The University of the State of New York

REGENTS HIGH SCHOOL EXAMINATION

GEOMETRY

Wednesday, January 29, 2014 — 9:15 a.m.

SAMPLE RESPONSE SET

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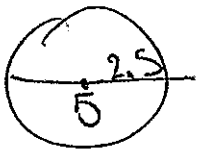
Question 29

29 The diameter of a sphere is 5 inches. Determine and state the surface area of the sphere, to the *nearest hundredth of a square inch*.



$SA = 4\pi r^2$

$= 4\pi(2.5)^2$

$= 4\pi(6.25)$

$= 25\pi$

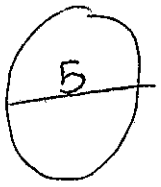
$= 78.539816334$

$SA = 78.54 \text{ in}^2$

Score 2: The student has a complete and correct response. Note: Labeling "in^2" was not required.

Question 29

29 The diameter of a sphere is 5 inches. Determine and state the surface area of the sphere, to the *nearest hundredth of a square inch*.



$SA_{sphere} = 4\pi r^2$

$SA = 4\pi(2.5)^2$

$SA = 4\pi(6.25)$

$SA = 4(19.63495408)$

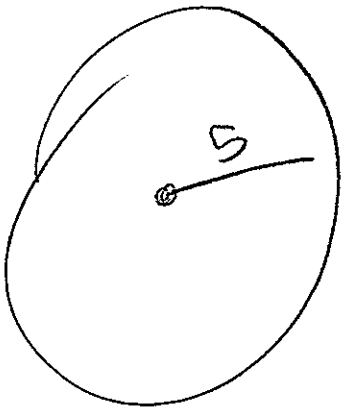
$SA = 78.53981634$

$SA \approx 79 \text{ inches}^2$

Score 1: The student made a rounding error.

Question 29

29 The diameter of a sphere is 5 inches. Determine and state the surface area of the sphere, to the *nearest hundredth of a square inch*.



$SA = 4\pi r^2$

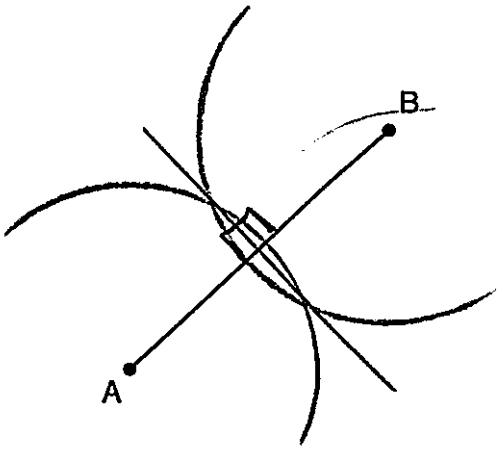
$4\pi(5)^2$

$314.15 in^2$

Score 0: The student made a conceptual error by using 5 as the radius and a rounding error.

Question 30

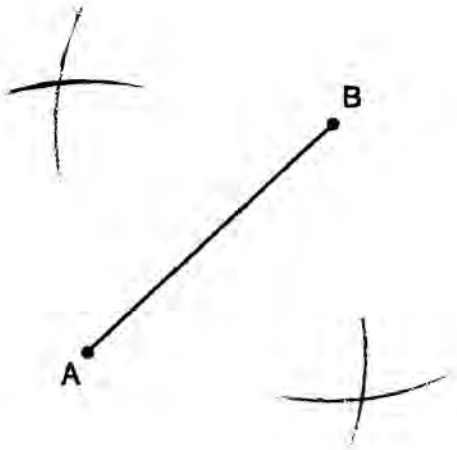
30 Using a compass and straightedge, construct the perpendicular bisector of $\overline{AB}$.
[Leave all construction marks.]



Score 2: The student has a correct construction. Note: The right angle symbols were not required.

Question 30

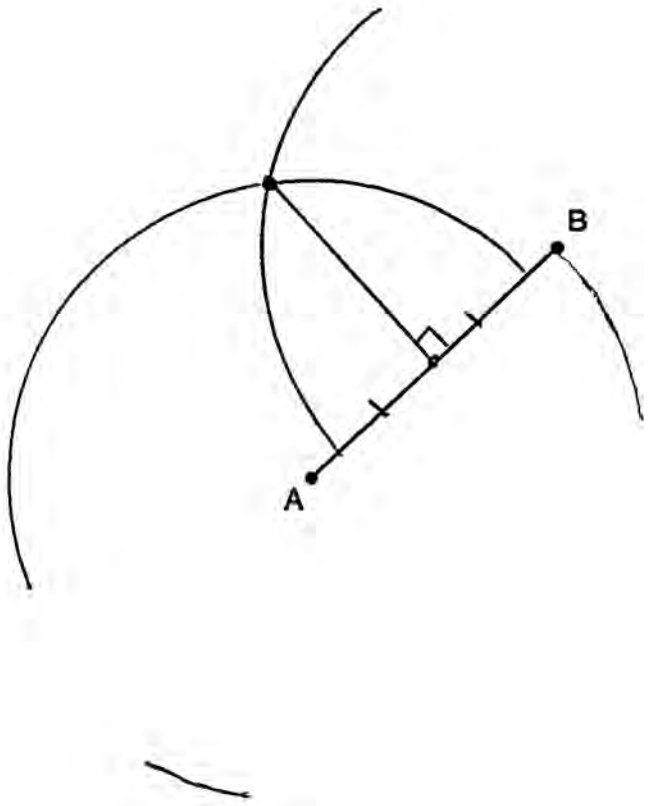
30 Using a compass and straightedge, construct the perpendicular bisector of $\overline{AB}$.
[Leave all construction marks.]



