$ is greater than $\frac{\pi}{2}$ and less than π, it follows that the terminal side of the angle is in quadrant II and forms an angle of $\frac{\pi}{3}$, or 60°, with the negative *x*-axis. Therefore, the terminal side of the angle intersects the unit circle at the point $\left(-\frac{1}{2}, \frac{\sqrt{3}}{2}\right)$. It follows that the value of $\tan\left(\frac{2\pi}{3}\right)$ is $\frac{\frac{\sqrt{3}}{2}}{-\frac{1}{2}}$, which is equivalent to $-\sqrt{3}$. Therefore, the value of $\tan\left(\frac{92\pi}{3}\right)$ is $-\sqrt{3}$.

Choice B is incorrect. This is the value of $\frac{1}{\tan\left(\frac{92\pi}{3}\right)}$, not $\tan\left(\frac{92\pi}{3}\right)$.

Choice C is incorrect. This is the value of $\frac{1}{\tan\left(\frac{\pi}{3}\right)}$, not $\tan\left(\frac{92\pi}{3}\right)$.

Choice D is incorrect. This is the value of $\tan\left(\frac{\pi}{3}\right)$, not $\tan\left(\frac{92\pi}{3}\right)$.

Question Difficulty:
Hard

Question ID 010243e6

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Lines, angles, and triangles	

ID: 010243e6

Triangles PQR and LMN are graphed in the *xy*-plane. Triangle PQR has vertices P, Q, and R at $(4, 5)$, $(4, 7)$, and $(6, 5)$, respectively. Triangle LMN has vertices L, M, and N at $(4, 5)$, $(4, 7 + k)$, and $(6 + k, 5)$, respectively, where k is a positive constant. If the measure of $\angle Q$ is t°, what is the measure of $\angle N$?

A. $(90 - (t - k))^\circ$

B. $(90 - (t + k))^\circ$

C. $(90 - t)^\circ$

D. $(90 + k)^\circ$

ID: 010243e6 Answer

Correct Answer:
C

Rationale

Choice C is correct. Since $P = (4, 5)$ and $Q = (4, 7)$, side PQ is parallel to the *y*-axis and has a length of 2. Since $P = (4, 5)$ and $R = (6, 5)$, side PR is parallel to the *x*-axis and has a length of 2. Therefore, triangle PQR is a right isosceles triangle, where $\angle P$ has measure 90° and $\angle Q$ and $\angle R$ each have measure 45°. It follows that if the measure of $\angle Q$ is t°, then $t = 45$. Since $L = (4, 5)$ and $M = (4, 7 + k)$, side LM is parallel to the *y*-axis and has a length of $k + 2$. Since $L = (4, 5)$ and $N = (6 + k, 5)$, side LN is parallel to the *x*-axis and has a length of $k + 2$. Therefore, triangle LMN is a right isosceles triangle, where $\angle L$ has measure 90° and $\angle M$ and $\angle N$ each have measure 45°. Of the given choices, only $(90 - t)^\circ$ is equal to 45°, so the measure of $\angle N$ is $(90 - t)^\circ$.

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

Choice B 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 08b7a3f5

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

ID: 08b7a3f5

A triangular prism has a height of 8 centimeters (cm) and a volume of 216 cm^3. What is the area, 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

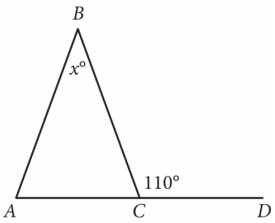
The correct answer is 27. It's given that a triangular prism has a volume of 216 cubic centimeters (cm^3) and the volume of a triangular prism is equal to Bh, where B is the area of the base and h is the height of the prism. Therefore, $216 = Bh$. It's also given that the triangular prism has a height of 8 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 cm^2, of the base of the prism is 27.

Question Difficulty:
Medium

Question ID 5733ce30

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Lines, angles, and triangles	

ID: 5733ce30



In the given figure, $\overline{AC}$ extends to point *D*. If the measure of $\angle BAC$ is equal to the measure of $\angle BCA$, what is the value of *x* ?

A. 110

B. 70

C. 55

D. 40

ID: 5733ce30 Answer

Correct Answer:
D

Rationale

Choice D is correct. Since $\angle BCD$ and $\angle BCA$ form a linear pair of angles, their measures sum to 180°. It's given that the measure of $\angle BCD$ is 110°. Therefore, $110° + \angle BCA = 180°$. Subtracting 110° from both sides of this equation gives the measure of $\angle BCA$ as 70°. It's also given that the measure of $\angle BAC$ is equal to the measure of $\angle BCA$. Thus, the measure of $\angle BAC$ is also 70°. The measures of the interior angles of a triangle sum to 180°. Thus, $70° + 70° + x° = 180°$. Combining like terms on the left-hand side of this equation yields $140° + x° = 180°$. Subtracting 140° from both sides of this equation yields $x° = 40°$, or $x = 40$.

Choice A is incorrect. This is the value of the measure of $\angle BCD$. Choice B is incorrect. This is the value of the measure of each of the other two interior angles, $\angle BCA$ and $\angle BAC$. Choice C is incorrect and may result from an error made when identifying the relationship between the exterior angle of a triangle and the interior angles of the triangle.

Question Difficulty:
Easy

Question ID 0acfddb5

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Circles	

ID: 0acfddb5

A circle has center G, and points M and N lie on the circle. Line segments MH and NH are tangent to the circle at points M and N, respectively. If the radius of the circle is 168 millimeters and the perimeter of quadrilateral $GMHN$ is $3{,}856$ millimeters, what is the distance, in millimeters, between points G and H?

A. 168

B. $1{,}752$

C. $1{,}760$

D. $1{,}768$

ID: 0acfddb5 Answer

Correct Answer:
D

Rationale

Choice D is correct. It's given that the radius of the circle is 168 millimeters. Since points M and N both lie on the circle, segments GM and GN are both radii. Therefore, segments GM and GN each have length 168 millimeters. Two segments that are tangent to a circle and have a common exterior endpoint have equal length. Therefore, segment MH and segment NH have equal length. Let x represent the length of segment MH. Then x also represents the length of segment NH. It's given that the perimeter of quadrilateral $GMHN$ is $3{,}856$ millimeters. Since the perimeter of a quadrilateral is equal to the sum of the lengths of the sides of the quadrilateral, $3{,}856 = 168 + 168 + x + x$, or $3{,}856 = 336 + 2x$. Subtracting 336 from both sides of this equation yields $3{,}520 = 2x$, and dividing both sides of this equation by 2 yields $1{,}760 = x$. Therefore, the length of segment MH is $1{,}760$ millimeters. A line segment that's tangent to a circle is perpendicular to the radius of the circle at the point of tangency. Therefore, segment GM is perpendicular to segment MH. Since perpendicular segments form right angles, angle GMH is a right angle. Therefore, triangle GMH is a right triangle with legs of length $1{,}760$ millimeters and 168 millimeters, and hypotenuse GH. By the Pythagorean theorem, if a right triangle has a hypotenuse with length c and legs with lengths a and b, then $a^2 + b^2 = c^2$. Substituting $1{,}760$ for a and 168 for b in this equation yields $1{,}760^2 + 168^2 = c^2$, or $3{,}125{,}824 = c^2$. Taking the square root of both sides of this equation yields $\pm 1{,}768 = c$. Since c represents a length, which must be positive, the value of c is $1{,}768$. Therefore, the length of segment GH is $1{,}768$ millimeters, so the distance between points G and H is $1{,}768$ millimeters.

Choice A is incorrect. This is the distance between points G and M and between points G and N, not the distance between points G and H.

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

Choice C is incorrect. This is the distance between points M and H and between points N and H, not the distance between points G and H.

Question Difficulty:
Hard

Question ID 7a8ad237

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Lines, angles, and triangles	

ID: 7a8ad237

Triangles ABC and DEF are congruent, where A corresponds to D, and B and E are right angles. The measure of angle A is 69°. What is the measure, in degrees, of angle F?

ID: 7a8ad237 Answer

Correct Answer:
21

Rationale

The correct answer is 21. It's given that triangles ABC and DEF are congruent with angle A corresponding to angle D. Corresponding angles of congruent triangles are congruent and, therefore, have equal measure. It's given that the measure of angle A is 69°. It follows that the measure of angle D is also 69°. It's given that angle E is a right angle. Therefore, the measure of angle E is 90°. Let x represent the measure, in degrees, of angle F. Since the measures of the angles in a triangle sum to 180°, it follows that $69 + 90 + x = 180$, or $159 + x = 180$. Subtracting 159 from both sides of this equation yields $x = 21$. Therefore, the measure, in degrees, of angle F is 21.

Question Difficulty:
Medium

Question ID 50774285

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

ID: 50774285

Each base of a right rectangular prism has a length of 19 inches and a width of 8 inches. The prism has a volume of $2{,}736$ cubic inches. What is the height, in inches, of the prism?

A. 18

B. 27

C. 144

D. 152

ID: 50774285 Answer

Correct Answer:
A

Rationale

Choice A is correct. The volume, V, of a rectangular prism is given by the formula $V = \ell wh$, where ℓ is the length of the base, w is the width of the base, and h is the height of the prism. It's given that each base of a right rectangular prism has a length of 19 inches and a width of 8 inches, and that the prism has a volume of $2{,}736$ cubic inches. Substituting 19 for ℓ, 8 for w, and $2{,}736$ for V in the formula $V = \ell wh$ gives $2{,}736 = (19)(8)(h)$, or $2{,}736 = 152h$. Dividing each side of this equation by 152 yields $18 = h$. Therefore, the height, in inches, of the prism is 18.

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

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

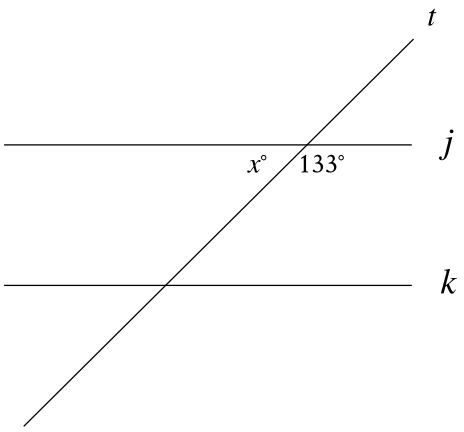
Choice D is incorrect. This is the area, in square inches, of the base of the prism, not the height, in inches, of the prism.

Question Difficulty:
Easy

Question ID 3b4b5b1e

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Lines, angles, and triangles	

ID: 3b4b5b1e



Note: Figure not drawn to scale.

In the figure, line j is parallel to line k. What is the value of x?

ID: 3b4b5b1e Answer

Correct Answer:
47

Rationale

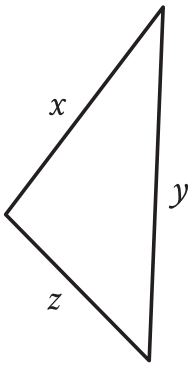
The correct answer is 47. Based on the figure, the angle with measure x° and the angle with measure 133° together form a straight line. Therefore, these two angles are supplementary, so the sum of their measures is 180°. It follows that $x + 133 = 180$. Subtracting 133 from both sides of this equation yields $x = 47$.

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 5b4757df

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Lines, angles, and triangles	

ID: 5b4757df

In triangle RST, angle T is a right angle, point L lies on $\overline{RS}$, point K lies on $\overline{ST}$, and $\overline{LK}$ is parallel to $\overline{RT}$. If the length of $\overline{RT}$ is 72 units, the length of $\overline{LK}$ is 24 units, and the area of triangle RST is 792 square units, what is the length of $\overline{KT}$, in units?

ID: 5b4757df Answer

Correct Answer:
14.66, 14.67, 44/3

Rationale

The correct answer is $\frac{44}{3}$. It's given that in triangle RST, angle T is a right angle. The area of a right triangle can be found using the formula $A = \frac{1}{2}\ell_1\ell_2$, where A represents the area of the right triangle, ℓ_1 represents the length of one leg of the triangle, and ℓ_2 represents the length of the other leg of the triangle. In triangle RST, the two legs are $\overline{RT}$ and $\overline{ST}$. Therefore, if the length of $\overline{RT}$ is 72 and the area of triangle RST is 792, then $792 = \frac{1}{2}(72)(ST)$, or $792 = (36)(ST)$. Dividing both sides of this equation by 36 yields $22 = ST$. Therefore, the length of $\overline{ST}$ is 22. It's also given that point L lies on $\overline{RS}$, point K lies on $\overline{ST}$, and $\overline{LK}$ is parallel to $\overline{RT}$. It follows that angle LKS is a right angle. Since triangles RST and LSK share angle S and have right angles T and K, respectively, triangles RST and LSK are similar triangles. Therefore, the ratio of the length of $\overline{RT}$ to the length of $\overline{LK}$ is equal to the ratio of the length of $\overline{ST}$ to the length of $\overline{SK}$. If the length of $\overline{RT}$ is 72 and the length of $\overline{LK}$ is 24, it follows that the ratio of the length of $\overline{RT}$ to the length of $\overline{LK}$ is $\frac{72}{24}$, or 3, so the ratio of the length of $\overline{ST}$ to the length of $\overline{SK}$ is 3. Therefore, $\frac{22}{SK} = 3$. Multiplying both sides of this equation by SK yields $22 = (3)(SK)$. Dividing both sides of this equation by 3 yields $\frac{22}{3} = SK$. Since the length of $\overline{ST}$, 22, is the sum of the length of $\overline{SK}$, $\frac{22}{3}$, and the length of $\overline{KT}$, it follows that the length of $\overline{KT}$ is $22 - \frac{22}{3}$, or $\frac{44}{3}$. Note that 44/3, 14.66, and 14.67 are examples of ways to enter a correct answer.

Question Difficulty:
Hard

Question ID ca2235f6

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Circles	

ID: ca2235f6

A circle has center O, and points A and B lie on the circle. The measure of arc AB is $45°$ and the length of arc AB is 3 inches. What is the circumference, in inches, of the circle?

A. 3

B. 6

C. 9

D. 24

ID: ca2235f6 Answer

Correct Answer:
D

Rationale

Choice D is correct. It's given that the measure of arc AB is 45° and the length of arc AB is 3 inches. The arc measure of the full circle is 360°. If x represents the circumference, in inches, of the circle, it follows that $\frac{45^\circ}{360^\circ} = \frac{3 \text{ inches}}{x \text{ inches}}$. This equation is equivalent to $\frac{45}{360} = \frac{3}{x}$, or $\frac{1}{8} = \frac{3}{x}$. Multiplying both sides of this equation by $8x$ yields $1(x) = 3(8)$, or $x = 24$. Therefore, the circumference of the circle is 24 inches.

Choice A is incorrect. This is the length of arc AB.

Choice B is incorrect and may result from multiplying the length of arc AB by 2.

Choice C is incorrect and may result from squaring the length of arc AB.

Question Difficulty:
Hard

Question ID 856372ca

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Circles	

ID: 856372ca

In the *xy*-plane, a circle with radius 5 has center $(-8,6)$. Which of the following is an equation of the circle?

A. $(x-8)^2+(y+6)^2=25$

B. $(x+8)^2+(y-6)^2=25$

C. $(x-8)^2+(y+6)^2=5$

D. $(x+8)^2+(y-6)^2=5$

ID: 856372ca Answer

Correct Answer:
B

Rationale

Choice B is correct. An equation of a circle is $(x-h)^2+(y-k)^2=r^2$, where the center of the circle is (h,k) and the radius is r. It's given that the center of this circle is $(-8,6)$ and the radius is 5. Substituting these values into the equation gives $(x-(-8))^2+(y-6)^2=5^2$, or $(x+8)^2+(y-6)^2=25$.

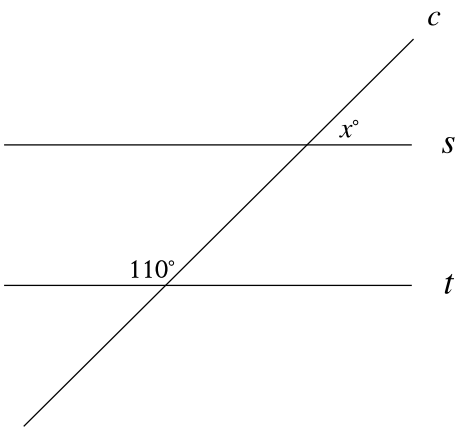
Choice A is incorrect. This is an equation of a circle that has center $(8,-6)$. Choice C is incorrect. This is an equation of a circle that has center $(8,-6)$ and radius $\sqrt{5}$. Choice D is incorrect. This is an equation of a circle that has radius $\sqrt{5}$.

Question Difficulty:
Medium

Question ID cf0d3050

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Lines, angles, and triangles	

ID: cf0d3050



Note: Figure not drawn to scale.

In the figure shown, line c intersects parallel lines s and t. What is the value of x?

ID: cf0d3050 Answer

Correct Answer:
70

Rationale

The correct answer is 70. Based on the figure, the angle with measure 110° and the angle vertical to the angle with measure x° are same side interior angles. Since vertical angles are congruent, the angle vertical to the angle with measure x° also has measure x°. It's given that lines s and t are parallel. Therefore, same side interior angles between lines s and t are supplementary. It follows that $x + 110 = 180$. Subtracting 110 from both sides of this equation yields $x = 70$.

Question Difficulty:
Easy

Question ID 0bb39de4

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Lines, angles, and triangles	

ID: 0bb39de4

Triangles ABC and DEF are congruent, where A corresponds to D, and B and E are right angles. The measure of angle A is 18°. What is the measure of angle F?

A. 18°

B. 72°

C. 90°

D. 162°

ID: 0bb39de4 Answer

Correct Answer:
B

Rationale

Choice B is correct. It's given that triangle ABC is congruent to triangle DEF. Corresponding angles of congruent triangles are congruent and, therefore, have equal measure. It's given that angle A corresponds to angle D, and that the measure of angle A is 18°. It's also given that the measures of angles B and E are 90°. Since these angles have equal measure, they are corresponding angles. It follows that angle C corresponds to angle F. Let x° represent the measure of angle C. Since the sum of the measures of the interior angles of a triangle is 180°, it follows that $18^\circ+90^\circ+x^\circ=180^\circ$, or $108^\circ+x^\circ=180^\circ$. Subtracting 108° from both sides of this equation yields $x^\circ=72^\circ$. Therefore, the measure of angle C is 72°. Since angle C corresponds to angle F, it follows that the measure of angle F is also 72°.

Choice A is incorrect. This is the measure of angle D, not the measure of angle F.

Choice C is incorrect. This is the measure of angle E, not the measure of angle F.

Choice D is incorrect. This is the sum of the measures of angles E and F, not the measure of angle F.

Question Difficulty:
Easy

Question ID 1be8b6b2

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

ID: 1be8b6b2

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: 1be8b6b2 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 9c0a0eca

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

ID: 9c0a0eca

A triangle has a base length of 10 centimeters and a corresponding height of 70 centimeters. What is the area, in square centimeters, of the triangle?

A. 700

B. 350

C. 175

D. 80

ID: 9c0a0eca Answer

Correct Answer:
B

Rationale

Choice B is correct. The area, A, of a triangle is given by $A = \left(\frac{1}{2}\right)bh$, where b is the length of a base of the triangle and h is the corresponding height of the triangle. It's given that a triangle has a base length of 10 centimeters and a corresponding height of 70 centimeters. Substituting 10 for b and 70 for h in the formula $A = \left(\frac{1}{2}\right)bh$ yields $A = \left(\frac{1}{2}\right)(10)(70)$, or $A = 350$. Therefore, the area, in square centimeters, of the triangle is 350.

Choice A is incorrect. This is the product of the given base and height of the triangle, not its area.

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

Choice D is incorrect. This is the sum of the given base and height of the triangle, not its area.

Question Difficulty:
Medium

Question ID 9d159400

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Circles	

ID: 9d159400

Which of the following equations represents a circle in the *xy*-plane that intersects the *y*-axis at exactly one point?

A. $(x-8)^2+(y-8)^2=16$

B. $(x-8)^2+(y-4)^2=16$

C. $(x-4)^2+(y-9)^2=16$

D. $x^2+(y-9)^2=16$

ID: 9d159400 Answer

Correct Answer:
C

Rationale

Choice C is correct. The graph of the equation $(x-h)^2+(y-k)^2=r^2$ in the *xy*-plane is a circle with center (h, k) and a radius of length r. The radius of a circle is the distance from the center of the circle to any point on the circle. If a circle in the *xy*-plane intersects the *y*-axis at exactly one point, then the perpendicular distance from the center of the circle to this point on the *y*-axis must be equal to the length of the circle's radius. It follows that the *x*-coordinate of the circle's center must be equivalent to the length of the circle's radius. In other words, if the graph of $(x-h)^2+(y-k)^2=r^2$ is a circle that intersects the *y*-axis at exactly one point, then $r=|h|$ must be true. The equation in choice C is $(x-4)^2+(y-9)^2=16$, or $(x-4)^2+(y-9)^2=4^2$. This equation is in the form $(x-h)^2+(y-k)^2=r^2$, where $h=4$, $k=9$, and $r=4$, and represents a circle in the *xy*-plane with center $(4, 9)$ and radius of length 4. Substituting 4 for r and 4 for h in the equation $r=|h|$ yields $4=|4|$, or $4=4$, which is true. Therefore, the equation in choice C represents a circle in the *xy*-plane that intersects the *y*-axis at exactly one point.

Choice A is incorrect. This is the equation of a circle that does not intersect the *y*-axis at any point.

Choice B is incorrect. This is an equation of a circle that intersects the *x*-axis, not the *y*-axis, at exactly one point.

Choice D is incorrect. This is the equation of a circle with the center located on the *y*-axis and thus intersects the *y*-axis at exactly two points, not exactly one point.

Question Difficulty:
Hard

Question ID 379ffefb

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Right triangles and trigonometry	

ID: 379ffefb

A right triangle has legs with lengths of 11 centimeters and 9 centimeters. What is the length of this triangle's hypotenuse, in centimeters?

A. $\sqrt{40}$

B. $\sqrt{202}$

C. 20

D. 202

ID: 379ffefb Answer

Correct Answer:
B

Rationale

Choice B is correct. The Pythagorean theorem states that for a right triangle, $c^2 = a^2 + b^2$, where c represents the length of the hypotenuse and a and b represent the lengths of the legs. It's given that a right triangle has legs with lengths of 11 centimeters and 9 centimeters. Substituting 11 for a and 9 for b in the formula $c^2 = a^2 + b^2$ yields $c^2 = 11^2 + 9^2$, which is equivalent to $c^2 = 121 + 81$, or $c^2 = 202$. Taking the square root of each side of this equation yields $c = \pm\sqrt{202}$. Since c represents a length, c must be positive. Therefore, the length of the triangle's hypotenuse, in centimeters, is $\sqrt{202}$.

Choice A is incorrect. This is the result of solving the equation $c^2 = 11(2) + 9(2)$, not $c^2 = 11^2 + 9^2$.

Choice C is incorrect. This is the result of solving the equation $c(2) = 11(2) + 9(2)$, not $c^2 = 11^2 + 9^2$.

