

Question ID ec5df4b7

Assessment	Test	Domain	Skill	Difficulty
PSAT/NMSQT & PSAT 10	Math	Geometry and Trigonometry	Lines, angles, and triangles	<div><div></div><div></div><div></div></div>

ID: ec5df4b7

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: ec5df4b7 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.

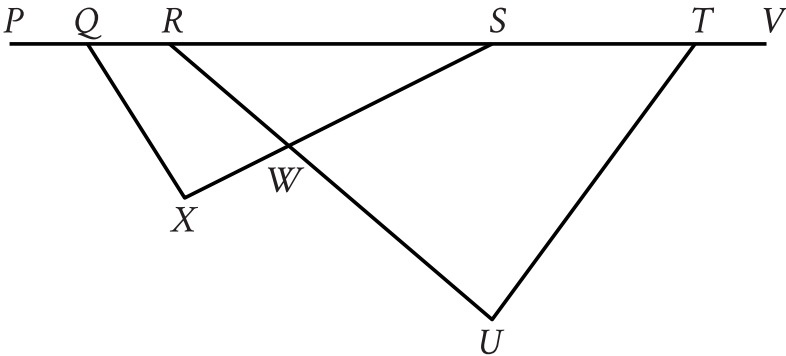
Choice C is incorrect and may result from conceptual or calculation errors.

Question Difficulty: Hard

Question ID f4bbb880

Assessment	Test	Domain	Skill	Difficulty
PSAT/NMSQT & PSAT 10	Math	Geometry and Trigonometry	Lines, angles, and triangles	<div><div></div><div></div><div></div></div>

ID: f4bbb880



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: f4bbb880 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 17332082

Assessment	Test	Domain	Skill	Difficulty
PSAT/NMSQT & PSAT 10	Math	Geometry and Trigonometry	Lines, angles, and triangles	<div><div></div><div></div><div></div></div>

ID: 17332082

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: 17332082 Answer

Correct Answer: D

Rationale

Choice D is correct. It's given that in triangle ABC , the measure of angle B is 90° and 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 e85d3221

Assessment	Test	Domain	Skill	Difficulty
PSAT/NMSQT & PSAT 10	Math	Geometry and Trigonometry	Lines, angles, and triangles	<div><div></div><div></div><div></div></div>

ID: e85d3221

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: e85d3221 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.

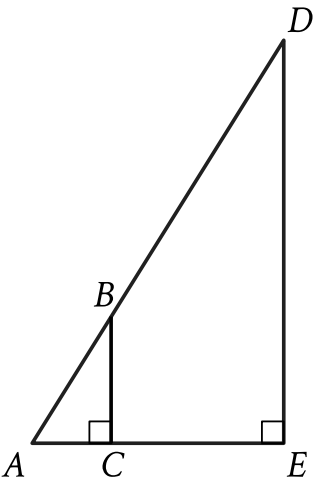
Choice D is incorrect. This is 3 times the measure of angle P' .

Question Difficulty: Hard

Question ID 88475d5e

Assessment	Test	Domain	Skill	Difficulty
PSAT/NMSQT & PSAT 10	Math	Geometry and Trigonometry	Lines, angles, and triangles	<div><div></div><div></div><div></div></div>

ID: 88475d5e



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: 88475d5e 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 $a^2 + 24^2 = 8\sqrt{34}^2$, which is equivalent to $a^2 + 576 = 6434$, 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 $\frac{1}{2}4024$, or 480. Therefore, the area, in square units, of triangle ADE is 480.

Question Difficulty: Hard

Question ID 4803dc51

Assessment	Test	Domain	Skill	Difficulty
PSAT/NMSQT & PSAT 10	Math	Geometry and Trigonometry	Lines, angles, and triangles	<div><div></div><div></div><div></div></div>

ID: 4803dc51

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: 4803dc51 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.

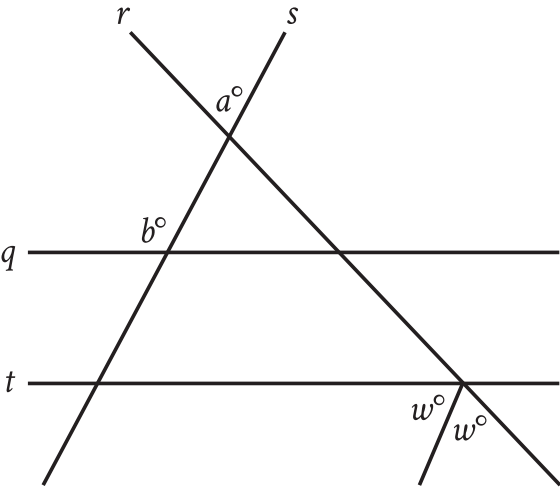
Choice D is incorrect. The given information is sufficient to determine that triangles ABC and DEF are similar, but not whether they are congruent.