Score 1: The student has correct construction arcs, but did not draw the perpendicular bisector.

Question 30

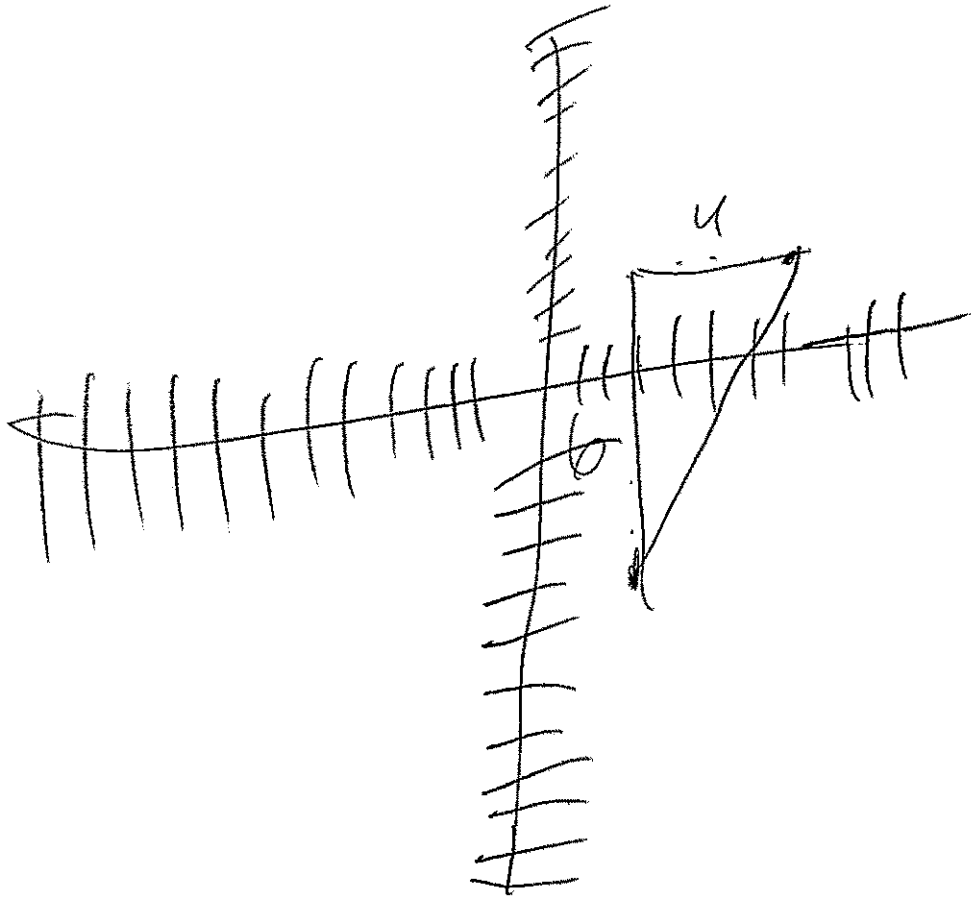
30 Using a compass and straightedge, construct the perpendicular bisector of $\overline{AB}$.
[Leave all construction marks.]



Score 0: The student did not construct two pairs of intersecting arcs.

Question 31

31 The endpoints of $\overline{AB}$ are $A(3,-4)$ and $B(7,2)$. Determine and state the length of $\overline{AB}$ in simplest radical form.



$52 = x^2$

$\sqrt{52}$

$2\sqrt{13}$

Score 2: The student has a complete and correct response. The student graphed $\overline{AB}$, drew a right triangle, and applied the Pythagorean Theorem.

Question 31

31 The endpoints of $\overline{AB}$ are $A(3,-4)$ and $B(7,2)$. Determine and state the length of $\overline{AB}$ in simplest radical form.

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

$d = \sqrt{(7-3)^2 + (2+4)^2}$

$d = \sqrt{4^2 + 6^2}$

$d = \sqrt{16 + 36}$

$d = \sqrt{52}$

$d = 7\sqrt{3}$

$\boxed{d = 2\sqrt{6}}$

Score 1: The student showed correct work to find $\sqrt{52}$, but no further correct work is shown.