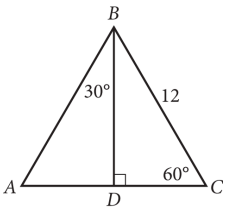
Choice D is incorrect. This is the result of solving the equation $c = 11^2 + 9^2$, not $c^2 = 11^2 + 9^2$.

Question Difficulty:
Easy

Question ID bf8d843e

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Right triangles and trigonometry	

ID: bf8d843e



In ΔABC above, what is the length of $\overline{AD}$?

A. 4

B. 6

C. $6\sqrt{2}$

D. $6\sqrt{3}$

ID: bf8d843e Answer

Correct Answer:
B

Rationale

Choice B is correct. Triangles ADB and CDB are both $30°-60°-90°$ triangles and share $\overline{BD}$. Therefore, triangles ADB and CDB are congruent by the angle-side-angle postulate. Using the properties of $30°-60°-90°$ triangles, the length of $\overline{AD}$ is half the length of hypotenuse $\overline{AB}$. Since the triangles are congruent, $AB = BC = 12$. So the length of $\overline{AD}$ is $\frac{12}{2} = 6$.

Alternate approach: Since angle CBD has a measure of $30°$, angle ABC must have a measure of $60°$. It follows that triangle ABC is equilateral, so side AC also has length 12. It also follows that the altitude BD is also a median, and therefore the length of AD is half of the length of AC, which is 6.

Choice A is incorrect. If the length of $\overline{AD}$ were 4, then the length of $\overline{AB}$ would be 8. However, this is incorrect because $\overline{AB}$ is congruent to $\overline{BC}$, which has a length of 12. Choices C and D are also incorrect. Following the same procedures as used to test choice A gives $\overline{AB}$ a length of $12\sqrt{2}$ for choice C and $12\sqrt{3}$ for choice D. However, these results cannot be true because $\overline{AB}$ is congruent to $\overline{BC}$, which has a length of 12.

Question Difficulty:

Medium

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 aef4fd8a

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

ID: aef4fd8a

The length of each side of a square is 94 centimeters (cm). Which expression gives the area, in cm^2, of the square?

A. $2 \cdot 94$

B. $2 \cdot 94 \cdot 94$

C. $4 \cdot 94$

D. $94 \cdot 94$

ID: aef4fd8a Answer

Correct Answer:
D

Rationale

Choice D is correct. The area of a square is given by s^2, where s is the length of each side of the square. It's given that the length of each side of a square is 94 cm. It follows that the area, in cm^2, of the square is $(94)^2$, or $94 \cdot 94$. Therefore, the expression that gives the area, in cm^2, of the square is $94 \cdot 94$.

Choice A is incorrect and may result from conceptual errors.

Choice B is incorrect and may result from conceptual errors.

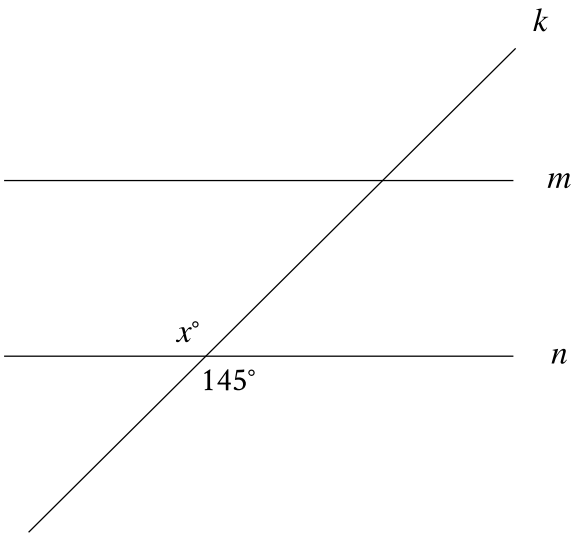
Choice C is incorrect. This expression gives the perimeter, in cm, of the square.

Question Difficulty:
Medium

Question ID 43236565

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Lines, angles, and triangles	

ID: 43236565



Note: Figure not drawn to scale.

In the figure, line m is parallel to line n, and line k intersects both lines. Which of the following statements is true?

A. The value of x is less than 145.

B. The value of x is greater than 145.

C. The value of x is equal to 145.

D. The value of x cannot be determined.

ID: 43236565 Answer

Correct Answer:
C

Rationale

Choice C is correct. Vertical angles, or angles that are opposite each other when two lines intersect, are congruent. It's given that line k intersects line n. Based on the figure, the angle with measure x° and the angle with measure 145° are vertical angles. Therefore, the value of x is equal to 145.

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

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

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

Question Difficulty:
Easy

Question ID 981275d2

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Circles	

ID: 981275d2

$(x-6)^2+(y+5)^2=16$

In the *xy*-plane, the graph of the equation above is a circle. Point *P* is on the circle and has coordinates $(10,-5)$. If $\overline{PQ}$ is a diameter of the circle, what are the coordinates of point *Q* ?

A. $(2,-5)$

B. $(6,-1)$

C. $(6,-5)$

D. $(6,-9)$

ID: 981275d2 Answer

Correct Answer:
A

Rationale

Choice A is correct. The standard form for the equation of a circle is $(x-h)^2+(y-k)^2=r^2$, where (h,k) are the coordinates of the center and r is the length of the radius. According to the given equation, the center of the circle is $(6,-5)$. Let (x_1,y_1) represent the coordinates of point Q. Since point P $(10,-5)$ and point Q (x_1,y_1) are the endpoints of a diameter of the circle, the center $(6,-5)$ lies on the diameter, halfway between P and Q. Therefore, the following relationships hold: $\frac{x_1+10}{2}=6$ and $\frac{y_1+(-5)}{2}=-5$. Solving the equations for x_1 and y_1, respectively, yields $x_1=2$ and $y_1=-5$. Therefore, the coordinates of point Q are $(2,-5)$.

Alternate approach: Since point P $(10,-5)$ on the circle and the center of the circle $(6,-5)$ have the same y-coordinate, it follows that the radius of the circle is $10-6=4$. In addition, the opposite end of the diameter $\overline{PQ}$ must have the same y-coordinate as P and be 4 units away from the center. Hence, the coordinates of point Q must be $(2,-5)$.

Choices B and D are incorrect because the points given in these choices lie on a diameter that is perpendicular to the diameter $\overline{PQ}$. If either of these points were point Q, then $\overline{PQ}$ would not be the diameter of the circle. Choice C is incorrect because $(6,-5)$ is the center of the circle and does not lie on the circle.

Question Difficulty:
Hard

Question ID 89661424

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Circles	

ID: 89661424

A circle in the *xy*-plane has its center at $(-5, 2)$ and has a radius of 9. An equation of this circle is $x^2 + y^2 + ax + by + c = 0$, where a, b, and c are constants. What is the value of c?

ID: 89661424 Answer

Correct Answer:
-52

Rationale

The correct answer is -52. The equation of a circle in the *xy*-plane with its center at (h, k) and a radius of r can be written in the form $(x - h)^2 + (y - k)^2 = r^2$. It's given that a circle in the *xy*-plane has its center at $(-5, 2)$ and has a radius of 9. Substituting -5 for h, 2 for k, and 9 for r in the equation $(x - h)^2 + (y - k)^2 = r^2$ yields $(x - (-5))^2 + (y - 2)^2 = 9^2$, or $(x + 5)^2 + (y - 2)^2 = 81$. It's also given that an equation of this circle is $x^2 + y^2 + ax + by + c = 0$, where a, b, and c are constants. Therefore, $(x + 5)^2 + (y - 2)^2 = 81$ can be rewritten in the form $x^2 + y^2 + ax + by + c = 0$. The equation $(x + 5)^2 + (y - 2)^2 = 81$, or $(x + 5)(x + 5) + (y - 2)(y - 2) = 81$, can be rewritten as $x^2 + 5x + 5x + 25 + y^2 - 2y - 2y + 4 = 81$. Combining like terms on the left-hand side of this equation yields $x^2 + y^2 + 10x - 4y + 29 = 81$. Subtracting 81 from both sides of this equation yields $x^2 + y^2 + 10x - 4y - 52 = 0$, which is equivalent to $x^2 + y^2 + 10x + (-4)y + (-52) = 0$. This equation is in the form $x^2 + y^2 + ax + by + c = 0$. Therefore, the value of c is -52.

Question Difficulty:
Hard

Question ID 196e8e6e

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Circles	

ID: 196e8e6e

In the *xy*-plane, a circle has center C with coordinates (h, k). Points A and B lie on the circle. Point A has coordinates $\left(h+1, k+\sqrt{102}\right)$, and $\angle ACB$ is a right angle. What is the length of $\overline{AB}$?

A. $\sqrt{206}$

B. $2\sqrt{102}$

C. $103\sqrt{2}$

D. $103\sqrt{3}$

ID: 196e8e6e Answer

Correct Answer:
A

Rationale

Choice A is correct. It's given that points A and B lie on the circle with center C. Therefore, $\overline{AC}$ and $\overline{BC}$ are both radii of the circle. Since all radii of a circle are congruent, $\overline{AC}$ is congruent to $\overline{BC}$. The length of $\overline{AC}$, or the distance from point A to point C, can be found using the distance formula, which gives the distance between two points, (x_1, y_1) and (x_2, y_2), as $\sqrt{(x_1-x_2)^2+(y_1-y_2)^2}$. Substituting the given coordinates of point A, $\left(h+1, k+\sqrt{102}\right)$, for (x_1, y_1) and the given coordinates of point C, (h, k), for (x_2, y_2) in the distance formula yields $\sqrt{(h+1-h)^2+\left(k+\sqrt{102}-k\right)^2}$, or $\sqrt{1^2+\left(\sqrt{102}\right)^2}$, which is equivalent to $\sqrt{1+102}$, or $\sqrt{103}$. Therefore, the length of $\overline{AC}$ is $\sqrt{103}$ and the length of $\overline{BC}$ is $\sqrt{103}$. It's given that angle ACB is a right angle. Therefore, triangle ACB is a right triangle with legs $\overline{AC}$ and $\overline{BC}$ and hypotenuse $\overline{AB}$. By the Pythagorean theorem, if a right triangle has a hypotenuse with length c and legs with lengths a and b, then $a^2+b^2=c^2$. Substituting $\sqrt{103}$ for a and b in this equation yields $\left(\sqrt{103}\right)^2+\left(\sqrt{103}\right)^2=c^2$, or $103+103=c^2$, which is equivalent to $206=c^2$. Taking the positive square root of both sides of this equation yields $\sqrt{206}=c$. Therefore, the length of $\overline{AB}$ is $\sqrt{206}$.

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

Choice C is incorrect. This would be the length of $\overline{AB}$ if the length of $\overline{AC}$ were 103, not $\sqrt{103}$.

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

Question Difficulty:
Hard

Question ID d03e29f1

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Circles	

ID: d03e29f1

$$(x-6)^2+(y-3)^2=81$$

The graph of the given equation in the *xy*-plane is a circle. What is the length of the radius of this circle?

A. 3

B. 6

C. 9

D. 81

ID: d03e29f1 Answer

Correct Answer:
C

Rationale

Choice C is correct. The equation of a circle in the *xy*-plane can be written as $(x-h)^2+(y-k)^2=r^2$, where the center of the circle is (h, k) and the radius of the circle is r. The graph of the given equation, $(x-6)^2+(y-3)^2=81$, is a circle in the *xy*-plane. This equation can be written as $(x-6)^2+(y-3)^2=9^2$, where $h=6$, $k=3$, and $r=9$. Therefore, the radius of this circle is 9.

Choice A is incorrect. This is the *y*-coordinate of the center, not the radius, of the circle defined by the given equation.

Choice B is incorrect. This is the *x*-coordinate of the center, not the radius, of the circle defined by the given equation.

Choice D is incorrect. This is the value of the radius squared, not the radius, of the circle defined by the given equation.

Question Difficulty:
Easy

Question ID 7c25b0dc

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Right triangles and trigonometry	

ID: 7c25b0dc

The length of a rectangle's diagonal is $3\sqrt{17}$, and the length of the rectangle's shorter side is 3. What is the length of the rectangle's longer side?

ID: 7c25b0dc Answer

Correct Answer:
12

Rationale

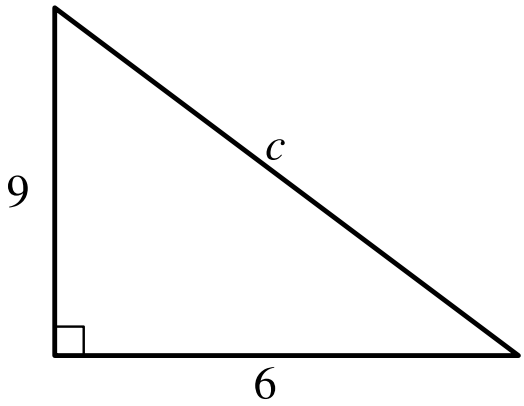
The correct answer is 12. The diagonal of a rectangle forms a right triangle, where the shorter side and the longer side of the rectangle are the legs of the triangle and the diagonal of the rectangle is the hypotenuse of the triangle. It's given that the length of the rectangle's diagonal is $3\sqrt{17}$ and the length of the rectangle's shorter side is 3. Thus, the length of the hypotenuse of the right triangle formed by the diagonal is $3\sqrt{17}$ and the length of one of the legs is 3. By the Pythagorean theorem, if a right triangle has a hypotenuse with length c and legs with lengths a and b, then $a^2 + b^2 = c^2$. Substituting $3\sqrt{17}$ for c and 3 for b in this equation yields $a^2 + (3)^2 = \left(3\sqrt{17}\right)^2$, or $a^2 + 9 = 153$. Subtracting 9 from both sides of this equation yields $a^2 = 144$. Taking the square root of both sides of this equation yields $a = \pm\sqrt{144}$, or $a = \pm 12$. Since a represents a length, which must be positive, the value of a is 12. Thus, the length of the rectangle's longer side is 12.

Question Difficulty:
Hard

Question ID 36661021

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Right triangles and trigonometry	

ID: 36661021



Note: Figure not drawn to scale.

In the right triangle shown, which of the following is closest to the value of c?

A. 7.5

B. 10.8

C. 15

D. 58.5

ID: 36661021 Answer

Correct Answer:
B

Rationale

Choice B is correct. By the Pythagorean theorem, if a right triangle has a hypotenuse with length t and legs with lengths r and s, then $r^2 + s^2 = t^2$. It's given in the right triangle shown that the legs have lengths of 9 and 6 and the hypotenuse has a length of c. Substituting 9 for r, 6 for s, and c for t in $r^2 + s^2 = t^2$ yields $9^2 + 6^2 = c^2$, or $117 = c^2$. Taking the square root of both sides of this equation yields $\pm\sqrt{117} = c$. Since the length of a side of a triangle must be positive, the value of c is $\sqrt{117}$, which is approximately equal to 10.8167. Of the choices, 10.8 is the closest to the value of c.

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:
Easy

Question ID e80d62c6

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Circles	

ID: e80d62c6

The equation $x^2 + (y-2)^2 = 36$ represents circle A. Circle B is obtained by shifting circle A down 4 units in the *xy*-plane. Which of the following equations represents circle B?

A. $x^2 + (y+2)^2 = 36$

B. $x^2 + (y-6)^2 = 36$

C. $(x-4)^2 + (y-2)^2 = 36$

D. $(x+4)^2 + (y-2)^2 = 36$

ID: e80d62c6 Answer

Correct Answer:
A

Rationale

Choice A is correct. The standard form of an equation of a circle in the *xy*-plane is $(x-h)^2 + (y-k)^2 = r^2$, where the coordinates of the center of the circle are (h, k) and the length of the radius of the circle is r. The equation of circle A, $x^2 + (y-2)^2 = 36$, can be rewritten as $(x-0)^2 + (y-2)^2 = 6^2$. Therefore, the center of circle A is at $(0, 2)$ and the length of the radius of circle A is 6. If circle A is shifted down 4 units, the *y*-coordinate of its center will decrease by 4; the radius of the circle and the *x*-coordinate of its center will not change. Therefore, the center of circle B is at $(0, 2-4)$, or $(0, -2)$, and its radius is 6. Substituting 0 for h, -2 for k, and 6 for r in the equation $(x-h)^2 + (y-k)^2 = r^2$ yields $(x-0)^2 + (y-(-2))^2 = (6)^2$, or $x^2 + (y+2)^2 = 36$. Therefore, the equation $x^2 + (y+2)^2 = 36$ represents circle B.

Choice B is incorrect. This equation represents a circle obtained by shifting circle A up, rather than down, 4 units.

Choice C is incorrect. This equation represents a circle obtained by shifting circle A right, rather than down, 4 units.

Choice D is incorrect. This equation represents a circle obtained by shifting circle A left, rather than down, 4 units.

Question Difficulty:
Hard

Question ID f243c383

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

ID: f243c383

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 cm^2. If the prisms are glued together along a square base, the resulting prism has a surface area of $\frac{92}{47}K$ cm^2. What is the side length, in cm, of each square base?

A. 4

B. 8

C. 9

D. 16

ID: f243c383 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 $2K - 2x^2$ cm^2 . It's given that this resulting surface area is equal to $\frac{92}{47}K$ 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 cm, it follows that the area of each square base is x^2 cm^2 and the area of each lateral face is $90x$ 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.

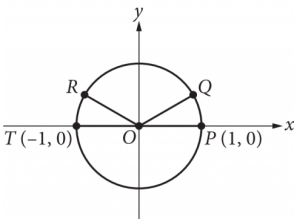
Choice D is incorrect and may result from conceptual or calculation errors.

Question Difficulty:
Hard

Question ID 95ba2d09

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Circles	

ID: 95ba2d09



In the *xy*-plane above, points *P*, *Q*, *R*, and *T* lie on the circle with center *O*. The degree measures of angles POQ and ROT are each 30°. What is the radian measure of angle QOR ?

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

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

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

D. $\frac{1}{3}\pi$

ID: 95ba2d09 Answer

Correct Answer:
C

Rationale

Choice C is correct. Because points T, O, and P all lie on the x-axis, they form a line. Since the angles on a line add up to $180°$, and it's given that angles POQ and ROT each measure $30°$, it follows that the measure of angle *QOR* is $180° - 30° - 30° = 120°$. Since the arc of a complete circle is $360°$ or 2π radians, a proportion can be set up to convert the measure of angle QOR from degrees to radians: $\frac{360 \text{ degrees}}{2\pi \text{ radians}} = \frac{120 \text{ degrees}}{x \text{ radians}}$, where x is the radian measure of angle QOR. Multiplying each side of the proportion by $2\pi x$ gives $360x = 240\pi$. Solving for x gives $\frac{240}{360}\pi$, or $\frac{2}{3}\pi$.

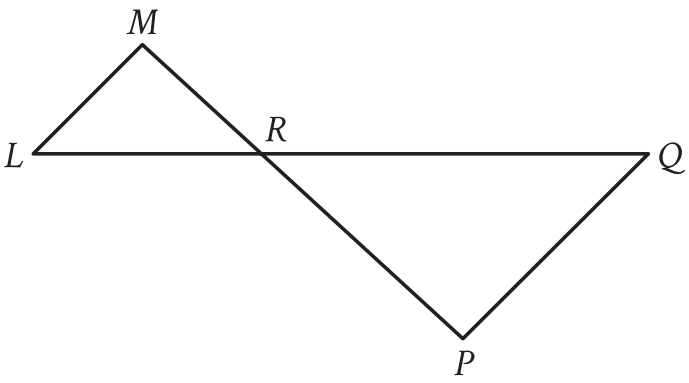
Choice A is incorrect and may result from subtracting only angle POQ from $180°$ to get a value of $150°$ and then finding the radian measure equivalent to that value. Choice B is incorrect and may result from a calculation error. Choice D is incorrect and may result from calculating the sum of the angle measures, in radians, of angles POQ and ROT.

Question Difficulty:
Medium

Question ID adae6543

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Lines, angles, and triangles	

ID: adae6543



Note: Figure not drawn to scale.

In the figure, $\overline{LQ}$ intersects $\overline{MP}$ at point R, and $\overline{LM}$ is parallel to $\overline{PQ}$. The lengths of $\overline{MR}$, $\overline{LR}$, and $\overline{RP}$ are 6, 7, and 11, respectively. What is the length of $\overline{LQ}$?

A. $\frac{119}{11}$

B. $\frac{77}{6}$

C. $\frac{113}{6}$

D. $\frac{119}{6}$

ID: adae6543 Answer

Correct Answer:
D

Rationale

Choice D is correct. The figure shows that angle MRL and angle PRQ are vertical angles. Since vertical angles are congruent, angle MRL and angle PRQ are congruent. It's given that $\overline{LM}$ is parallel to $\overline{PQ}$. The figure also shows that $\overline{LQ}$ intersects $\overline{LM}$ and $\overline{PQ}$. If two parallel segments are intersected by a third segment, alternate interior angles are congruent. Thus, alternate interior angles MLR and PQR are congruent. Since triangles LMR and PQR have two pairs of congruent angles, the triangles are similar. Sides LR and MR in triangle LMR correspond to sides RQ and RP, respectively, in triangle PQR. Since the lengths of corresponding sides in similar triangles are proportional, it follows that $\frac{RQ}{LR} = \frac{RP}{MR}$. It's given that the lengths of $\overline{MR}$, $\overline{LR}$, and $\overline{RP}$ are 6, 7, and 11, respectively. Substituting 6 for MR, 7 for LR, and 11 for RP in the equation $\frac{RQ}{LR} = \frac{RP}{MR}$ yields $\frac{RQ}{7} = \frac{11}{6}$. Multiplying each side of this equation by 7 yields $RQ = \left(\frac{11}{6}\right)(7)$, or $RQ = \frac{77}{6}$. It's given that $\overline{LQ}$ intersects $\overline{MP}$ at point R, so $LQ = LR + RQ$. Substituting 7 for LR and $\frac{77}{6}$ for RQ in this equation yields $LQ = 7 + \frac{77}{6}$, or $LQ = \frac{119}{6}$. Therefore, the length of $\overline{LQ}$ is $\frac{119}{6}$.

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

Choice B is incorrect. This is the length of $\overline{RQ}$, not $\overline{LQ}$.

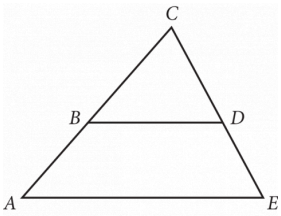
Choice C is incorrect and may result from conceptual or calculation errors.

Question Difficulty:
Hard

Question ID 6dd463ca

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Lines, angles, and triangles	

ID: 6dd463ca



Note: Figure not drawn to scale.

In the figure above, segments *AE* and *BD* are parallel. If angle *BDC* measures 58° and angle *ACE* measures 62°, what is the measure of angle *CAE* ?

