Question ID 4c46a790

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Geometry and Trigonometry	Lines, angles, and triangles	Hard

ID: 4c46a790

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: 4c46a790 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 5e67f9e2

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Geometry and Trigonometry	Lines, angles, and triangles	Hard

ID: 5e67f9e2

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: 5e67f9e2 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 $(-7x + 430)^\circ$.

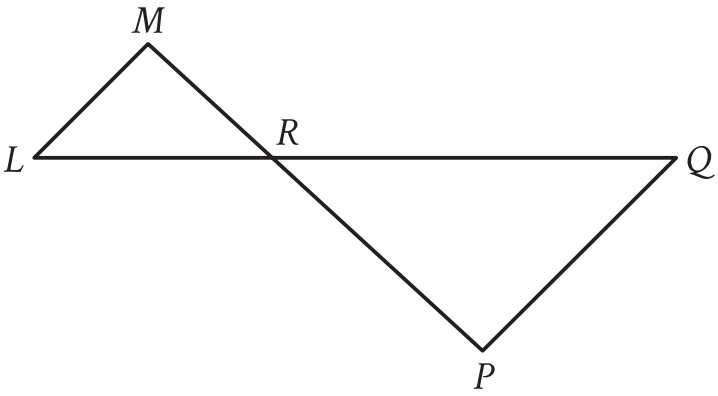
Choice D is incorrect. This is the sum of two angles with measure $(7x - 250)^\circ$ and two angles with measure $(-7x + 430)^\circ$.

Question Difficulty: Hard

Question ID 44a14b05

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Geometry and Trigonometry	Lines, angles, and triangles	Hard

ID: 44a14b05



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: 44a14b05 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 9cb52fdb

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Geometry and Trigonometry	Lines, angles, and triangles	Hard

ID: 9cb52fdb

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: 9cb52fdb Answer

Correct Answer: 153

Rationale

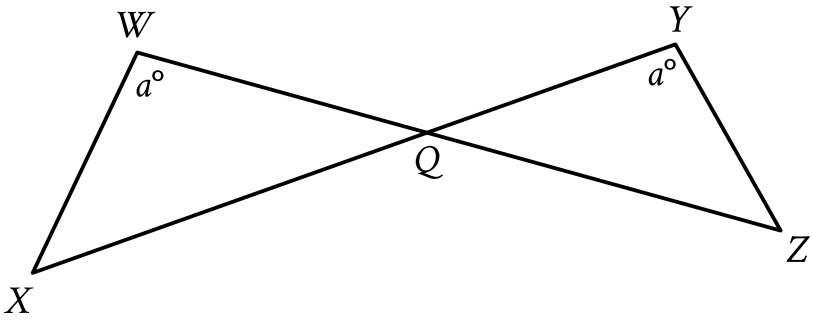
The correct answer is 153. Since it's given that $\overline{PQ}$ is parallel to $\overline{XY}$ and angle Y is a right angle, angle ZQP is also a right angle. Angle ZPQ is complementary to angle XZY, which means its measure, in degrees, is $90 - 63$, or 27. Since angle XPQ is supplementary to angle ZPQ,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

Question Difficulty: Hard

Question ID 738229cb

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Geometry and Trigonometry	Lines, angles, and triangles	Hard

ID: 738229cb



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: 738229cb Answer

Correct Answer: 54

Rationale

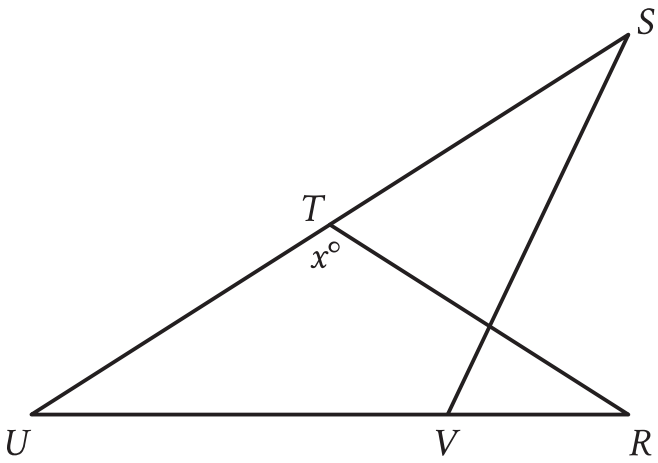
The correct answer is 54. The figure shown includes two triangles, triangle WQX and triangle YQZ, such that angle WQX and angle YQZ are vertical angles. It follows that angle WQX is congruent to angle YQZ. It's also given in the figure that the measures of angle W and angle Y are a°. Therefore angle 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 f52bcdc0