Question 31

31 The endpoints of $\overline{AB}$ are $A(3,-4)$ and $B(7,2)$. Determine and state the length of $\overline{AB}$ in simplest radical form.

$\sqrt{(3+7)^2+(-4+2)^2} = AB^2$

$\sqrt{100+4} = AB^2$

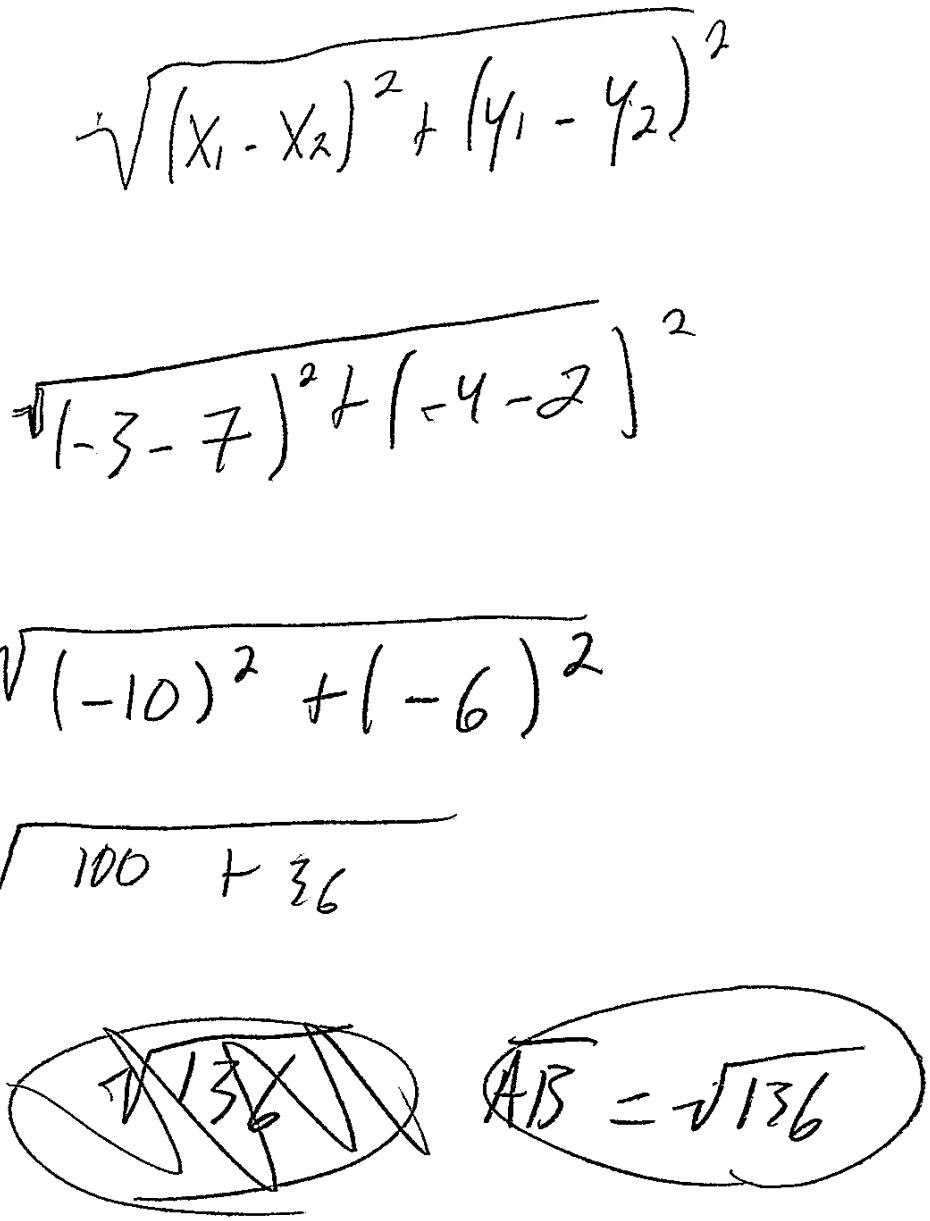
$\sqrt{104} = AB^2$

$2\sqrt{26} = AB$

Score 1: The student made a conceptual error in using the formula for length of a segment. The student's answer was simplified correctly.

Question 31

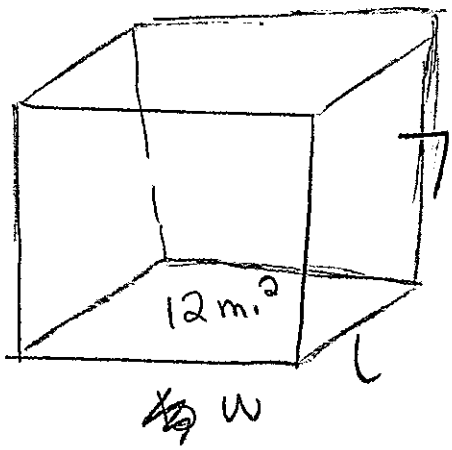
31 The endpoints of $\overline{AB}$ are $A(3,-4)$ and $B(7,2)$. Determine and state the length of $\overline{AB}$ in simplest radical form.