A. 58°

B. 60°

C. 62°

D. 120°

ID: 6dd463ca Answer

Correct Answer:
B

Rationale

Choice B is correct. It's given that angle ACE measures $62°$. Since segments AE and BD are parallel, angles BDC and CEA are congruent. Therefore, angle CEA measures $58°$. The sum of the measures of angles ACE, CEA, and CAE is $180°$ since the sum of the interior angles of triangle ACE is equal to $180°$. Let the measure of angle CAE be $x°$. Therefore, $62+58+x=180$, which simplifies to $x=60$. Thus, the measure of angle CAE is $60°$.

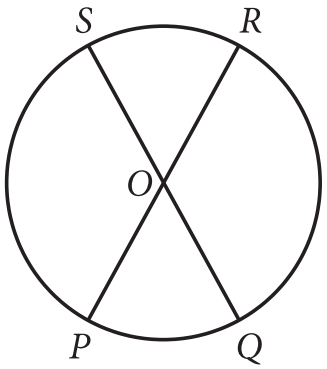
Choice A is incorrect. This is the measure of angle AEC, not that of angle CAE. Choice C is incorrect. This is the measure of angle ACE, not that of CAE. Choice D is incorrect. This is the sum of the measures of angles ACE and CEA.

Question Difficulty:
Medium

Question ID 0815a5af

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Circles	

ID: 0815a5af



Note: Figure not drawn to scale.

The circle shown has center O, circumference 144π, and diameters $\overline{PR}$ and $\overline{QS}$. The length of arc PS is twice the length of arc PQ. What is the length of arc QR?

A. 24π

B. 48π

C. 72π

D. 96π

ID: 0815a5af Answer

Correct Answer:
B

Rationale

Choice B is correct. Since $\overline{PR}$ and $\overline{QS}$ are diameters of the circle shown, $\overline{OS}$, $\overline{OR}$, $\overline{OP}$, and $\overline{OQ}$ are radii of the circle and are therefore congruent. Since $\angle SOP$ and $\angle ROQ$ are vertical angles, they are congruent. Therefore, arc PS and arc QR are formed by congruent radii and have the same angle measure, so they are congruent arcs. Similarly, $\angle SOR$ and $\angle POQ$ are vertical angles, so they are congruent. Therefore, arc SR and arc PQ are formed by congruent radii and have the same angle measure, so they are congruent arcs. Let x represent the length of arc SR. Since arc SR and arc PQ are congruent arcs, the length of arc PQ can also be represented by x. It's given that the length of arc PS is twice the length of arc PQ. Therefore, the length of arc PS can be represented by the expression $2x$. Since arc PS and arc QR are congruent arcs, the length of arc QR can also be represented by $2x$. This gives the expression $x + x + 2x + 2x$. Since it's given that the circumference is 144π, the expression $x + x + 2x + 2x$ is equal to 144π. Thus $x + x + 2x + 2x = 144\pi$, or $6x = 144\pi$. Dividing both sides of this equation by 6 yields $x = 24\pi$. Therefore, the length of arc QR is $2(24\pi)$, or 48π.

Choice A is incorrect. This is the length of arc PQ, not arc QR.

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:
Medium

Question ID f731d88b

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Lines, angles, and triangles	

ID: f731d88b

In convex pentagon $ABCDE$, segment AB is parallel to segment DE. The measure of angle B is 139 degrees, and the measure of angle D is 174 degrees. What is the measure, in degrees, of angle C?

ID: f731d88b Answer

Correct Answer:
47

Rationale

The correct answer is 47. It's given that the measure of angle B is 139 degrees. Therefore, the exterior angle formed by extending segment AB at point B has measure $180 - 139$, or 41, degrees. It's given that segment AB is parallel to segment DE. Extending segment BC at point C and extending segment DE at point D until the two segments intersect results in a transversal that intersects two parallel line segments. One of these intersection points is point B, and let the other intersection point be point X. Since segment AB is parallel to segment DE, alternate interior angles are congruent. Angle CXD and the exterior angle formed by extending segment AB at point B are alternate interior angles. Therefore, the measure of angle CXD is 41 degrees. It's given that the measure of angle D in pentagon $ABCDE$ is 174 degrees. Therefore, angle CDX has measure $180 - 174$, or 6, degrees. Since angle C in pentagon $ABCDE$ is an exterior angle of triangle CDX, it follows that the measure of angle C is the sum of the measures of angles CDX and CXD. Therefore, the measure, in degrees, of angle C is $6 + 41$, or 47.

Alternate approach: A line can be created that's perpendicular to segments AB and DE and passes through point C. Extending segments AB and DE at points B and D, respectively, until they intersect this line yields two right triangles. Let these intersection points be point X and point Y, and the two right triangles be triangle BXC and triangle DYC. It's given that the measure of angle B is 139 degrees. Therefore, angle CBX has measure $180 - 139$, or 41, degrees. Since the measure of angle CBX is 41 degrees and the measure of angle BXC is 90 degrees, it follows that the measure of angle XCB is $180 - 90 - 41$, or 49, degrees. It's given that the measure of angle D is 174 degrees. Therefore, angle YDC has measure $180 - 174$, or 6, degrees. Since the measure of angle YDC is 6 degrees and the measure of angle CYD is 90 degrees, it follows that the measure of angle DCY is $180 - 90 - 6$, or 84, degrees. Since angles XCB, DCY, and angle C in pentagon $ABCDE$ form segment XY, it follows that the sum of the measures of those angles is 180 degrees. Therefore, the measure, in degrees, of angle C is $180 - 49 - 84$, or 47.

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 16d66178

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Right triangles and trigonometry	

ID: 16d66178

Which of the following expressions is equivalent to $(\sin 24^\circ)(\cos 66^\circ) + (\cos 24^\circ)(\sin 66^\circ)$?

A. $2(\cos 66^\circ)(\sin 24^\circ)$

B. $2(\cos 66^\circ) + 2(\cos 24^\circ)$

C. $(\cos 66^\circ)^2 + (\cos 24^\circ)^2$

D. $(\cos 66^\circ)^2 + (\sin 24^\circ)^2$

ID: 16d66178 Answer

Correct Answer:
C

Rationale

Choice C is correct. The sine of an angle is equal to the cosine of its complementary angle. Since angles with measures 24° and 66° are complementary to each other, $\sin 24^\circ$ is equal to $\cos 66^\circ$ and $\sin 66^\circ$ is equal to $\cos 24^\circ$. Substituting $\cos 66^\circ$ for $\sin 24^\circ$ and $\cos 24^\circ$ for $\sin 66^\circ$ in the given expression yields $(\cos 66^\circ)(\cos 66^\circ) + (\cos 24^\circ)(\cos 24^\circ)$, or $(\cos 66^\circ)^2 + (\cos 24^\circ)^2$.

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

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

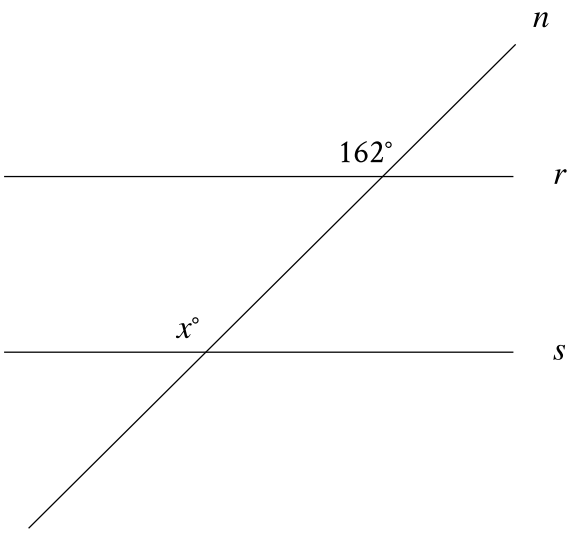
Choice D is incorrect and may result from conceptual or calculation errors.

Question Difficulty:
Hard

Question ID 5b918ebb

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Lines, angles, and triangles	

ID: 5b918ebb



Note: Figure not drawn to scale.

In the figure, line n intersects lines r and s. Line r is parallel to line s. What is the value of x?

ID: 5b918ebb Answer

Correct Answer:
162

Rationale

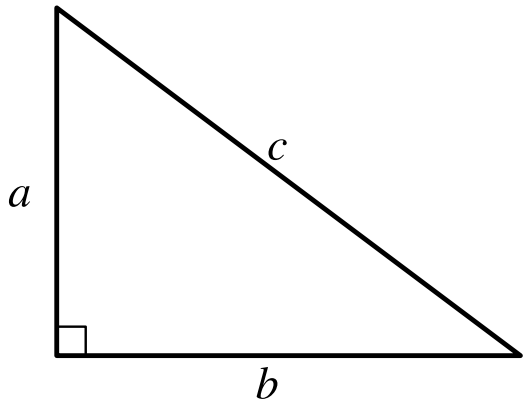
The correct answer is 162. It's given that line r is parallel to line s. Since line n intersects both lines r and s, it's a transversal. The angles in the figure marked as 162° and x° are on the same side of the transversal, where one is an interior angle with line s as a side, and the other is an exterior angle with line r as a side. Thus, the marked angles are corresponding angles. When two parallel lines are intersected by a transversal, corresponding angles are congruent and, therefore, have equal measure. It follows that the value of x is 162.

Question Difficulty:
Easy

Question ID c9f8d1e9

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Right triangles and trigonometry	

ID: c9f8d1e9



Note: Figure not drawn to scale.

For the right triangle shown, $a = 4$ and $b = 5$. Which expression represents the value of c?

A. $4 + 5$

B. $\sqrt{(4)(5)}$

C. $\sqrt{4 + 5}$

D. $\sqrt{4^2 + 5^2}$

ID: c9f8d1e9 Answer

Correct Answer:
D

Rationale

Choice D is correct. By the Pythagorean theorem, if a right triangle has a hypotenuse with length c and legs with lengths a and b, then $c^2 = a^2 + b^2$. In the right triangle shown, the hypotenuse has length c and the legs have lengths a and b. It's given that $a = 4$ and $b = 5$. Substituting 4 for a and 5 for b in the Pythagorean theorem yields $c^2 = 4^2 + 5^2$. Taking the square root of both sides of this equation yields $c = \pm\sqrt{4^2 + 5^2}$. Since the length of a side of a triangle must be positive, the value of c is $\sqrt{4^2 + 5^2}$.

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

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

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 d2047497

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

ID: d2047497

What is the area of a rectangle with a length of 17 centimeters (cm) and a width of 7 cm?

A. $24\ \text{cm}^2$

B. $48\ \text{cm}^2$

C. $119\ \text{cm}^2$

D. $576\ \text{cm}^2$

ID: d2047497 Answer

Correct Answer:
C

Rationale

Choice C is correct. The area of a rectangle with length l and width w can be found using the formula $A = lw$. It's given that the rectangle has a length of 17 cm and a width of 7 cm. Therefore, the area of this rectangle is $A = 17(7)$, or $119\ \text{cm}^2$.

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

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

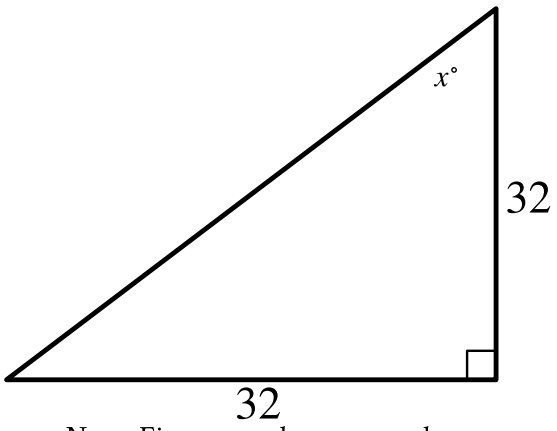
Choice D is incorrect. This is the sum of the length and width of the rectangle squared, not the area.

Question Difficulty:
Easy

Question ID a71617d3

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Right triangles and trigonometry	

ID: a71617d3



Note: Figure not drawn to scale.

In the triangle shown, what is the value of x?

ID: a71617d3 Answer

Correct Answer:
45

Rationale

The correct answer is 45. An isosceles right triangle has a right angle and two legs of equal length. In the triangle shown, one angle is a right angle and the two legs each have a length of 32. Thus, the given triangle is an isosceles right triangle. In an isosceles right triangle, the measures of the two non-right angles are 45°. It follows that the value of x is 45.

Question Difficulty:
Medium

Question ID a5aee181

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Right triangles and trigonometry	

ID: a5aee181

The length of a rectangle's diagonal is $5\sqrt{17}$, and the length of the rectangle's shorter side is 5. What is the length of the rectangle's longer side?

A. $\sqrt{17}$

B. 20

C. $15\sqrt{2}$

D. 400

ID: a5aee181 Answer

Correct Answer:
B

Rationale

Choice B is correct. A rectangle's diagonal divides a rectangle into two congruent right triangles, where the diagonal is the hypotenuse of both triangles. It's given that the length of the diagonal is $5\sqrt{17}$ and the length of the rectangle's shorter side is 5. Therefore, each of the two right triangles formed by the rectangle's diagonal has a hypotenuse with length $5\sqrt{17}$, and a shorter leg with length 5. To calculate the length of the longer leg of each right triangle, the Pythagorean theorem, $a^2 + b^2 = c^2$, can be used, where a and b are the lengths of the legs and c is the length of the hypotenuse of the triangle. Substituting 5 for a and $5\sqrt{17}$ for c in the equation $a^2 + b^2 = c^2$ yields $5^2 + b^2 = \left(5\sqrt{17}\right)^2$, which is equivalent to $25 + b^2 = 25(17)$, or $25 + b^2 = 425$. Subtracting 25 from each side of this equation yields $b^2 = 400$. Taking the positive square root of each side of this equation yields $b = 20$. Therefore, the length of the longer leg of each right triangle formed by the diagonal of the rectangle is 20. It follows that the length of the rectangle's longer side is 20.

Choice A is incorrect and may result from dividing the length of the rectangle's diagonal by the length of the rectangle's shorter side, rather than substituting these values into the Pythagorean theorem.

Choice C is incorrect and may result from using the length of the rectangle's diagonal as the length of a leg of the right triangle, rather than the length of the hypotenuse.

Choice D is incorrect. This is the square of the length of the rectangle's longer side.

Question Difficulty:
Medium

Question ID 4efea6a3

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

ID: 4efea6a3

The area of a rectangle is 57 square inches. The length of the longest side of the rectangle is 19 inches. What is the length, in inches, of the shortest side of this rectangle?

ID: 4efea6a3 Answer

Correct Answer:
3

Rationale

The correct answer is 3. The area of a rectangle can be calculated by multiplying the length of its longest side by the length of its shortest side. It's given that the area of the rectangle is 57 square inches and the length of the longest side of the rectangle is 19 inches. Let x represent the length, in inches, of the shortest side of this rectangle. It follows that $57 = 19x$. Dividing both sides of this equation by 19 yields $3 = x$. Therefore, the length, in inches, of the shortest side of the rectangle is 3.

Question Difficulty:
Easy

Question ID fb58c0db

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Circles	

ID: fb58c0db

Points *A* and *B* lie on a circle with radius 1, and arc $\overset{\frown}{AB}$ has length $\frac{\pi}{3}$. What fraction of the circumference of the circle is the length of arc $\overset{\frown}{AB}$?

ID: fb58c0db Answer

Rationale

The correct answer is $\frac{1}{6}$. The circumference, C, of a circle is $C = 2\pi r$, where r is the length of the radius of the circle. For the given circle with a radius of 1, the circumference is $C = 2(\pi)(1)$, or $C = 2\pi$. To find what fraction of the circumference the length of arc $\overset{\frown}{AB}$ is, divide the length of the arc by the circumference, which gives $\frac{\pi}{3} \div 2\pi$. This division can be represented by $\frac{\pi}{3} \cdot \frac{1}{2\pi} = \frac{1}{6}$. Note that 1/6, .1666, .1667, 0.166, and 0.167 are examples of ways to enter a correct answer.

Question Difficulty:
Hard

Question ID ae041e52

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Right triangles and trigonometry	

ID: ae041e52

A square is inscribed in a circle. The radius of the circle is $\frac{20\sqrt{2}}{2}$ inches. What is the side length, in inches, of the square?

A. 20

B. $\frac{20\sqrt{2}}{2}$

C. $20\sqrt{2}$

D. 40

ID: ae041e52 Answer

Correct Answer:
A

Rationale

Choice A is correct. When a square is inscribed in a circle, a diagonal of the square is a diameter of the circle. It's given that a square is inscribed in a circle and the length of a radius of the circle is $\frac{20\sqrt{2}}{2}$ inches. Therefore, the length of a diameter of the circle is $2\left(\frac{20\sqrt{2}}{2}\right)$ inches, or $20\sqrt{2}$ inches. It follows that the length of a diagonal of the square is $20\sqrt{2}$ inches. A diagonal of a square separates the square into two right triangles in which the legs are the sides of the square and the hypotenuse is a diagonal. Since a square has 4 congruent sides, each of these two right triangles has congruent legs and a hypotenuse of length $20\sqrt{2}$ inches. Since each of these two right triangles has congruent legs, they are both 45-45-90 triangles. In a 45-45-90 triangle, the length of the hypotenuse is $\sqrt{2}$ times the length of a leg. Let s represent the length of a leg of one of these 45-45-90 triangles. It follows that $20\sqrt{2} = \sqrt{2}(s)$. Dividing both sides of this equation by $\sqrt{2}$ yields $20 = s$. Therefore, the length of a leg of one of these 45-45-90 triangles is 20 inches. Since the legs of these two 45-45-90 triangles are the sides of the square, it follows that the side length of the square is 20 inches.

Choice B is incorrect. This is the length of a radius, in inches, of the circle.

Choice C is incorrect. This is the length of a diameter, in inches, of the circle.

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

Question Difficulty:
Hard

Question ID c6dff223

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Right triangles and trigonometry	

ID: c6dff223

Triangle ABC is similar to triangle DEF, where angle A corresponds to angle D and angles C and F are right angles. The length of $\overline{AB}$ is 2.9 times the length of $\overline{DE}$. If $\tan A = \frac{21}{20}$, what is the value of $\sin D$?

ID: c6dff223 Answer

Correct Answer:
.7241, 21/29

Rationale

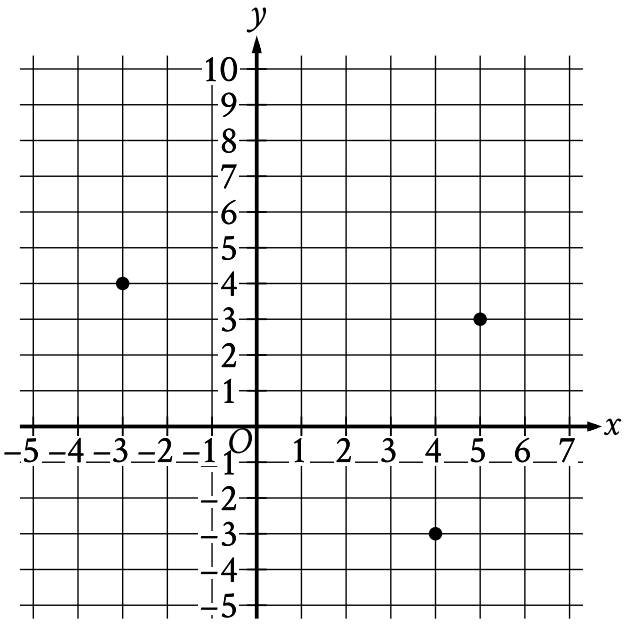
The correct answer is $\frac{21}{29}$. It's given that triangle ABC is similar to triangle DEF, where angle A corresponds to angle D and angles C and F are right angles. In similar triangles, the tangents of corresponding angles are equal. Therefore, if $\tan A = \frac{21}{20}$, then $\tan D = \frac{21}{20}$. In a right triangle, the tangent of an acute angle is the ratio of the length of the leg opposite the angle to the length of the leg adjacent to the angle. Therefore, in triangle DEF, if $\tan D = \frac{21}{20}$, the ratio of the length of $\overline{EF}$ to the length of $\overline{DF}$ is $\frac{21}{20}$. If the lengths of $\overline{EF}$ and $\overline{DF}$ are 21 and 20, respectively, then the ratio of the length of $\overline{EF}$ to the length of $\overline{DF}$ is $\frac{21}{20}$. In a right triangle, the sine of an acute angle is the ratio of the length of the leg opposite the angle to the length of the hypotenuse. Therefore, the value of $\sin D$ is the ratio of the length of $\overline{EF}$ to the length of $\overline{DE}$. The length of $\overline{DE}$ can be calculated using the Pythagorean theorem, which states that if the lengths of the legs of a right triangle are a and b and the length of the hypotenuse is c, then $a^2 + b^2 = c^2$. Therefore, if the lengths of $\overline{EF}$ and $\overline{DF}$ are 21 and 20, respectively, then $(21)^2 + (20)^2 = (DE)^2$, or $841 = (DE)^2$. Taking the positive square root of both sides of this equation yields $29 = DE$. Therefore, if the lengths of $\overline{EF}$ and $\overline{DF}$ are 21 and 20, respectively, then the length of $\overline{DE}$ is 29 and the ratio of the length of $\overline{EF}$ to the length of $\overline{DE}$ is $\frac{21}{29}$. Thus, if $\tan A = \frac{21}{20}$, the value of $\sin D$ is $\frac{21}{29}$. Note that 21/29, .7241, and 0.724 are examples of ways to enter a correct answer.

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

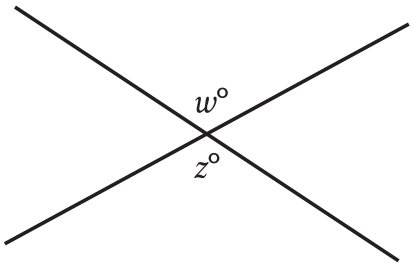
found by calculating the distance between the points $(4, -3)$ and $(-3, -3)$. This distance is $4 - (-3)$, or 7. The corresponding height, in units, of this triangle can be found by calculating the distance between the points $(-3, 4)$ and $(-3, -3)$. This distance is $4 - (-3)$, or 7. It follows that 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 64d1f49f

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Lines, angles, and triangles	

ID: 64d1f49f



Note: Figure not drawn to scale.

In the figure, two lines intersect at a point. If $w = 136$, what is the value of z?

A. 36

B. 44

C. 68

D. 136

ID: 64d1f49f Answer

Correct Answer:
D

Rationale

Choice D is correct. In the figure shown, the angles with measures w° and z° are vertical angles. Since vertical angles are congruent, $w = z$. Therefore, if $w = 136$, the value of z is 136.

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

Choice B is incorrect. This is the measure, in degrees, of an angle that's supplementary, not congruent, to the angle with measure w°.

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

Question Difficulty:
Easy

Question ID f329442c

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

ID: f329442c

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: f329442c 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 f39f88b7

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

ID: f39f88b7

A triangle has a base length of 40 centimeters and a height of 90 centimeters. What is the area, in square centimeters, of the triangle?

