The University of the State of New York

REGENTS HIGH SCHOOL EXAMINATION

GEOMETRY

Tuesday, January 26, 2016 — 1:15 p.m.

SAMPLE RESPONSE SET

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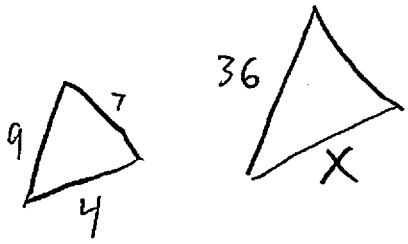
Question 29

29 The sides of a triangle measure 7, 4, and 9. If the longest side of a similar triangle measures 36, determine and state the length of the shortest side of this triangle.



$\frac{9}{36} = \frac{4}{x}$

$9x = (36)(4)$

$9x = 144$

$x = 16$

Shortest side = 16

Score 2: The student has a complete and correct response.

Question 29

29 The sides of a triangle measure 7, 4, and 9. If the longest side of a similar triangle measures 36, determine and state the length of the shortest side of this triangle.

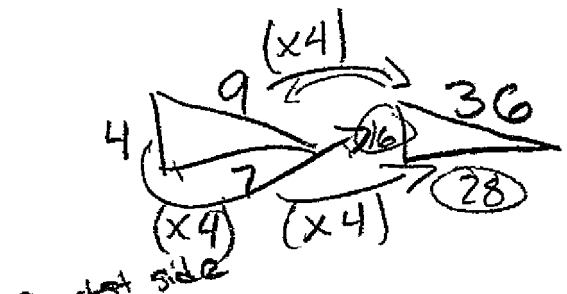
$$\frac{9}{4} = \frac{36}{x}$$

$$x = 16$$

Score 2: The student has a complete and correct response.

Question 29

29 The sides of a triangle measure 7, 4, and 9. If the longest side of a similar triangle measures 36, determine and state the length of the shortest side of this triangle.



$4 \times 4 = 16$

$7 \times 4 = 28$

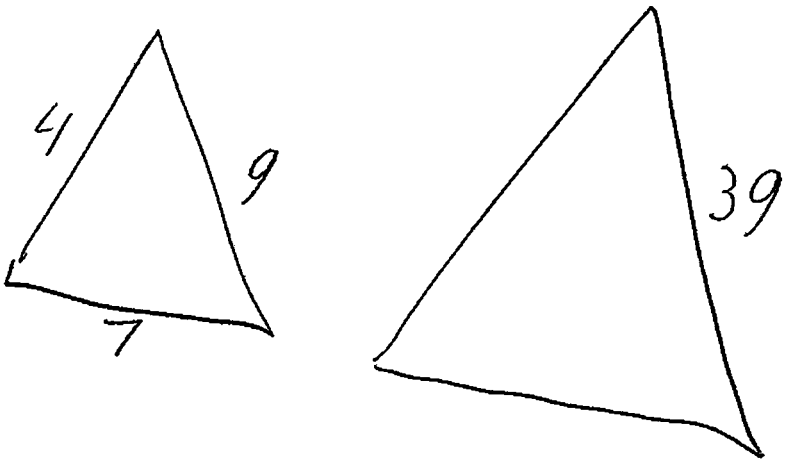
$9 \times 4 = 36$

Shortest side = 36

Score 1: The student wrote shortest side next to $4 \times 4 = 16$ but circled "shortest side = 36" as the answer.

Question 29

29 The sides of a triangle measure 7, 4, and 9. If the longest side of a similar triangle measures 36, determine and state the length of the shortest side of this triangle.



$\frac{9}{4} = \frac{39}{x}$

$9x = 156$

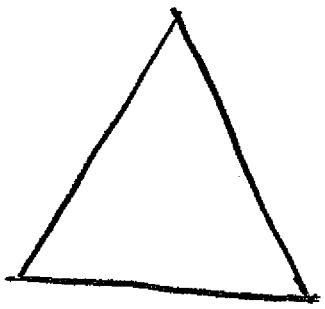
$\frac{9x}{9} = \frac{156}{9}$

$x = 17.\overline{3}$

Score 1: The student made a transcription error, but found an appropriate length for the shortest side.

Question 29

29 The sides of a triangle measure 7, 4, and 9. If the longest side of a similar triangle measures 36, determine and state the length of the shortest side of this triangle.



7, 4, 9

$a^2 + b^2 = c^2$

$7^2 + 4^2 = 9^2$

$49 + 16 = 81$

$-49 \qquad -49$

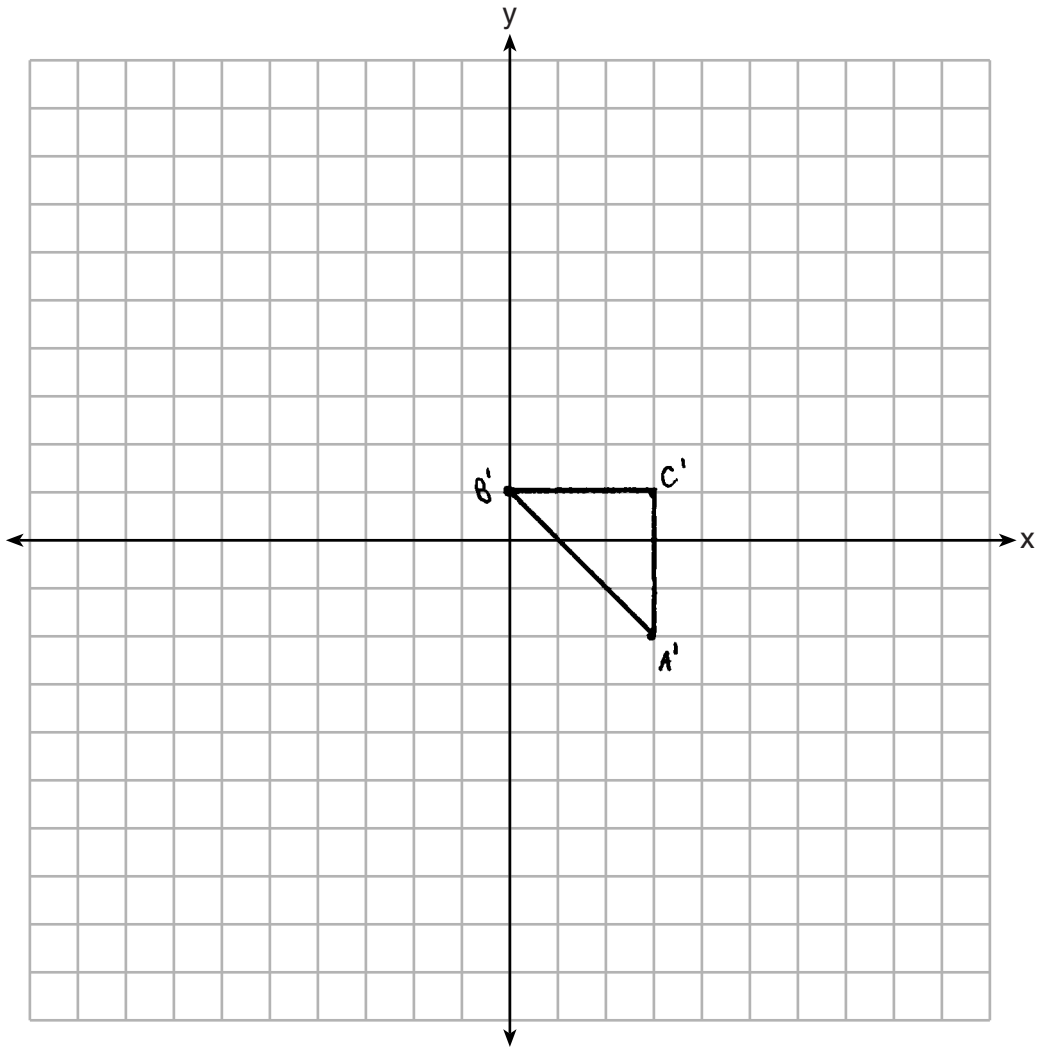
$\frac{16}{16} = \frac{32}{16}$

$x = 2$ = shortest side

Score 0: The student's work was completely incorrect.

Question 30

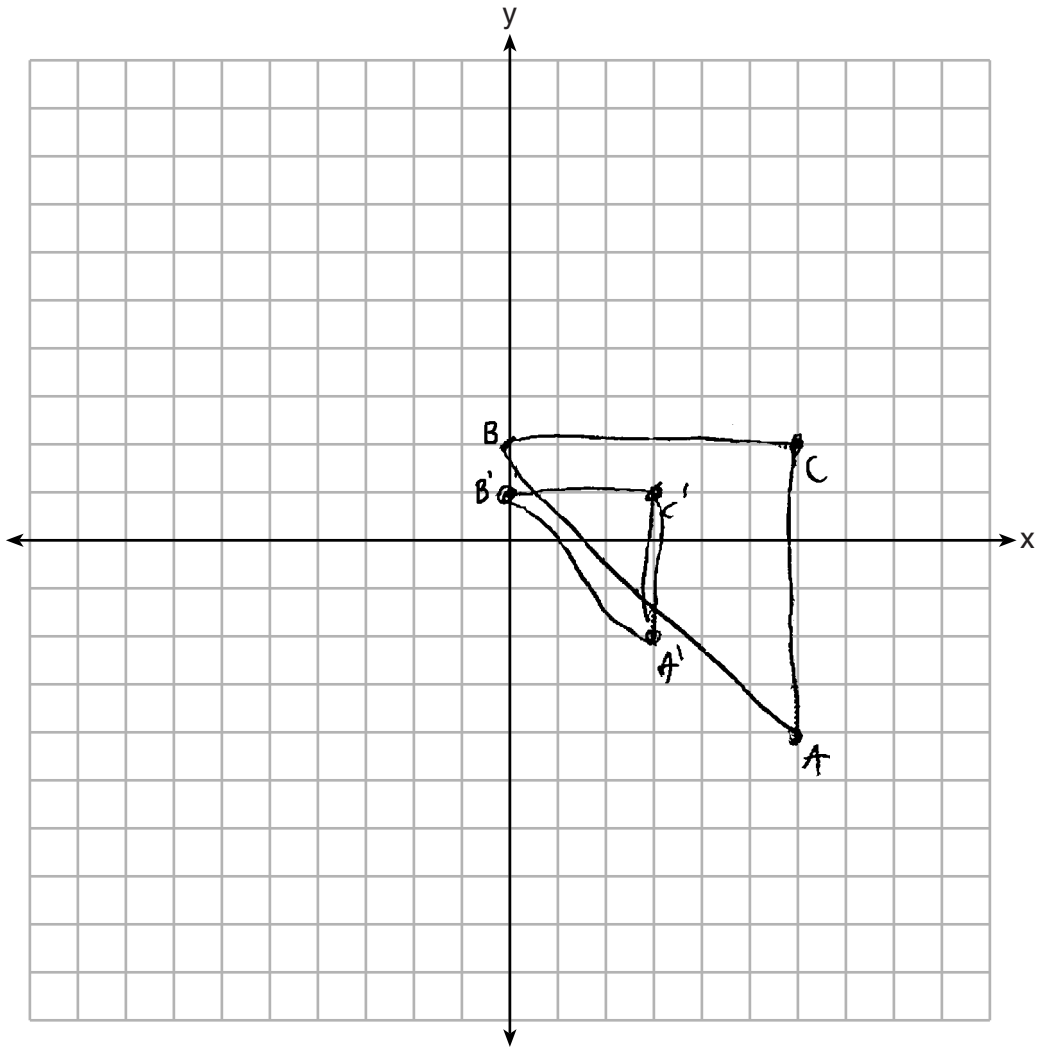
30 Triangle ABC has coordinates $A(6,-4)$, $B(0,2)$, and $C(6,2)$. On the set of axes below, graph and label $\triangle A'B'C'$, the image of $\triangle ABC$ after a dilation of $\frac{1}{2}$.



Score 2: The student has a complete and correct response.

Question 30

30 Triangle ABC has coordinates $A(6,-4)$, $B(0,2)$, and $C(6,2)$. On the set of axes below, graph and label $\triangle A'B'C'$, the image of $\triangle ABC$ after a dilation of $\frac{1}{2}$.



Score 2: The student has a complete and correct response.

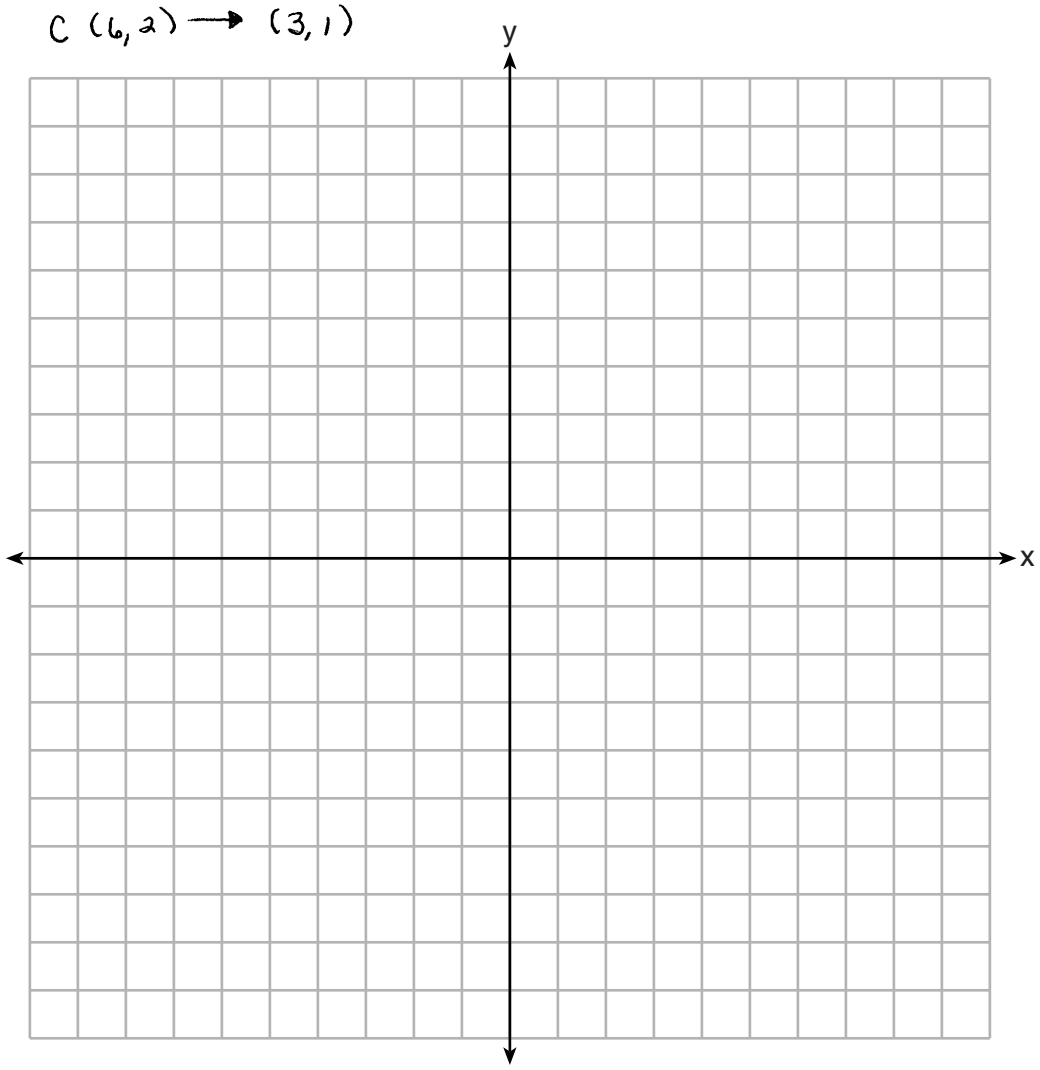
Question 30

30 Triangle ABC has coordinates $A(6,-4)$, $B(0,2)$, and $C(6,2)$. On the set of axes below, graph and label $\triangle A'B'C'$, the image of $\triangle ABC$ after a dilation of $\frac{1}{2}$.

A (6,-4) → (3,-2)

B (0,2) → (0,1)

C (6,2) → (3,1)

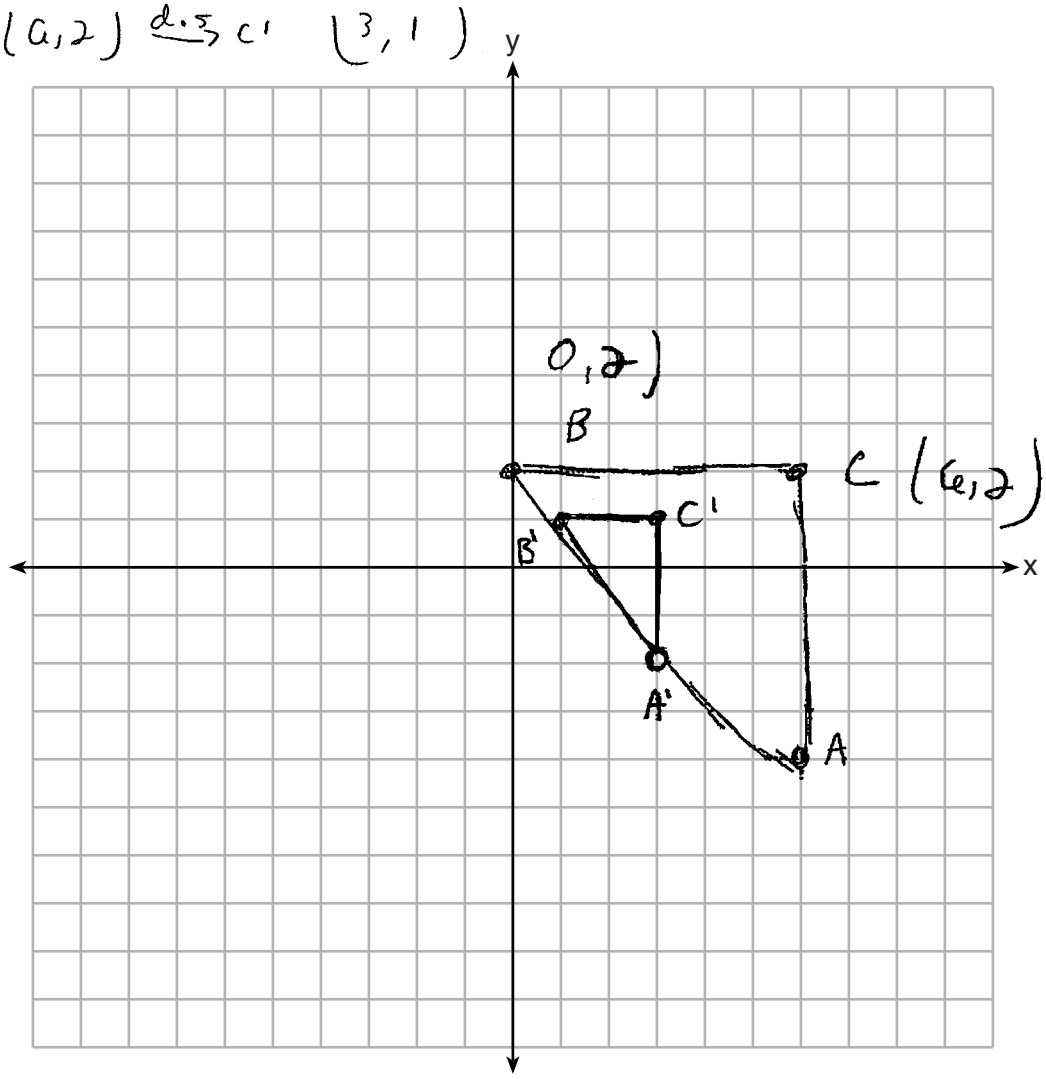


Score 1: The student stated the coordinates of each corresponding point of the image of $\triangle ABC$.