Score 0: The student made an error in substituting into the distance formula and did not simplify the answer.

Question 32

32 A right prism has a square base with an area of 12 square meters. The volume of the prism is 84 cubic meters. Determine and state the height of the prism, in meters.



7 meters

84/12=7

12·1
2·6
3·4

Score 2: The student has a complete and correct response. Note: Labeling "meters" was not required.

Question 32

32 A right prism has a square base with an area of 12 square meters. The volume of the prism is 84 cubic meters. Determine and state the height of the prism, in meters.

$V = Bh$

$\frac{84}{12} = \frac{12h}{12}$

$7 = h$

height = 7 m.²

Score 1: The student showed correct work, but labeled the answer with incorrect units.

Question 32

32 A right prism has a square base with an area of 12 square meters. The volume of the prism is 84 cubic meters. Determine and state the height of the prism, in meters.

$12m^2 + 84m^3 = 96m^5$

Score 0: The student work is completely incorrect.

Question 33

33 State whether the lines represented by the equations $y = \frac{1}{2}x - 1$ and $y + 4 = -\frac{1}{2}(x - 2)$ are parallel, perpendicular, or neither.

Explain your answer.

$y = \frac{1}{2}x - 1$

$y + 4 = -\frac{1}{2}(x - 2)$

$y + 4 = -\frac{1}{2}x + 1$

$-4 \quad -4$

$y = -\frac{1}{2}x - 3$

They are neither because they do not have the same slope which would make them parallel, and they do not have negative reciprocle slopes which would make them perpendicular.

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

Question 33

33 State whether the lines represented by the equations $y = \frac{1}{2}x - 1$ and $y + 4 = -\frac{1}{2}(x - 2)$ are parallel, perpendicular, or neither.

Explain your answer.

$y = \frac{1}{2}x - 1$

$m = \frac{1}{2}$

$y + 4 = -\frac{1}{2}(x - 2)$

$y + 4 = -\frac{1}{2}x + 1$

$-4 \quad -4 \quad -4$

$y = -4.5x - 3$

$m = -4.5$

Neither because their slopes aren't the same or negative reciprocals of each other.

Score 1: The student made a conceptual error in solving the second equation for y. An appropriate determination and justification were written.

Question 33

33 State whether the lines represented by the equations $y = \frac{1}{2}x - 1$ and $y + 4 = -\frac{1}{2}(x - 2)$ are parallel, perpendicular, or neither.
Explain your answer.

$Y+4=-\frac{1}{2}(X-2)$
$-4 \qquad\qquad -4$

$Y=\frac{1}{2}(X-6$

$Y=\frac{1}{2}x-6 \neq Y=\frac{1}{2}x-1$

nether because they have different Y- intercepts

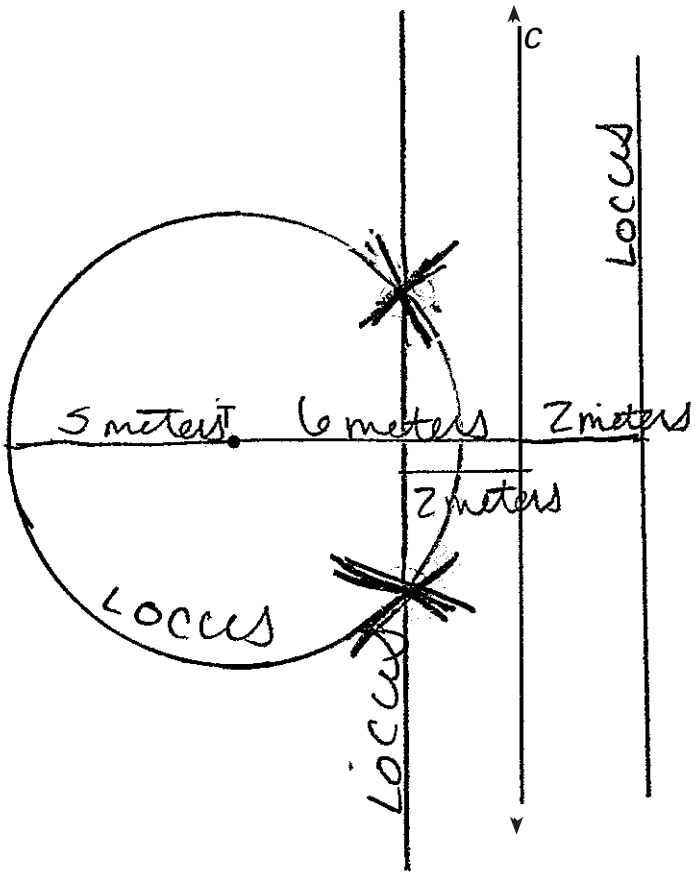
Score 0: The student wrote "neither," but the work and justification are completely incorrect.