ID: f39f88b7 Answer

Correct Answer:
1800

Rationale

The correct answer is $1{,}800$. The area, A, of a triangle can be found using the formula $A = \frac{1}{2}bh$, where b is the base length of the triangle and h is the height of the triangle. It's given that the triangle has a base length of 40 centimeters and a height of 90 centimeters. Substituting 40 for b and 90 for h in the formula $A = \frac{1}{2}bh$ yields $A = \frac{1}{2}(40)(90)$, or $A = 1{,}800$. Therefore, the area, in square centimeters, of the triangle is $1{,}800$.

Question Difficulty:
Easy

Question ID 92eb236a

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Right triangles and trigonometry	

ID: 92eb236a

In a right triangle, the tangent of one of the two acute angles is $\frac{\sqrt{3}}{3}$. What is the tangent of the other acute angle?

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

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

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

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

ID: 92eb236a Answer

Correct Answer:
D

Rationale

Choice D is correct. The tangent of a nonright angle in a right triangle is defined as the ratio of the length of the leg opposite the angle to the length of the leg adjacent to the angle. Using that definition for tangent, in a right triangle with legs that have lengths a and b, the tangent of one acute angle is $\frac{a}{b}$ and the tangent for the other acute angle is $\frac{b}{a}$. It follows that the tangents of the acute angles in a right triangle are reciprocals of each other. Therefore, the tangent of the other acute angle in the given triangle is the reciprocal of $\frac{\sqrt{3}}{3}$ or $\frac{3}{\sqrt{3}}$.

Choice A is incorrect and may result from assuming that the tangent of the other acute angle is the negative of the tangent of the angle described. Choice B is incorrect and may result from assuming that the tangent of the other acute angle is the negative of the reciprocal of the tangent of the angle described. Choice C is incorrect and may result from interpreting the tangent of the other acute angle as equal to the tangent of the angle described.

Question Difficulty:
Hard

Question ID ae33e0a1

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

ID: ae33e0a1

A right circular cylinder has a base diameter of 22 centimeters and a height of 6 centimeters. What is the volume, in cubic centimeters, of the cylinder?

A. 132π

B. 264π

C. 726π

D. $2{,}904\pi$

ID: ae33e0a1 Answer

Correct Answer:
C

Rationale

Choice C is correct. The volume, V, of a right circular cylinder is given by the formula $V = \pi r^2 h$, where r is the radius of the base of the cylinder and h is the height of the cylinder. It's given that a right circular cylinder has a height of 6 centimeters. Therefore, $h = 6$. It's also given that the cylinder has a base diameter of 22 centimeters. The radius of a circle is half the diameter of the circle. Since the base of a right circular cylinder is a circle, it follows that the radius of the base of the right circular cylinder is $\frac{22}{2}$, or 11, centimeters. Therefore, $r = 11$. Substituting 11 for r and 6 for h in the formula $V = \pi r^2 h$ yields $V = \pi(11)^2(6)$, which is equivalent to $V = \pi(121)(6)$, or $V = 726\pi$. Therefore, the volume, in cubic centimeters, of the cylinder is 726π.

Choice A is incorrect. This is the volume of a right circular cylinder that has a base diameter of $2\sqrt{22}$, not 22, centimeters and a height of 6 centimeters.

Choice B is incorrect. This is the volume of a right circular cylinder that has a base diameter of $4\sqrt{11}$, not 22, centimeters and a height of 6 centimeters.

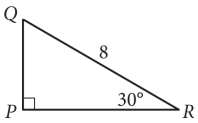
Choice D is incorrect. This is the volume of a right circular cylinder that has a base diameter of 44, not 22, centimeters and a height of 6 centimeters.

Question Difficulty:
Medium

Question ID 13d9a1c3

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Right triangles and trigonometry	

ID: 13d9a1c3



In the right triangle shown above, what is the length of $\overline{PQ}$?

ID: 13d9a1c3 Answer

Rationale

The correct answer is 4. Triangle PQR has given angle measures of 30° and 90°, so the third angle must be 60° because the measures of the angles of a triangle sum to 180°. For any special right triangle with angles measuring 30°, 60°, and 90°, the length of the hypotenuse (the side opposite the right angle) is 2x, where x is the length of the side opposite the 30° angle. Segment PQ is opposite the 30° angle. Therefore, 2(PQ) = 8 and PQ = 4.

Question Difficulty:
Medium

Question ID 76670c80

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

ID: 76670c80

Each side of a square has a length of 45. What is the perimeter of this square?

ID: 76670c80 Answer

Correct Answer:
180

Rationale

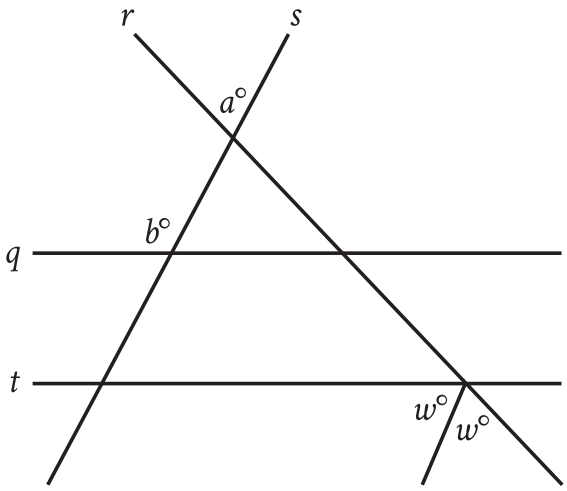
The correct answer is 180. The perimeter of a polygon is equal to the sum of the lengths of the sides of the polygon. It's given that each side of the square has a length of 45. Since a square is a polygon with 4 sides, the perimeter of this square is $45 + 45 + 45 + 45$, or 180.

Question Difficulty:
Easy

Question ID 17912810

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Lines, angles, and triangles	

ID: 17912810



Note: Figure not drawn to scale.

In the figure, parallel lines q and t are intersected by lines r and s. If $a = 43$ and $b = 122$, what is the value of w?

ID: 17912810 Answer

Correct Answer:

101/2, 50.5

Rationale

The correct answer is $\frac{101}{2}$. In the figure, lines q, r, and s form a triangle. One interior angle of this triangle is vertical to the angle marked a°; therefore, the interior angle also has measure a°. It's given that $a = 43$. Therefore, the interior angle of the triangle has measure 43°. A second interior angle of the triangle forms a straight line, q, with the angle marked b°. Therefore, the sum of the measures of these two angles is 180°. It's given that $b = 122$. Therefore, the angle marked b° has measure 122° and the second interior angle of the triangle has measure $(180 - 122)^\circ$, or 58°. The sum of the interior angles of a triangle is 180°. Therefore, the measure of the third interior angle of the triangle is $(180 - 43 - 58)^\circ$, or 79°. It's given that parallel lines q and t are intersected by line r. It follows that the triangle's interior angle with measure 79° is congruent to the same side interior angle between lines q and t formed by lines t and r. Since this angle is supplementary to the two angles marked w°, the sum of 79°, w°, and w° is 180°. It follows that $79 + w + w = 180$, or $79 + 2w = 180$. Subtracting 79 from both sides of this equation yields $2w = 101$. Dividing both sides of this equation by 2 yields $w = \frac{101}{2}$. Note that 101/2 and 50.5 are examples of ways to enter a correct answer.

Question Difficulty:

Hard

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.

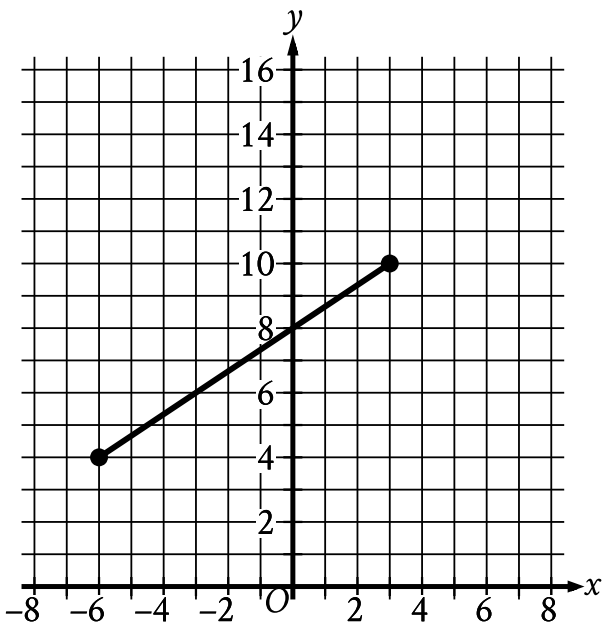
Choice D is incorrect. This is the sum of the length and width of the rectangle squared, not the area.

Question Difficulty:
Easy

Question ID 099526fc

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

ID: 099526fc



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: 099526fc 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.

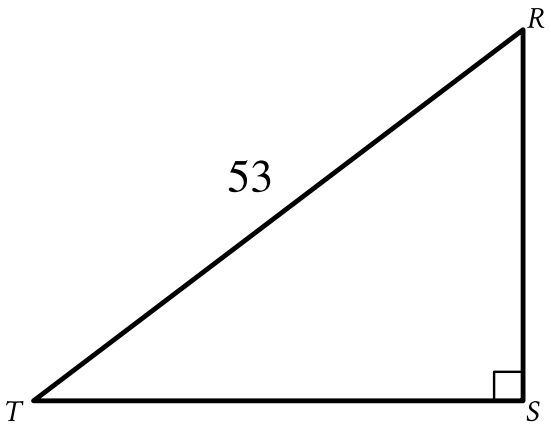
Choice D is incorrect and may result from conceptual or calculation errors.

Question Difficulty:
Hard

Question ID a67b9f88

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Right triangles and trigonometry	

ID: a67b9f88



Note: Figure not drawn to scale.

In the triangle shown, $RS = \sqrt{105}$. What is the value of $\sin R$?

ID: a67b9f88 Answer

Correct Answer:
.9811, 52/53

Rationale

The correct answer is $\frac{52}{53}$. In a right triangle, the square of the length of the hypotenuse is equal to the sum of the squares of the lengths of the two legs. The length of the hypotenuse of the right triangle shown is 53. It's given that $RS = \sqrt{105}$. Therefore, the length of one of the legs of the triangle shown is $\sqrt{105}$. Let x represent TS, the length of the other leg of the triangle shown. Therefore, $53^2 = \left(\sqrt{105}\right)^2 + x^2$, or $2{,}809 = 105 + x^2$. Subtracting 105 from both sides of this equation yields $2{,}704 = x^2$. Taking the positive square root of both sides of this equation yields $52 = x$. Therefore, TS, the length of the other leg of the triangle shown, is 52. The sine of an acute angle in a right triangle is defined as the ratio of the length of the leg opposite the angle to the length of the hypotenuse. The length of the leg opposite angle R is 52, and the length of the hypotenuse is 53. Therefore, the value of $\sin R$ is $\frac{52}{53}$. Note that 52/53 or .9811 are examples of ways to enter a correct answer.

Question Difficulty:
Hard

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

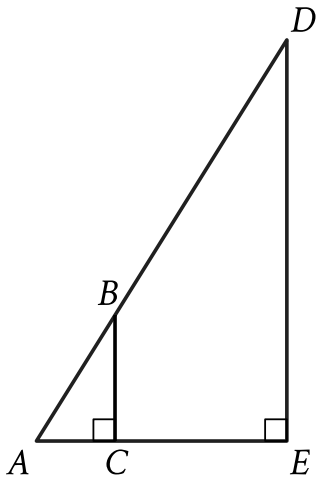
The correct answer is $2{,}048$. The area A, in square inches, of a rectangle is equal to the product of its length ℓ, in inches, and its width w, in inches, or $A = \ell w$. It's given that the rectangle has a length of 64 inches and a width of 32 inches. Substituting 64 for ℓ and 32 for w in the equation $A = \ell w$ 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 694b7fce

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Lines, angles, and triangles	

ID: 694b7fce



Note: Figure not drawn to scale.

In the figure shown, $AB = \sqrt{34}$ units, $AC = 3$ units, and $CE = 21$ units. What is the area, in square units, of triangle ADE?

ID: 694b7fce Answer

Correct Answer:

480

Rationale

The correct answer is 480. It's given in the figure that angle ACB and angle AED are right angles. It follows that angle ACB is congruent to angle AED. It's also given that angle BAC and angle DAE are the same angle. It follows that angle BAC is congruent to angle DAE. Since triangles ABC and ADE have two pairs of congruent angles, the triangles are similar. Sides AB and AC in triangle ABC correspond to sides AD and AE, respectively, in triangle ADE. Corresponding sides in similar triangles are proportional. Therefore, $\frac{AD}{AB} = \frac{AE}{AC}$. It's given that $AC = 3$ units and $CE = 21$ units. Therefore, $AE = 24$ units. It's also given that $AB = \sqrt{34}$ units. Substituting 3 for AC, 24 for AE, and $\sqrt{34}$ for AB in the equation $\frac{AD}{AB} = \frac{AE}{AC}$ yields $\frac{AD}{\sqrt{34}} = \frac{24}{3}$, or $\frac{AD}{\sqrt{34}} = 8$. Multiplying each side of this equation by $\sqrt{34}$ yields $AD = 8\sqrt{34}$. By the Pythagorean theorem, if a right triangle has a hypotenuse with length c and legs with lengths a and b, then $a^2 + b^2 = c^2$. Since triangle ADE is a right triangle, it follows that AD represents the length of the hypotenuse, c, and DE and AE represent the lengths of the legs, a and b. Substituting 24 for b and $8\sqrt{34}$ for c in the equation $a^2 + b^2 = c^2$ yields $a^2 + (24)^2 = \left(8\sqrt{34}\right)^2$, which is equivalent to $a^2 + 576 = 64(34)$, or $a^2 + 576 = 2{,}176$. Subtracting 576 from both sides of this equation yields $a^2 = 1{,}600$. Taking the square root of both sides of this equation yields $a = \pm 40$. Since a represents a length, which must be positive, the value of a is 40. Therefore, $DE = 40$. Since DE and AE represent the lengths of the legs of triangle ADE, it follows that DE and AE can be used to calculate the area, in square units, of the triangle as $\frac{1}{2}(40)(24)$, or 480. Therefore, the area, in square units, of triangle ADE is 480.

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 2be01bd9

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Right triangles and trigonometry	

ID: 2be01bd9

Triangle ABC is similar to triangle DEF, where angle A corresponds to angle D and angle C corresponds to angle F. Angles C and F are right angles. If $\tan(A) = \frac{50}{7}$, what is the value of $\tan(E)$?

ID: 2be01bd9 Answer

Correct Answer:
.14, 7/50

Rationale

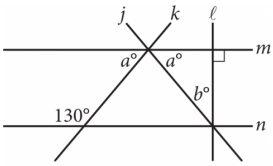
The correct answer is $\frac{7}{50}$. It's given that triangle ABC is similar to triangle DEF, where angle A corresponds to angle D and angle C corresponds to angle F. In similar triangles, the tangents of corresponding angles are equal. Since angle A and angle D are corresponding angles, if $\tan(A) = \frac{50}{7}$, then $\tan(D) = \frac{50}{7}$. It's also given that angles C and F are right angles. It follows that triangle DEF is a right triangle with acute angles D and E. The tangent of one acute angle in a right triangle is the inverse of the tangent of the other acute angle in the triangle. Therefore, $\tan(E) = \frac{1}{\tan(D)}$. Substituting $\frac{50}{7}$ for $\tan(D)$ in this equation yields $\tan(E) = \frac{1}{\frac{50}{7}}$, or $\tan(E) = \frac{7}{50}$. Thus, if $\tan(A) = \frac{50}{7}$, the value of $\tan(E)$ is $\frac{7}{50}$. Note that 7/50 and .14 are examples of ways to enter a correct answer.

Question Difficulty:
Hard

Question ID 3828f53d

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Lines, angles, and triangles	

ID: 3828f53d



Note: Figure not drawn to scale.

In the figure above, lines *m* and *n* are parallel.
What is the value of *b* ?

A. 40

B. 50

C. 65

D. 80

ID: 3828f53d Answer

Correct Answer:
A

Rationale

Choice A is correct. Given that lines m and n are parallel, the angle marked 130° must be supplementary to the leftmost angle marked a° because they are same-side interior angles. Therefore, 130° + a° = 180°, which yields a = 50°. Lines ℓ and m intersect at a right angle, so lines j, ℓ, and m form a right triangle where the two acute angles are a° and b°. The acute angles of a right triangle are complementary, so a° + b° = 90°, which yields 50° + b° = 90°, and b = 40.

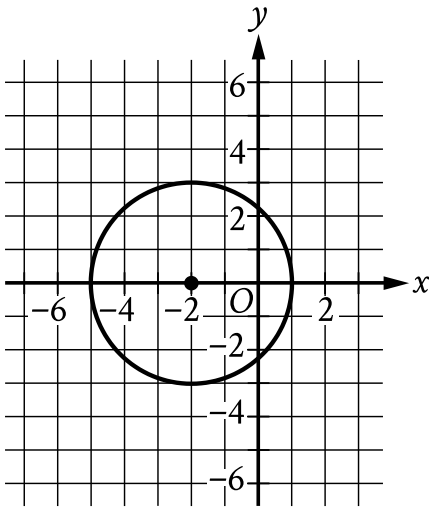
Choice B is incorrect. This is the value of a, not b. Choice C is incorrect and may be the result of dividing 130° by 2. Choice D is incorrect and may be the result of multiplying b by 2.

Question Difficulty:
Easy

Question ID a38c0183

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Circles	

ID: a38c0183



Circle A (shown) is defined by the equation $(x+2)^2+y^2=9$. Circle B (not shown) is the result of shifting circle A down 6 units and increasing the radius so that the radius of circle B is 2 times the radius of circle A. Which equation defines circle B?

A. $(x+2)^2+(y+6)^2=(4)(9)$

B. $2(x+2)^2+2(y+6)^2=9$

C. $(x+2)^2+(y-6)^2=(4)(9)$

D. $2(x+2)^2+2(y-6)^2=9$

ID: a38c0183 Answer

Correct Answer:
A

Rationale

Choice A is correct. According to the graph, the center of circle A has coordinates $(-2,0)$, and the radius of circle A is 3. It's given that circle B is the result of shifting circle A down 6 units and increasing the radius so that the radius of circle B is 2 times the radius of circle A. It follows that the center of circle B is 6 units below the center of circle A. The point that's 6 units below $(-2,0)$ has the same x-coordinate as $(-2,0)$ and has a y-coordinate that is 6 less than the y-coordinate of $(-2,0)$. Therefore, the coordinates of the center of circle B are $(-2,0-6)$, or $(-2,-6)$. Since the radius of circle B is 2 times the radius of circle A, the radius of circle B is $(2)(3)$. A circle in the xy-plane can be defined by an equation of the form $(x-h)^2+(y-k)^2=r^2$, where the coordinates of the center of the circle are (h,k) and the radius of the circle is r. Substituting -2 for h, -6 for k, and $(2)(3)$ for r in this equation yields $(x-(-2))^2+(y-(-6))^2=((2)(3))^2$, which is equivalent to $(x+2)^2+(y+6)^2=(2)^2(3)^2$, or $(x+2)^2+(y+6)^2=(4)(9)$. Therefore, the equation $(x+2)^2+(y+6)^2=(4)(9)$ defines circle B.

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

Choice C is incorrect. This equation defines a circle that's the result of shifting circle A up, not down, by 6 units and increasing the radius.

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

Question Difficulty:
Hard

Question ID 739f1bbc

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Lines, angles, and triangles	

ID: 739f1bbc

In triangle ABC, $AB = 4{,}680$ millimeters (mm) and $BC = 4{,}680$ mm. Which statement is sufficient to prove that triangle ABC is equilateral?

A. $AC = 4{,}680$ mm

B. $AC = 468$ mm

C. $AC = 46.8$ mm

D. $AC = 4.68$ mm

ID: 739f1bbc Answer

Correct Answer:
A

Rationale

Choice A is correct. In an equilateral triangle, all three sides have the same length. It's given that in triangle ABC, $AB = 4{,}680$ mm and $BC = 4{,}680$ mm. Therefore, if $AC = 4{,}680$ mm, then all three sides of triangle ABC have the same length, so triangle ABC is equilateral. Therefore, $AC = 4{,}680$ mm is sufficient to prove that triangle ABC is equilateral.

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

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

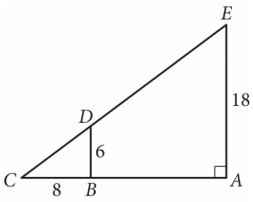
Choice D is incorrect and may result from conceptual or calculation errors.

Question Difficulty:
Easy

Question ID dba6a25a

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Right triangles and trigonometry	

ID: dba6a25a



In the figure above, $\overline{BD}$ is parallel to $\overline{AE}$.

What is the length of $\overline{CE}$?

ID: dba6a25a Answer

Rationale

The correct answer is 30. In the figure given, since $\overline{BD}$ is parallel to $\overline{AE}$ and both segments are intersected by $\overline{CE}$, then angle BDC and angle AEC are corresponding angles and therefore congruent. Angle BCD and angle ACE are also congruent because they are the same angle. Triangle BCD and triangle ACE are similar because if two angles of one triangle are congruent to two angles of another triangle, the triangles are similar. Since triangle BCD and triangle ACE are similar, their corresponding sides are proportional. So in triangle BCD and triangle ACE, $\overline{BD}$ corresponds to $\overline{AE}$ and $\overline{CD}$ corresponds to $\overline{CE}$. Therefore, $\frac{BD}{CD} = \frac{AE}{CE}$. Since triangle BCD is a right triangle, the Pythagorean theorem can be used to give the value of CD: $6^2 + 8^2 = CD^2$. Taking the square root of each side gives $CD = 10$. Substituting the values in the proportion $\frac{BD}{CD} = \frac{AE}{CE}$ yields $\frac{6}{10} = \frac{18}{CE}$. Multiplying each side by CE, and then multiplying by $\frac{10}{6}$ yields $CE = 30$. Therefore, the length of $\overline{CE}$ is 30.

Question Difficulty:
Hard

Question ID c984f1a5

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

ID: c984f1a5

A hemisphere is half of a sphere. If a hemisphere has a radius of 27 inches, which of the following is closest to the volume, in cubic inches, of this hemisphere?

A. $1{,}500$

B. $6{,}100$

C. $30{,}900$

D. $41{,}200$

ID: c984f1a5 Answer

Correct Answer:
D

Rationale

Choice D is correct. The volume, V, of a sphere is given by $V = \frac{4}{3}\pi r^3$, where r is the radius of the sphere. Since a hemisphere is half of a sphere, it follows that the volume, V, of a hemisphere is given by $V = \left(\frac{1}{2}\right)\left(\frac{4}{3}\right)\pi r^3$, or $V = \frac{2}{3}\pi r^3$. Substituting 27 for r in this formula yields $V = \frac{2}{3}\pi(27)^3$, which gives $V = 13{,}122\pi$, or V is approximately equal to $41{,}223.98$. Therefore, the choice that is closest to the volume, in cubic inches, of this hemisphere is $41{,}200$.

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

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

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

Question Difficulty:
Hard

Question ID acd30391

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Circles	

ID: acd30391

A circle in the *xy*-plane has equation $(x+3)^2+(y-1)^2=25$. Which of the following points does NOT lie in the interior of the circle?