Question 30

30 Triangle ABC has coordinates $A(6,-4)$, $B(0,2)$, and $C(6,2)$. On the set of axes below, graph and label $\triangle A'B'C'$, the image of $\triangle ABC$ after a dilation of $\frac{1}{2}$.

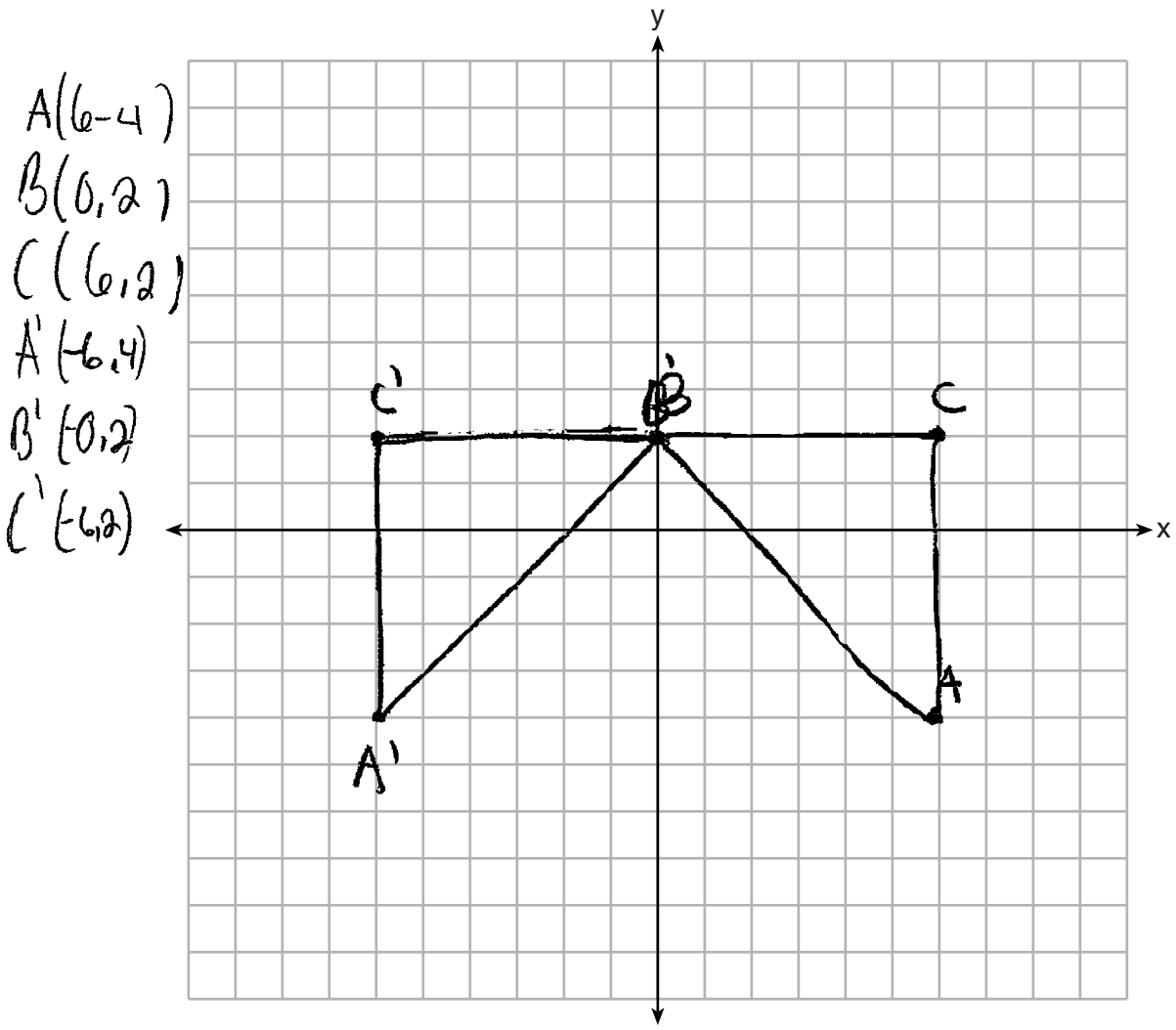
A(6,-4) $\xrightarrow{d.5}$ A' (3,-2)
B (0,2) $\xrightarrow{d.5}$ B' (0,1)
C (6,2) $\xrightarrow{d.5}$ C' (3,1)



Score 1: The student made an error graphing B'.

Question 30

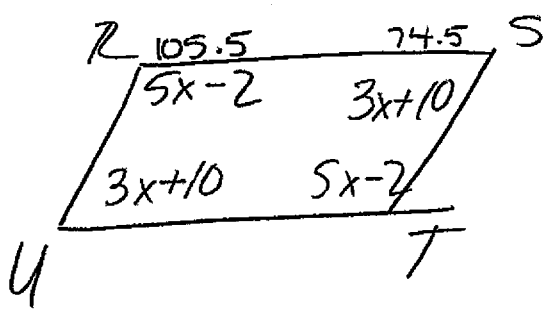
30 Triangle ABC has coordinates $A(6,-4)$, $B(0,2)$, and $C(6,2)$. On the set of axes below, graph and label $\triangle A'B'C'$, the image of $\triangle ABC$ after a dilation of $\frac{1}{2}$.



Score 0: The student's work was completely incorrect.

Question 31

31 In parallelogram $RSTU$, $m\angle R = 5x - 2$ and $m\angle S = 3x + 10$. Determine and state the value of x.



$360 = 5x-2+5x-2+3x+10+3x+10$

$360 = 10x - 4 + 6x + 20$

$360 = 16x + 16$

-16

$344 = 16x$

16

$21.5 = x$

Score 2: The student has a complete and correct response.

Question 31

31 In parallelogram $RSTU$, $m\angle R = 5x - 2$ and $m\angle S = 3x + 10$. Determine and state the value of x.

$5x - 2 + 3x + 10 = 180$

$8x + 8 = 180$

$8x = 172$

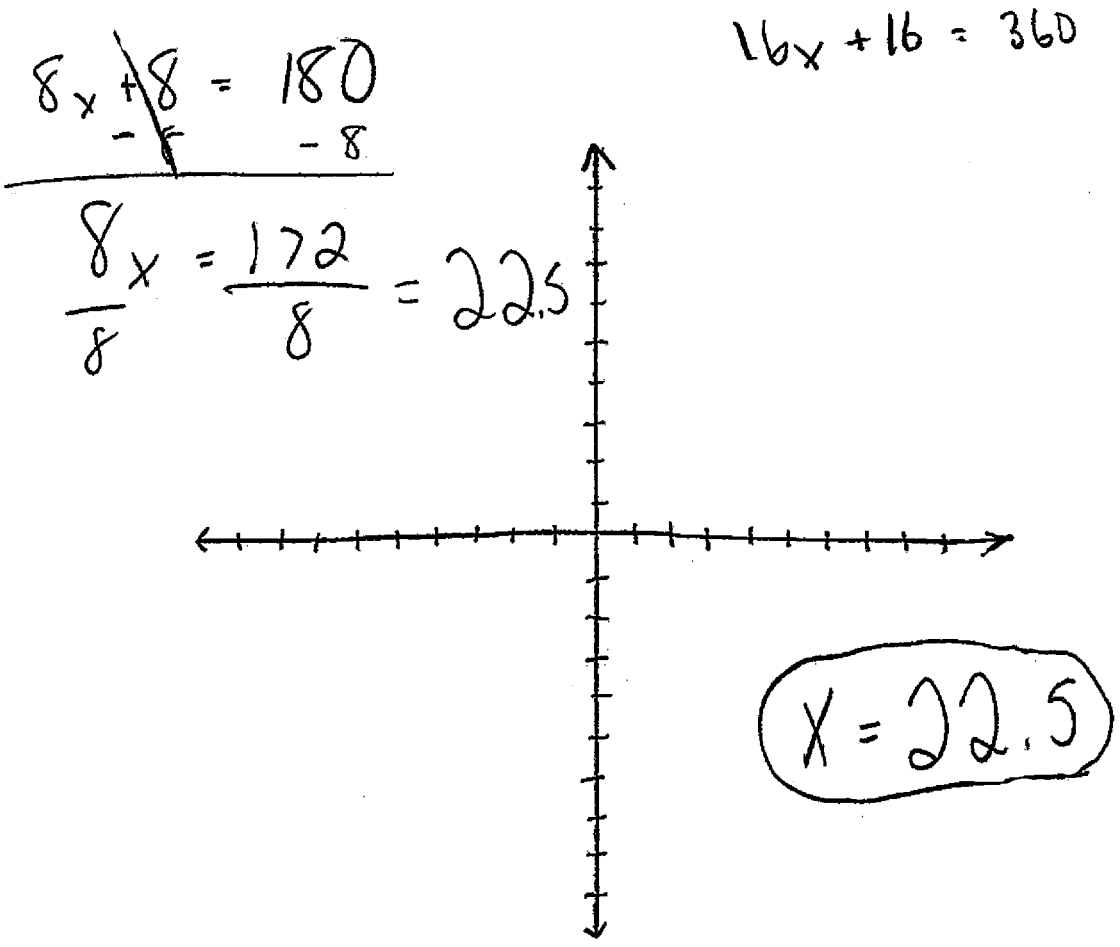
$\frac{8x}{8} = \frac{172}{8}$

$x = 21.5$

Score 2: The student has a complete and correct response.

Question 31

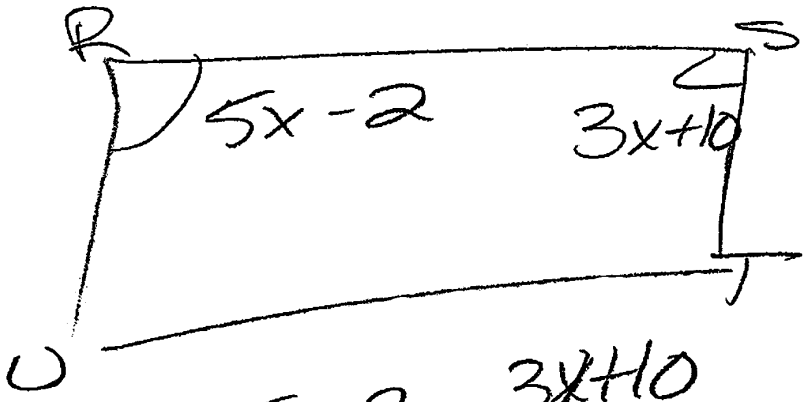
31 In parallelogram $RSTU$, $m\angle R = 5x - 2$ and $m\angle S = 3x + 10$.
Determine and state the value of x.



Score 1: The student made an error in division.

Question 31

31 In parallelogram $RSTU$, $m\angle R = 5x - 2$ and $m\angle S = 3x + 10$. Determine and state the value of x.



$5x - 2 = 3x + 10$

$-3x \quad -3x$

$2x - 2 = 10$

$+2 \quad +2$

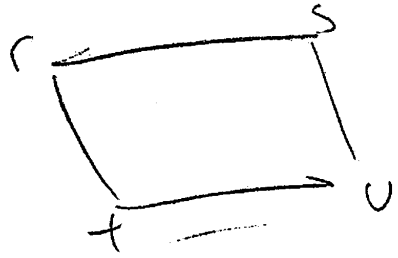
$\frac{2x}{2} = \frac{12}{2}$

$x = 6$

Score 1: The student made an error by setting the consecutive angles of the parallelogram equal.

Question 31

31 In parallelogram $RSTU$, $m\angle R = 5x - 2$ and $m\angle S = 3x + 10$. Determine and state the value of x.



$5x - 2 + 3x + 10 = 360$

$8x - 2 + 10 = 360$

$8x - 8 = 360$

$+8 \quad +8$

$\frac{8x}{8} = \frac{368}{8}$

$x = 46$

Score 0: The student wrote an incorrect equation and made an error in solving it.

Question 32

32 Determine and state the length of a line segment whose endpoints are (6,4) and (−9,−4).

$\sqrt{(6+9)^2+(4+4)^2} = \sqrt{(15)^2+(8)^2}$

$\sqrt{225+64}$

$\sqrt{289} =$

17

Score 2: The student has a complete and correct response.

Question 32

32 Determine and state the length of a line segment whose endpoints are (6,4) and (−9,−4).

$\sqrt{(x_2+x_1)^2+(y_2+y_1)^2}$

$\sqrt{(6+-9)^2+(4+-4)^2}$

$\sqrt{(-3)^2+(0)^2}$

$\sqrt{9+0}$

$=\sqrt{9}$

Score 1: The student used an incorrect formula for the length of a line segment, but found an appropriate solution.

Question 32

32 Determine and state the length of a line segment whose endpoints are (6,4) and (−9,−4).

$d=\sqrt{(x_2-x_1)^2+(y_2-y_1)^2}$

$d=\sqrt{(-9-6)^2+(-4-6)^2}$

$d=\sqrt{-15^2+-10^2}$

$d=\sqrt{225+100}$

$d=\sqrt{325}$

$d=18$

Score 0: The student made an incorrect substitution into the formula and did not show the entire display of the calculator.

Question 33

33 The base of a right pentagonal prism has an area of 20 square inches. If the prism has an altitude of 8 inches, determine and state the volume of the prism, in cubic inches.

$V = 20(8)$

$V = 160$

Score 2: The student has a complete and correct response.

Question 33

33 The base of a right pentagonal prism has an area of 20 square inches. If the prism has an altitude of 8 inches, determine and state the volume of the prism, in cubic inches.

$V = 160 \text{ in}^3$

Score 1: The student showed no work.

Question 33

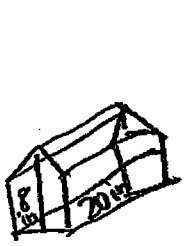
33 The base of a right pentagonal prism has an area of 20 square inches. If the prism has an altitude of 8 inches, determine and state the volume of the prism, in cubic inches.

(20)(8)
160 sq. in.

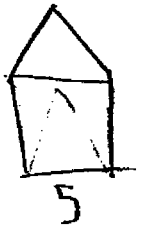
Score 1: The student wrote incorrect units in the answer.

Question 33

33 The base of a right pentagonal prism has an area of 20 square inches. If the prism has an altitude of 8 inches, determine and state the volume of the prism, in cubic inches.



$\frac{1}{2}(8)(20)$



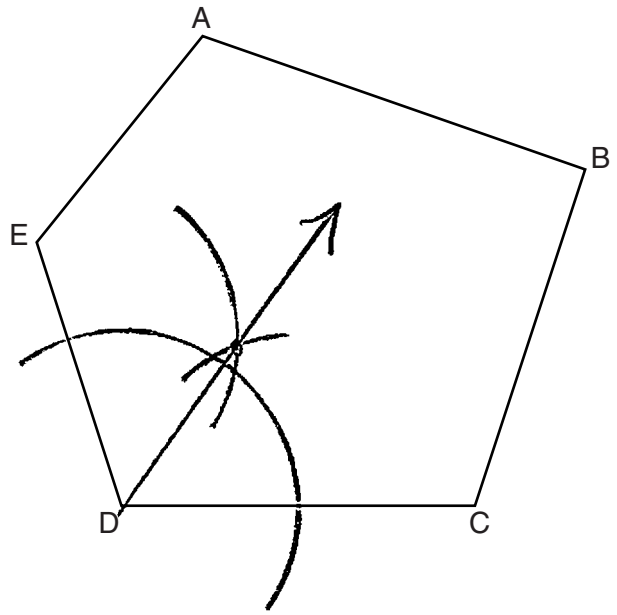
Volume = 100 in^3

Score 0: The student used an incorrect formula and made an error in multiplication.

Question 34

34 Using a compass and a straightedge, construct the bisector of $\angle CDE$.

[Leave all construction marks.]