Question 34

34 A tree, T, is 6 meters from a row of corn, c, as represented in the diagram below. A farmer wants to place a scarecrow 2 meters from the row of corn and also 5 meters from the tree.

Sketch both loci.

Indicate, with an **X**, all possible locations for the scarecrow.



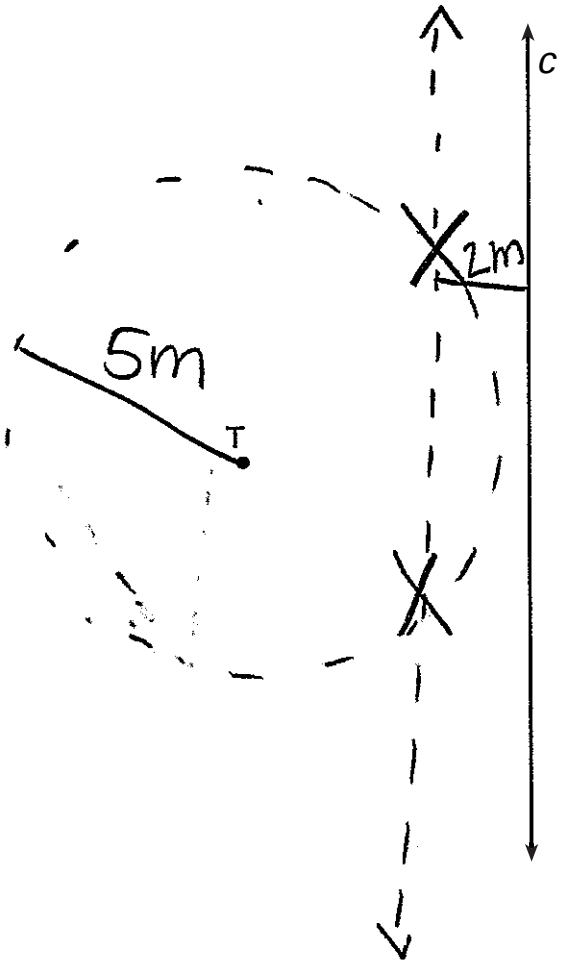
Score 2: The student sketched both loci correctly and labeled both locations with an X.

Question 34

34 A tree, T, is 6 meters from a row of corn, c, as represented in the diagram below. A farmer wants to place a scarecrow 2 meters from the row of corn and also 5 meters from the tree.

Sketch both loci.

Indicate, with an **X**, all possible locations for the scarecrow.



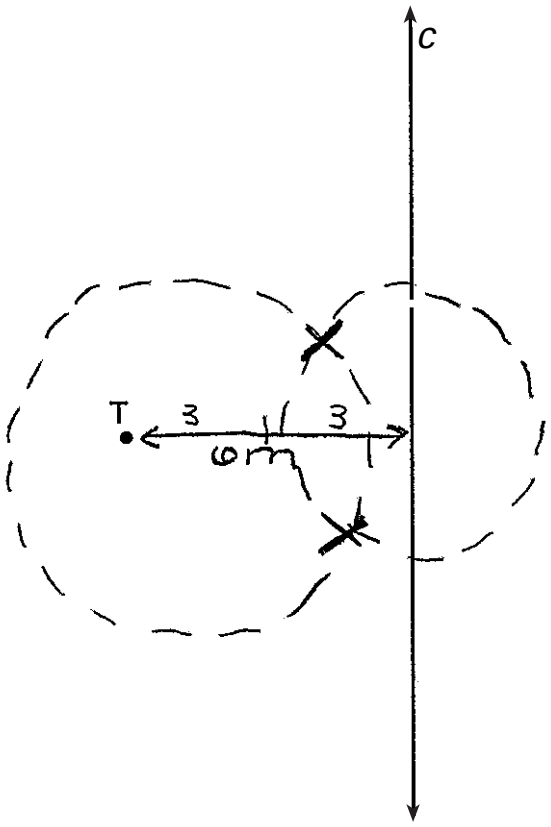
Score 1: The student made a conceptual error and drew only one line parallel to the row of corn, but labeled appropriate points with an X.

Question 34

34 A tree, T, is 6 meters from a row of corn, c, as represented in the diagram below. A farmer wants to place a scarecrow 2 meters from the row of corn and also 5 meters from the tree.

Sketch both loci.

Indicate, with an **X**, all possible locations for the scarecrow.