A. $(-7, 3)$

B. $(-3, 1)$

C. $(0, 0)$

D. $(3, 2)$

ID: acd30391 Answer

Correct Answer:
D

Rationale

Choice D is correct. The circle with equation $(x+3)^2+(y-1)^2=25$ has center $(-3,1)$ and radius 5. For a point to be inside of the circle, the distance from that point to the center must be less than the radius, 5. The distance between $(3,2)$ and $(-3,1)$ is $\sqrt{(-3-3)^2+(1-2)^2}=\sqrt{(-6)^2+(-1)^2}=\sqrt{37}$, which is greater than 5. Therefore, $(3,2)$ does NOT lie in the interior of the circle.

Choice A is incorrect. The distance between $(-7,3)$ and $(-3,1)$ is $\sqrt{(-7+3)^2+(3-1)^2}=\sqrt{(-4)^2+(2)^2}=\sqrt{20}$, which is less than 5, and therefore $(-7,3)$ lies in the interior of the circle. Choice B is incorrect because it is the center of the circle. Choice C is incorrect because the distance between $(0,0)$ and $(-3,1)$ is $\sqrt{(0+3)^2+(0-1)^2}=\sqrt{(3)^2+(1)^2}=\sqrt{8}$, which is less than 5, and therefore $(0,0)$ in the interior of the circle.

Question Difficulty:
Hard

Question ID 4ff7b652

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Lines, angles, and triangles	

ID: 4ff7b652

Right triangles LMN and PQR are similar, where L and M correspond to P and Q, respectively. Angle M has a measure of 53°. What is the measure of angle Q?

A. 37°

B. 53°

C. 127°

D. 143°

ID: 4ff7b652 Answer

Correct Answer:
B

Rationale

Choice B is correct. It's given that triangle LMN is similar to triangle PQR. Corresponding angles of similar triangles are congruent. Since angle M and angle Q correspond to each other, they must be congruent. Therefore, if the measure of angle M is 53°, then the measure of angle Q is also 53°.

Choice A is incorrect and may result from concluding that angle M and angle Q are complementary rather than congruent.

Choice C is incorrect and may result from concluding that angle M and angle Q are supplementary rather than congruent.

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

Question Difficulty:
Medium

Question ID 8027db3f

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Right triangles and trigonometry	

ID: 8027db3f

In triangle JKL, $\cos(K) = \frac{24}{51}$ and angle J is a right angle. What is the value of $\cos(L)$?

ID: 8027db3f Answer

Correct Answer:
.8823, .8824, 15/17

Rationale

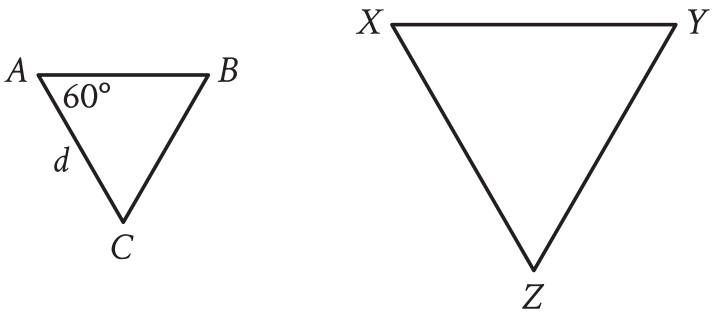
The correct answer is $\frac{15}{17}$. It's given that angle J is the right angle in triangle JKL. Therefore, the acute angles of triangle JKL are angle K and angle L. The hypotenuse of a right triangle is the side opposite its right angle. Therefore, the hypotenuse of triangle JKL is side KL. The cosine of an acute angle in a right triangle is the ratio of the length of the side adjacent to the angle to the length of the hypotenuse. It's given that $\cos(K) = \frac{24}{51}$. This can be written as $\cos(K) = \frac{8}{17}$. Since the cosine of angle K is a ratio, it follows that the length of the side adjacent to angle K is $8n$ and the length of the hypotenuse is $17n$, where n is a constant. Therefore, $JK = 8n$ and $KL = 17n$. The Pythagorean theorem states that in a right triangle, the square of the length of the hypotenuse is equal to the sum of the squares of the lengths of the other two sides. For triangle JKL, it follows that $(JK)^2 + (JL)^2 = (KL)^2$. Substituting $8n$ for JK and $17n$ for KL yields $(8n)^2 + (JL)^2 = (17n)^2$. This is equivalent to $64n^2 + (JL)^2 = 289n^2$. Subtracting $64n^2$ from each side of this equation yields $(JL)^2 = 225n^2$. Taking the square root of each side of this equation yields $JL = 15n$. Since $\cos(L) = \frac{JL}{KL}$, it follows that $\cos(L) = \frac{15n}{17n}$, which can be rewritten as $\cos(L) = \frac{15}{17}$. Note that 15/17, .8824, .8823, and 0.882 are examples of ways to enter a correct answer.

Question Difficulty:
Hard

Question ID e0d2e21a

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Lines, angles, and triangles	

ID: e0d2e21a



Note: Figures not drawn to scale.

For the triangles shown, triangle ABC is dilated by a scale factor of 3 to obtain triangle XYZ, where $d = 16$. What is the measure, in degrees, of angle X?

A. 20

B. 57

C. 60

D. 63

ID: e0d2e21a Answer

Correct Answer:
C

Rationale

Choice C is correct. It's given that triangle XYZ is obtained by a dilation of triangle ABC. It follows that triangle ABC is similar to triangle XYZ, where A corresponds to X. Since corresponding angles in similar triangles have the same measure and the measure of angle A is 60 degrees, it follows that the measure of angle X is also 60 degrees.

Choice A is incorrect and may result from conceptual errors.

Choice B is incorrect and may result from conceptual errors.

Choice D is incorrect and may result from conceptual errors.

Question Difficulty:
Easy

Question ID cecbdeba

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

ID: cecbdeba

A right circular cylinder has a volume of 432 cubic centimeters. The area of the base of the cylinder is 24 square centimeters. What is the height, in centimeters, of the cylinder?

A. 18

B. 24

C. 216

D. $10{,}368$

ID: cecbdeba Answer

Correct Answer:
A

Rationale

Choice A is correct. The volume, V, of a right circular cylinder is given by the formula $V = \pi r^2 h$, where πr^2 is the area of the base of the cylinder and h is the height. It's given that a right circular cylinder has a volume of 432 cubic centimeters and the area of the base is 24 square centimeters. Substituting 432 for V and 24 for πr^2 in the formula $V = \pi r^2 h$ yields $432 = 24h$. Dividing both sides of this equation by 24 yields $18 = h$. Therefore, the height of the cylinder, in centimeters, is 18.

Choice B is incorrect. This is the area of the base, in square centimeters, not the height, in centimeters, of the cylinder.

Choice C is incorrect. This is the height, in centimeters, of a cylinder if its volume is 432 cubic centimeters and the area of its base is 2, not 24, cubic centimeters.

Choice D is incorrect. This is the height, in centimeters, of a cylinder if its volume is 432 cubic centimeters and the area of its base is $\frac{1}{24}$, not 24, cubic centimeters.

Question Difficulty:
Medium

Question ID 42b4493b

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Lines, angles, and triangles	

ID: 42b4493b

In a right triangle, the measure of one of the acute angles is 51°. What is the measure, in degrees, of the other acute angle?

A. 6

B. 39

C. 49

D. 51

ID: 42b4493b Answer

Correct Answer:
B

Rationale

Choice B is correct. The sum of the measures of the interior angles of a triangle is 180 degrees. Since the triangle is a right triangle, it has one angle that measures 90 degrees. Therefore, the sum of the measures, in degrees, of the remaining two angles is $180 - 90$, or 90. It's given that the measure of one of the acute angles in the triangle is 51 degrees. Therefore, the measure, in degrees, of the other acute angle is $90 - 51$, or 39.

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

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

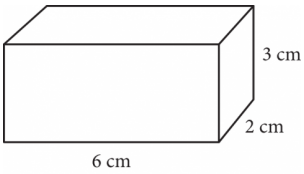
Choice D is incorrect. This is the measure, in degrees, of the acute angle whose measure is given.

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.

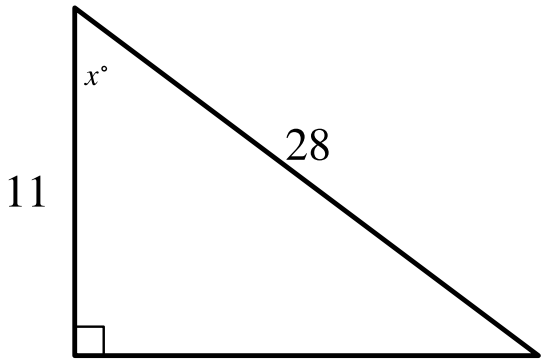
Choice B is incorrect. This is the volume of a rectangular prism with edge lengths of 6, 2, and 2. Choice C is incorrect and may result from only finding the product of the length and width of the base of the prism. Choice D is incorrect and may result from finding the sum, not the product, of the edge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

Question Difficulty:
Easy

Question ID 1bf809b5

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Right triangles and trigonometry	

ID: 1bf809b5



Note: Figure not drawn to scale.

In the triangle shown, what is the value of $\cos x^\circ$?

ID: 1bf809b5 Answer

Correct Answer:
.3928, .3929, 11/28

Rationale

The correct answer is $\frac{11}{28}$. The cosine of an acute angle in a right triangle is defined as the ratio of the length of the leg adjacent to the angle to the length of the hypotenuse. In the triangle shown, the length of the leg adjacent to the angle with measure x° is 11 units and the length of the hypotenuse is 28 units. Therefore, the value of $\cos x^\circ$ is $\frac{11}{28}$. Note that 11/28, .3928, .3929, 0.392, and 0.393 are examples of ways to enter a correct answer.

Question Difficulty:
Hard

Question ID 14e7c1f4

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Right triangles and trigonometry	

ID: 14e7c1f4

For two acute angles, $\angle Q$ and $\angle R$, $\cos(Q) = \sin(R)$. The measures, in degrees, of $\angle Q$ and $\angle R$ are $x + 61$ and $4x + 4$, respectively. What is the value of x?

A. 5

B. 19

C. 23

D. 29

ID: 14e7c1f4 Answer

Correct Answer:
A

Rationale

Choice A is correct. It's given that for two acute angles, $\angle Q$ and $\angle R$, $\cos(Q) = \sin(R)$. For two acute angles, if the sine of one angle is equal to the cosine of the other angle, the angles are complementary. It follows that $\angle Q$ and $\angle R$ are complementary. That is, the sum of the measures of the angles is 90 degrees. It's given that the measure of $\angle Q$ is $x + 61$ degrees and the measure of $\angle R$ is $4x + 4$ degrees. It follows that $(x + 61) + (4x + 4) = 90$. By combining like terms, this equation can be rewritten as $5x + 65 = 90$. Subtracting 65 from each side of this equation yields $5x = 25$. Dividing each side of this equation by 5 yields $x = 5$.

Choice B is incorrect. This would be the value of x if $\cos(Q) = \cos(R)$ rather than $\cos(Q) = \sin(R)$.

Choice C is incorrect. This would be the value of x if $\cos(Q) = -\cos(R)$ rather than $\cos(Q) = \sin(R)$ and if $\angle R$ were obtuse rather than acute.

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

Question Difficulty:
Hard

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 $75\ \text{cm}^2$, and the height of the can is 10 cm. If $110\ \text{cm}^3$ 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. $7.5\ \text{cm}^3$

B. $185\ \text{cm}^3$

C. $640\ \text{cm}^3$

D. $750\ \text{cm}^3$

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, $75\ \text{cm}^2$, by the height of the can, 10 cm, which yields $750\ \text{cm}^3$. If the syrup needed to fill the can has a volume of $110\ \text{cm}^3$, 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 $7.5\ \text{cm}^3$, 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 $185\ \text{cm}^3$, 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

Question ID 468613c0

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

ID: 468613c0

A triangle has a base length of 56 centimeters and a height of 112 centimeters. What is the area, in square centimeters, of the triangle?

A. 168

B. $1{,}568$

C. $3{,}136$

D. $6{,}272$

ID: 468613c0 Answer

Correct Answer:
C

Rationale

Choice C is correct. The area, A, of a triangle is given by the formula $A = \frac{1}{2}bh$, where b is the base length and h is the height of the triangle. It's given that a triangle has a base length of 56 centimeters and a height of 112 centimeters. Substituting 56 for b and 112 for h in the formula $A = \frac{1}{2}bh$ yields $A = \left(\frac{1}{2}\right)(56)(112)$, or $A = 3{,}136$. Therefore, the area, in square centimeters, of the triangle is $3{,}136$.

Choice A is incorrect. This is the value of $56 + 112$, not $\left(\frac{1}{2}\right)(56)(112)$.

Choice B is incorrect. This is the value of $\left(\frac{1}{4}\right)(56)(112)$, not $\left(\frac{1}{2}\right)(56)(112)$.

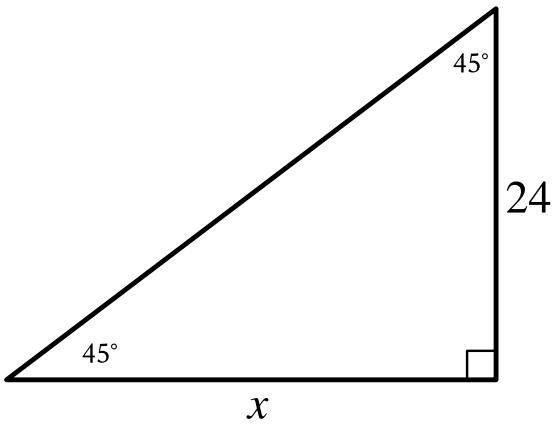
Choice D is incorrect. This is the value of $(56)(112)$, not $\left(\frac{1}{2}\right)(56)(112)$.

Question Difficulty:
Medium

Question ID 145337bc

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Right triangles and trigonometry	

ID: 145337bc



Note: Figure not drawn to scale.

In the triangle shown, what is the value of x?

A. 24

B. 45

C. 48

D. 69

ID: 145337bc Answer

Correct Answer:
A

Rationale

Choice A is correct. Since the two acute angles have the same measure and the third angle is a right angle, the triangle shown is an isosceles right triangle. In an isosceles right triangle, the two legs have the same length. The figure shows that the length of one leg of the triangle is 24 and the length of the other leg of the triangle is x. It follows that the value of x is 24.

Choice B is incorrect. This is the measure, in degrees, of one of the angles shown.

Choice C is incorrect and may result from conceptual errors.

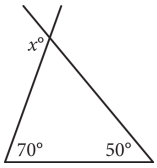
Choice D is incorrect and may result from conceptual errors.

Question Difficulty:
Easy

Question ID 36200a38

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Lines, angles, and triangles	

ID: 36200a38



In the figure above, two sides of a triangle are extended. What is the value of x ?

A. 110

B. 120

C. 130

D. 140

ID: 36200a38 Answer

Correct Answer:
B

Rationale

Choice B is correct. The sum of the interior angles of a triangle is 180°. The measures of the two interior angles of the given triangle are shown. Therefore, the measure of the third interior angle is 180° − 70° − 50° = 60°. The angles of measures x° and 60° are supplementary, so their sum is 180°. Therefore, x = 180 − 60 = 120.

Choice A is incorrect and may be the result of misinterpreting x° as supplementary to 70°. Choice C is incorrect and may be the result of misinterpreting x° as supplementary to 50°. Choice D is incorrect and may be the result of a calculation error.

Question Difficulty:
Easy

Question ID a490003a

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

ID: a490003a

The width of a rectangle is 7 centimeters. The length of the rectangle is 40 centimeters longer than the width. What is the area, in square centimeters, of this rectangle?

A. 7

B. 14

C. 54

D. 329

ID: a490003a Answer

Correct Answer:
D

Rationale

Choice D is correct. It's given that the width of this rectangle is 7 centimeters and that the length of this rectangle is 40 centimeters longer than the width. Therefore, the length of this rectangle is $7 + 40$, or 47, centimeters. The area of a rectangle can be found by multiplying its length and its width. Therefore the area, in square centimeters, of this rectangle is $(7)(47)$, or 329.

Choice A is incorrect. This is the width, in centimeters, not the area, in square centimeters, of this rectangle.

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

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

Question Difficulty:
Easy

Question ID 95ca2683

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Lines, angles, and triangles	

ID: 95ca2683

In triangle ABC, the measure of angle A is 54°, the measure of angle B is 90°, and the measure of angle C is $\left(\frac{k}{2}\right)^\circ$. What is the value of k?

A. 36

B. 45

C. 72

D. 108

ID: 95ca2683 Answer

Correct Answer:
C

Rationale

Choice C is correct. The sum of the interior angles of a triangle is 180°. It's given that the interior angles of triangle ABC are 54°, 90°, and $\left(\frac{k}{2}\right)^\circ$. It follows that $54 + 90 + \frac{k}{2} = 180$, or $144 + \frac{k}{2} = 180$. Subtracting 144 from each side of this equation yields $\frac{k}{2} = 36$. Multiplying each side of this equation by 2 yields $k = 72$. Therefore, the value of k is 72.

Choice A is incorrect. This is the value of $\frac{k}{2}$, not k.

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

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

Question Difficulty:
Medium

Question ID 306264ab

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

ID: 306264ab

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: 306264ab 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.

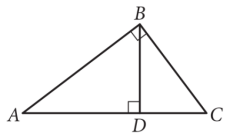
Choice D is incorrect and may result from conceptual or calculation errors.

Question Difficulty:
Hard

Question ID 6a3fbec3

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Lines, angles, and triangles	

ID: 6a3fbec3



Note: Figure not drawn to scale.

In the figure above, $BD = 6$ and $AD = 8$.

What is the length of $\overline{DC}$?

ID: 6a3fbec3 Answer

Rationale

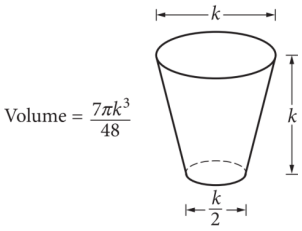
The correct answer is 4.5. According to the properties of right triangles, BD divides triangle ABC into two similar triangles, ABD and BCD. The corresponding sides of ABD and BCD are proportional, so the ratio of BD to AD is the same as the ratio of DC to BD. Expressing this information as a proportion gives $\frac{6}{8} = \frac{DC}{6}$. Solving the proportion for DC results in $DC = 4.5$. Note that 4.5 and 9/2 are examples of ways to enter a correct answer.

Question Difficulty:
Hard

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 Difficulty:
Medium

Question ID f67255ea

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Lines, angles, and triangles	

ID: f67255ea

A line intersects two parallel lines, forming four acute angles and four obtuse angles. The measure of one of the acute angles is $(9x - 560)^\circ$. The sum of the measures of one of the acute angles and three of the obtuse angles is $(-18x + w)^\circ$. What is the value of w?

ID: f67255ea Answer

Correct Answer:
1660

Rationale

The correct answer is $1{,}660$. It's given that a line intersects two parallel lines, forming four acute angles and four obtuse angles. When two parallel lines are intersected by a transversal line, the angles formed have the following properties: two adjacent angles are supplementary, and alternate interior angles are congruent. Therefore, each of the four acute angles have the same measure, and each of the four obtuse angles have the same measure. It's also given that the measure of one of the acute angles is $(9x - 560)^\circ$. If two angles are supplementary, then the sum of their measures is 180°. Therefore, the measure of the obtuse angle adjacent to any of the acute angles is $(180 - (9x - 560))^\circ$, or $(180 - 9x + 560)^\circ$, which is equivalent to $(-9x + 740)^\circ$. It's given that the sum of the measures of one of the acute angles and three of the obtuse angles is $(-18x + w)^\circ$. It follows that $(9x - 560) + 3(-9x + 740) = (-18x + w)$, which is equivalent to $9x - 560 - 27x + 2{,}220 = -18x + w$, or $-18x + 1{,}660 = -18x + w$. Adding $18x$ to both sides of this equation yields $1{,}660 = w$.

Question Difficulty:
Hard

Question ID 02b02213

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

ID: 02b02213

What is the perimeter, in inches, of a rectangle with a length of 4 inches and a width of 9 inches?

A. 13

B. 17

C. 22

D. 26

ID: 02b02213 Answer

Correct Answer:
D

Rationale

Choice D is correct. The perimeter of a figure is equal to the sum of the measurements of the sides of the figure. It's given that the rectangle has a length of 4 inches and a width of 9 inches. Since a rectangle has 4 sides, of which opposite sides are parallel and equal, it follows that the rectangle has two sides with a length of 4 inches and two sides with a width of 9 inches. Therefore, the perimeter of this rectangle is $4 + 4 + 9 + 9$, or 26 inches.

Choice A is incorrect. This is the sum, in inches, of the length and the width of the rectangle.

Choice B is incorrect. This is the sum, in inches, of the two lengths and the width of the rectangle.

Choice C is incorrect. This is the sum, in inches, of the length and the two widths of the rectangle.

Question Difficulty:
Easy

Question ID 82c8325f

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Circles	

ID: 82c8325f

A circle in the *xy*-plane has its center at $(-4, 5)$ and the point $(-8, 8)$ lies on the circle. Which equation represents this circle?

A. $(x-4)^2+(y+5)^2=5$

B. $(x+4)^2+(y-5)^2=5$

C. $(x-4)^2+(y+5)^2=25$

D. $(x+4)^2+(y-5)^2=25$

ID: 82c8325f Answer

Correct Answer:
D

Rationale

Choice D is correct. A circle in the *xy*-plane can be represented by an equation of the form $(x-h)^2+(y-k)^2=r^2$, where (h, k) is the center of the circle and r is the length of a radius of the circle. It's given that the circle has its center at $(-4, 5)$. Therefore, $h=-4$ and $k=5$. Substituting -4 for h and 5 for k in the equation $(x-h)^2+(y-k)^2=r^2$ yields $(x-(-4))^2+(y-5)^2=r^2$, or $(x+4)^2+(y-5)^2=r^2$. It's also given that the point $(-8, 8)$ lies on the circle. Substituting -8 for x and 8 for y in the equation $(x+4)^2+(y-5)^2=r^2$ yields $(-8+4)^2+(8-5)^2=r^2$, or $(-4)^2+(3)^2=r^2$, which is equivalent to $16+9=r^2$, or $25=r^2$. Substituting 25 for r^2 in the equation $(x+4)^2+(y-5)^2=r^2$ yields $(x+4)^2+(y-5)^2=25$. Thus, the equation $(x+4)^2+(y-5)^2=25$ represents the circle.

Choice A is incorrect. The circle represented by this equation has its center at $(4, -5)$, not $(-4, 5)$, and the point $(-8, 8)$ doesn't lie on the circle.

Choice B is incorrect. The point $(-8, 8)$ doesn't lie on the circle represented by this equation.

Choice C is incorrect. The circle represented by this equation has its center at $(4, -5)$, not $(-4, 5)$, and the point $(-8, 8)$ doesn't lie on the circle.