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Geometry and Trigonometry	Lines, angles, and triangles	Hard

ID: f52bcdc0



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: f52bcdc0 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 a51d9e19

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Geometry and Trigonometry	Lines, angles, and triangles	Hard

ID: a51d9e19

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: a51d9e19 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: Hard

Question ID 1e9938e0

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Geometry and Trigonometry	Lines, angles, and triangles	Hard

ID: 1e9938e0

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: 1e9938e0 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 30919088

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Geometry and Trigonometry	Lines, angles, and triangles	Hard

ID: 30919088

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: 30919088 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 cacfcd97

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Geometry and Trigonometry	Lines, angles, and triangles	Hard

ID: cacfcd97

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: cacfcd97 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 b9e99471

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Geometry and Trigonometry	Lines, angles, and triangles	Hard

ID: b9e99471

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: b9e99471 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: Hard

Question ID fecacef5

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Geometry and Trigonometry	Lines, angles, and triangles	Hard

ID: fecacef5

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: fecacef5 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.

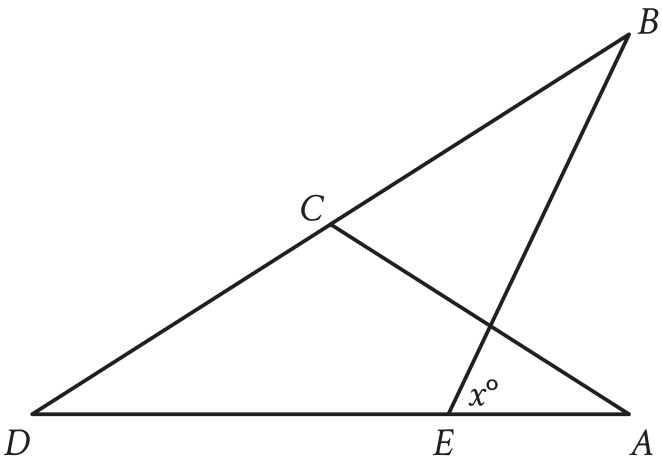
Choice C is incorrect. This is the length of $\overline{YZ}$, not $\overline{XY}$.

Question Difficulty: Hard

Question ID 8bda151c

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Geometry and Trigonometry	Lines, angles, and triangles	Hard

ID: 8bda151c



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: 8bda151c Answer

Correct Answer: 83

Rationale

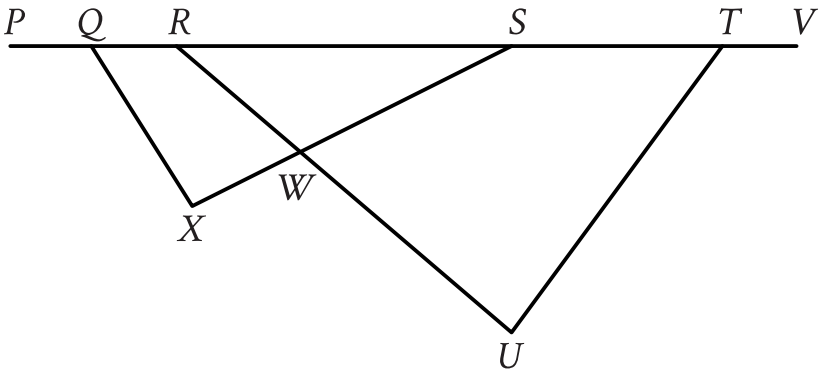
The correct answer is 83. It's given that in the figure, $AC = CD$. Thus, triangle ACD is an isosceles triangle and the measure of angle CDA is equal to the measure of angle CAD. The sum of the measures of the interior angles of a triangle is 180°. Thus, the sum of the measures of the interior angles 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 ece966fa

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Geometry and Trigonometry	Lines, angles, and triangles	Hard