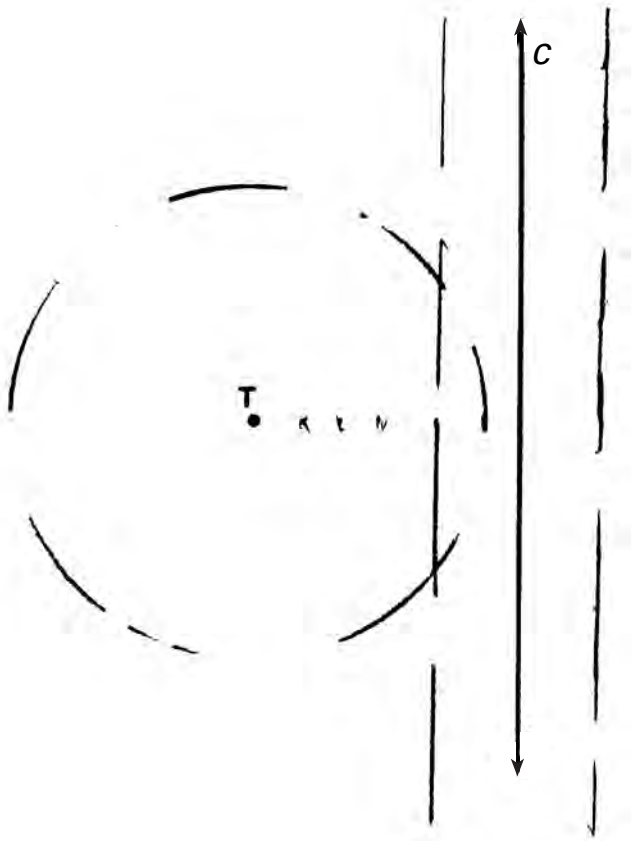
Score 1: The student made a conceptual error in drawing one locus, but labeled appropriate points X.

Question 34

34 A tree, T, is 6 meters from a row of corn, c, as represented in the diagram below. A farmer wants to place a scarecrow 2 meters from the row of corn and also 5 meters from the tree.

Sketch both loci.

Indicate, with an **X**, all possible locations for the scarecrow.



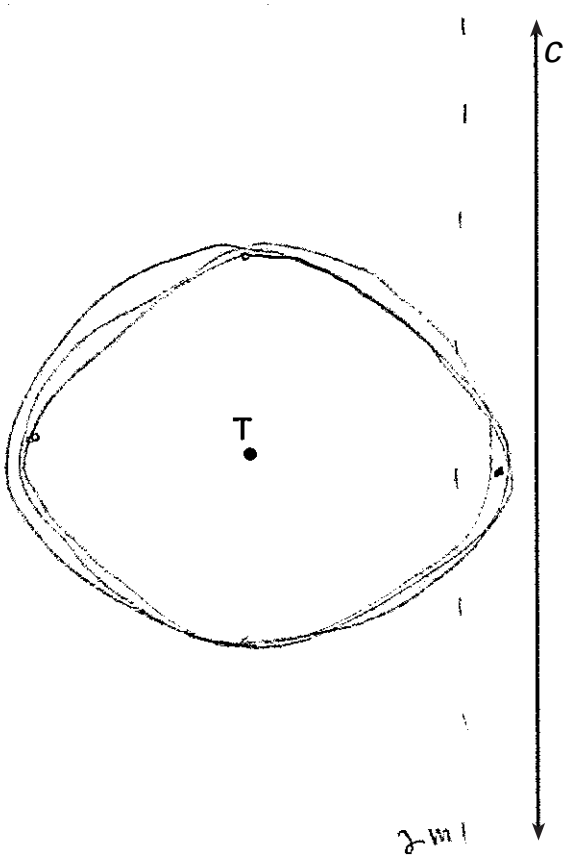
Score 1: The student sketched both loci correctly, but the locations are not labeled with an X.

Question 34

34 A tree, *T*, is 6 meters from a row of corn, *c*, as represented in the diagram below. A farmer wants to place a scarecrow 2 meters from the row of corn and also 5 meters from the tree.

Sketch both loci.

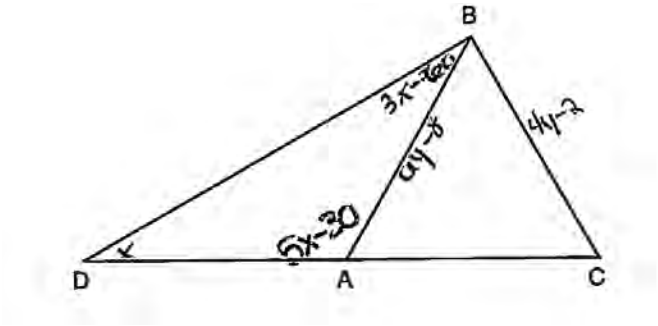
Indicate, with an **X**, all possible locations for the scarecrow.



Score 0: The student sketched only one locus correctly and made a conceptual error in sketching the second locus. Appropriate points are not labeled with an X.