Question Difficulty:
Medium

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 6585d841

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Circles	

ID: 6585d841

$$x^2 + 14x + y^2 = 6y + 109$$

In the *xy*-plane, the graph of the given equation is a circle. What is the length of the circle's radius?

A. $\sqrt{109}$

B. $\sqrt{149}$

C. $\sqrt{167}$

D. $\sqrt{341}$

ID: 6585d841 Answer

Correct Answer:
C

Rationale

Choice C is correct. It's given that in the *xy*-plane, the graph of the given equation is a circle. The equation of a circle in the *xy*-plane can be written in the form $(x - h)^2 + (y - k)^2 = r^2$, where (h, k) is the center of the circle and r is the length of the circle's radius. Subtracting $6y$ from both sides of the equation $x^2 + 14x + y^2 = 6y + 109$ yields $x^2 + 14x + y^2 - 6y = 109$. By completing the square, this equation can be rewritten as $\left(x^2 + 14x + \left(\frac{14}{2}\right)^2\right) + \left(y^2 - 6y + \left(\frac{-6}{2}\right)^2\right) = 109 + \left(\frac{14}{2}\right)^2 + \left(\frac{-6}{2}\right)^2$. This equation can be rewritten as $\left(x^2 + 14x + 49\right) + \left(y^2 - 6y + 9\right) = 109 + 49 + 9$, or $(x + 7)^2 + (y - 3)^2 = 167$. Therefore, $r^2 = 167$. Taking the square root of both sides of this equation yields $r = \sqrt{167}$ and $r = -\sqrt{167}$. Since r is the length of the circle's radius, r must be positive. Therefore, the length of the circle's radius is $\sqrt{167}$.

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

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

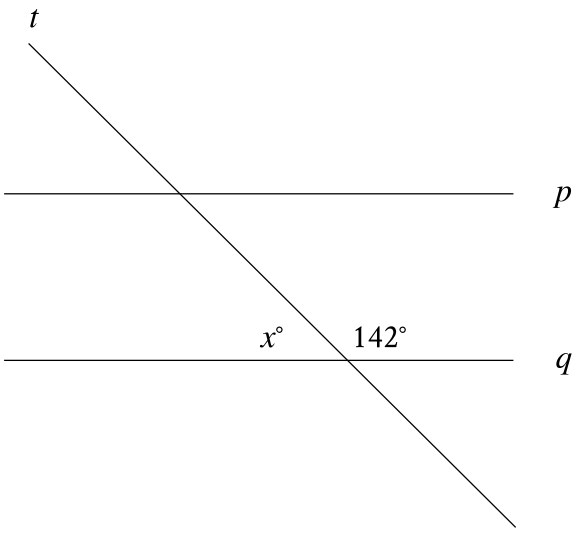
Choice D is incorrect and may result from conceptual or calculation errors.

Question Difficulty:
Hard

Question ID 3b44439b

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Lines, angles, and triangles	

ID: 3b44439b



Note: Figure not drawn to scale.

In the figure, line p is parallel to line q, and line t intersects both lines. What is the value of $x + 142$?

A. 52

B. 90

C. 142

D. 180

ID: 3b44439b Answer

Correct Answer:
D

Rationale

Choice D is correct. In the figure shown, the angle marked x° and the angle marked 142° form a linear pair of angles. If two angles form a linear pair of angles, the sum of the measures of the angles is 180°. Therefore, the value of $x + 142$ is 180.

Choice A is incorrect. This is 90 less than 142, not the sum of x and 142.

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

Choice C is incorrect. This is the measure, in degrees, of one of the angles shown.

Question Difficulty:
Easy

Question ID 1efd7ef3

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Circles	

ID: 1efd7ef3

What is the value of $\sin 42\pi$?

A. 0

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

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

D. 1

ID: 1efd7ef3 Answer

Correct Answer:
A

Rationale

Choice A is correct. The sine of a number t is the *y*-coordinate of the point arrived at by traveling a distance of t units counterclockwise around the unit circle from the starting point $(1, 0)$. Since the unit circle has a circumference of 2π units, it follows that one full rotation around the circle is equal to a distance of 2π units. Therefore, a distance of 42π units around the circle from the starting point $(1, 0)$ would result in exactly 21 full rotations, arriving back at the point $(1, 0)$. So, $\sin 42\pi$ is equal to the *y*-coordinate of the point $(1, 0)$, which is 0.

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. This is the value of $\cos 42\pi$, not $\sin 42\pi$.

Question Difficulty:
Hard

Question ID 25da87f8

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Right triangles and trigonometry	

ID: 25da87f8

A triangle with angle measures 30°, 60°, and 90° has a perimeter of $18+6\sqrt{3}$. What is the length of the longest side of the triangle?

ID: 25da87f8 Answer

Rationale

The correct answer is 12. It is given that the triangle has angle measures of 30°, 60°, and 90°, and so the triangle is a special right triangle. The side measures of this type of special triangle are in the ratio $2:1:\sqrt{3}$. If x is the measure of the shortest leg, then the measure of the other leg is $\sqrt{3}x$ and the measure of the hypotenuse is 2x. The perimeter of the triangle is given to be $18+6\sqrt{3}$, and so the equation for the perimeter can be written as $2x+x+\sqrt{3}x=18+6\sqrt{3}$. Combining like terms and factoring out a common factor of x on the left-hand side of the equation gives $(3+\sqrt{3})x=18+6\sqrt{3}$. Rewriting the right-hand side of the equation by factoring out 6 gives $(3+\sqrt{3})x=6(3+\sqrt{3})$. Dividing both sides of the equation by the common factor $(3+\sqrt{3})$ gives x = 6. The longest side of the right triangle, the hypotenuse, has a length of 2x, or 2(6), which is 12.

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.

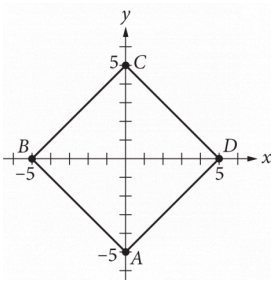
Choices A, C, and D are incorrect and may result from calculation errors.

Question Difficulty:
Hard

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 b96ff36e

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Circles	

ID: b96ff36e

In the *xy*-plane, the graph of the equation $(x-3)^2+(y-5)^2=9$ is a circle. The point $(6, c)$, where c is a constant, lies on this circle. What is the value of c?

ID: b96ff36e Answer

Correct Answer:
5

Rationale

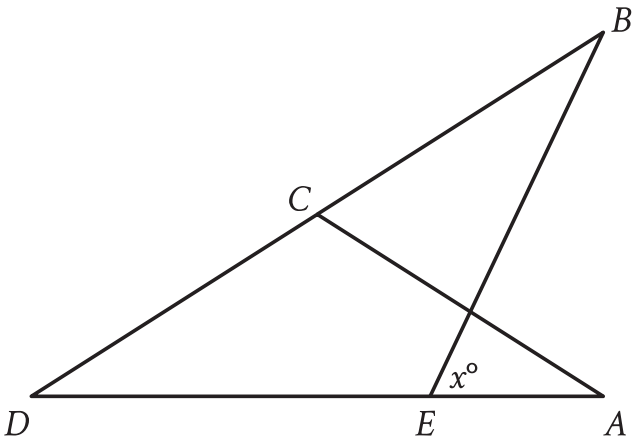
The correct answer is 5. It's given that in the *xy*-plane, the graph of the equation $(x-3)^2+(y-5)^2=9$ is a circle. It's also given that the point $(6, c)$, where c is a constant, lies on this circle. It follows that the ordered pair $(6, c)$ makes the equation $(x-3)^2+(y-5)^2=9$ true. Substituting 6 for x and c for y in this equation yields $(6-3)^2+(c-5)^2=9$, or $9+(c-5)^2=9$. Subtracting 9 from each side of this equation yields $(c-5)^2=0$. It follows that the value of c is 5.

Question Difficulty:
Medium

Question ID 6d99b141

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Lines, angles, and triangles	

ID: 6d99b141



Note: Figure not drawn to scale.

In the figure, $AC = CD$. The measure of angle EBC is 45°, and the measure of angle ACD is 104°. What is the value of x?

ID: 6d99b141 Answer

Correct Answer:
83

Rationale

The correct answer is 83. It's given that in the figure, $AC = CD$. Thus, triangle ACD is an isosceles triangle and the measure of angle CDA is equal to the measure of angle CAD. The sum of the measures of the interior angles of a triangle is 180°. Thus, the sum of the measures of the interior angles of triangle ACD is 180°. It's given that the measure of angle ACD is 104°. It follows that the sum of the measures of angles CDA and CAD is $(180 - 104)^\circ$, or 76°. Since the measure of angle CDA is equal to the measure of angle CAD, the measure of angle CDA is half of 76°, or 38°. The sum of the measures of the interior angles of triangle BDE is 180°. It's given that the measure of angle EBC is 45°. Since the measure of angle BDE, which is the same angle as angle CDA, is 38°, it follows that the measure of angle DEB is $(180 - 45 - 38)^\circ$, or 97°. Since angle DEB and angle AEB form a straight line, the sum of the measures of these angles is 180°. It's given in the figure that the measure of angle AEB is x°. It follows that $97 + x = 180$. Subtracting 97 from both sides of this equation yields $x = 83$.

Question Difficulty:
Hard

Question ID 9912e19f

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Lines, angles, and triangles	

ID: 9912e19f

Triangles EFG and JKL are congruent, where E, F, and G correspond to J, K, and L, respectively. The measure of angle E is 45° and the measure of angle F is 20°. What is the measure of angle J?

A. 20°

B. 45°

C. 135°

D. 160°

ID: 9912e19f Answer

Correct Answer:
B

Rationale

Choice B is correct. It's given that triangles EFG and JKL are congruent such that angle E corresponds to angle J. Corresponding angles of congruent triangles are congruent, so angle E and angle J must be congruent. Therefore, if the measure of angle E is 45°, then the measure of angle J is also 45°.

Choice A is incorrect. This is the measure of angle K, not angle J.

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:
Easy

Question ID 4b7bb316

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

ID: 4b7bb316

The length of each edge of a box is 29 inches. Each side of the box is in the shape of a square. The box does not have a lid. What is the exterior surface area, in square inches, of this box without a lid?

ID: 4b7bb316 Answer

Correct Answer:
4205

Rationale

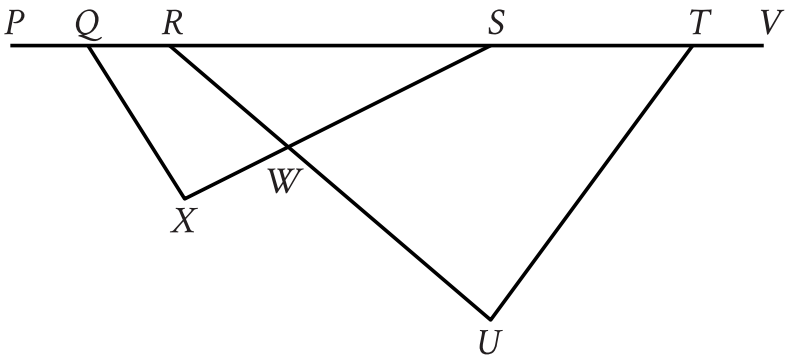
The correct answer is $4{,}205$. The exterior surface area of a figure is the sum of the areas of all its faces. It's given that the box does not have a lid and that each side of the box is in the shape of a square. Therefore, the box consists of 5 congruent square faces. It's also given that the length of each edge is 29 inches. Let s represent the length of an edge of a square. It follows that the area of a square is equal to s^2. Therefore, the area of each of the 5 square faces is equal to 29^2, or 841, square inches. Since the box consists of 5 congruent square faces, it follows that the sum of the areas of all its faces, or the exterior surface area of this box without a lid, is $5(841)$, or $4{,}205$, square inches.

Question Difficulty:
Medium

Question ID e10d8313

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Lines, angles, and triangles	

ID: e10d8313



Note: Figure not drawn to scale.

In the figure shown, points Q, R, S, and T lie on line segment PV, and line segment RU intersects line segment SX at point W. The measure of $\angle SQX$ is 48°, the measure of $\angle SXQ$ is 86°, the measure of $\angle SWU$ is 85°, and the measure of $\angle VTU$ is 162°. What is the measure, in degrees, of $\angle TUR$?

ID: e10d8313 Answer

Correct Answer:

123

Rationale

The correct answer is 123. The triangle angle sum theorem states that the sum of the measures of the interior angles of a triangle is 180 degrees. It's given that the measure of $\angle SQX$ is 48° and the measure of $\angle SXQ$ is 86°. Since points S, Q, and X form a triangle, it follows from the triangle angle sum theorem that the measure, in degrees, of $\angle QSX$ is $180 - 48 - 86$, or 46. It's also given that the measure of $\angle SWU$ is 85°. Since $\angle SWU$ and $\angle SWR$ are supplementary angles, the sum of their measures is 180 degrees. It follows that the measure, in degrees, of $\angle SWR$ is $180 - 85$, or 95. Since points R, S, and W form a triangle, and $\angle RSW$ is the same angle as $\angle QSX$, it follows from the triangle angle sum theorem that the measure, in degrees, of $\angle WRS$ is $180 - 46 - 95$, or 39. It's given that the measure of $\angle VTU$ is 162°. Since $\angle VTU$ and $\angle STU$ are supplementary angles, the sum of their measures is 180 degrees. It follows that the measure, in degrees, of $\angle STU$ is $180 - 162$, or 18. Since points R, T, and U form a triangle, and $\angle URT$ is the same angle as $\angle WRS$, it follows from the triangle angle sum theorem that the measure, in degrees, of $\angle TUR$ is $180 - 39 - 18$, or 123.

Question Difficulty:

Hard

Question ID bcb66188

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Right triangles and trigonometry	

ID: bcb66188

Triangle FGH is similar to triangle JKL, where angle F corresponds to angle J and angles G and K are right angles. If $\sin(F) = \frac{308}{317}$, what is the value of $\sin(J)$?

A. $\frac{75}{317}$

B. $\frac{308}{317}$

C. $\frac{317}{308}$

D. $\frac{317}{75}$

ID: bcb66188 Answer

Correct Answer:
B

Rationale

Choice B is correct. If two triangles are similar, then their corresponding angles are congruent. It's given that right triangle FGH is similar to right triangle JKL and angle F corresponds to angle J. It follows that angle F is congruent to angle J and, therefore, the measure of angle F is equal to the measure of angle J. The sine ratios of angles of equal measure are equal. Since the measure of angle F is equal to the measure of angle J, $\sin(F) = \sin(J)$. It's given that $\sin(F) = \frac{308}{317}$. Therefore, $\sin(J)$ is $\frac{308}{317}$.

Choice A is incorrect. This is the value of $\cos(J)$, not the value of $\sin(J)$.

Choice C is incorrect. This is the reciprocal of the value of $\sin(J)$, not the value of $\sin(J)$.

Choice D is incorrect. This is the reciprocal of the value of $\cos(J)$, not the value of $\sin(J)$.

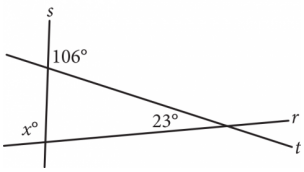
Question Difficulty:
Medium

Question ID f88f27e5

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Lines, angles, and triangles	

ID: f88f27e5

Intersecting lines *r*, *s*, and *t* are shown below.



What is the value of *x* ?

ID: f88f27e5 Answer

Rationale

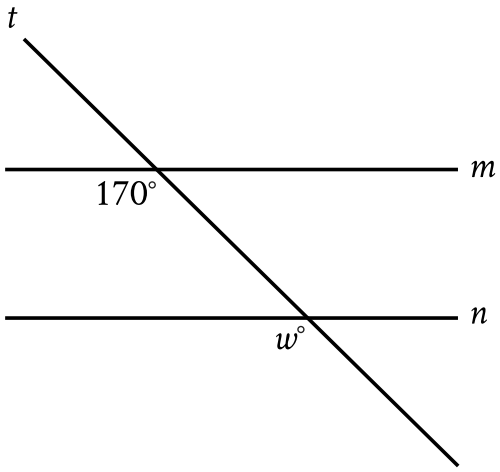
The correct answer is 97. The intersecting lines form a triangle, and the angle with measure of $x°$ is an exterior angle of this triangle. The measure of an exterior angle of a triangle is equal to the sum of the measures of the two nonadjacent interior angles of the triangle. One of these angles has measure of $23°$ and the other, which is supplementary to the angle with measure $106°$, has measure of $180° - 106° = 74°$. Therefore, the value of x is $23 + 74 = 97$.

Question Difficulty:
Hard

Question ID 5207e508

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Lines, angles, and triangles	

ID: 5207e508



Note: Figure not drawn to scale.

In the figure, line m is parallel to line n. What is the value of w?

A. 17

B. 30

C. 70

D. 170

ID: 5207e508 Answer

Correct Answer:
D

Rationale

Choice D is correct. It's given that lines m and n are parallel. Since line t intersects both lines m and n, it's a transversal. The angles in the figure marked as 170° and w° are on the same side of the transversal, where one is an interior angle with line m as a side, and the other is an exterior angle with line n as a side. Thus, the marked angles are corresponding angles. When two parallel lines are intersected by a transversal, corresponding angles are congruent and, therefore, have equal measure. It follows that $w^\circ = 170^\circ$. Therefore, the value of w is 170.

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

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

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

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 e5c57163

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

ID: e5c57163

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: e5c57163 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 33e29881

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Right triangles and trigonometry	

ID: 33e29881

In right triangle RST, the sum of the measures of angle R and angle S is 90 degrees. The value of $\sin(R)$ is $\frac{\sqrt{15}}{4}$. What is the value of $\cos(S)$?

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

B. $\frac{\sqrt{15}}{4}$

C. $\frac{4\sqrt{15}}{15}$

D. $\sqrt{15}$

ID: 33e29881 Answer

Correct Answer:
B

Rationale

Choice B is correct. The sine of any acute angle is equal to the cosine of its complement. It's given that in right triangle RST, the sum of the measures of angle R and angle S is 90 degrees. Therefore, angle R and angle S are complementary, and the value of $\sin R$ is equal to the value of $\cos S$. It's given that the value of $\sin R$ is $\frac{\sqrt{15}}{4}$, so the value of $\cos S$ is also $\frac{\sqrt{15}}{4}$.

Choice A is incorrect. This is the value of $\tan S$.

Choice C is incorrect. This is the value of $\frac{1}{\cos S}$.

Choice D is incorrect. This is the value of $\frac{1}{\tan S}$.

Question Difficulty:
Medium

Question ID 93f48423

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

ID: 93f48423

What is the area, in square inches, of a rectangle with a length of 7 inches and a width of 6 inches?

A. 13

B. 20

C. 42

D. 84

ID: 93f48423 Answer

Correct Answer:
C

Rationale

Choice C is correct. The area, A, of a rectangle is given by the formula $A = \ell w$, where ℓ represents the length of the rectangle and w represents its width. It's given that the rectangle has a length of 7 inches and a width of 6 inches. Substituting 7 for ℓ and 6 for w in the formula $A = \ell w$ yields $A = (7)(6)$, or $A = 42$. Thus, the area, in square inches, of the rectangle is 42.

Choice A is incorrect. This is the sum, not the product, of the length and width of the rectangle.

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

Choice D is incorrect. This is twice the area, in square inches, of the rectangle.

Question Difficulty:
Easy

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 bb560789

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

ID: bb560789

Triangle R has an area of 80 square centimeters (cm^2). Square S has side lengths of 4 cm. What is the total area of triangle R and square S, in cm^2?

A. 42

B. 44

C. 84

D. 96

ID: bb560789 Answer

Correct Answer:
D

Rationale

Choice D is correct. It's given that triangle R has an area of 80 cm^2. The area of a square is ℓ^2, where ℓ is the side length of the square. It's given that square S has side lengths of 4 cm. It follows that the area, in cm^2, of square S is 4^2, or 16. Therefore, the total area, in cm^2, of triangle R and square S is $80 + 16$, or 96.

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

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

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

Question Difficulty:
Easy

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 983412ea

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

ID: 983412ea

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: 983412ea 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 $2{,}016 = (s^2)(14)$. 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 a4c0547f

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Right triangles and trigonometry	

ID: a4c0547f

In triangle XYZ, angle Z is a right angle and the length of $\overline{YZ}$ is 24 units. If $\tan X = \frac{12}{35}$, what is the perimeter, in units, of triangle XYZ?

A. 188

B. 168

C. 84

D. 71

ID: a4c0547f Answer

Correct Answer:
B

Rationale

Choice B is correct. It's given that angle Z in triangle XYZ is a right angle. Thus, side YZ is the leg opposite angle X and side XZ is the leg adjacent to angle X. The tangent of an acute angle in a right triangle is the ratio of the length of the leg opposite the angle to the length of the leg adjacent to the angle. It follows that $\tan X = \frac{YZ}{XZ}$. It's given that $\tan X = \frac{12}{35}$ and the length of side YZ is 24 units. Substituting $\frac{12}{35}$ for $\tan X$ and 24 for YZ in the equation $\tan X = \frac{YZ}{XZ}$ yields $\frac{12}{35} = \frac{24}{XZ}$. Multiplying both sides of this equation by $35(XZ)$ yields $12(XZ) = 24(35)$, or $12(XZ) = 840$. Dividing both sides of this equation by 12 yields $XZ = 70$. The length XY can be calculated using the Pythagorean theorem, which states that if a right triangle has legs with lengths of a and b and a hypotenuse with length c, then $a^2 + b^2 = c^2$. Substituting 70 for a and 24 for b in this equation yields $70^2 + 24^2 = c^2$, or $5{,}476 = c^2$. Taking the square root of both sides of this equation yields $\pm 74 = c$. Since the length of the hypotenuse must be positive, $74 = c$. Therefore, the length of XY is 74 units. The perimeter of a triangle is the sum of the lengths of all sides. Thus, $(74 + 70 + 24)$ units, or 168 units, is the perimeter of triangle XYZ.

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

Choice C is incorrect. This would be the perimeter, in units, for a right triangle where the length of side YZ is 12 units, not 24 units.

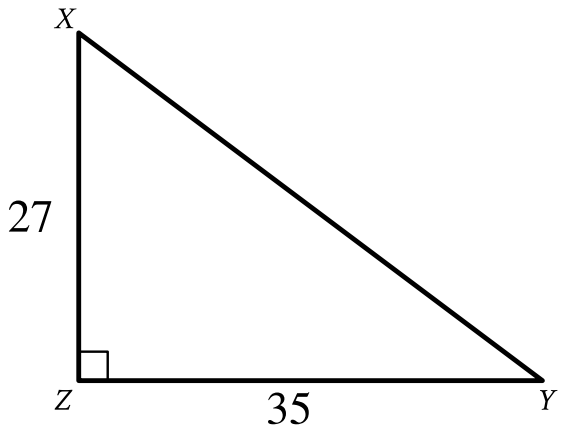
Choice D is incorrect and may result from conceptual or calculation errors.