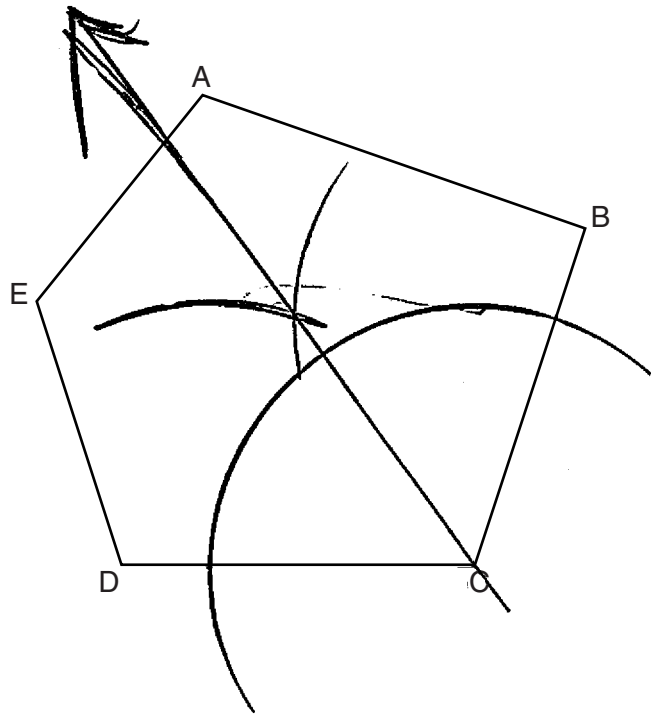


Score 2: The student has a complete and correct response.

Question 34

34 Using a compass and a straightedge, construct the bisector of $\angle CDE$.

[Leave all construction marks.]

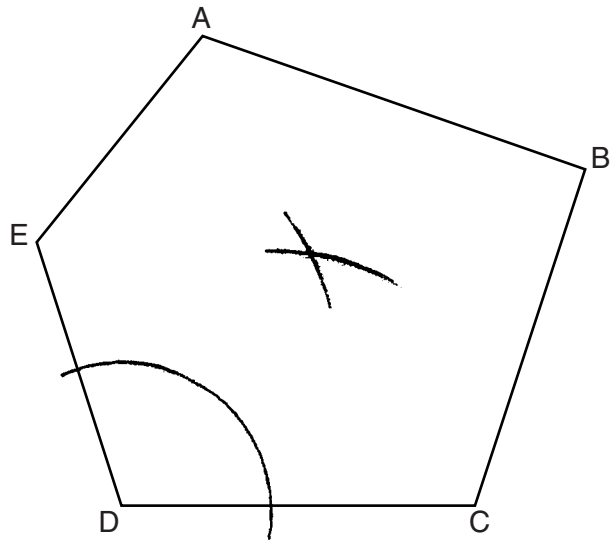


Score 1: The student drew a correct construction on an angle other than $\angle CDE$.

Question 34

34 Using a compass and a straightedge, construct the bisector of $\angle CDE$.

[Leave all construction marks.]

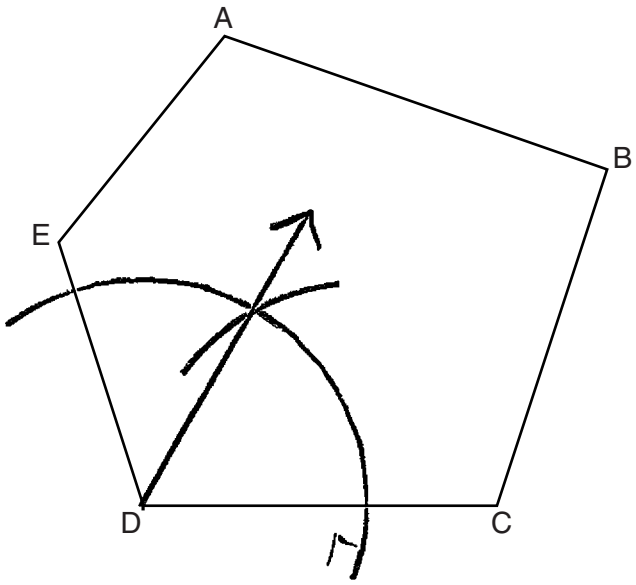


Score 1: The student did not complete the construction.

Question 34

34 Using a compass and a straightedge, construct the bisector of $\angle CDE$.

[Leave all construction marks.]

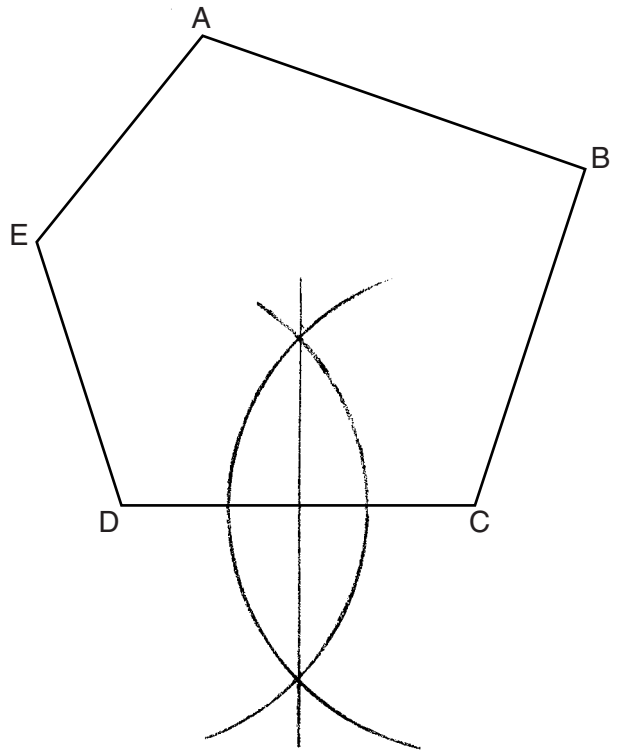


Score 0: The student did not demonstrate a proper method of construction.

Question 34

34 Using a compass and a straightedge, construct the bisector of $\angle CDE$.

[Leave all construction marks.]



Score 0: The student drew a construction that was irrelevant to the problem.

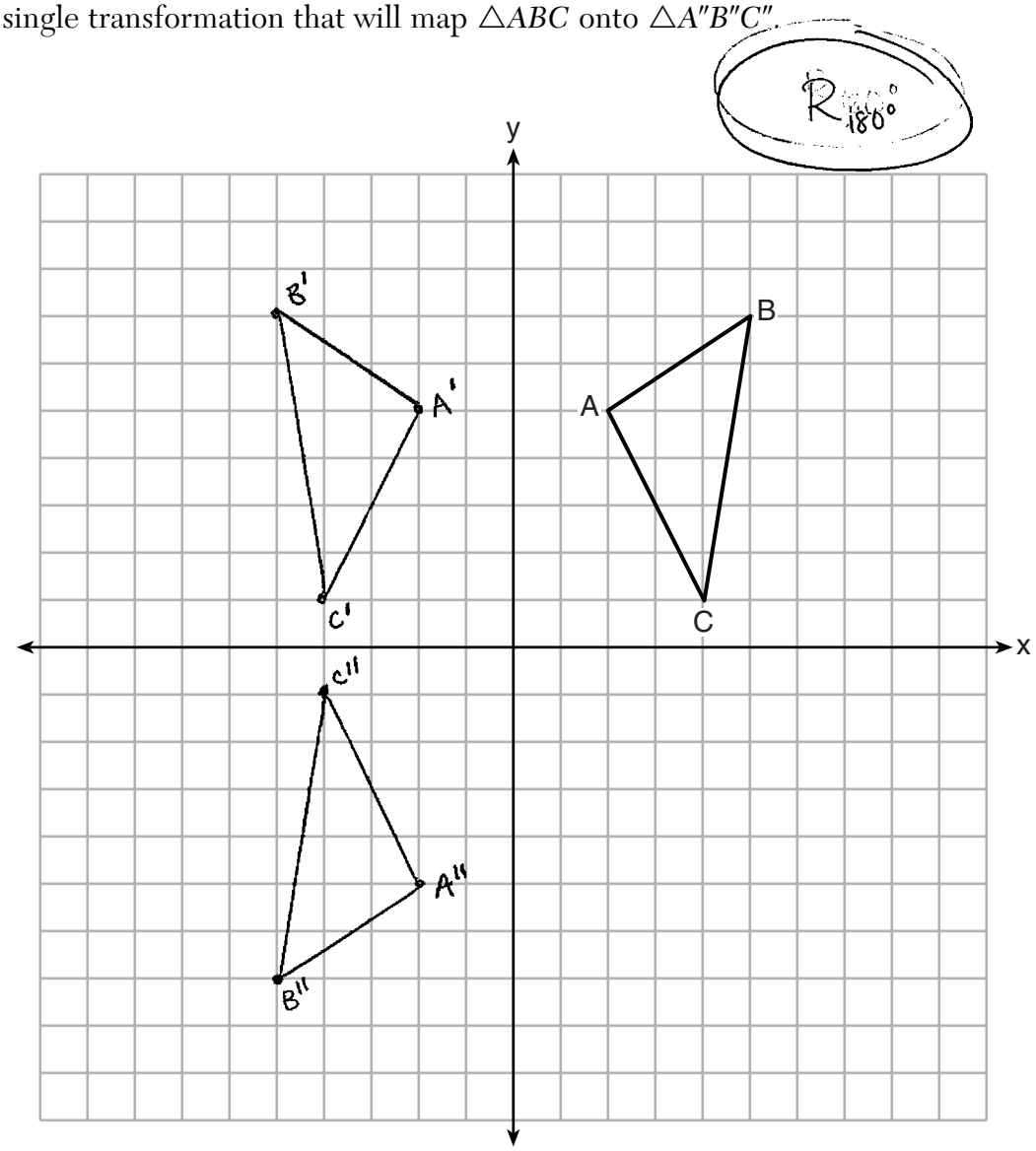
Question 35

35 The coordinates of $\triangle ABC$, shown on the graph below, are $A(2,5)$, $B(5,7)$, and $C(4,1)$.

Graph and label $\triangle A'B'C'$, the image of $\triangle ABC$ after it is reflected over the y-axis.

Graph and label $\triangle A''B''C''$, the image of $\triangle A'B'C'$ after it is reflected over the x-axis.

State a single transformation that will map $\triangle ABC$ onto $\triangle A''B''C''$.



Score 4: The student has a complete and correct response.

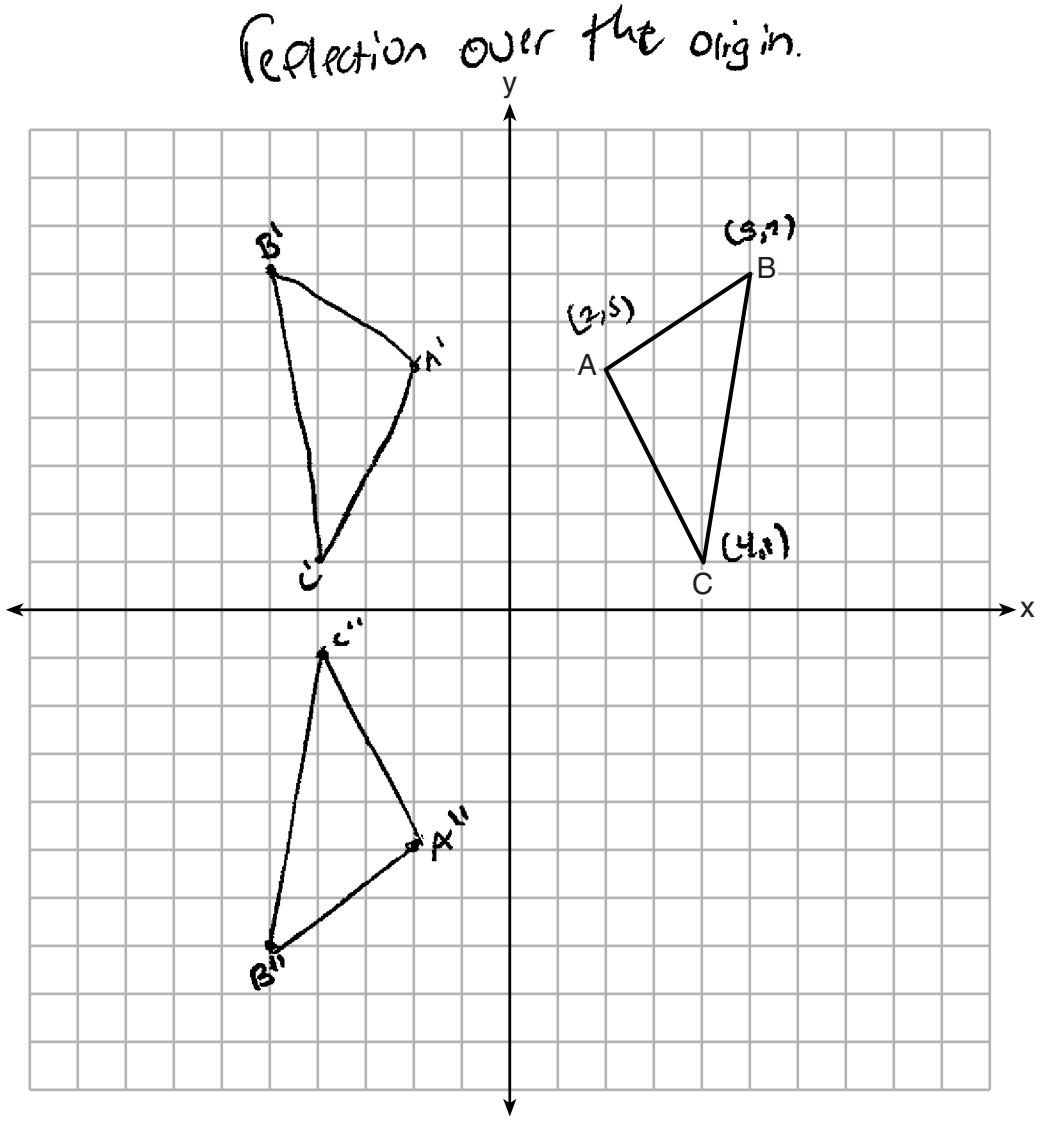
Question 35

35 The coordinates of $\triangle ABC$, shown on the graph below, are $A(2,5)$, $B(5,7)$, and $C(4,1)$.

Graph and label $\triangle A'B'C'$, the image of $\triangle ABC$ after it is reflected over the y-axis.

Graph and label $\triangle A''B''C''$, the image of $\triangle A'B'C'$ after it is reflected over the x-axis.

State a single transformation that will map $\triangle ABC$ onto $\triangle A''B''C''$.



Score 4: The student has a complete and correct response.

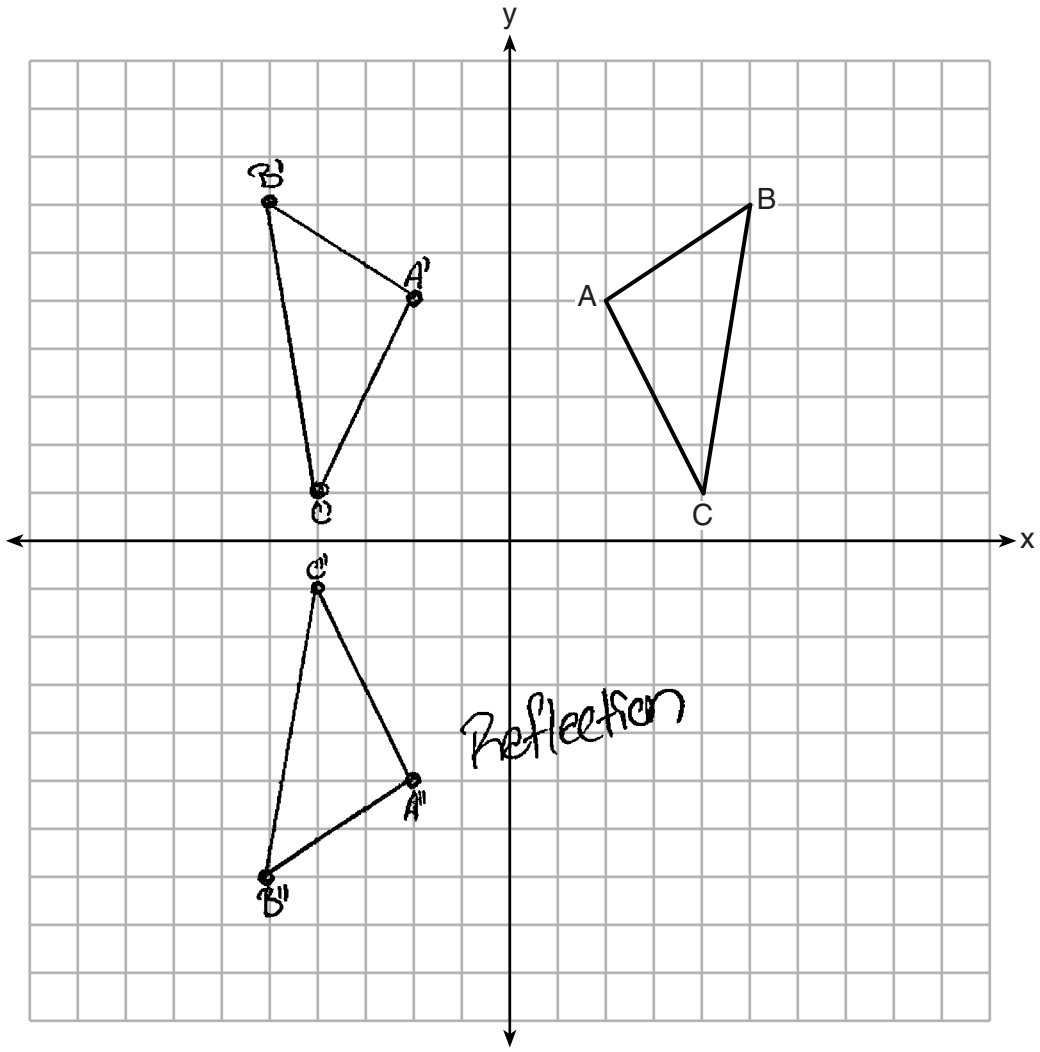
Question 35

35 The coordinates of $\triangle ABC$, shown on the graph below, are $A(2,5)$, $B(5,7)$, and $C(4,1)$.

Graph and label $\triangle A'B'C'$, the image of $\triangle ABC$ after it is reflected over the y-axis.