Question 35

35 In the diagram of $\triangle BCD$ shown below, $\overline{BA}$ is drawn from vertex B to point A on $\overline{DC}$, such that $\overline{BC} \cong \overline{BA}$.



In $\triangle DAB$, $m\angle D = x$, $m\angle DAB = 5x - 30$, and $m\angle DBA = 3x - 60$. In $\triangle ABC$, $AB = 6y - 8$ and $BC = 4y - 2$. [Only algebraic solutions can receive full credit.]

Find $m\angle D$.

$x + 3x - 60 + 5x - 30 = 180$
$9x - 90 = 180$
$+90 \quad +90$
$\frac{9x}{9} = \frac{270}{9}$
$x = 30°$

Find $m\angle BAC$.

$5x - 30 = \angle BAD$
$5(30) - 30 = \angle BAD$
$150 - 30$

$180 - 120 = 60°$

Find the length of $\overline{BC}$.

$6y - 8 = 4y - 2$
$+8 \quad +8$
$6y = 4y + 6$
$-4y \quad -4y$
$\frac{2y}{2} = \frac{6}{2} \quad y = 3$

$\overline{BC} = 4y - 2$
$BC = 4(3) - 2$
$\overline{BC} = 12 - 2$
$\overline{BC} = 10$

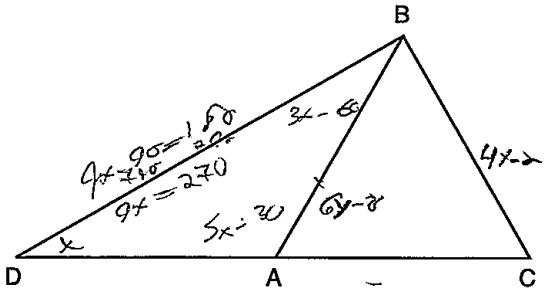
Find the length of $\overline{DC}$.

20

Score 4: The student has a complete and correct response. The student wrote and solved correct equations to find $x = 30$ and $y = 3$. The four correct answers are stated.

Question 35

35 In the diagram of $\triangle BCD$ shown below, $\overline{BA}$ is drawn from vertex B to point A on $\overline{DC}$, such that $\overline{BC} \cong \overline{BA}$.



$6x - 8 = 4x - 2$
$+4x \quad +8 \quad -4x \quad +8$
$\frac{2x}{2} = \frac{6}{2}$
$x = 3$

In $\triangle DAB$, $m\angle D = x$, $m\angle DAB = 5x - 30$, and $m\angle DBA = 3x - 60$. In $\triangle ABC$, $AB = 6y - 8$ and $BC = 4y - 2$. [Only algebraic solutions can receive full credit.]

Find $m\angle D$.

$m\angle D = 30$

Find $m\angle BAC$.

$\angle BAC = 60$

Find the length of $\overline{BC}$.

16

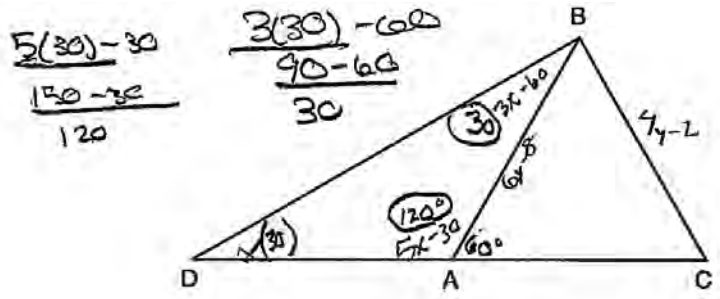
Find the length of $\overline{DC}$.

30

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

Question 35

35 In the diagram of $\triangle BCD$ shown below, $\overline{BA}$ is drawn from vertex B to point A on $\overline{DC}$, such that $\overline{BC} \cong \overline{BA}$.



In $\triangle DAB$, $m\angle D = x$, $m\angle DAB = 5x - 30$, and $m\angle DBA = 3x - 60$. In $\triangle ABC$, $AB = 6y - 8$ and $BC = 4y - 2$. [Only algebraic solutions can receive full credit.]

Find $m\angle D$.

30°

$x + 5x - 30 + 3x - 60 = 180$

$9x - 90 = 180$

$+90 \quad +90$

$9x = 270$

$x = 30$

Find $m\angle BAC$.

60°

Find the length of $\overline{BC}$.

10

$6y - 8 = 4y - 2$

$-4y \quad -4y$

$2y - 8 = -2$

$+8 \quad +8$

$2y = 6$

$y = 3$

$4(3) - 2$

$12 - 2$

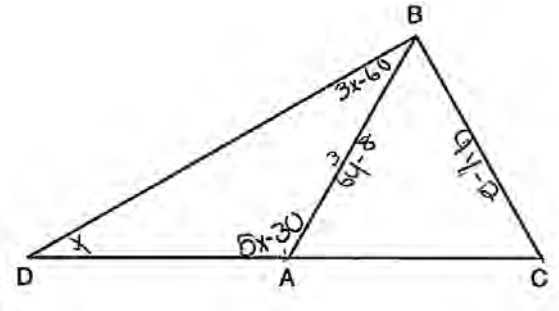
10

Find the length of $\overline{DC}$.