Question Difficulty:
Hard

Question ID 659cb706

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Right triangles and trigonometry	

ID: 659cb706



Note: Figure not drawn to scale.

Triangle XYZ shown is a right triangle. Which of the following has the same value as $\sin X$?

A. $\tan X$

B. $\tan Y$

C. $\cos X$

D. $\cos Y$

ID: 659cb706 Answer

Correct Answer:
D

Rationale

Choice D is correct. The sine of an angle is equal to the cosine of its complementary angle. In the triangle shown, angle Z is a right angle; thus, angles X and Y are complementary angles. Therefore, $\cos Y$ has the same value as $\sin X$.

Choice A is incorrect and may result from conceptual errors.

Choice B is incorrect and may result from conceptual errors.

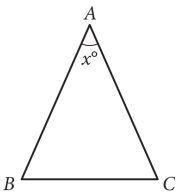
Choice C is incorrect and may result from conceptual errors.

Question Difficulty:
Medium

Question ID c8d60e48

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Lines, angles, and triangles	

ID: c8d60e48



In the given triangle, $AB = AC$ and $\angle ABC$ has a measure of $67°$. What is the value of x ?

A. 36

B. 46

C. 58

D. 70

ID: c8d60e48 Answer

Correct Answer:
B

Rationale

Choice B is correct. Since $AB = AC$, the measures of their corresponding angles, $\angle ABC$ and $\angle ACB$, are equal. Since $\angle ABC$ has a measure of $67°$, the measure of $\angle ACB$ is also $67°$. Since the sum of the measures of the interior angles in a triangle is $180°$, it follows that $67 + 67 + x = 180$, or $134 + x = 180$. Subtracting by 134 on both sides of this equation yields $x = 46$.

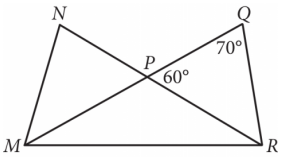
Choices A, C, and D are incorrect and may result from calculation errors.

Question Difficulty:
Easy

Question ID 947a3cde

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Lines, angles, and triangles	

ID: 947a3cde



In the figure above, $\overline{MQ}$ and $\overline{NR}$ intersect at point P, $NP = QP$, and $MP = PR$. What is the measure, in degrees, of $\angle QMR$? (Disregard the degree symbol when gridding your answer.)

ID: 947a3cde Answer

Rationale

The correct answer is 30. It is given that the measure of $\angle QPR$ is $60°$. Angle MPR and $\angle QPR$ are collinear and therefore are supplementary angles. This means that the sum of the two angle measures is $180°$, and so the measure of $\angle MPR$ is $120°$. The sum of the angles in a triangle is $180°$. Subtracting the measure of $\angle MPR$ from $180°$ yields the sum of the other angles in the triangle MPR. Since $180 - 120 = 60$, the sum of the measures of $\angle QMR$ and $\angle NRM$ is $60°$. It is given that $MP = PR$, so it follows that triangle MPR is isosceles. Therefore $\angle QMR$ and $\angle NRM$ must be congruent. Since the sum of the measure of these two angles is $60°$, it follows that the measure of each angle is $30°$.

An alternate approach would be to use the exterior angle theorem, noting that the measure of $\angle QPR$ is equal to the sum of the measures of $\angle QMR$ and $\angle NRM$. Since both angles are equal, each of them has a measure of $30°$.

Question Difficulty:
Hard

Question ID 1f0b582e

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

ID: 1f0b582e

Square X has a side length of 12 centimeters. The perimeter of square Y is 2 times the perimeter of square X. What is the length, in centimeters, of one side of square Y?

A. 6

B. 10

C. 14

D. 24

ID: 1f0b582e Answer

Correct Answer:
D

Rationale

Choice D is correct. The perimeter, P, of a square can be found using the formula $P = 4s$, where s is the length of each side of the square. It's given that square X has a side length of 12 centimeters. Substituting 12 for s in the formula for the perimeter of a square yields $P = 4(12)$, or $P = 48$. Therefore, the perimeter of square X is 48 centimeters. It's also given that the perimeter of square Y is 2 times the perimeter of square X. Therefore, the perimeter of square Y is $2(48)$, or 96, centimeters. Substituting 96 for P in the formula $P = 4s$ gives $96 = 4s$. Dividing both sides of this equation by 4 gives $24 = s$. Therefore, the length of one side of square Y is 24 centimeters.

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

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

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

Question Difficulty:
Medium

Question ID deff8a2f

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

ID: deff8a2f

The circumference of the base of a right circular cylinder is 20π meters, and the height of the cylinder is 6 meters. What is the volume, in cubic meters, of the cylinder?

A. 60π

B. 120π

C. 600π

D. $2{,}400\pi$

ID: deff8a2f Answer

Correct Answer:
C

Rationale

Choice C is correct. The volume, V, of a right circular cylinder is given by the formula $V = \pi r^2 h$, where r is the radius of the base of the cylinder and h is the height of the cylinder. It's given that a right circular cylinder has a height of 6 meters. Therefore, $h = 6$. It's also given that the right circular cylinder has a base with a circumference of 20π meters. The circumference, C, of a circle is given by $C = 2\pi r$, where r is the radius of the circle. Substituting 20π for C in the formula $C = 2\pi r$ yields $20\pi = 2\pi r$. Dividing each side of this equation by 2π yields $10 = r$. Substituting 10 for r and 6 for h in the formula $V = \pi r^2 h$ yields $V = \pi(10)^2(6)$, or $V = 600\pi$. Therefore, the volume, in cubic meters, of the cylinder is 600π.

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

Choice B is incorrect. This is the lateral surface area, not the volume, of the cylinder.

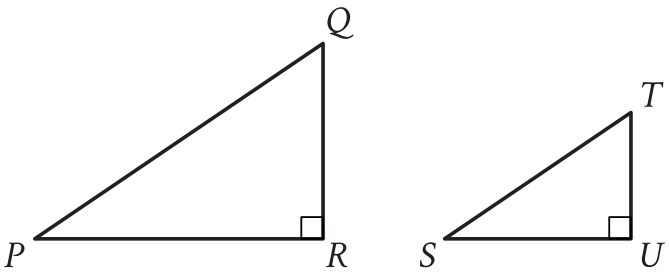
Choice D is incorrect. This is the result of using the diameter, not the radius, for the value of r in the formula $V = \pi r^2 h$.

Question Difficulty:
Hard

Question ID d5f349b7

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Lines, angles, and triangles	

ID: d5f349b7



Note: Figures not drawn to scale.

Right triangles PQR and STU are similar, where P corresponds to S. If the measure of angle Q is 18°, what is the measure of angle S?

A. 18°

B. 72°

C. 82°

D. 162°

ID: d5f349b7 Answer

Correct Answer:
B

Rationale

Choice B is correct. In similar triangles, corresponding angles are congruent. It's given that right triangles PQR and STU are similar, where angle P corresponds to angle S. It follows that angle P is congruent to angle S. In the triangles shown, angle R and angle U are both marked as right angles, so angle R and angle U are corresponding angles. It follows that angle Q and angle T are corresponding angles, and thus, angle Q is congruent to angle T. It's given that the measure of angle Q is 18°, so the measure of angle T is also 18°. Angle U is a right angle, so the measure of angle U is 90°. The sum of the measures of the interior angles of a triangle is 180°. Thus, the sum of the measures of the interior angles of triangle STU is 180 degrees. Let s represent the measure, in degrees, of angle S. It follows that $s + 18 + 90 = 180$, or $s + 108 = 180$. Subtracting 108 from both sides of this equation yields $s = 72$. Therefore, if the measure of angle Q is 18 degrees, then the measure of angle S is 72 degrees.

Choice A is incorrect. This is the measure of angle T.

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

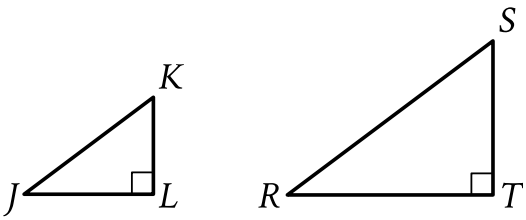
Choice D is incorrect. This is the sum of the measures of angle S and angle U.

Question Difficulty:
Easy

Question ID babd7461

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

ID: babd7461



Note: Figure not drawn to scale.

In the figure shown, triangle JKL is similar to triangle RST, where J corresponds to R and K corresponds to S. The length of $\overline{JK}$ is 15, and the perimeter of triangle JKL is 36. The length of $\overline{RS}$ is 135. What is the perimeter of triangle RST?

A. 324

B. 540

C. $2{,}916$

D. $8{,}100$

ID: babd7461 Answer

Correct Answer:
A

Rationale

Choice A is correct. It's given that triangle JKL is similar to triangle RST, where J corresponds to R and K corresponds to S. It follows that $\overline{JK}$ corresponds to $\overline{RS}$. If two triangles are similar, then the scale factor between their perimeters is equal to the scale factor between the lengths of their corresponding sides. It's given that the length of $\overline{JK}$ is 15 and the length of $\overline{RS}$ is 135. Therefore, the scale factor from the length of $\overline{JK}$ to the length of $\overline{RS}$ is $\frac{135}{15}$, or 9. It's given that the perimeter of triangle JKL is 36. Let p represent the perimeter of triangle RST. It follows that $\frac{p}{36} = 9$. Multiplying each side of this equation by 36 yields $p = 324$. Therefore, the perimeter of triangle RST is 324.

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

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

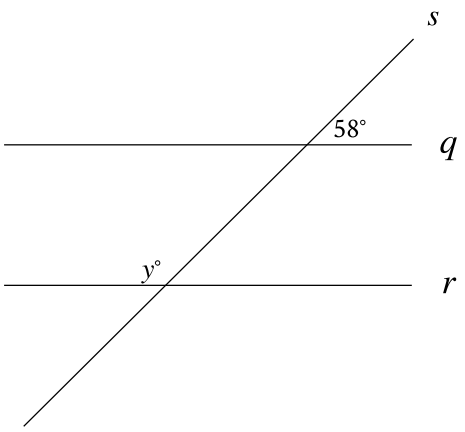
Choice D is incorrect and may result from conceptual or calculation errors.

Question Difficulty:
Easy

Question ID 686b5212

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Lines, angles, and triangles	

ID: 686b5212



Note: Figure not drawn to scale.

In the figure, line q is parallel to line r, and both lines are intersected by line s. If $y = 2x + 8$, what is the value of x?

ID: 686b5212 Answer

Correct Answer:
57

Rationale

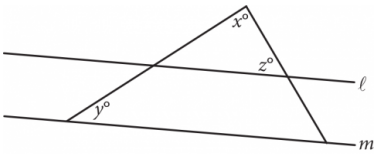
The correct answer is 57. Based on the figure, the angle with measure y° and the angle vertical to the angle with measure 58° are same side interior angles. Since vertical angles are congruent, the angle vertical to the angle with measure 58° also has measure 58°. It's given that lines q and r are parallel. Therefore, same side interior angles between lines q and r are supplementary. It follows that $y + 58 = 180$. If $y = 2x + 8$, then the value of x can be found by substituting $2x + 8$ for y in the equation $y + 58 = 180$, which yields $(2x + 8) + 58 = 180$, or $2x + 66 = 180$. Subtracting 66 from both sides of this equation yields $2x = 114$. Dividing both sides of this equation by 2 yields $x = 57$. Thus, if $y = 2x + 8$, the value of x is 57.

Question Difficulty:
Medium

Question ID a6dbad6b

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Lines, angles, and triangles	

ID: a6dbad6b



Note: Figure not drawn to scale.

In the figure above, lines ℓ and m are parallel, $y = 20$, and $z = 60$. What is the value of x ?

A. 120

B. 100

C. 90

D. 80

ID: a6dbad6b Answer

Correct Answer:
B

Rationale

Choice B is correct. Let the measure of the third angle in the smaller triangle be $a°$. Since lines ℓ and m are parallel and cut by transversals, it follows that the corresponding angles formed are congruent. So $a° = y° = 20°$. The sum of the measures of the interior angles of a triangle is $180°$, which for the interior angles in the smaller triangle yields $a + x + z = 180$. Given that $z = 60$ and $a = 20$, it follows that $20 + x + 60 = 180$. Solving for x gives $x = 180 - 60 - 20$, or $x = 100$.

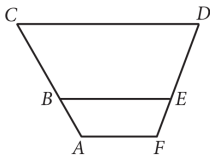
Choice A is incorrect and may result from incorrectly assuming that angles $x + z = 180$. Choice C is incorrect and may result from incorrectly assuming that the smaller triangle is a right triangle, with x as the right angle. Choice D is incorrect and may result from a misunderstanding of the exterior angle theorem and incorrectly assuming that $x = y + z$.

Question Difficulty:
Easy

Question ID 81b664bc

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Lines, angles, and triangles	

ID: 81b664bc



In the figure above, $\overline{AF}$, $\overline{BE}$, and $\overline{CD}$ are parallel. Points *B* and *E* lie on $\overline{AC}$ and $\overline{FD}$, respectively. If $AB = 9$, $BC = 18.5$, and $FE = 8.5$, what is the length of $\overline{ED}$, to the nearest tenth?

A. 16.8

B. 17.5

C. 18.4

D. 19.6

ID: 81b664bc Answer

Correct Answer:
B

Rationale

Choice B is correct. Since $\overline{AF}$, $\overline{BE}$, and $\overline{CD}$ are parallel, quadrilaterals $AFEB$ and $BEDC$ are similar. Let x represent the length of $\overline{ED}$. With similar figures, the ratios of the lengths of corresponding sides are equal. It follows that $\frac{9}{18.5} = \frac{8.5}{x}$. Multiplying both sides of this equation by 18.5 and by x yields $9x = (18.5)(8.5)$, or $9x = 157.25$. Dividing both sides of this equation by 9 yields $x = 17.47$, which to the nearest tenth is 17.5.

Choices A, C, and D are incorrect and may result from errors made when setting up the proportion.

Question Difficulty:
Medium

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.

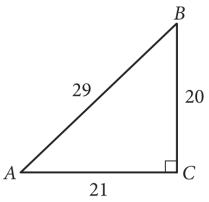
Choice D is incorrect and may result from conceptual or calculation errors.

Question Difficulty:
Easy

Question ID 902dc959

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Right triangles and trigonometry	

ID: 902dc959



In the figure above, what is the value of $\tan(A)$?

A. $\frac{20}{29}$

B. $\frac{21}{29}$

C. $\frac{20}{21}$

D. $\frac{21}{20}$

ID: 902dc959 Answer

Correct Answer:
C

Rationale

Choice C is correct. Angle A is an acute angle in a right triangle, so the value of tan(A) is equivalent to the ratio of the length of the side opposite angle A, 20, to the length of the nonhypotenuse side adjacent to angle A, 21. Therefore, $\tan(A) = \frac{20}{21}$.

Choice A is incorrect. This is the value of sin(A). Choice B is incorrect. This is the value of cos(A). Choice D is incorrect. This is the value of tan(B).

Question Difficulty:
Medium

Question ID e86f0651

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

ID: e86f0651

A circle has a radius of 43 meters. What is the area, in square meters, of the circle?

A. $\frac{43\pi}{2}$

B. 43π

C. 86π

D. $1{,}849\pi$

ID: e86f0651 Answer

Correct Answer:
D

Rationale

Choice D is correct. The area, A, of a circle is given by the formula $A = \pi r^2$, where r is the radius of the circle. It's given that the circle has a radius of 43 meters. Substituting 43 for r in the formula $A = \pi r^2$ yields $A = \pi(43)^2$, or $A = 1{,}849\pi$. Therefore, the area, in square meters, of the circle is $1{,}849\pi$.

Choice A is incorrect. This is the area, in square meters, of a circle with a radius of $\sqrt{\frac{43}{2}}$ meters.

Choice B is incorrect. This is the area, in square meters, of a circle with a radius of $\sqrt{43}$ meters.

Choice C is incorrect. This is the circumference, in meters, of the circle.

Question Difficulty:
Medium

Question ID 858fd1cf

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Circles	

ID: 858fd1cf

A circle in the *xy*-plane has its center at $(-1, 1)$. Line t is tangent to this circle at the point $(5, -4)$. Which of the following points also lies on line t?

A. $(0, \frac{6}{5})$

B. $(4, 7)$

C. $(10, 2)$

D. $(11, 1)$

ID: 858fd1cf Answer

Correct Answer:
C

Rationale

Choice C is correct. It's given that the circle has its center at $(-1, 1)$ and that line t is tangent to this circle at the point $(5, -4)$. Therefore, the points $(-1, 1)$ and $(5, -4)$ are the endpoints of the radius of the circle at the point of tangency. The slope of a line or line segment that contains the points (a, b) and (c, d) can be calculated as $\frac{d-b}{c-a}$. Substituting $(-1, 1)$ for (a, b) and $(5, -4)$ for (c, d) in the expression $\frac{d-b}{c-a}$ yields $\frac{-4-1}{5-(-1)}$, or $-\frac{5}{6}$. Thus, the slope of this radius is $-\frac{5}{6}$. A line that's tangent to a circle is perpendicular to the radius of the circle at the point of tangency. It follows that line t is perpendicular to the radius at the point $(5, -4)$, so the slope of line t is the negative reciprocal of the slope of this radius. The negative reciprocal of $-\frac{5}{6}$ is $\frac{6}{5}$. Therefore, the slope of line t is $\frac{6}{5}$. Since the slope of line t is the same between any two points on line t, a point lies on line t if the slope of the line segment connecting the point and $(5, -4)$ is $\frac{6}{5}$. Substituting choice C, $(10, 2)$, for (a, b) and $(5, -4)$ for (c, d) in the expression $\frac{d-b}{c-a}$ yields $\frac{-4-2}{5-10}$, or $\frac{6}{5}$. Therefore, the point $(10, 2)$ lies on line t.

Choice A is incorrect. The slope of the line segment connecting $(0, \frac{6}{5})$ and $(5, -4)$ is $\frac{-4-\frac{6}{5}}{5-0}$, or $-\frac{26}{25}$, not $\frac{6}{5}$.

Choice B is incorrect. The slope of the line segment connecting $(4, 7)$ and $(5, -4)$ is $\frac{-4-7}{5-4}$, or -11, not $\frac{6}{5}$.

Choice D is incorrect. The slope of the line segment connecting $(11, 1)$ and $(5, -4)$ is $\frac{-4-1}{5-11}$, or $\frac{5}{6}$, not $\frac{6}{5}$.

Question Difficulty:
Hard

Question ID 9adb86ed

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Circles	

ID: 9adb86ed

Points Q and R lie on a circle with center P. The radius of this circle is 9 inches. Triangle PQR has a perimeter of 31 inches. What is the length, in inches, of $\overline{QR}$?

A. $13\sqrt{2}$

B. 13

C. $9\sqrt{2}$

D. 9

ID: 9adb86ed Answer

Correct Answer:
B

Rationale

Choice B is correct. Since it's given that P is the center of a circle with a radius of 9 inches, and that points Q and R lie on that circle, it follows that $\overline{PQ}$ and $\overline{RP}$ of triangle PQR each have a length of 9 inches. Let the length of $\overline{QR}$ be x inches. It follows that the perimeter of triangle PQR is $9 + 9 + x$ inches. Since it's given that the perimeter of triangle PQR is 31 inches, it follows that $9 + 9 + x = 31$, or $18 + x = 31$. Subtracting 18 from both sides of this equation gives $x = 13$. Therefore, the length, in inches, of $\overline{QR}$ is 13.

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

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

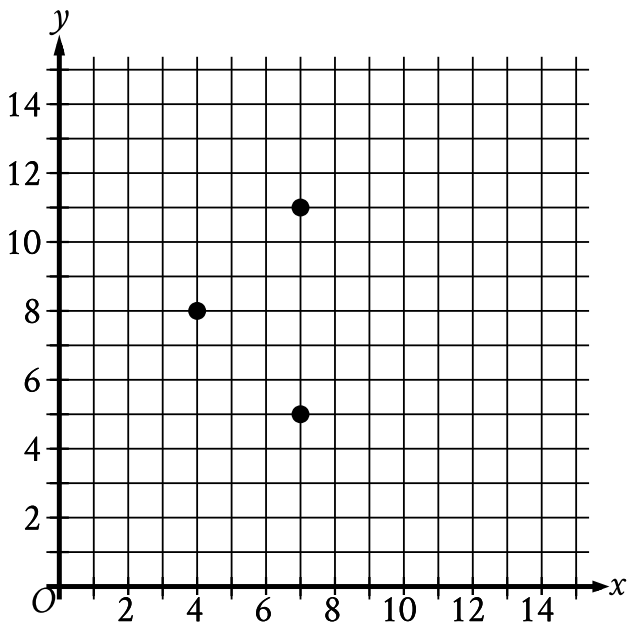
Choice D is incorrect and may result from conceptual or calculation errors.

Question Difficulty:
Hard

Question ID 096c7ef5

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

ID: 096c7ef5



The three points shown define a circle. The circumference of this circle is $k\pi$, where k is a constant. What is the value of k?

A. 3

B. 6

C. 7

D. 9

ID: 096c7ef5 Answer

Correct Answer:
B

Rationale

Choice B is correct. It's given that the three points shown define a circle, so the center of that circle is an equal distance from each of the three points. The point $(7, 8)$ is halfway between the points $(7, 5)$ and $(7, 11)$ and is a distance of 3 units from each of those two points. The point $(7, 8)$ is also a distance of 3 units from $(4, 8)$. Because the point $(7, 8)$ is the same distance from all three given points, it must be the center of the circle. The radius of a circle is the distance from the center to any point on the circle. Since that distance is 3, it follows that the radius of the circle is 3. The circumference of a circle with radius r is equal to $2\pi r$. It follows that the circumference of the circle is $2(\pi)(3)$, or 6π. It's given that the circumference of the circle is $k\pi$. Therefore, the value of k is 6.

Choice A is incorrect. This is the radius of the circle, not the value of k in the expression $k\pi$.

Choice C is incorrect. This is the *x*-coordinate of the center of the circle, not the value of k in the expression $k\pi$.

Choice D is incorrect. This is the value of k for which $k\pi$ represents the area of the circle, in square units, not the circumference of the circle, in units.

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 9966235e

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

ID: 9966235e

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 not taken up by the sphere?

A. $149{,}796$

B. $164{,}500$

C. $190{,}955$

D. $310{,}800$

ID: 9966235e 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 2b41a4c4

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

ID: 2b41a4c4

A right rectangular prism has a length of 11 meters, a width of 8 meters, and a height of 10 meters. What is the volume, in cubic meters, of the prism?

ID: 2b41a4c4 Answer

Correct Answer:
880

Rationale

The correct answer is 880. The volume, V, of a right rectangular prism is given by the formula $V = \ell wh$, where ℓ is the length, w is the width, and h is the height of the prism. It's given that a right rectangular prism has a length of 11 meters, a width of 8 meters, and a height of 10 meters. Substituting 11 for ℓ, 8 for w, and 10 for h in the formula $V = \ell wh$ yields $V = (11)(8)(10)$, or $V = 880$. Therefore, the volume, in cubic meters, of the prism is 880.

