Question ID a0d55a7e

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

ID: a0d55a7e

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: a0d55a7e 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 aabd482e

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

ID: aabd482e

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: aabd482e 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.

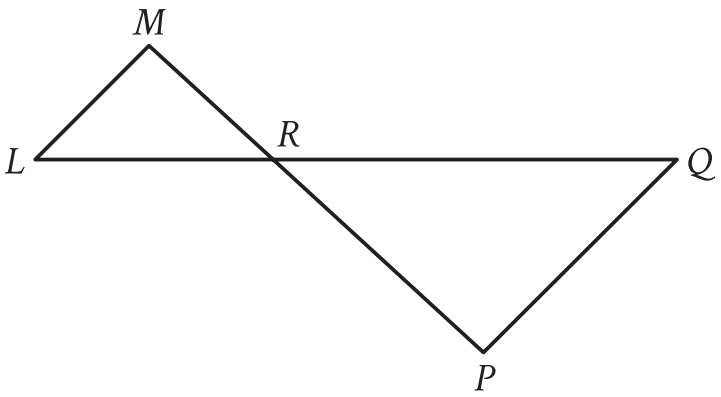
Choice C is incorrect and may result from conceptual or calculation errors.

Question Difficulty: Hard

Question ID 4bedd065

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

ID: 4bedd065



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: 4bedd065 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 c3f47bd8

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

ID: c3f47bd8

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: c3f47bd8 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 75cef981

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

ID: 75cef981

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: 75cef981 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 a445876d

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

ID: a445876d

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: a445876d 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 $\angle Z$.

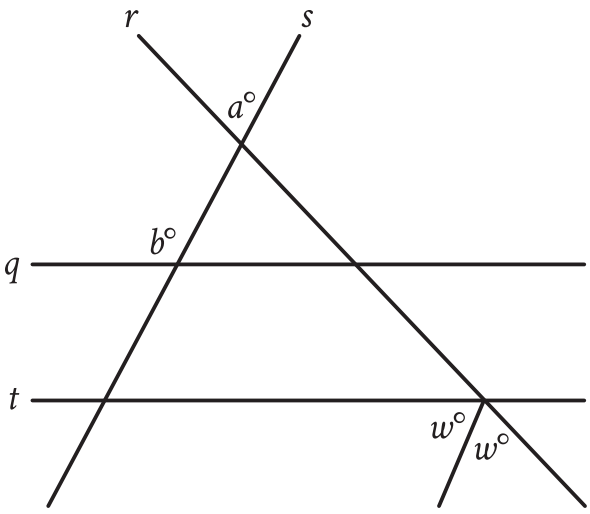
Choice D is incorrect. This is twice the measure of $\angle Z$.

Question Difficulty: Hard

Question ID 9a3b790e

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

ID: 9a3b790e



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: 9a3b790e 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 01cec512

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

ID: 01cec512

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: 01cec512 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 c6f2e3c2

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

ID: c6f2e3c2

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: c6f2e3c2 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 edf2d791

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

ID: edf2d791

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: edf2d791 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 aac770b4

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

ID: aac770b4

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: aac770b4 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.

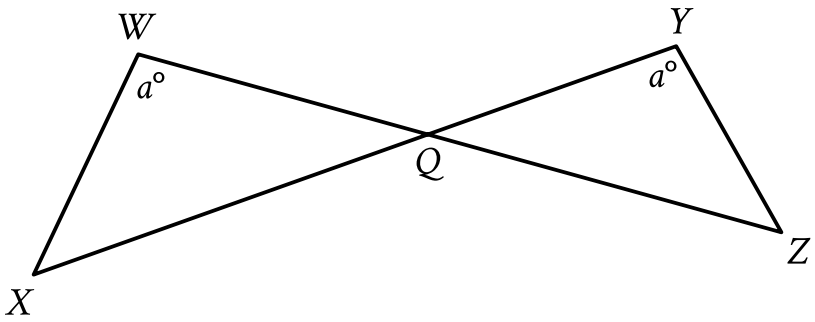
Choice C is incorrect and may result from conceptual or calculation errors.

Question Difficulty: Hard

Question ID 082dcfa7

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

ID: 082dcfa7



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: 082dcfa7 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 3dd4aa7b

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

ID: 3dd4aa7b

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: 3dd4aa7b Answer

Correct Answer: 153

Rationale

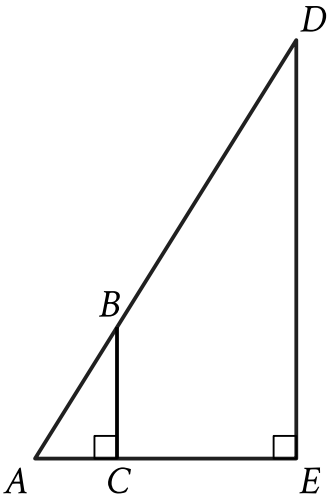
The correct answer is 153. Since it's given that $\overline{PQ}$ is parallel to $\overline{XY}$ and angle Y is a right angle, angle ZQP is also a right angle. Angle ZPQ is complementary to angle XZY, which means its measure, in degrees, is $90 - 63$, or 27. Since angle XPQ is supplementary to angle ZPQ,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