Question Difficulty: Hard

Question ID 5789afdb

Assessment	Test	Domain	Skill	Difficulty
PSAT/NMSQT & PSAT 10	Math	Geometry and Trigonometry	Lines, angles, and triangles	<div><div></div><div></div><div></div></div>

ID: 5789afdb



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: 5789afdb 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 437a6f56

Assessment	Test	Domain	Skill	Difficulty
PSAT/NMSQT & PSAT 10	Math	Geometry and Trigonometry	Lines, angles, and triangles	<div><div></div><div></div><div></div></div>

ID: 437a6f56

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: 437a6f56 Answer

Correct Answer: 54

Rationale

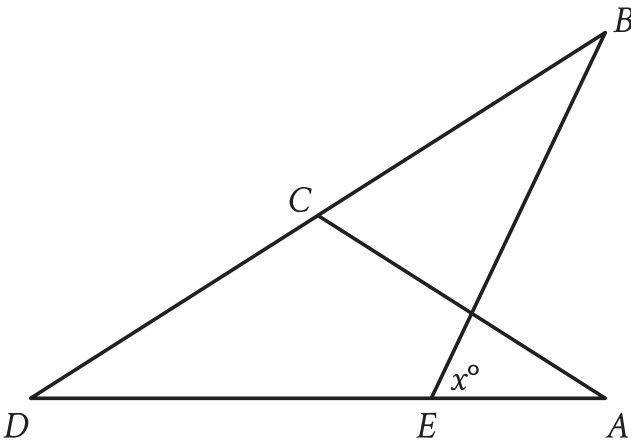
The correct answer is 54. It's given that in triangle ABC , point D on side AB is connected by a line segment with point E on side AC such that line segment DE is parallel to side BC . It follows that parallel segments DE and BC are intersected by sides AB and AC . If two parallel segments are intersected 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 fd643f08

Assessment	Test	Domain	Skill	Difficulty
PSAT/NMSQT & PSAT 10	Math	Geometry and Trigonometry	Lines, angles, and triangles	<div><div></div><div></div><div></div></div>

ID: fd643f08



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: fd643f08 Answer

Correct Answer: 83

Rationale

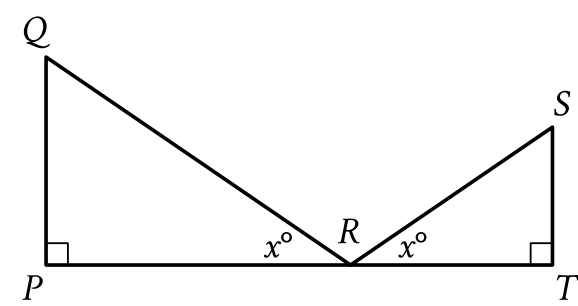
The correct answer is 83. It's given that in the figure, $AC = CD$. Thus, triangle ACD is an isosceles triangle and the measure of angle CDA is equal to the measure of angle CAD . The sum of the measures of the interior angles of a triangle is 180° . Thus, the sum of the measures of the interior angles 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 d15d0186

Assessment	Test	Domain	Skill	Difficulty
PSAT/NMSQT & PSAT 10	Math	Geometry and Trigonometry	Lines, angles, and triangles	<div><div></div><div></div><div></div></div>

ID: d15d0186



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: d15d0186 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 $\overline{ST}$, 15 for $\overline{QP}$, and 25 for $\overline{QR}$ 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 $SR = \frac{14}{15}25$, 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 34bc22bf

Assessment	Test	Domain	Skill	Difficulty
PSAT/NMSQT & PSAT 10	Math	Geometry and Trigonometry	Lines, angles, and triangles	<div><div></div><div></div><div></div></div>

ID: 34bc22bf

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: 34bc22bf 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 $\angle Z$.