ID: ece966fa



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: ece966fa Answer

Correct Answer: 123

Rationale

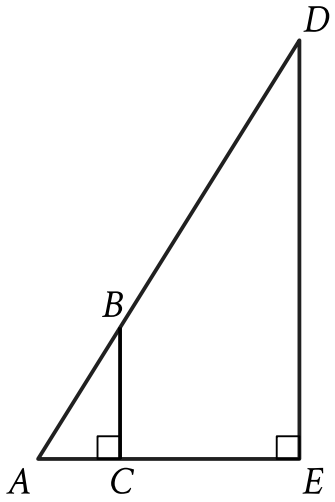
The correct answer is 123. The triangle angle sum theorem states that the sum of the measures of the interior angles of a triangle is 180 degrees. It's given that the measure of $\angle SQX$ is 48° and the measure of $\angle SXQ$ is 86°. Since points S, Q, and X form a triangle, it follows from the triangle 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 0dffd714

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Geometry and Trigonometry	Lines, angles, and triangles	Hard

ID: 0dffd714



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: 0dffd714 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 5c60a944

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Geometry and Trigonometry	Lines, angles, and triangles	Hard

ID: 5c60a944

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: 5c60a944 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: Hard

Question ID f3b1340c

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Geometry and Trigonometry	Lines, angles, and triangles	Hard

ID: f3b1340c

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: f3b1340c 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.

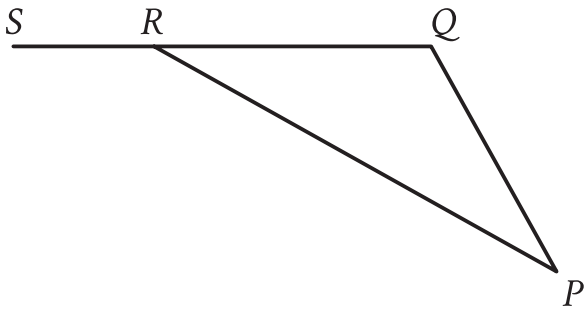
Choice D is incorrect and may result from conceptual or calculation errors.

Question Difficulty: Hard

Question ID c9c9ac91

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Geometry and Trigonometry	Lines, angles, and triangles	Hard

ID: c9c9ac91



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: c9c9ac91 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.

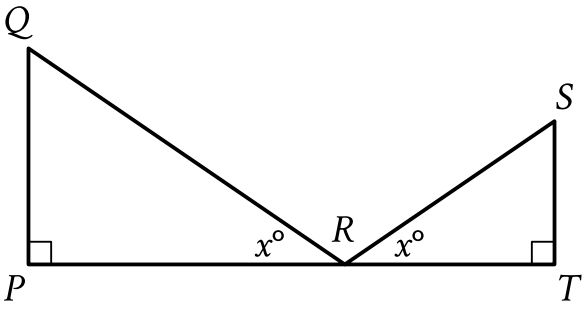
Choice D is incorrect. This is the measure of $\angle PRQ$, not the measure of $\angle QPR$.

Question Difficulty: Hard

Question ID 4b1d6381

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Geometry and Trigonometry	Lines, angles, and triangles	Hard

ID: 4b1d6381



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: 4b1d6381 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: Hard

Question ID 5e0cd314

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Geometry and Trigonometry	Lines, angles, and triangles	Hard

ID: 5e0cd314

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: 5e0cd314 Answer

Correct Answer: 84

Rationale

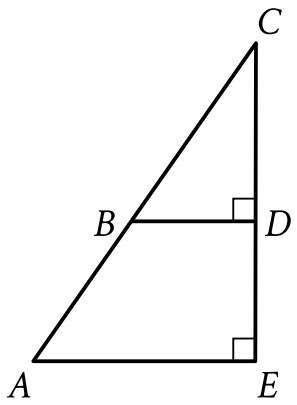
The correct answer is 84. The sum of the measures of the interior angles of a triangle is 180°. It's given that in triangle JKL, the measures of $\angle K$ and $\angle L$ are each 48°. Adding the measures, in degrees, of $\angle K$ and $\angle L$ gives $48 + 48$, or 96. Therefore, the measure of $\angle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

Question Difficulty: Hard

Question ID d1272ce8

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Geometry and Trigonometry	Lines, angles, and triangles	Hard

ID: d1272ce8



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: d1272ce8 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: Hard

Question ID 2a00c7ba

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Geometry and Trigonometry	Lines, angles, and triangles	Hard

ID: 2a00c7ba

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: 2a00c7ba 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: Hard