Question Difficulty: Hard

Question ID 2b1b9792

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

ID: 2b1b9792



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: 2b1b9792 Answer

Correct Answer: 480

Rationale

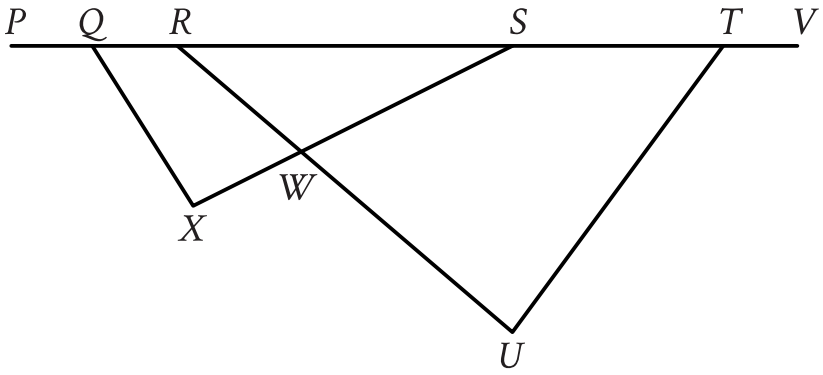
The correct answer is 480. It's given in the figure that angle ACB and angle AED are right angles. It follows that angle ACB is congruent to angle AED. It's also given that angle BAC and angle DAE are the same angle. It follows that angle BAC is congruent to angle DAE. Since triangles ABC and ADE have 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 034aa7ae

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

ID: 034aa7ae



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: 034aa7ae Answer

Correct Answer: 123

Rationale

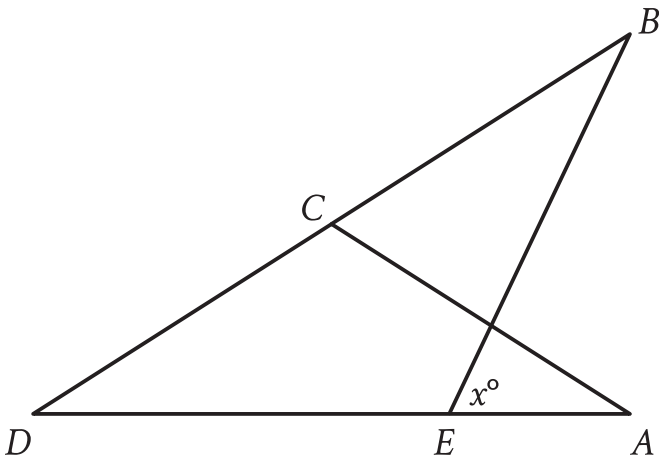
The correct answer is 123. The triangle angle sum theorem states that the sum of the measures of the interior angles of a triangle is 180 degrees. It's given that the measure of $\angle SQX$ is 48° and the measure of $\angle SXQ$ is 86°. Since points S, Q, and X form a triangle, it follows from the triangle 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 b7222daa

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

ID: b7222daa



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: b7222daa Answer

Correct Answer: 83

Rationale

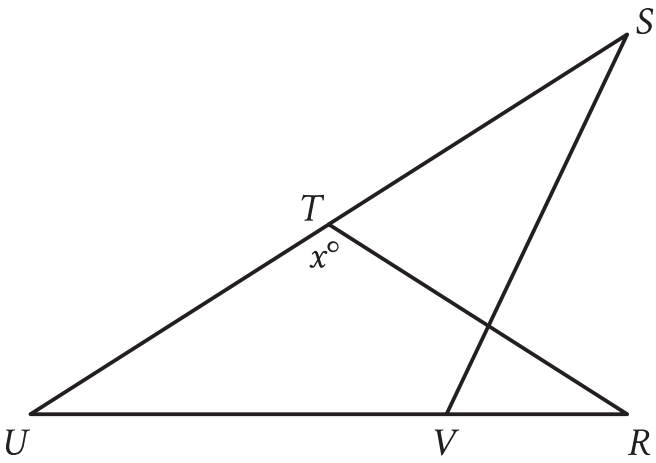
The correct answer is 83. It's given that in the figure, $AC = CD$. Thus, triangle ACD is an isosceles triangle and the measure of angle CDA is equal to the measure of angle CAD. The sum of the measures of the interior angles of a triangle is 180°. Thus, the sum of the measures of the interior angles 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 794c0ca9

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

ID: 794c0ca9



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: 794c0ca9 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