Graph and label $\triangle A''B''C''$, the image of $\triangle A'B'C'$ after it is reflected over the x-axis.

State a single transformation that will map $\triangle ABC$ onto $\triangle A''B''C''$.



Score 3: The student did not state the single transformation completely.

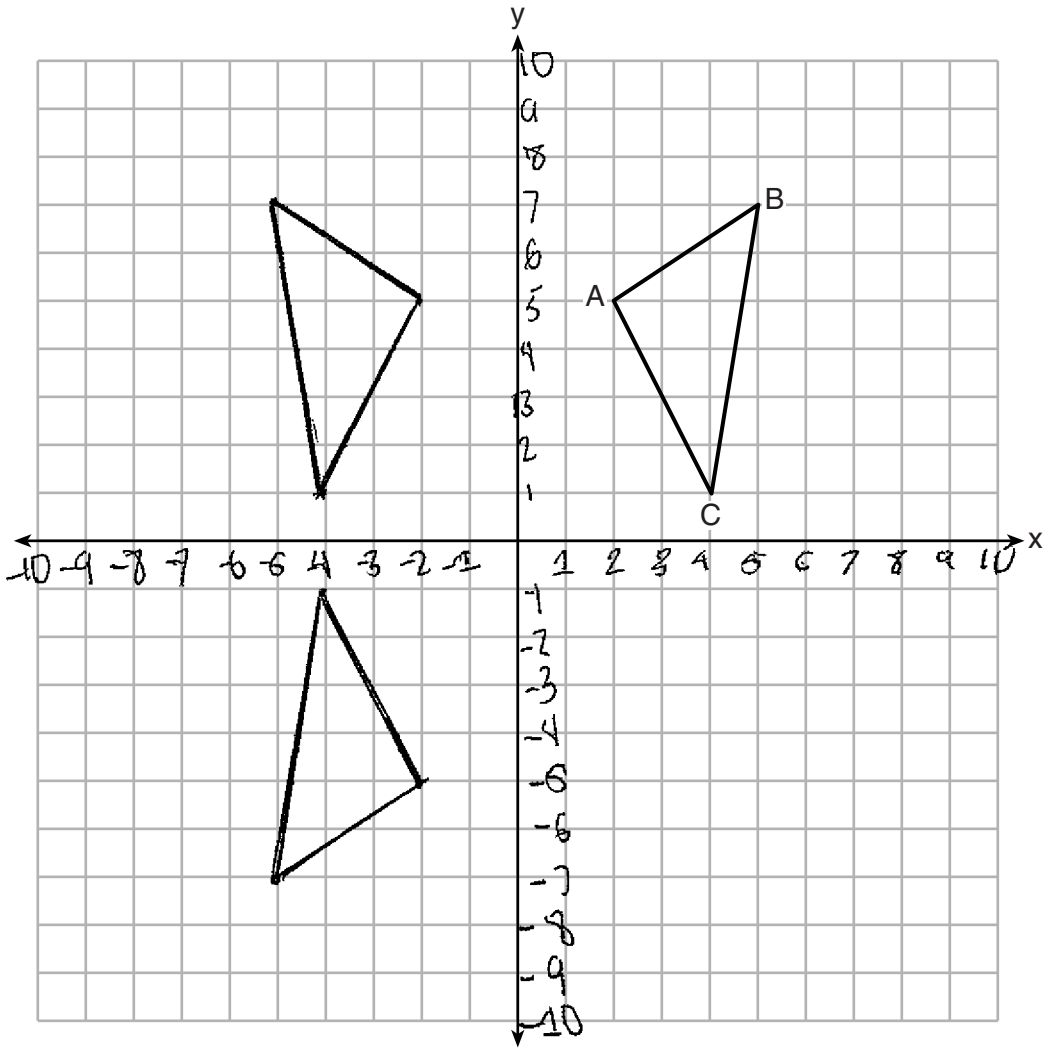
Question 35

35 The coordinates of $\triangle ABC$, shown on the graph below, are $A(2,5)$, $B(5,7)$, and $C(4,1)$.

Graph and label $\triangle A'B'C'$, the image of $\triangle ABC$ after it is reflected over the y-axis.

Graph and label $\triangle A''B''C''$, the image of $\triangle A'B'C'$ after it is reflected over the x-axis.

State a single transformation that will map $\triangle ABC$ onto $\triangle A''B''C''$.



Score 2: The student graphed the two images correctly, but did not label them or state a single transformation.

Question 35

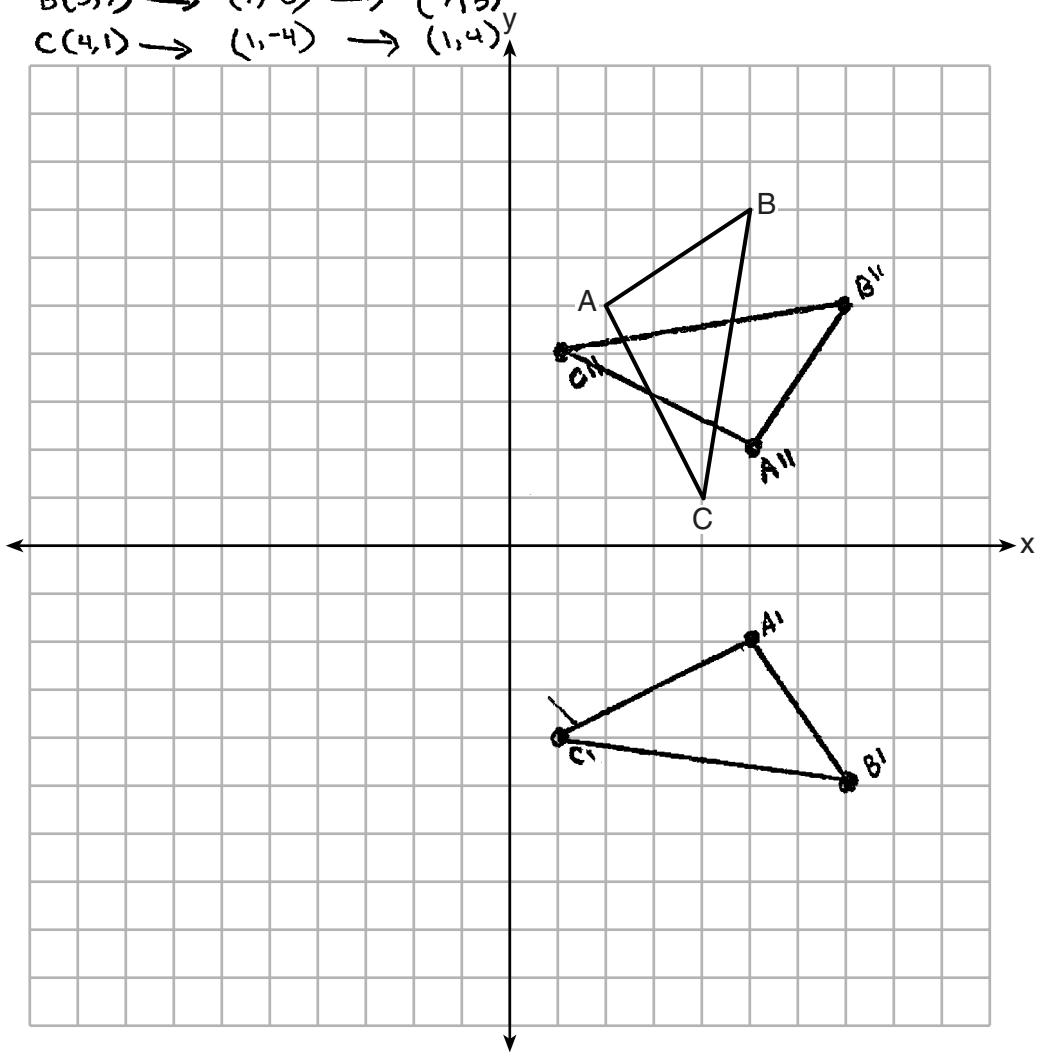
35 The coordinates of $\triangle ABC$, shown on the graph below, are $A(2,5)$, $B(5,7)$, and $C(4,1)$.

Graph and label $\triangle A'B'C'$, the image of $\triangle ABC$ after it is reflected over the y-axis.

Graph and label $\triangle A''B''C''$, the image of $\triangle A'B'C'$ after it is reflected over the x-axis.

State a single transformation that will map $\triangle ABC$ onto $\triangle A''B''C''$. $r_{y=x}$

A(2,5) → (5,-2) → (5,2)
B(5,7) → (7,-5) → (7,5)
C(4,1) → (1,-4) → (1,4)



Score 2: The student graphed the first transformation incorrectly, but graphed and labeled the second correctly and stated an appropriate single transformation.

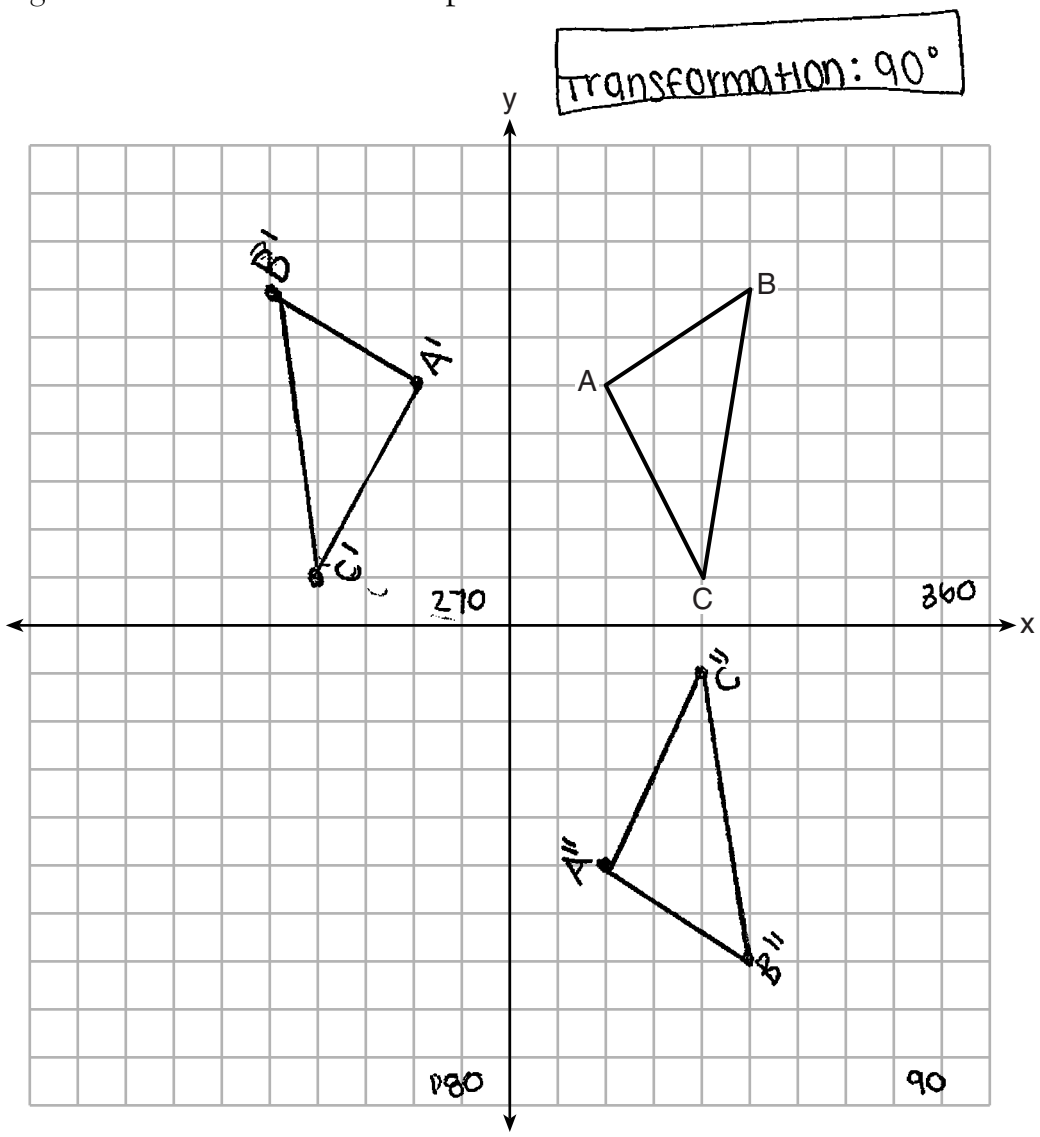
Question 35

35 The coordinates of $\triangle ABC$, shown on the graph below, are $A(2,5)$, $B(5,7)$, and $C(4,1)$.

Graph and label $\triangle A'B'C'$, the image of $\triangle ABC$ after it is reflected over the y-axis.

Graph and label $\triangle A''B''C''$, the image of $\triangle A'B'C'$ after it is reflected over the x-axis.

State a single transformation that will map $\triangle ABC$ onto $\triangle A''B''C''$.



Score 1: The student graphed and labeled $\triangle A'B'C'$ correctly. When graphing $\triangle A''B''C''$ the student reflected $\triangle ABC$ over the x-axis, and stated an incorrect single transformation.

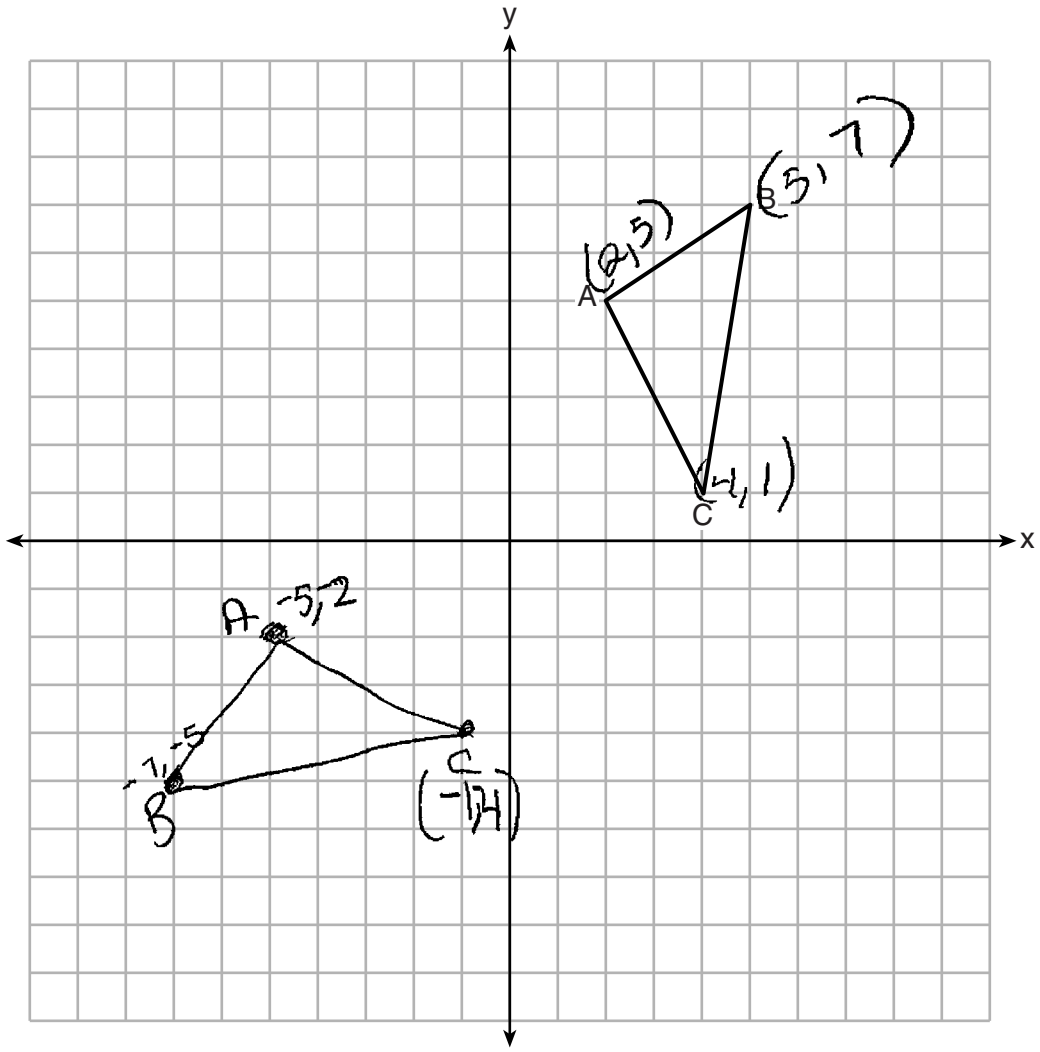
Question 35

35 The coordinates of $\triangle ABC$, shown on the graph below, are $A(2,5)$, $B(5,7)$, and $C(4,1)$.

Graph and label $\triangle A'B'C'$, the image of $\triangle ABC$ after it is reflected over the y-axis.

Graph and label $\triangle A''B''C''$, the image of $\triangle A'B'C'$ after it is reflected over the x-axis.

State a single transformation that will map $\triangle ABC$ onto $\triangle A''B''C''$.



Score 0: The student did not show any work that was relevant to the problem.