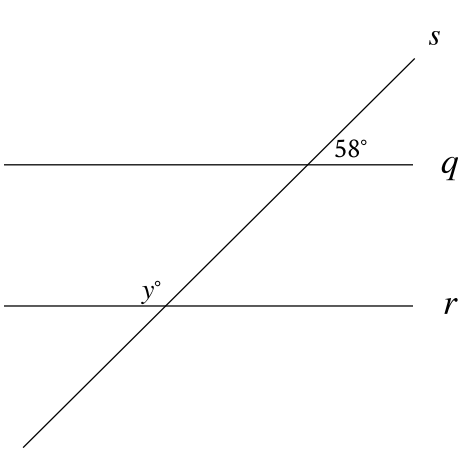
Choice D is incorrect. This is twice the measure of $\angle Z$.

Question Difficulty: Hard

Question ID b4029e85

Assessment	Test	Domain	Skill	Difficulty
PSAT/NMSQT & PSAT 10	Math	Geometry and Trigonometry	Lines, angles, and triangles	<div><div></div><div></div><div></div></div>

ID: b4029e85



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: b4029e85 Answer

Correct Answer: 57

Rationale

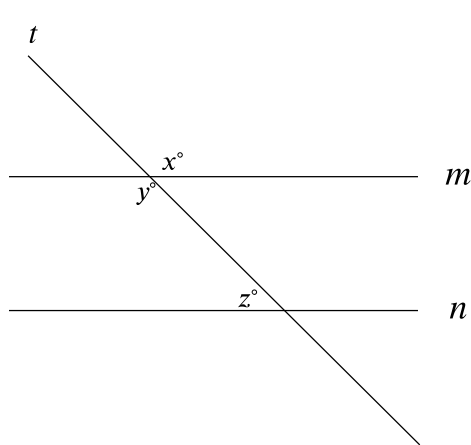
The correct answer is 57. Based on the figure, the angle with measure y° and the angle vertical to the angle with measure 58° are same side interior angles. Since vertical angles are congruent, the angle vertical to the angle with measure 58° also has measure 58° . It's given that lines q and r are parallel. 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: Hard

Question ID e280a2b3

Assessment	Test	Domain	Skill	Difficulty
PSAT/NMSQT & PSAT 10	Math	Geometry and Trigonometry	Lines, angles, and triangles	<div><div></div><div></div><div></div></div>

ID: e280a2b3



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: e280a2b3 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: Hard

Question ID 0f2297cc

Assessment	Test	Domain	Skill	Difficulty
PSAT/NMSQT & PSAT 10	Math	Geometry and Trigonometry	Lines, angles, and triangles	<div><div></div><div></div><div></div></div>

ID: 0f2297cc

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: 0f2297cc 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.

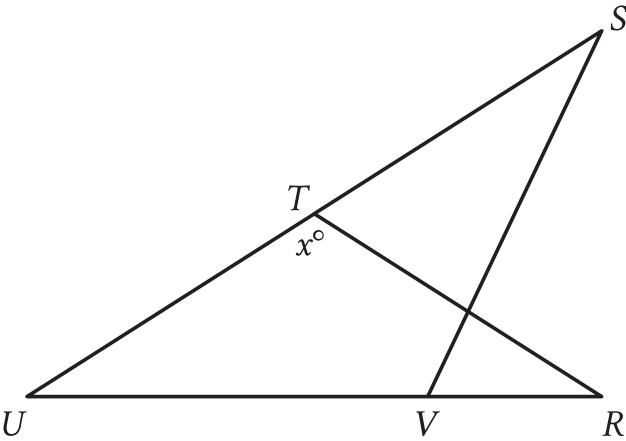
Alternate approach: A line can be created that's perpendicular to segments AB and DE and passes through point C . Extending segments AB and DE at points B and D , respectively, until they intersect this line yields two right triangles. Let these intersection points be point X and point Y , and the two 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 5a2734d6

Assessment	Test	Domain	Skill	Difficulty
PSAT/NMSQT & PSAT 10	Math	Geometry and Trigonometry	Lines, angles, and triangles	<div><div></div><div></div><div></div></div>