Question Difficulty:
Easy

Question ID a0369739

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Lines, angles, and triangles	

ID: a0369739

In triangle ABC, the measure of angle B is 90° and $\overline{BD}$ is an altitude of the triangle. The length of $\overline{AB}$ is 15 and the length of $\overline{AC}$ is 23 greater than the length of $\overline{AB}$. What is the value of $\frac{BC}{BD}$?

A. $\frac{15}{38}$

B. $\frac{15}{23}$

C. $\frac{23}{15}$

D. $\frac{38}{15}$

ID: a0369739 Answer

Correct Answer:
D

Rationale

Choice D is correct. It's given that in triangle ABC, the measure of angle B is 90° and $\overline{BD}$ is an altitude of the triangle. Therefore, the measure of angle BDC is 90°. It follows that angle B is congruent to angle D and angle C is congruent to angle C. By the angle-angle similarity postulate, triangle ABC is similar to triangle BDC. Since triangles ABC and BDC are similar, it follows that $\frac{AC}{AB} = \frac{BC}{BD}$. It's also given that the length of $\overline{AB}$ is 15 and the length of $\overline{AC}$ is 23 greater than the length of $\overline{AB}$. Therefore, the length of $\overline{AC}$ is $15 + 23$, or 38. Substituting 15 for AB and 38 for AC in the equation $\frac{AC}{AB} = \frac{BC}{BD}$ yields $\frac{38}{15} = \frac{BC}{BD}$. Therefore, the value of $\frac{BC}{BD}$ is $\frac{38}{15}$.

Choice A is incorrect. This is the value of $\frac{BD}{BC}$.

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

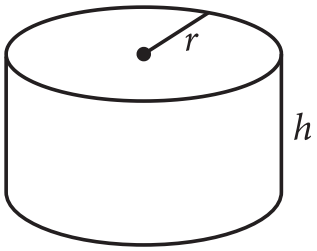
Choice C is incorrect and may result from conceptual or calculation errors.

Question Difficulty:
Hard

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 $19{,}208(\pi r^2 h)$. This expression is equal to $19{,}208$, not 392, times the volume of the cylinder shown.

Question Difficulty:
Hard

Question ID cbe8ca31

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Lines, angles, and triangles	

ID: cbe8ca31

In $\triangle XYZ$, the measure of $\angle X$ is 24° and the measure of $\angle Y$ is 98°. What is the measure of $\angle Z$?

A. 58°

B. 74°

C. 122°

D. 212°

ID: cbe8ca31 Answer

Correct Answer:
A

Rationale

Choice A is correct. The triangle angle sum theorem states that the sum of the measures of the interior angles of a triangle is 180°. It's given that in $\triangle XYZ$, the measure of $\angle X$ is 24° and the measure of $\angle Y$ is 98°. It follows that the measure of $\angle Z$ is $(180 - 24 - 98)^\circ$, or 58°.

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

Choice C is incorrect. This is the sum of the measures of $\angle X$ and $\angle Y$, not the measure of $\angle Z$.

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

Question Difficulty:
Easy

Question ID 3b931fb0

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

ID: 3b931fb0

A right circular cylinder has a volume of 377 cubic centimeters. The area of the base of the cylinder is 13 square centimeters. What is the height, in centimeters, of the cylinder?

ID: 3b931fb0 Answer

Correct Answer:
29

Rationale

The correct answer is 29. The volume, V, of a right circular cylinder is given by the formula $V = \pi r^2 h$, where r is the radius of the base of the cylinder and h is the height of the cylinder. Since the base of the cylinder is a circle with radius r, the area of the base of the cylinder is πr^2. It's given that a right circular cylinder has a volume of 377 cubic centimeters; therefore, $V = 377$. It's also given that the area of the base of the cylinder is 13 square centimeters; therefore, $\pi r^2 = 13$. Substituting 377 for V and 13 for πr^2 in the formula $V = \pi r^2 h$ yields $377 = 13h$. Dividing both sides of this equation by 13 yields $29 = h$. Therefore, the height of the cylinder, in centimeters, is 29.

Question Difficulty:
Medium

Question ID 94364a79

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Lines, angles, and triangles	

ID: 94364a79

Two nearby trees are perpendicular to the ground, which is flat. One of these trees is 10 feet tall and has a shadow that is 5 feet long. At the same time, the shadow of the other tree is 2 feet long. How tall, in feet, is the other tree?

A. 3

B. 4

C. 8

D. 27

ID: 94364a79 Answer

Correct Answer:
B

Rationale

Choice B is correct. Each tree and its shadow can be modeled using a right triangle, where the height of the tree and the length of its shadow are the legs of the triangle. At a given point in time, the right triangles formed by two nearby trees and their respective shadows will be similar. Therefore, if the height of the other tree is x, in feet, the value of x can be calculated by solving the proportional relationship $\frac{10 \text{ feet tall}}{5 \text{ feet long}} = \frac{x \text{ feet tall}}{2 \text{ feet long}}$. This equation is equivalent to $\frac{10}{5} = \frac{x}{2}$, or $2 = \frac{x}{2}$. Multiplying each side of the equation $2 = \frac{x}{2}$ by 2 yields $4 = x$. Therefore, the other tree is 4 feet tall.

Choice A is incorrect and may result from calculating the difference between the lengths of the shadows, rather than the height of the other tree.

Choice C is incorrect and may result from calculating the difference between the height of the 10-foot-tall tree and the length of the shadow of the other tree, rather than calculating the height of the other tree.

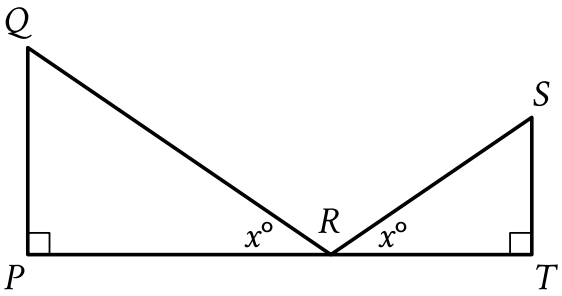
Choice D is incorrect and may result from a conceptual or calculation error.

Question Difficulty:
Medium

Question ID 51f26ce8

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Lines, angles, and triangles	

ID: 51f26ce8



Note: Figure not drawn to scale.

$\triangle QPR$ is similar to $\triangle STR$. The lengths represented by $\overline{ST}$, $\overline{QP}$, $\overline{PR}$, and $\overline{QR}$ in the figure are 14, 15, 20, and 25, respectively. What is the length of $\overline{SR}$?

A. $\frac{350}{15}$

B. $\frac{350}{20}$

C. $\frac{210}{20}$

D. $\frac{210}{25}$

ID: 51f26ce8 Answer

Correct Answer:
A

Rationale

Choice A is correct. The figure shows that angle P in $\triangle QPR$ and angle T in $\triangle STR$ are right angles. It follows that angle P is congruent to angle T. The figure also shows that the measures of angle QRP and angle SRT are both x°. Therefore, angle QRP is congruent to angle SRT. It's given that $\triangle QPR$ is similar to $\triangle STR$. Since angle P is congruent to angle T, and angle QRP is congruent to angle SRT, it follows that $\overline{QR}$ corresponds to $\overline{SR}$, and $\overline{QP}$ corresponds to $\overline{ST}$. Since corresponding sides of similar triangles are proportional, it follows that $\frac{SR}{QR} = \frac{ST}{QP}$. It's also given that the lengths of $\overline{ST}$, $\overline{QP}$, and $\overline{QR}$ are 14, 15, and 25, respectively. Substituting 14 for ST, 15 for QP, and 25 for QR in the equation $\frac{SR}{QR} = \frac{ST}{QP}$ yields $\frac{SR}{25} = \frac{14}{15}$. Multiplying each side of this equation by 25 yields $SR = \left(\frac{14}{15}\right)(25)$, or $SR = \frac{350}{15}$. Thus, the length of $\overline{SR}$ is $\frac{350}{15}$.

Choice B is incorrect. This is the result of solving the equation $\frac{SR}{25} = \frac{14}{20}$, not $\frac{SR}{25} = \frac{14}{15}$.

Choice C is incorrect. This is the result of solving the equation $\frac{SR}{14} = \frac{15}{20}$, not $\frac{SR}{25} = \frac{14}{15}$.

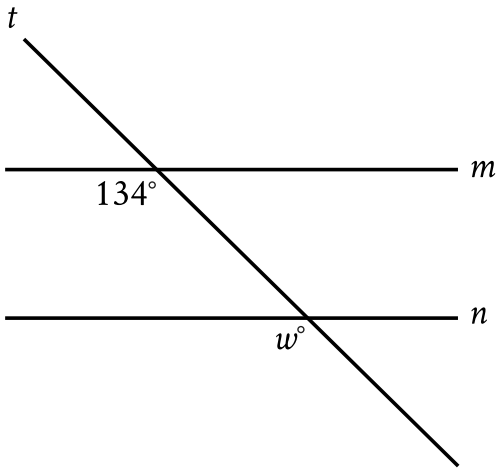
Choice D is incorrect. This is the result of solving the equation $\frac{SR}{14} = \frac{15}{25}$, not $\frac{SR}{25} = \frac{14}{15}$.

Question Difficulty:
Medium

Question ID c24e1bda

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Lines, angles, and triangles	

ID: c24e1bda



Note: Figure not drawn to scale.

In the figure, line m is parallel to line n. What is the value of w?

A. 13

B. 34

C. 66

D. 134

ID: c24e1bda Answer

Correct Answer:
D

Rationale

Choice D is correct. It's given that lines m and n are parallel. Since line t intersects both lines m and n, it's a transversal. The angles in the figure marked as 134° and w° are on the same side of the transversal, where one is an interior angle with line m as a side, and the other is an exterior angle with line n as a side. Thus, the marked angles are corresponding angles. When two parallel lines are intersected by a transversal, corresponding angles are congruent and, therefore, have equal measure. It follows that $w^\circ = 134^\circ$. Therefore, the value of w is 134.

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

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

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

Question Difficulty:
Easy

Question ID 055aafe7

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Lines, angles, and triangles	

ID: 055aafe7

Triangle ABC is similar to triangle XYZ, where A, B, and C correspond to X, Y, and Z, respectively. In triangle ABC, the length of $\overline{AB}$ is 170 and the length of $\overline{BC}$ is 850. In triangle XYZ, the length of $\overline{YZ}$ is 60. What is the length of $\overline{XY}$?

A. 204

B. 182

C. 60

D. 12

ID: 055aafe7 Answer

Correct Answer:
D

Rationale

Choice D is correct. It's given that triangle ABC is similar to triangle XYZ, where A, B, and C correspond to X, Y, and Z, respectively. It follows that side AB corresponds to side XY and side BC corresponds to side YZ. Since the lengths of corresponding sides in similar triangles are proportional, it follows that $\frac{XY}{AB} = \frac{YZ}{BC}$. Substituting 170 for AB, 60 for YZ, and 850 for BC in this equation yields $\frac{XY}{170} = \frac{60}{850}$. Multiplying each side of this equation by 170 yields $XY = 12$. Therefore, the length of $\overline{XY}$ is 12.

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

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

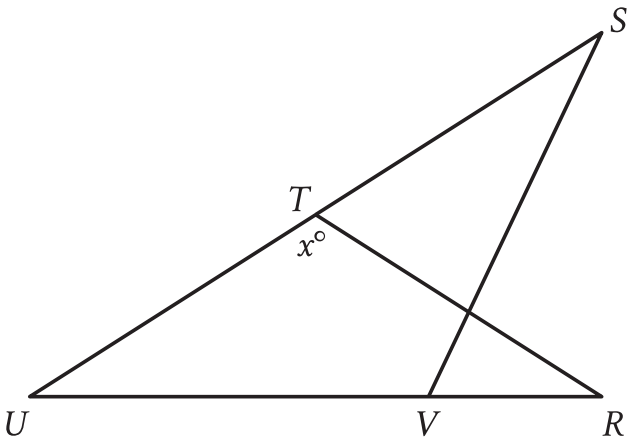
Choice C is incorrect. This is the length of $\overline{YZ}$, not $\overline{XY}$.

Question Difficulty:
Medium

Question ID 2d2cb85e

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Lines, angles, and triangles	

ID: 2d2cb85e



Note: Figure not drawn to scale.

In the figure, $RT = TU$, the measure of angle VST is 29°, and the measure of angle RVS is 41°. What is the value of x?

ID: 2d2cb85e Answer

Correct Answer:
156

Rationale

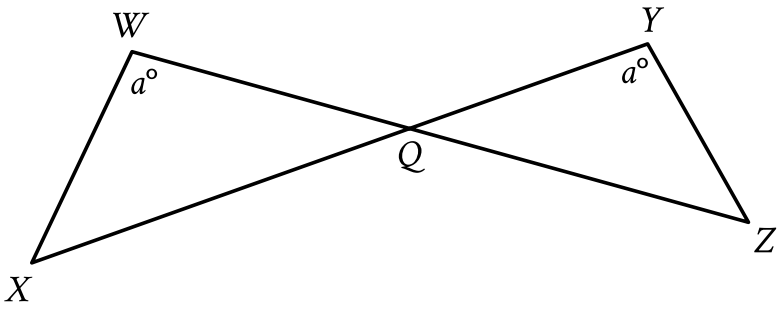
The correct answer is 156. In the figure shown, the sum of the measures of angle UVS and angle RVS is 180°. It's given that the measure of angle RVS is 41°. Therefore, the measure of angle UVS is $(180 - 41)^\circ$, or 139°. The sum of the measures of the interior angles of a triangle is 180°. In triangle UVS, the measure of angle UVS is 139° and it's given that the measure of angle VST is 29°. Thus, the measure of angle VUS is $(180 - 139 - 29)^\circ$, or 12°. It's given that $RT = TU$. Therefore, triangle TUR is an isosceles triangle and the measure of VUS is equal to the measure of angle TRU. In triangle TUR, the measure of angle VUS is 12° and the measure of angle TRU is 12°. Thus, the measure of angle UTR is $(180 - 12 - 12)^\circ$, or 156°. The figure shows that the measure of angle UTR is x°, so the value of x is 156.

Question Difficulty:
Hard

Question ID 345cc36a

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Lines, angles, and triangles	

ID: 345cc36a



Note: Figure not drawn to scale.

In the figure shown, $\overline{WZ}$ and $\overline{XY}$ intersect at point Q. $YQ = 63$, $WQ = 70$, $WX = 60$, and $XQ = 120$. What is the length of $\overline{YZ}$?

ID: 345cc36a Answer

Correct Answer:

54

Rationale

The correct answer is 54. The figure shown includes two triangles, triangle WQX and triangle YQZ, such that angle WQX and angle YQZ are vertical angles. It follows that angle WQX is congruent to angle YQZ. It's also given in the figure that the measures of angle W and angle Y are a°. Therefore angle W is congruent to angle Y. Since triangle WQX and triangle YQZ have two pairs of congruent angles, triangle WQX is similar to triangle YQZ by the angle-angle similarity postulate, where $\overline{YZ}$ corresponds to $\overline{WX}$, and $\overline{YQ}$ corresponds to $\overline{WQ}$. Since the lengths of corresponding sides in similar triangles are proportional, it follows that $\frac{YZ}{WX} = \frac{YQ}{WQ}$. It's given that $YQ = 63$, $WQ = 70$, and $WX = 60$. Substituting 63 for YQ, 70 for WQ, and 60 for WX in the equation $\frac{YZ}{WX} = \frac{YQ}{WQ}$ yields $\frac{YZ}{60} = \frac{63}{70}$. Multiplying each side of this equation by 60 yields $YZ = \left(\frac{63}{70}\right)(60)$, or $YZ = 54$. Therefore, the length of $\overline{YZ}$ is 54.

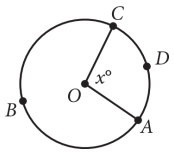
Question Difficulty:

Hard

Question ID c8345903

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Circles	

ID: c8345903



The circle above has center *O*, the length of arc $\overset{\frown}{ADC}$ is 5π, and $x = 100$. What is the length of arc $\overset{\frown}{ABC}$?

A. 9π

B. 13π

C. 18π

D. $\frac{13}{2}\pi$

ID: c8345903 Answer

Correct Answer:
B

Rationale

Choice B is correct. The ratio of the lengths of two arcs of a circle is equal to the ratio of the measures of the central angles that subtend the arcs. It's given that arc $\overset{\frown}{ADC}$ is subtended by a central angle with measure 100°. Since the sum of the measures of the angles about a point is 360°, it follows that arc $\overset{\frown}{ABC}$ is subtended by a central angle with measure $360° - 100° = 260°$. If s is the length of arc $\overset{\frown}{ABC}$, then s must satisfy the ratio $\frac{s}{5\pi} = \frac{260}{100}$. Reducing the fraction $\frac{260}{100}$ to its simplest form gives $\frac{13}{5}$. Therefore, $\frac{s}{5\pi} = \frac{13}{5}$. Multiplying both sides of $\frac{s}{5\pi} = \frac{13}{5}$ by 5π yields $s = 13\pi$.

Choice A is incorrect. This is the length of an arc consisting of exactly half of the circle, but arc $\overset{\frown}{ABC}$ is greater than half of the circle. Choice C is incorrect. This is the total circumference of the circle. Choice D is incorrect. This is half the length of arc $\overset{\frown}{ABC}$, not its full length.

Question Difficulty:
Hard

Question ID 901c3215

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Lines, angles, and triangles	

ID: 901c3215

In triangles ABC and DEF, angles B and E each have measure 27° and angles C and F each have measure 41°. Which additional piece of information is sufficient to determine whether triangle ABC is congruent to triangle DEF?

A. The measure of angle A

B. The length of side AB

C. The lengths of sides BC and EF

D. No additional information is necessary.

ID: 901c3215 Answer

Correct Answer:
C

Rationale

Choice C is correct. Since angles B and E each have the same measure and angles C and F each have the same measure, triangles ABC and DEF are similar, where side BC corresponds to side EF. To determine whether two similar triangles are congruent, it is sufficient to determine whether one pair of corresponding sides are congruent. Therefore, to determine whether triangles ABC and DEF are congruent, it is sufficient to determine whether sides BC and EF have equal length. Thus, the lengths of BC and EF are sufficient to determine whether triangle ABC is congruent to triangle DEF.

Choice A is incorrect and may result from conceptual errors.

Choice B is incorrect and may result from conceptual errors.

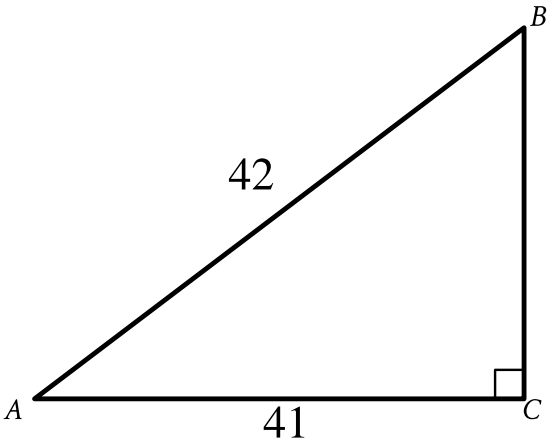
Choice D is incorrect. The given information is sufficient to determine that triangles ABC and DEF are similar, but not whether they are congruent.

Question Difficulty:
Hard

Question ID 2bddbc1b

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Right triangles and trigonometry	

ID: 2bddbc1b



Note: Figure not drawn to scale.

What is the value of $\cos A$ in the triangle shown?

A. $\frac{42}{41}$

B. $\frac{41}{42}$

C. $\frac{1}{42}$

D. $\frac{1}{41}$

ID: 2bddbc1b Answer

Correct Answer:
B

Rationale

Choice B is correct. The cosine of an acute angle in a right triangle is defined as the ratio of the length of the leg adjacent to the angle to the length of the hypotenuse. In the triangle shown, the length of the leg adjacent to angle A is 41, and the length of the hypotenuse is 42. Therefore, $\cos A = \frac{41}{42}$.

Choice A is incorrect. This is the value of $\frac{1}{\cos A}$.

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:
Medium

Question ID 85f1892d

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Right triangles and trigonometry	

ID: 85f1892d

In triangle XYZ, angle Y is a right angle, the measure of angle Z is 33°, and the length of $\overline{YZ}$ is 26 units. If the area, in square units, of triangle XYZ can be represented by the expression $k \tan 33^\circ$, where k is a constant, what is the value of k?

ID: 85f1892d Answer

Correct Answer:
338

Rationale

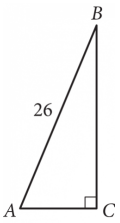
The correct answer is 338. The tangent of an acute angle in a right triangle is the ratio of the length of the leg opposite the angle to the length of the leg adjacent to the angle. In triangle XYZ, it's given that angle Y is a right angle. Thus, $\overline{XY}$ is the leg opposite of angle Z and $\overline{YZ}$ is the leg adjacent to angle Z. It follows that $\tan Z = \frac{XY}{YZ}$. It's also given that the measure of angle Z is 33° and the length of $\overline{YZ}$ is 26 units. Substituting 33° for Z and 26 for YZ in the equation $\tan Z = \frac{XY}{YZ}$ yields $\tan 33^\circ = \frac{XY}{26}$. Multiplying each side of this equation by 26 yields $26 \tan 33^\circ = XY$. Therefore, the length of $\overline{XY}$ is $26 \tan 33^\circ$. The area of a triangle is half the product of the lengths of its legs. Since the length of $\overline{YZ}$ is 26 and the length of $\overline{XY}$ is $26 \tan 33^\circ$, it follows that the area of triangle XYZ is $\frac{1}{2}(26)(26 \tan 33^\circ)$ square units, or $338 \tan 33^\circ$ square units. It's given that the area, in square units, of triangle XYZ can be represented by the expression $k \tan 33^\circ$, where k is a constant. Therefore, 338 is the value of k.

Question Difficulty:
Hard

Question ID bd87bc09

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Right triangles and trigonometry	

ID: bd87bc09



Triangle ABC above is a right triangle, and $\sin(B) = \frac{5}{13}$.

What is the length of side $\overline{BC}$?

ID: bd87bc09 Answer

Rationale

The correct answer is 24. The sine of an acute angle in a right triangle is equal to the ratio of the length of the side opposite the angle to the length of the hypotenuse. In the triangle shown, the sine of angle B, or $\sin(B)$, is equal to the ratio of the length of side $\overline{AC}$ to the length of side $\overline{AB}$. It's given that the length of side $\overline{AB}$ is 26 and that $\sin(B) = \frac{5}{13}$. Therefore, $\frac{5}{13} = \frac{AB}{26}$.

Multiplying both sides of this equation by 26 yields $AC = 10$.

By the Pythagorean Theorem, the relationship between the lengths of the sides of triangle ABC is as follows: $26^2 = 10^2 + BC^2$, or $676 = 100 + BC^2$. Subtracting 100 from both sides of $676 = 100 + BC^2$ yields $576 = BC^2$. Taking the square root of both sides of $576 = BC^2$ yields $24 = BC$.

Question Difficulty:
Hard