Question 36

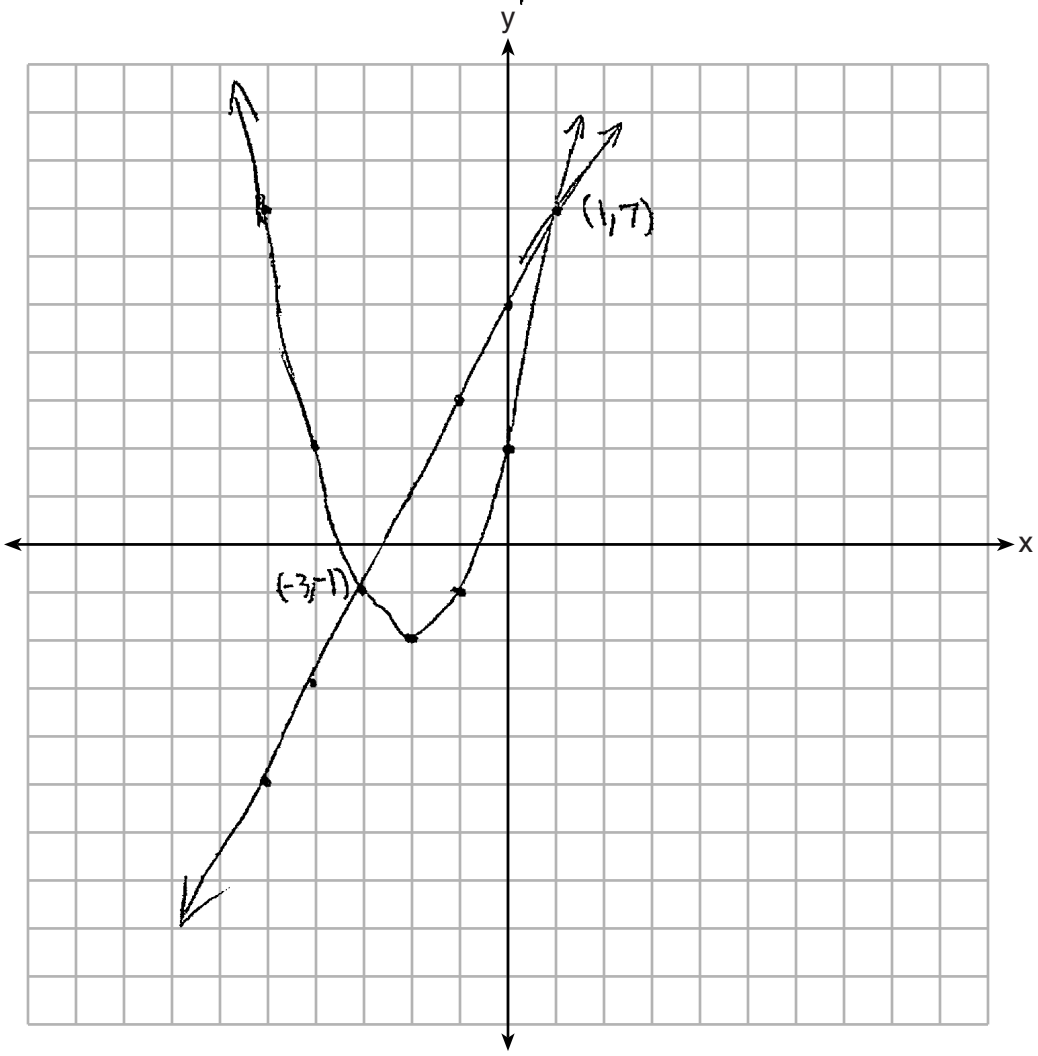
36 On the set of axes below, solve the following system of equations graphically and state the coordinates of all points in the solution.

$$y = x^2 + 4x + 2$$

$$y - 2x = 5$$

(-3,-1) ; (1,7)

$y = 2x + 5$



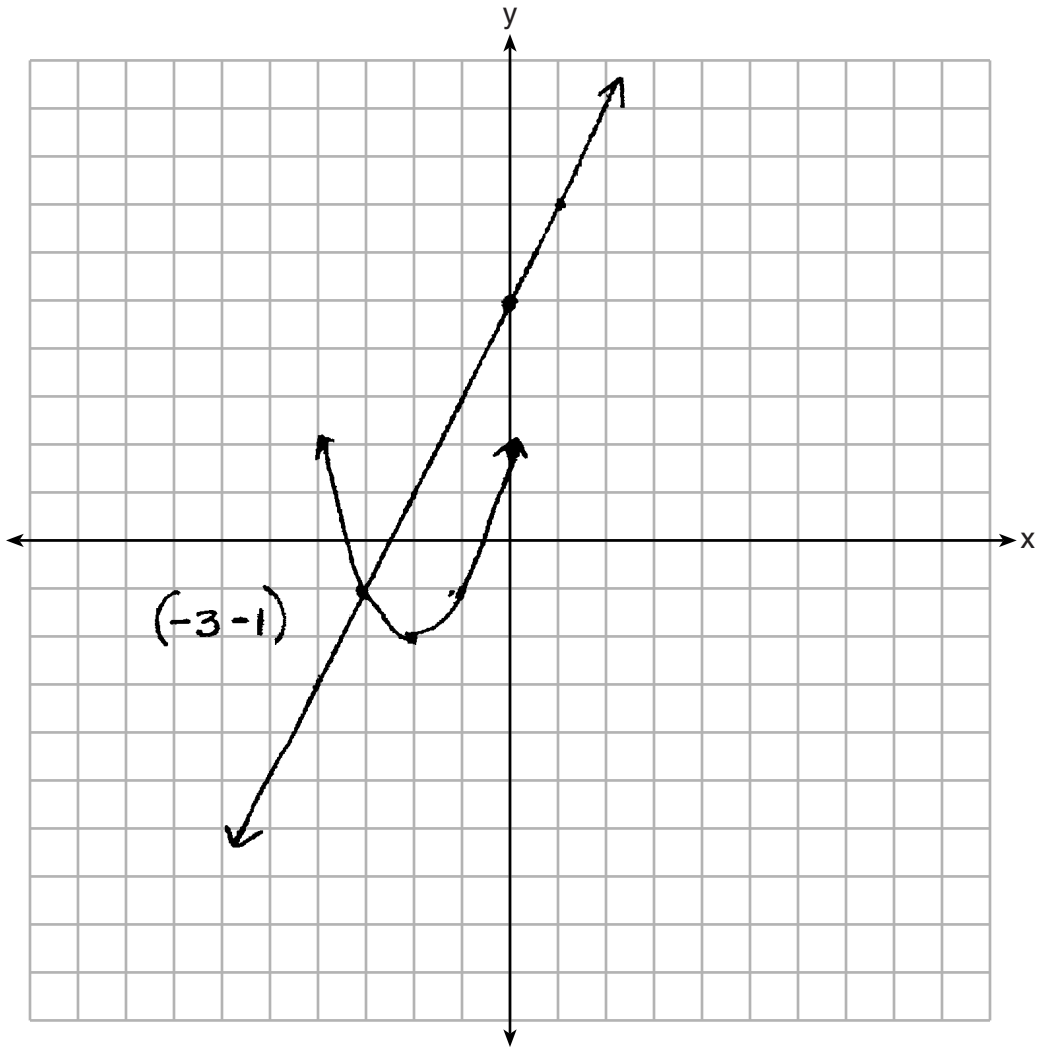
Score 4: The student has a complete and correct response.

Question 36

36 On the set of axes below, solve the following system of equations graphically and state the coordinates of all points in the solution.

$$y = x^2 + 4x + 2$$

$$y - 2x = 5 \qquad y = 2x + 5$$



Score 3: The student graphed both equations accurately, but only showed and stated one solution.

Question 36

36 On the set of axes below, solve the following system of equations graphically and state the coordinates of all points in the solution.

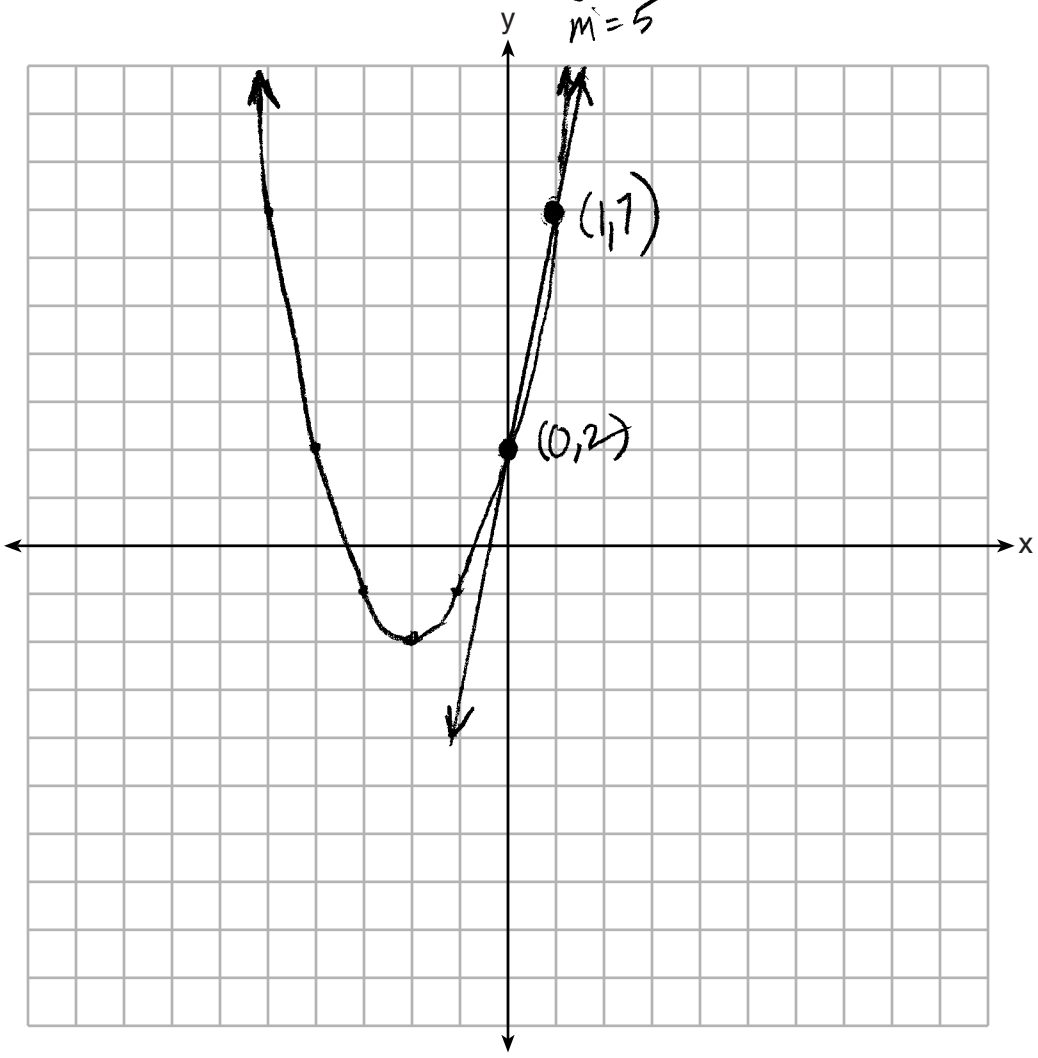
$$y = x^2 + 4x + 2$$

$$y - 2x = 5$$

$y = 2x + 5$

$b = 2$

$m = 5$



Score 2: The student confused the slope and y-intercept, but stated appropriate solutions.

Question 36

36 On the set of axes below, solve the following system of equations graphically and state the coordinates of all points in the solution.

$y = x^2 + 4x + 2$

$y - 2x = 5$

$y = 2x + 5$

$2x + 5 = x^2 + 4x + 2$

$0 = x^2 + 2x - 3$

$0 = (x - 1)(x + 3)$

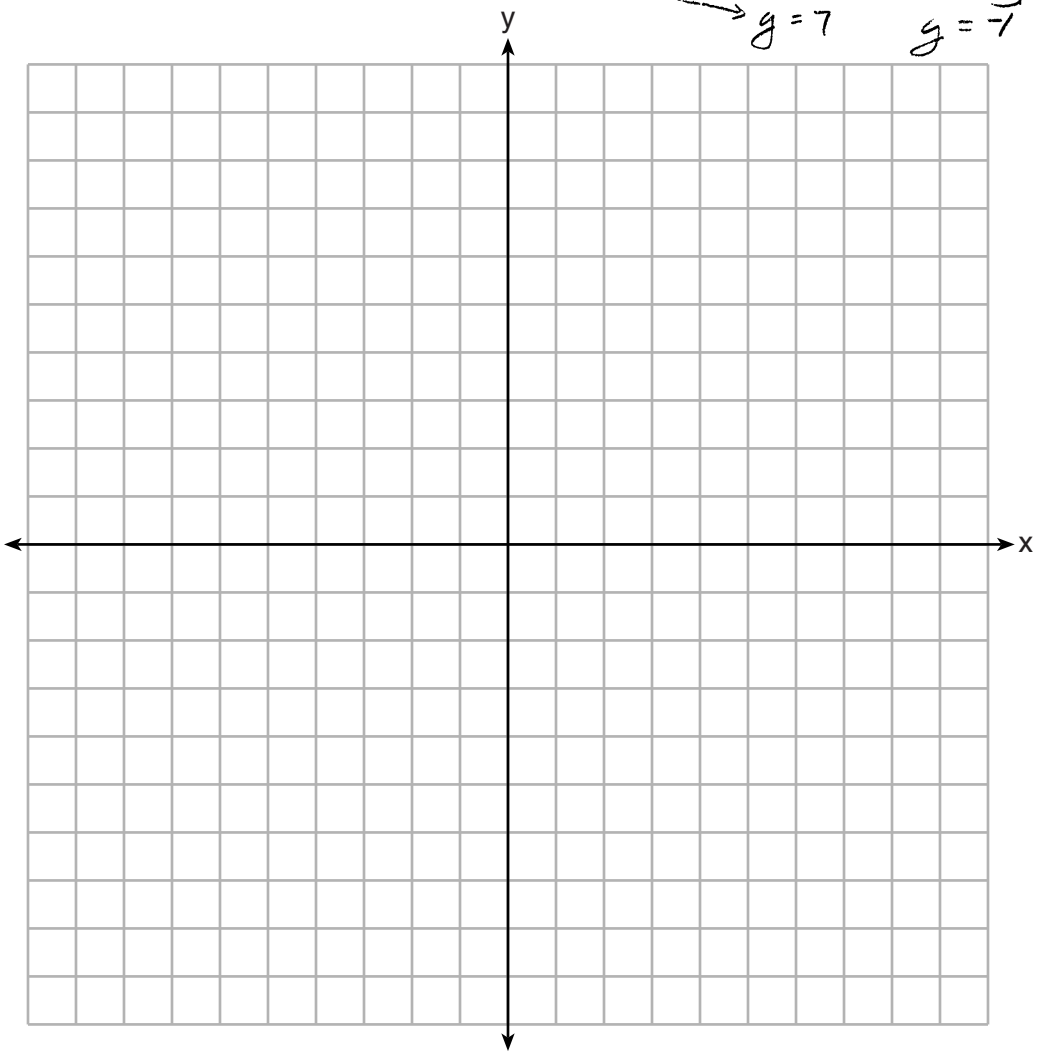
$x - 1 = 0 \quad x + 3 = 0$

$x = 1 \quad x = -3$

$y = 7 \quad y = -1$

(1, 7)

(-3, -1)



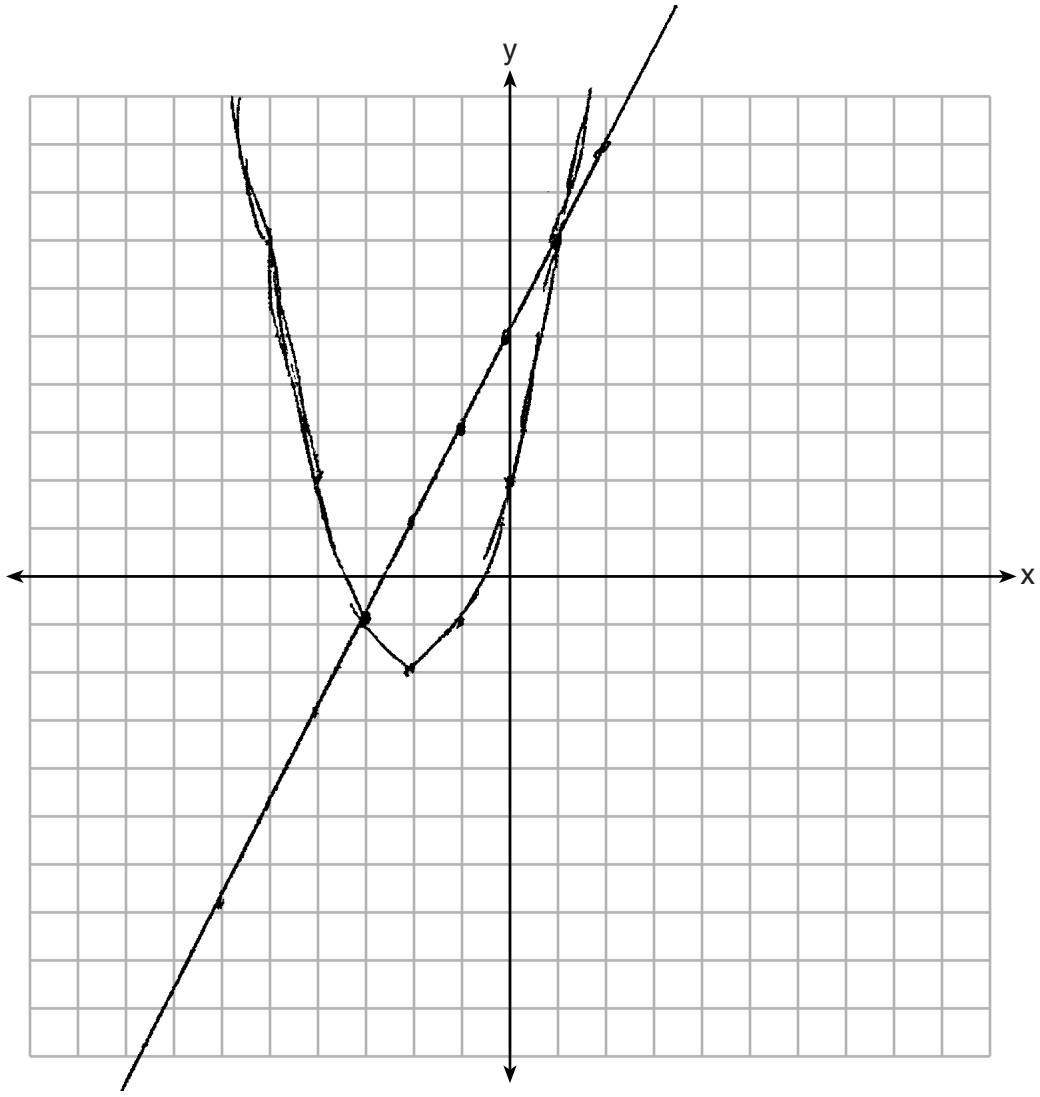
Score 2: The student found both solutions by a method other than graphing.