ID: 5a2734d6



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: 5a2734d6 Answer

Correct Answer: 156

Rationale

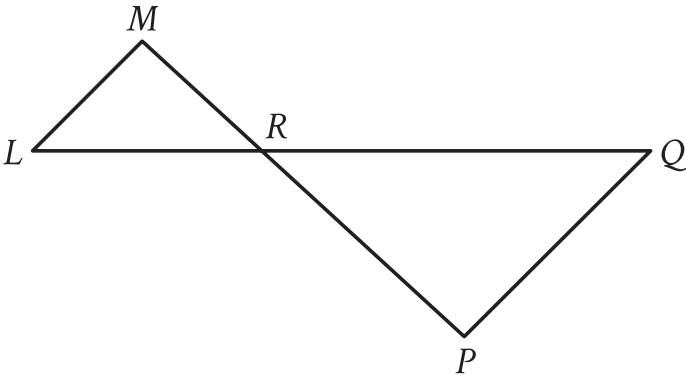
The correct answer is 156. In the figure shown, the sum of the measures of angle UVS and angle RVS is 180° . It's given that the measure of angle RVS is 41° . Therefore, the measure of angle UVS is $180 - 41^\circ$, or 139° . The sum of the measures of the interior angles of a triangle is 180° . In triangle 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 8211c0f2

Assessment	Test	Domain	Skill	Difficulty
PSAT/NMSQT & PSAT 10	Math	Geometry and Trigonometry	Lines, angles, and triangles	<div><div></div><div></div><div></div></div>

ID: 8211c0f2



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: 8211c0f2 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 $RQ = \frac{11}{6}7$, 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 $\overline{LQ}$.

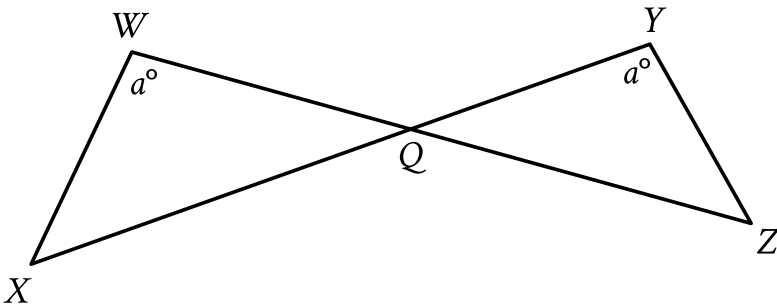
Choice C is incorrect and may result from conceptual or calculation errors.

Question Difficulty: Hard

Question ID 57754a45

Assessment	Test	Domain	Skill	Difficulty
PSAT/NMSQT & PSAT 10	Math	Geometry and Trigonometry	Lines, angles, and triangles	<div><div></div><div></div><div></div></div>

ID: 57754a45



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: 57754a45 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 $YZ = \frac{63}{70}60$, or $YZ = 54$. Therefore, the length of $\overline{YZ}$ is 54.

Question Difficulty: Hard

Question ID 1fafa02d

Assessment	Test	Domain	Skill	Difficulty
PSAT/NMSQT & PSAT 10	Math	Geometry and Trigonometry	Lines, angles, and triangles	<div><div></div><div></div><div></div></div>

ID: 1fafa02d

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: 1fafa02d Answer

Correct Answer: 14.66, 14.67, 44/3

Rationale

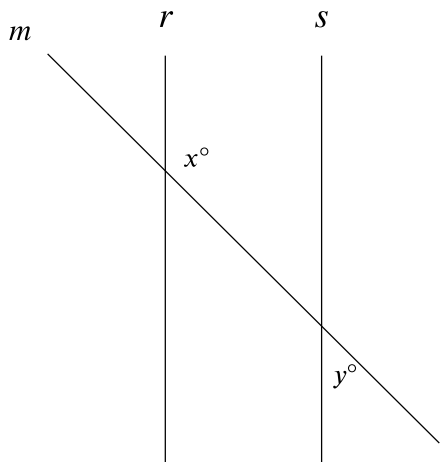
The correct answer is $\frac{44}{3}$. It's given that in triangle RST , angle T is a right angle. The area of a right triangle can be found using the formula $A = \frac{1}{2}l_1l_2$, where A represents the area of the right triangle, l_1 represents the length of one leg of the triangle, and l_2 represents 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 $792 = \frac{1}{2}72ST$, or $792 = 36ST$. 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 $22 = 3SK$. 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 77361a06

Assessment	Test	Domain	Skill	Difficulty
PSAT/NMSQT & PSAT 10	Math	Geometry and Trigonometry	Lines, angles, and triangles	<div><div></div><div></div><div></div></div>

ID: 77361a06



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: 77361a06 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.