Question 36

36 On the set of axes below, solve the following system of equations graphically and state the coordinates of all points in the solution.

$$y = x^2 + 4x + 2$$

$$y - 2x = 5$$



Score 2: The student graphed both equations correctly, but did not state the coordinates of the solution.

Question 36

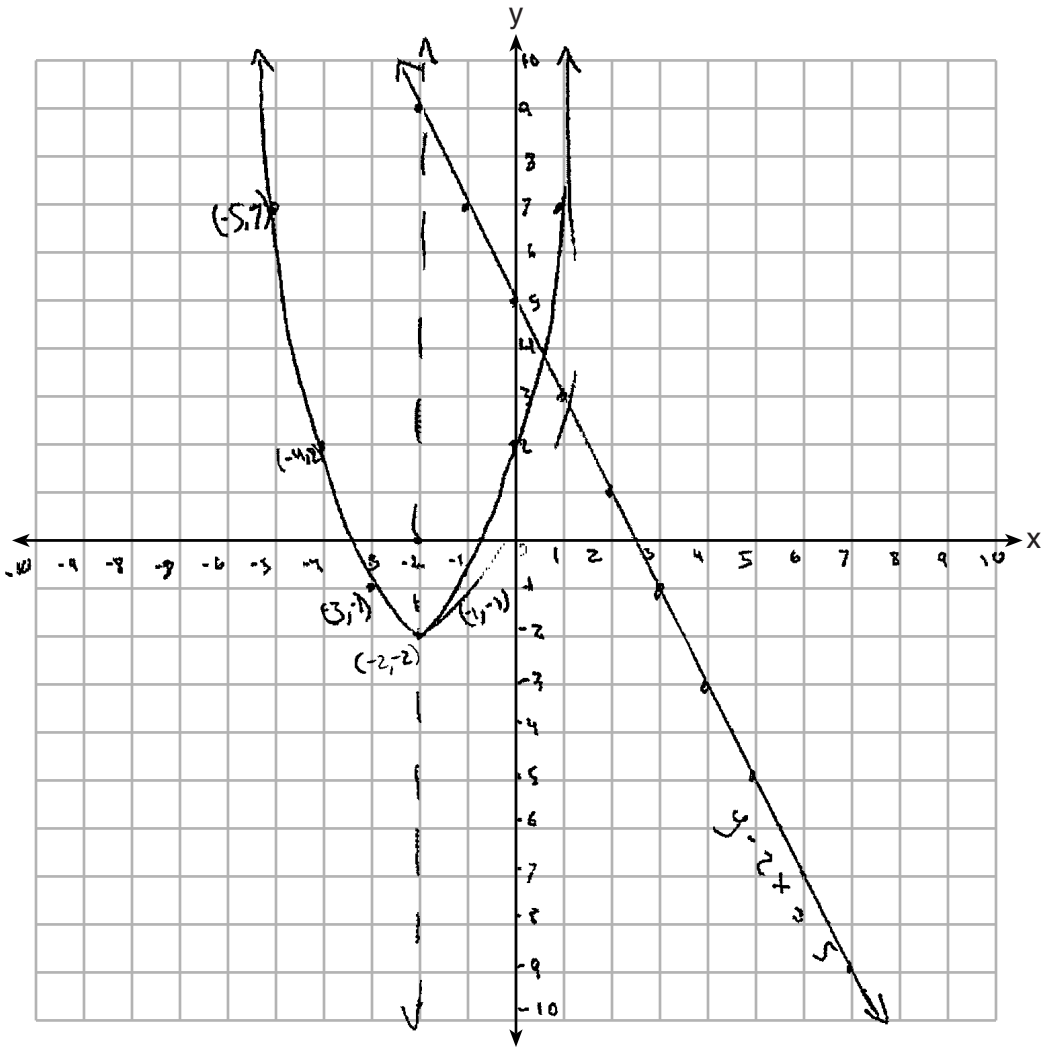
36 On the set of axes below, solve the following system of equations graphically and state the coordinates of all points in the solution.

$$y = x^2 + 4x + 2$$

$$y - 2x = 5$$

$y = x^2 + 4x + 2$

$y - 2x = 5$
$-2x \quad -2x$
$y = -2x + 5$



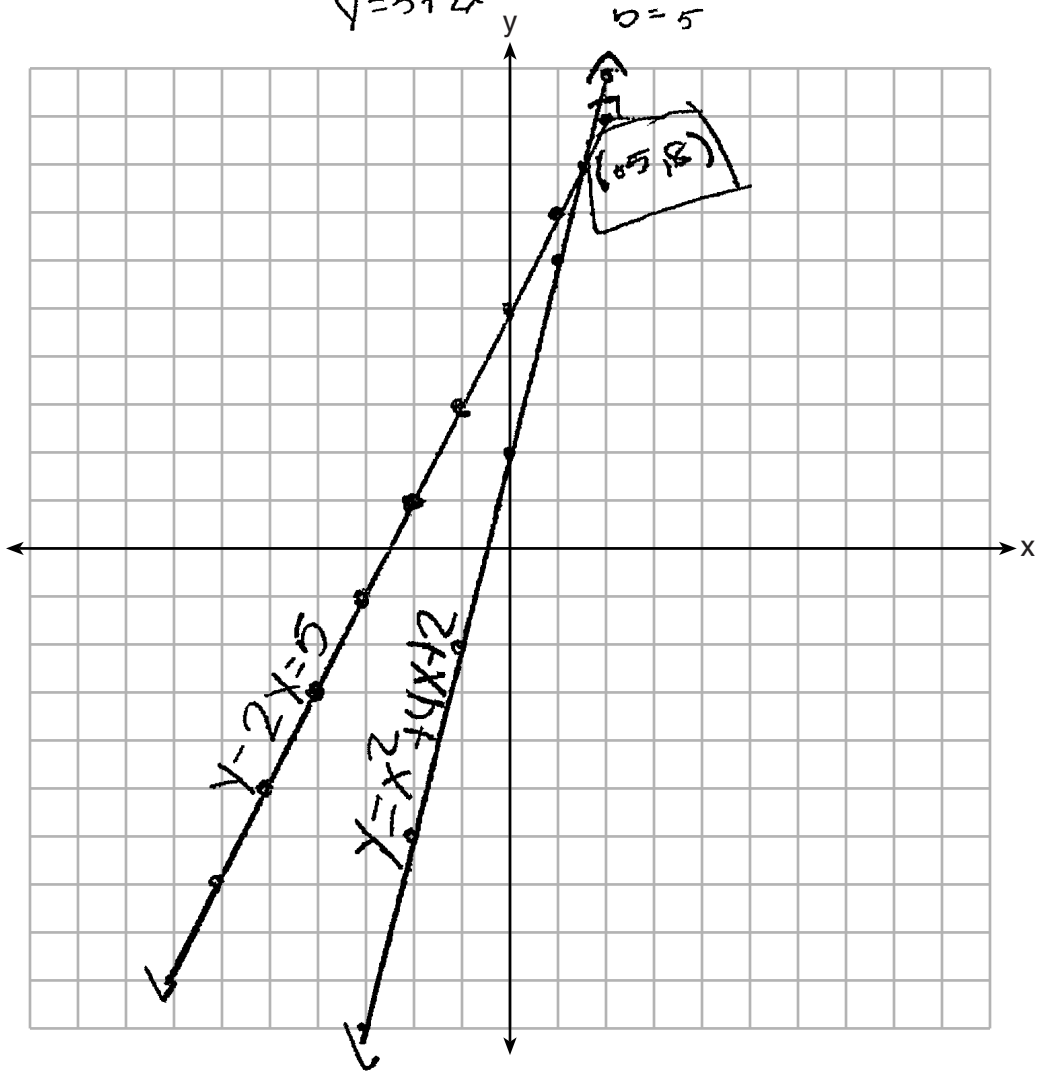
Score 1: The student only graphed the quadratic equation correctly.

Question 36

36 On the set of axes below, solve the following system of equations graphically and state the coordinates of all points in the solution.

$$y = x^2 + 4x + 2$$

$$y - 2x = 5$$



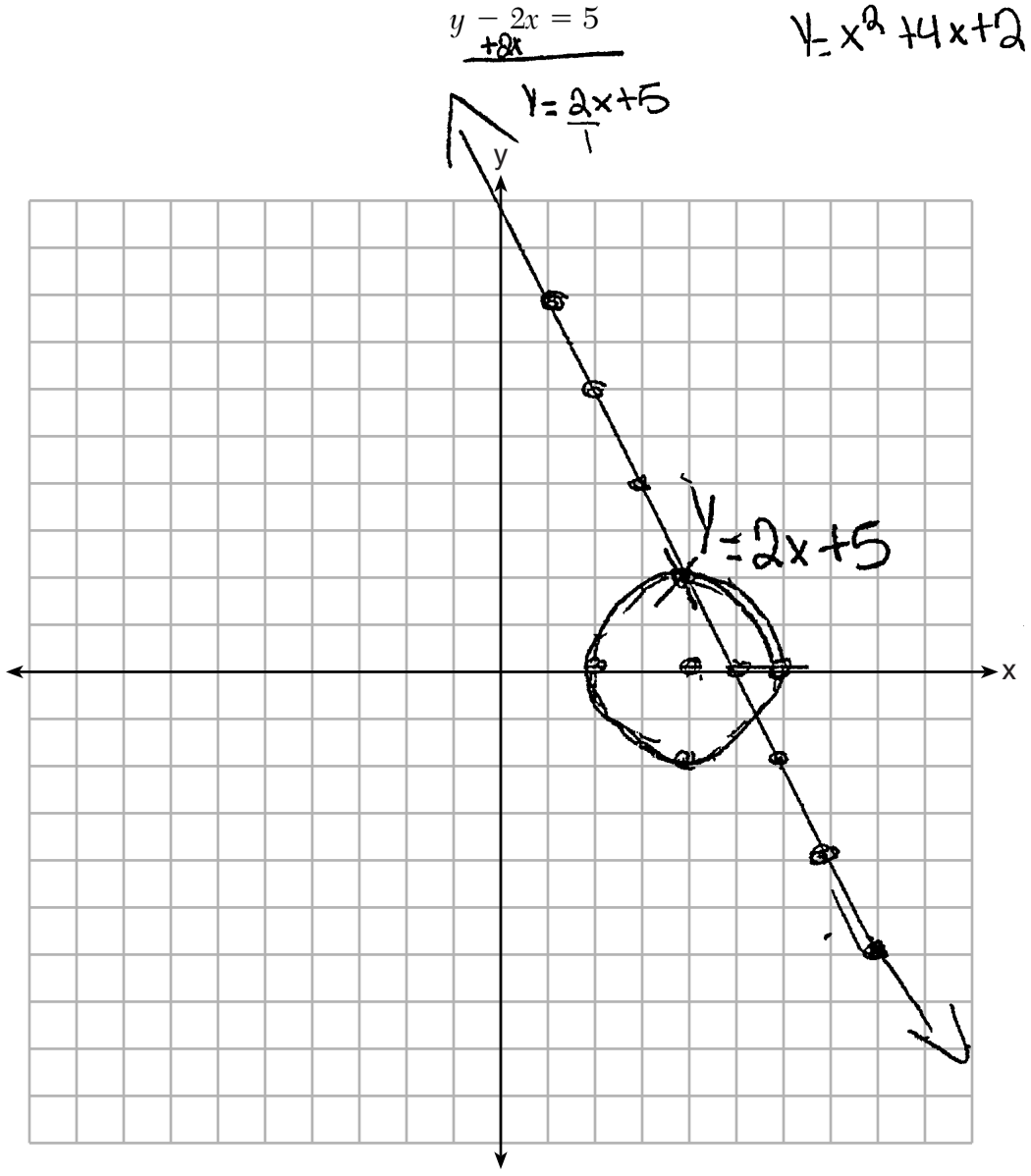
Score 1: The student only graphed the linear equation correctly.

Question 36

36 On the set of axes below, solve the following system of equations graphically and state the coordinates of all points in the solution.

$$y = x^2 + 4x + 2$$

$$y - 2x = 5$$



Score 0: The student did not show any work that was relevant to the problem.

Question 37

37 Given: Triangle RST has coordinates $R(-1,7)$, $S(3,-1)$, and $T(9,2)$

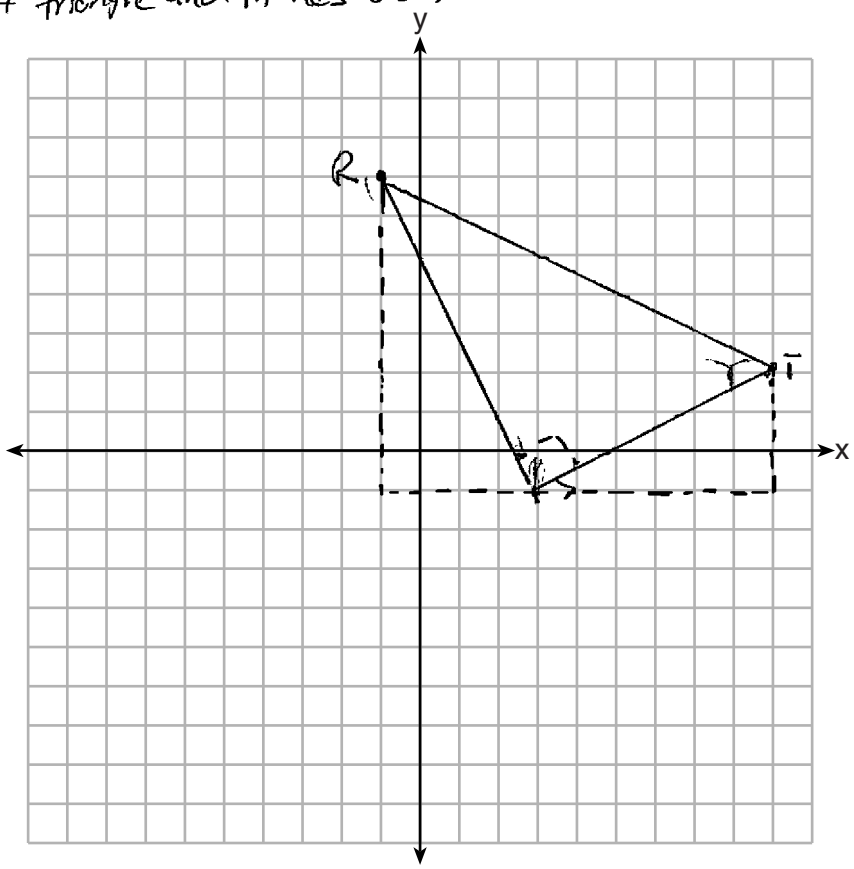
Prove: $\triangle RST$ is a right triangle

[The use of the set of axes below is optional.]

Slope $\overline{RS} = \frac{2}{1}$

Slope $\overline{ST} = \frac{3}{6} = \frac{1}{2}$

Lines RS and ST are perpendicular because they have negative reciprocal slopes of each other. Perpendicular lines can together form right angles therefore angle RST is a right angle, a triangle needs 1 right angle to be a right triangle and it has one.



Score 4: The student has a complete and correct response.

Question 37

37 Given: Triangle RST has coordinates $R(-1,7)$, $S(3,-1)$, and $T(9,2)$

Prove: $\triangle RST$ is a right triangle

[The use of the set of axes below is optional.]

1) Get side $\overline{RS}$ by doing Pythag therom $8^2+4^2=x^2$ $x=\sqrt{80}$

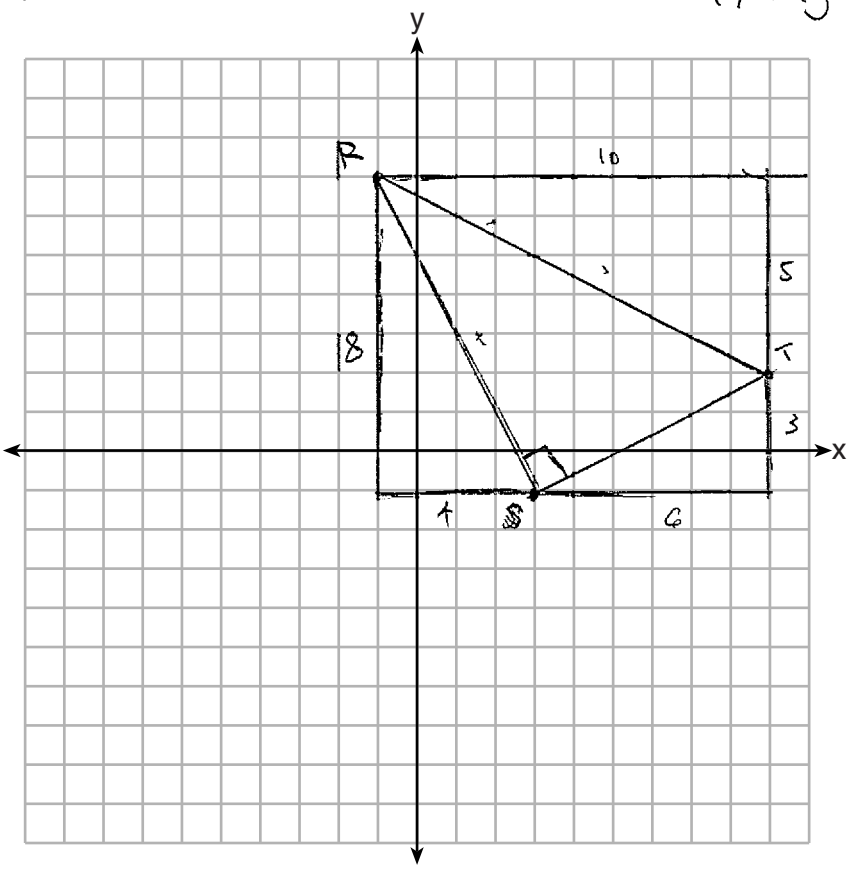
2) Get side $\overline{RT}$ by doing Pythag therom $10^2+5^2=x^2$ $x=\sqrt{125}$

3) Get side $\overline{ST}$ by doing Pythag therom $6^2+3^2=x^2$ $x=\sqrt{45}$

4) $\sqrt{45}^2+\sqrt{80}^2=\sqrt{125}^2$

5) $45+80=125$

6) ΔRST is a right Δ because it's sides worked in Pythag therom.



Score 4: The student has a complete and correct response.

Question 37

37 Given: Triangle RST has coordinates $R(-1,7)$, $S(3,-1)$, and $T(9,2)$

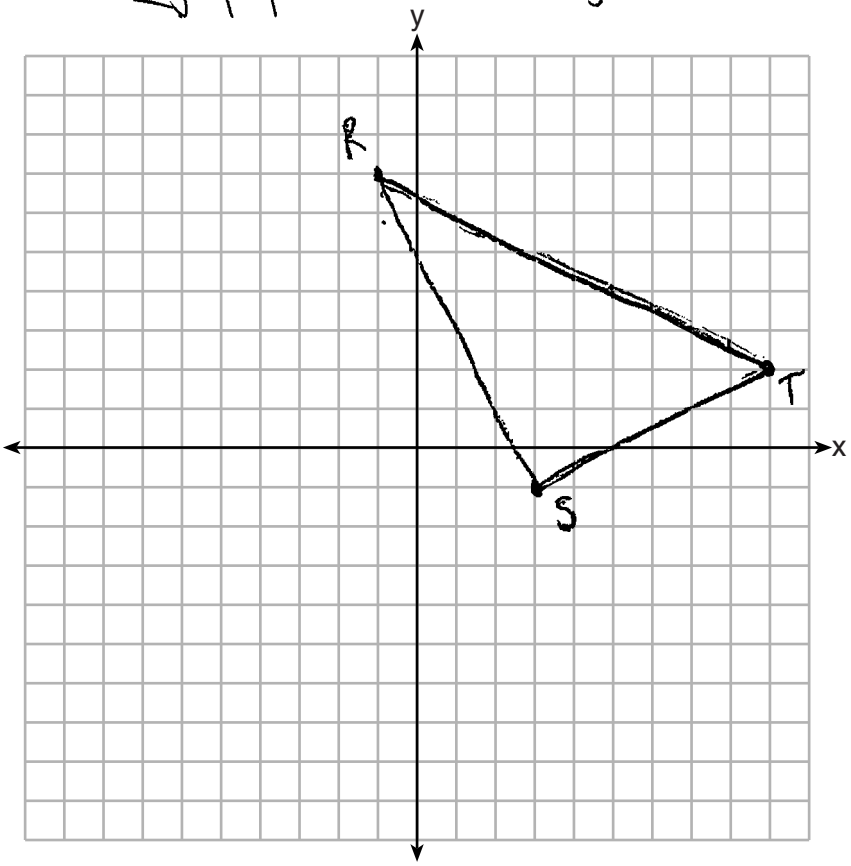
Prove: $\triangle RST$ is a right triangle

[The use of the set of axes below is optional.]

Slope of $\overline{ST} = \frac{\Delta y}{\Delta x} = \frac{2-(-1)}{9-3} = \frac{3}{6} = \frac{1}{2}$ $\overline{RS}$

Slope of $\overline{RS} = \frac{7-(-1)}{-1-3} = \frac{8}{-4} = -2$

m$\overline{RS}$ is the negative reciprocal of m$\overline{ST}$ so $\overline{RS}$ is perpendicular $\overline{ST}$ forming a 90° or right angle.



Score 3: The student wrote an incomplete concluding statement.

Question 37

37 Given: Triangle RST has coordinates $R(-1,7)$, $S(3,-1)$, and $T(9,2)$

Prove: $\triangle RST$ is a right triangle

[The use of the set of axes below is optional.]

$D = \sqrt{\Delta x^2 + \Delta y^2}$

$\overline{RT}(hyp.) = \sqrt{(-1-9)^2 + (7-2)^2}$

$\overline{RS} = \sqrt{(-1-3)^2 + (7+1)^2}$

$\overline{ST} = \sqrt{(3-9)^2 + (-1-2)^2}$

Distance Formula

$\overline{RT}(hyp.) = \sqrt{125}$

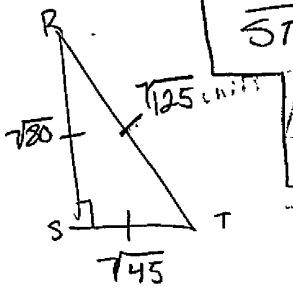
$\overline{RS} = \sqrt{80}$

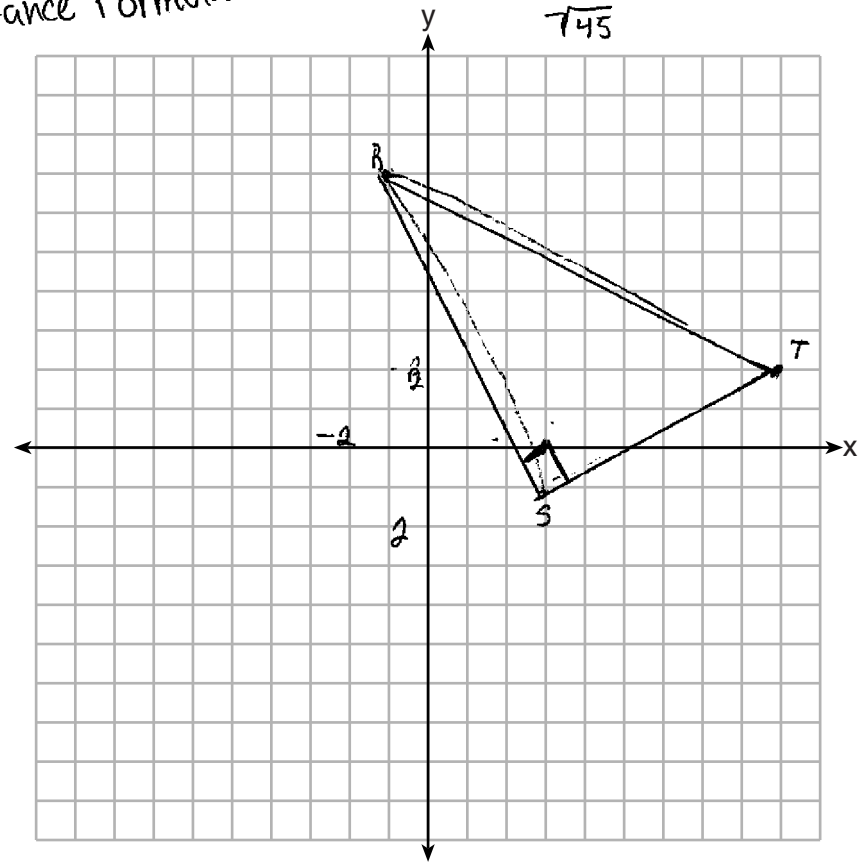
$\overline{ST} = \sqrt{45}$

$a^2 + b^2 = c^2$

$80 + 45 = 125$

The





Score 3: The student did not write a concluding statement.

Question 37

37 Given: Triangle RST has coordinates $R(-1,7)$, $S(3,-1)$, and $T(9,2)$

Prove: $\triangle RST$ is a right triangle

[The use of the set of axes below is optional.]

slope

$\overline{RS}$

$\frac{-1-7}{3+1}$

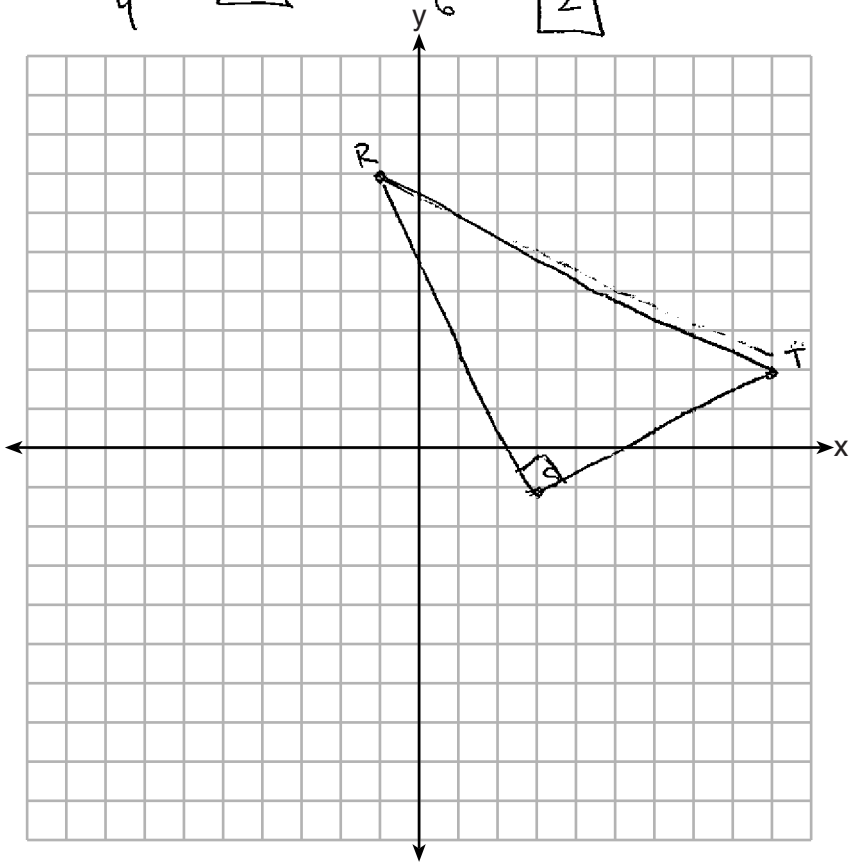
$\frac{-8}{4} = -2$

$\overline{ST}$

$\frac{2+1}{9-3}$

$\frac{3}{6} = \frac{1}{2}$

Line RS is perpendicular to Line ST because the slopes are neg reciprocals



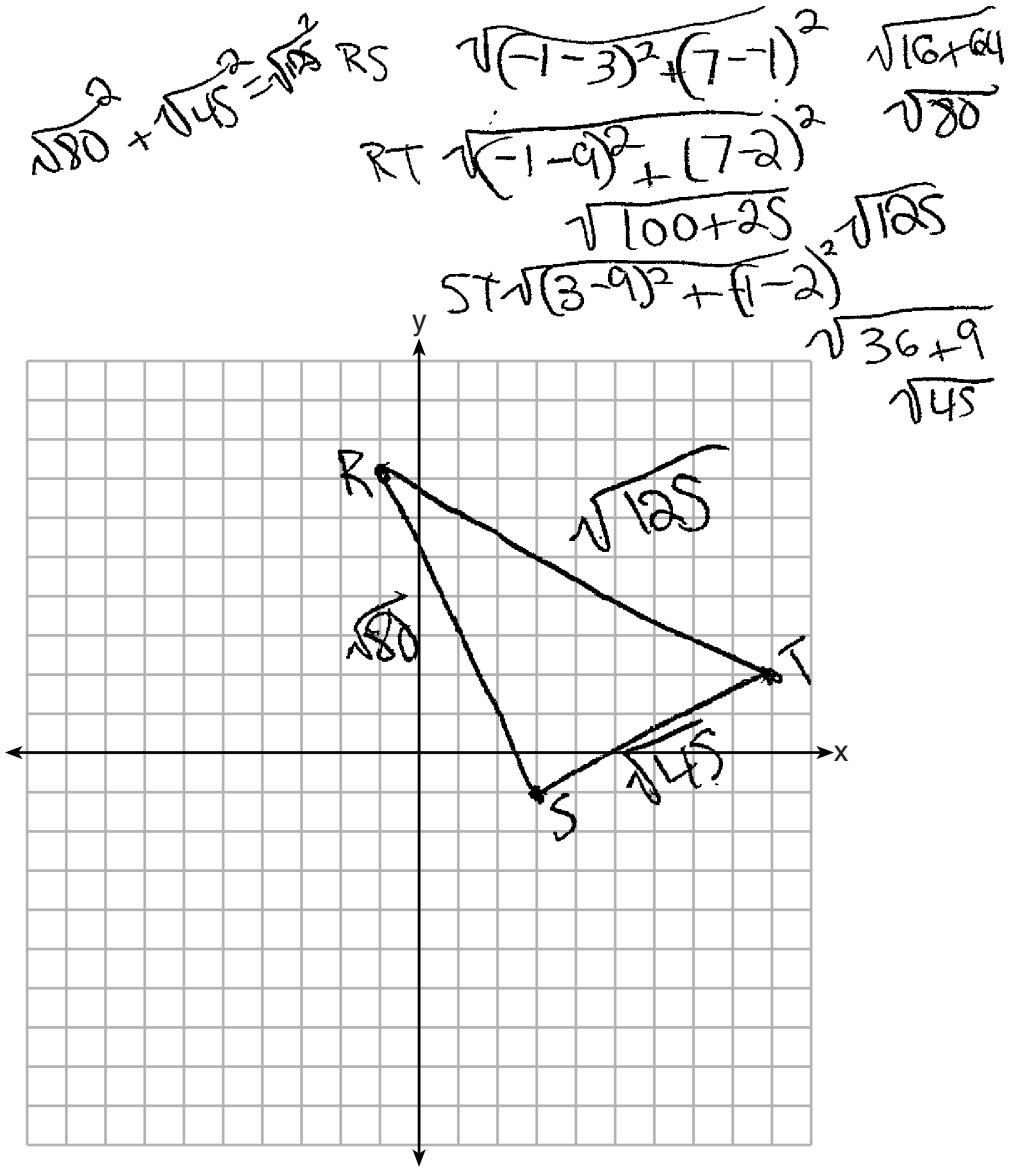
Score 2: The student proved $\overline{RS} \perp \overline{ST}$.

Question 37

37 Given: Triangle RST has coordinates $R(-1,7)$, $S(3,-1)$, and $T(9,2)$

Prove: $\triangle RST$ is a right triangle

[The use of the set of axes below is optional.]



Score 2: The student did not show that the Pythagorean Theorem was satisfied, and did not write a concluding statement.

Question 37

37 Given: Triangle RST has coordinates $R(-1,7)$, $S(3,-1)$, and $T(9,2)$

Prove: $\triangle RST$ is a right triangle

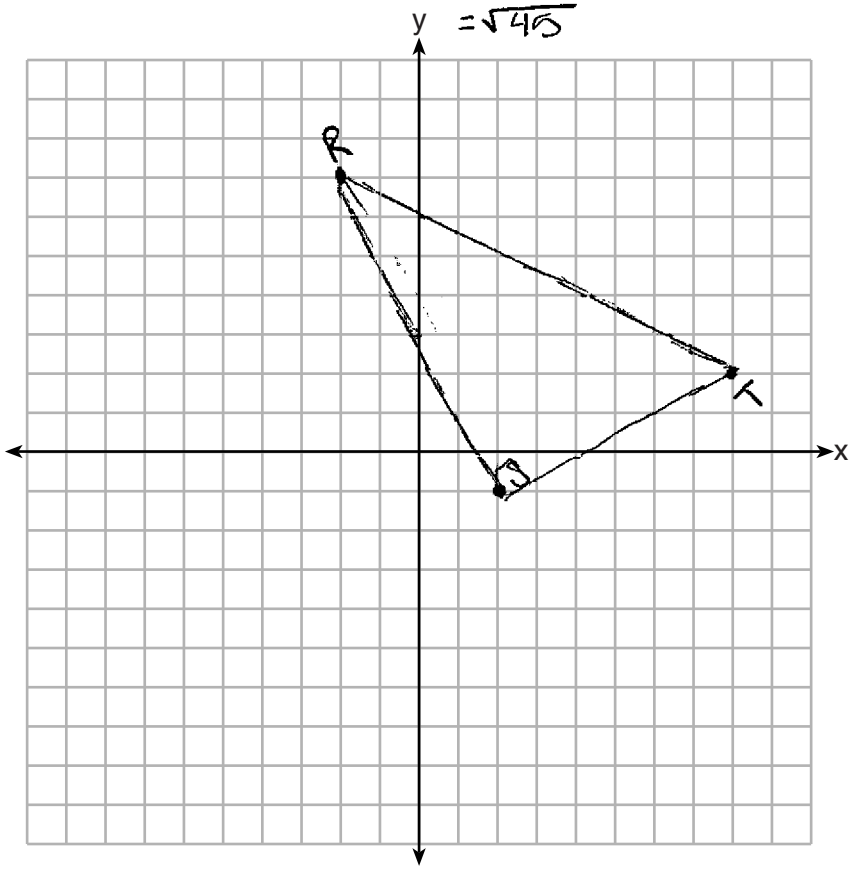
[The use of the set of axes below is optional.]

$d = \sqrt{(x_2-x_1)^2 + (y_2-y_1)^2}$

$dRS = \sqrt{(3--1)^2 + (-1-7)^2}$
$= \sqrt{(4)^2 + (-8)^2}$
$= \sqrt{16+64}$
$= \sqrt{80}$

$dRT = \sqrt{(9--1)^2 + (2-7)^2}$
$= \sqrt{(10)^2 + (-5)^2}$
$= \sqrt{100+25}$
$= \sqrt{125}$

$dST = \sqrt{(9-3)^2 + (2--1)^2}$
$= \sqrt{(6)^2 + (3)^2}$
$= \sqrt{36+9}$
$= \sqrt{45}$



Score 1: The student only found the lengths of all three sides.

Question 37

37 Given: Triangle RST has coordinates $R(-1,7)$, $S(3,-1)$, and $T(9,2)$

Prove: $\triangle RST$ is a right triangle

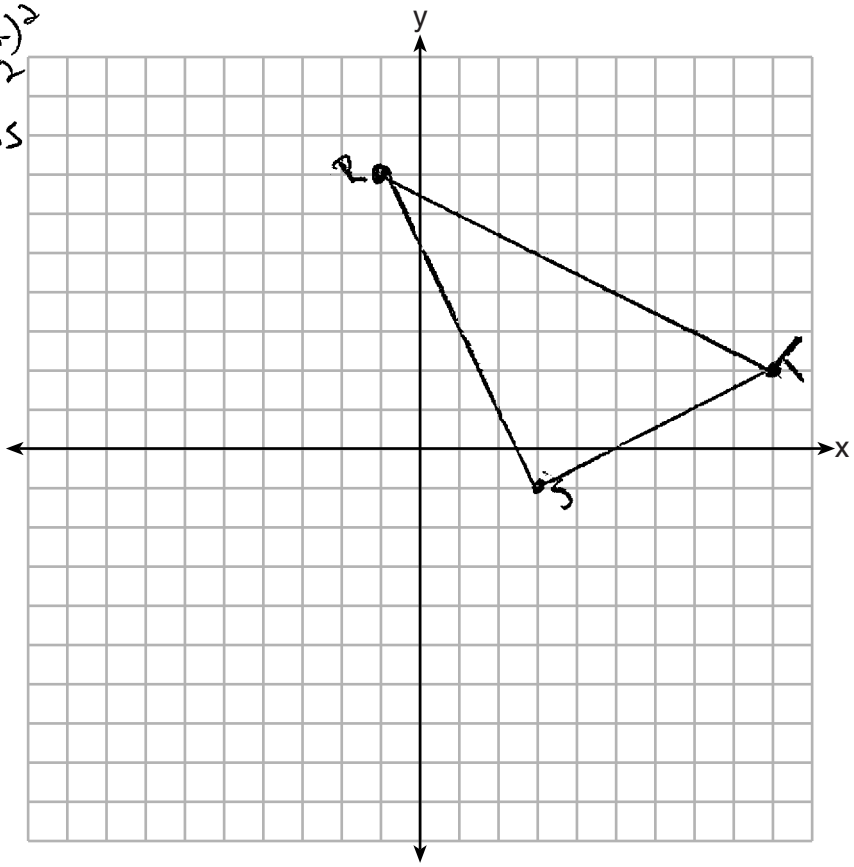
[The use of the set of axes below is optional.]

x y x y x y

RS $\sqrt{(-1-3)^2+(7--1)^2}=$
$(-4)^2+(8)^2$
$16+64=80$

SL $(3-9)^2+(-1-2)^2$
$(-6)^2+(-3)^2$
$36+9=45$

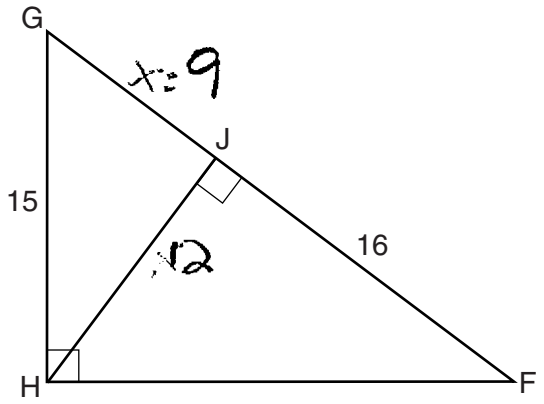
TR $(9--1)^2+(2-7)^2$
$(10)^2+(-5)^2$
$100+25=125$



Score 0: The student attempted to find the lengths of all three sides.

Question 38

38 In right triangle FGH shown below, $m\angle GHF = 90$, altitude $\overline{HJ}$ is drawn to $\overline{FG}$, $FJ = 16$, and $HG = 15$.



Determine and state the length of $\overline{JG}$. [Only an algebraic solution can receive full credit.]

WLLS

$\frac{16+x}{15} = \frac{15}{x}$

$16x + x^2 = 225$

$x^2 + 16x = 225$

$-225 = -225$

$x^2 + 16x - 225 = 0$

$(x+25)(x-9) = 0$

$x+25=0 \quad (x-9=0$

$-25=-25 \quad +9=+9$

$x=-25 \quad x=9$

rej

-225

$1 \cdot 225$

$3 \cdot 75$

$5 \cdot 45$

$9 \cdot 25$

$\overline{JG} = 9$

Determine and state the length of $\overline{HJ}$. [Only an algebraic solution can receive full credit.]

$c^2 = a^2 + b^2$

$15^2 = 9^2 + x^2$

$225 = 81 + x^2$

$-81 = -81$

$\sqrt{144} = \sqrt{x^2}$

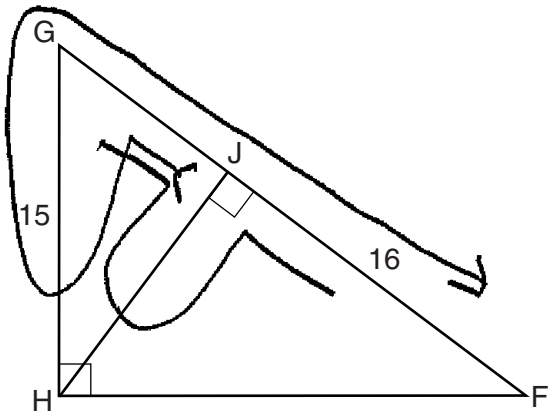
$12 = x$

$\overline{HJ} = 12$

Score 6: The student has a complete and correct response.

Question 38

38 In right triangle FGH shown below, $m\angle GHF = 90$, altitude $\overline{HJ}$ is drawn to $\overline{FG}$, $FJ = 16$, and $HG = 15$.



Determine and state the length of $\overline{JG}$. [Only an algebraic solution can receive full credit.]

$\frac{x}{15} \times \frac{15}{16+x}$ $16x + x^2 = 225$

$x^2 + 16x - 225 = 0$

$(x+25)(x-9) = 0$

$x = 9$

$GJ = 9$

$\frac{9}{15} = \frac{15}{16+9}$ $16+9$ 25 15×15 $(9) = 225$

Determine and state the length of $\overline{HJ}$. [Only an algebraic solution can receive full credit.]

$\frac{16}{x} \times \frac{x}{9}$ $x^2 = 144$

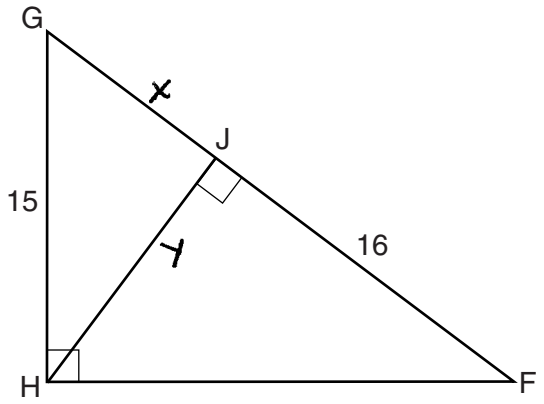
$\sqrt{144} = 12$ $x = 12$

$HJ = 12$

Score 6: The student has a complete and correct response.

Question 38

38 In right triangle FGH shown below, $m\angle GHF = 90$, altitude $\overline{HJ}$ is drawn to $\overline{FG}$, $FJ = 16$, and $HG = 15$.



Determine and state the length of $\overline{JG}$. [Only an algebraic solution can receive full credit.]

$\frac{x+16}{15} = \frac{15}{x}$

$x^2 + 16x = 225$

$x^2 + 16x - 225 = 0$

$(x-9)(x+25) = 0$

$x = 9$ $\quad x = -25$

Determine and state the length of $\overline{HJ}$. [Only an algebraic solution can receive full credit.]

$\frac{16}{y} = \frac{y}{9}$

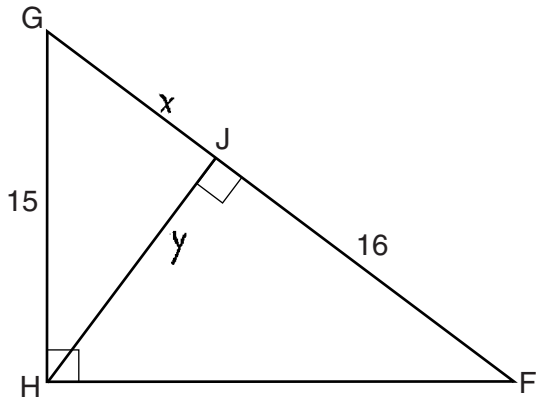
$y^2 = 154$

$y = \sqrt{154}$

Score 5: The student made a multiplication error.

Question 38

38 In right triangle FGH shown below, $m\angle GHF = 90$, altitude $\overline{HJ}$ is drawn to $\overline{FG}$, $FJ = 16$, and $HG = 15$.



Determine and state the length of $\overline{JG}$. [Only an algebraic solution can receive full credit.]

$\frac{x}{15} = \frac{15}{x+16}$

$x(x+16) = 15^2$

$x^2 + 16x = 225$

$-225 \quad -225$

$x^2 + 16x - 225 = 0$

$(x+25)(x-9) = 0$

$x+25=0 \quad x-9=0$

$-25 \quad -25 \quad +9 \quad +9$

$x = -25 \quad x = 9$

$\overline{JG} = 9$

Determine and state the length of $\overline{HJ}$. [Only an algebraic solution can receive full credit.]

$\frac{9}{y} = \frac{y}{15}$

$\sqrt{y^2} = \sqrt{135}$

$y = \sqrt{135}$

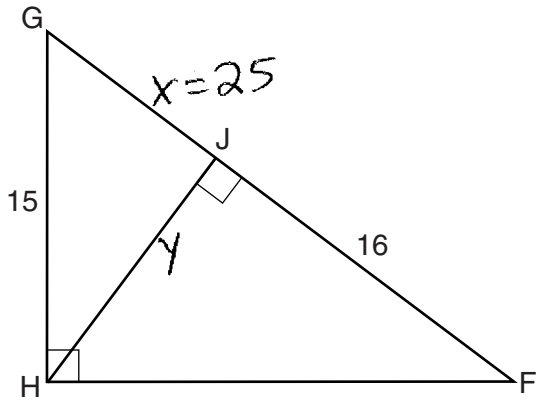
$y = 3\sqrt{15}$

$\overline{HJ} = 3\sqrt{15}$

Score 4: The student found the length of $\overline{JG}$, but no further correct work was shown.

Question 38

38 In right triangle FGH shown below, $m\angle GHF = 90$, altitude $\overline{HJ}$ is drawn to $\overline{FG}$, $FJ = 16$, and $HG = 15$.



Determine and state the length of $\overline{JG}$. [Only an algebraic solution can receive full credit.]

$$\frac{x+16}{15} = \frac{15}{x}$$

$$x^2 + 16x = 225$$

$$x^2 + 16x - 225 = 0$$

$$(x-25)(x+9) = 0$$

$x = 25 \quad | \quad x = -9$

Determine and state the length of $\overline{HJ}$. [Only an algebraic solution can receive full credit.]

$$25^2 = 15^2 + y^2$$

$$625 = 225 + y^2$$

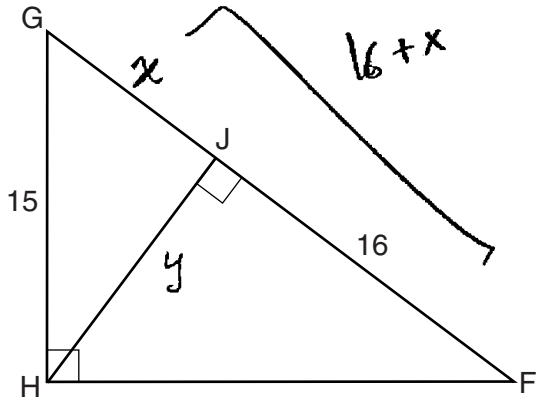
$$400 = y^2$$

$$y = 20$$

Score 3: The student made one factoring error when finding JG, and substituted into the Pythagorean Theorem incorrectly.

Question 38

38 In right triangle FGH shown below, $m\angle GHF = 90$, altitude $\overline{HJ}$ is drawn to $\overline{FG}$, $FJ = 16$, and $HG = 15$.



Determine and state the length of $\overline{JG}$. [Only an algebraic solution can receive full credit.]

$$\frac{16+x}{15} = \frac{15}{x}$$

$$225 = 16x + x^2$$

$$-x^2 - 16x + 225 = 0.$$

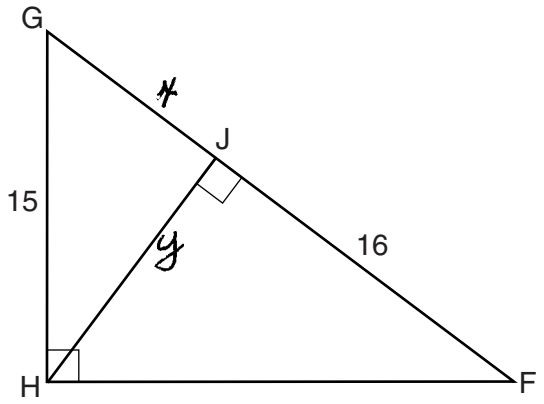
Determine and state the length of $\overline{HJ}$. [Only an algebraic solution can receive full credit.]

$$\frac{x}{y} = \frac{y}{16}$$

Score 3: The student wrote a correct quadratic equation for JG and a correct proportion for HJ.

Question 38

38 In right triangle FGH shown below, $m\angle GHF = 90$, altitude $\overline{HJ}$ is drawn to $\overline{FG}$, $FJ = 16$, and $HG = 15$.



Determine and state the length of $\overline{JG}$. [Only an algebraic solution can receive full credit.]

$$\frac{x+16}{15} = \frac{15}{x}$$

Determine and state the length of $\overline{HJ}$. [Only an algebraic solution can receive full credit.]

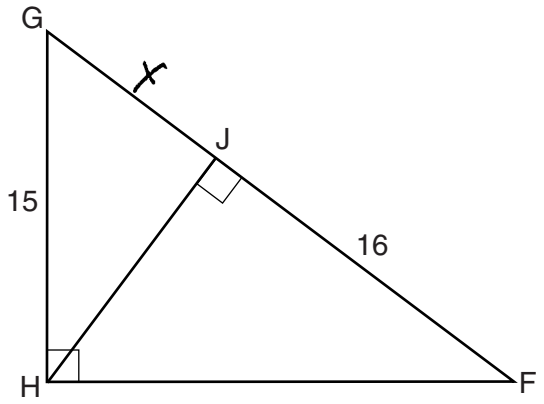
$$\frac{x}{y} = \frac{y}{16}$$

$$y^2 = 16x$$

Score 2: The student wrote correct proportions for both JG and HJ.

Question 38

38 In right triangle FGH shown below, $m\angle GHF = 90$, altitude $\overline{HJ}$ is drawn to $\overline{FG}$, $FJ = 16$, and $HG = 15$.



Determine and state the length of $\overline{JG}$. [Only an algebraic solution can receive full credit.]

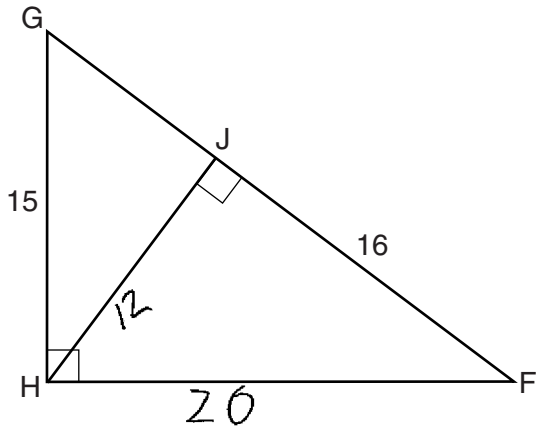
$$\frac{x}{15} = \frac{15}{x+16}$$

Determine and state the length of $\overline{HJ}$. [Only an algebraic solution can receive full credit.]

Score 1: The student wrote a correct proportion to find JG.

Question 38

38 In right triangle FGH shown below, $m\angle GHF = 90$, altitude $\overline{HJ}$ is drawn to $\overline{FG}$, $FJ = 16$, and $HG = 15$.



Determine and state the length of $\overline{JG}$. [Only an algebraic solution can receive full credit.]

3x5=15

3x3= 9

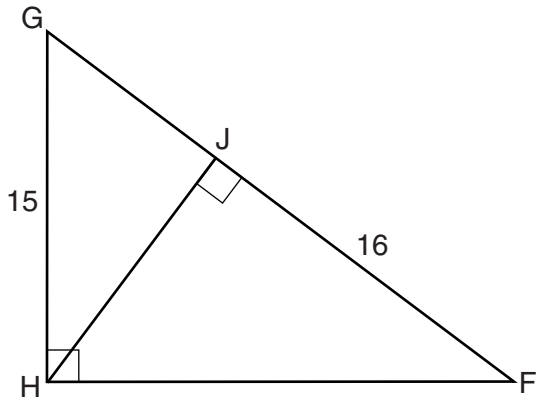
Determine and state the length of $\overline{HJ}$. [Only an algebraic solution can receive full credit.]

4x3=12

Score 1: The student did not show sufficient work for 9 and 12.

Question 38

38 In right triangle FGH shown below, $m\angle GHF = 90$, altitude $\overline{HJ}$ is drawn to $\overline{FG}$, $FJ = 16$, and $HG = 15$.



Determine and state the length of $\overline{JG}$. [Only an algebraic solution can receive full credit.]

$$\frac{16}{x} = \frac{x}{15}$$

$$\sqrt{x^2} = \sqrt{240}$$

$$x = 4\sqrt{15}$$

Determine and state the length of $\overline{HJ}$. [Only an algebraic solution can receive full credit.]

Score 0: The student's work was completely incorrect.