Score 3: The student showed correct work to find 30, 60, and 10. The length of $\overline{DC}$ is not stated.

Question 35

35 In the diagram of $\triangle BCD$ shown below, $\overline{BA}$ is drawn from vertex B to point A on $\overline{DC}$, such that $\overline{BC} \cong \overline{BA}$.



In $\triangle DAB$, $m\angle D = x$, $m\angle DAB = 5x - 30$, and $m\angle DBA = 3x - 60$. In $\triangle ABC$, $AB = 6y - 8$ and $BC = 4y - 2$. [Only algebraic solutions can receive full credit.]

Find $m\angle D$.

$x + 5x - 30 + 3x - 60 = 180$

$9x - 90 = 180$

$+90 \quad +90$

$\frac{9x}{9} = \frac{270}{9}$ → $x = 30$

$m\angle D = 30$

Find $m\angle BAC$.

$5x - 30 + x = 180$

$6x - 30 = 180$

$+30 \quad +30$

$\frac{6x}{6} = \frac{210}{6}$

$x = 35$

$m\angle BAC = 35$

Find the length of $\overline{BC}$.

$6y - 8 = 4y - 2$

$-4y \quad -4y$

$2y - 8 = -2$

$+8 \quad +8$

$2y = 6$

$\frac{2y}{2} = \frac{6}{2}$

$y = 3$

$BC = 4(3) - 2$

$= 12 - 2$

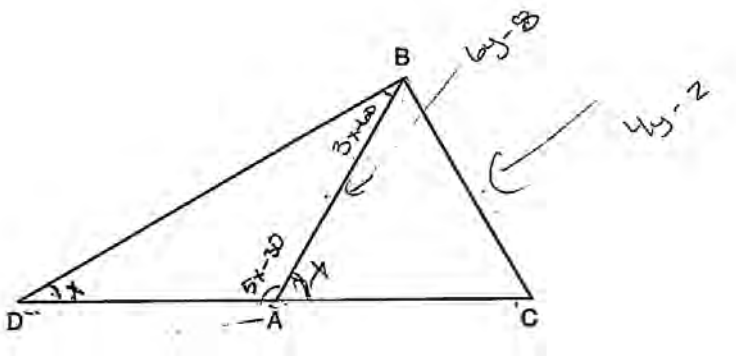
$BC = 10$

Find the length of $\overline{DC}$.

Score 2: The student showed correct work to find 30 and 10. No further correct work is shown.

Question 35

35 In the diagram of $\triangle BCD$ shown below, $\overline{BA}$ is drawn from vertex B to point A on $\overline{DC}$, such that $\overline{BC} \cong \overline{BA}$.



In $\triangle DAB$, $m\angle D = x$, $m\angle DAB = 5x - 30$, and $m\angle DBA = 3x - 60$. In $\triangle ABC$, $AB = 6y - 8$ and $BC = 4y - 2$. [Only algebraic solutions can receive full credit.]

Find $m\angle D$.

$x+5x+30+3x+60=180$
$9x+90=180$
$-90 \quad -90$
$9x = 90$
$x=10$

$m\angle D = 10$

Find $m\angle BAC$.

$5x-30+x=180$
$6x-30=180$
$+30 \quad +30$
$6x=150$

$\frac{6x}{6}=\frac{150}{6}$
$x=25$

$BAC=25$

Find the length of $\overline{BC}$.

$6y-8=4y-2$
$-4y \quad -4y$
$2y-8=-2$
$+8 \quad +8$
$2y=6$

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

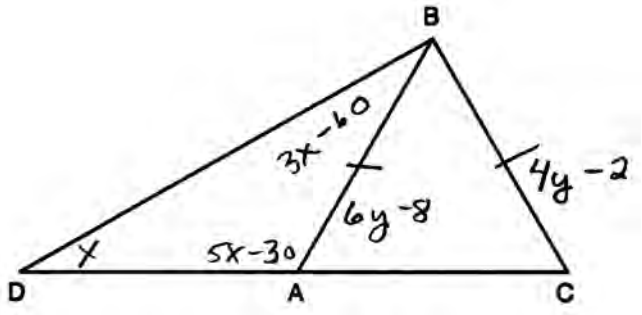
$BC = 4y-2$
$= 4(3)-2$
$12-2$
10

Find the length of $\overline{DC}$.

Score 1: The student showed correct work to find 10, the length of $\overline{BC}$. No further correct work is shown.

Question 35

35 In the diagram of $\triangle BCD$ shown below, $\overline{BA}$ is drawn from vertex B to point A on $\overline{DC}$, such that $\overline{BC} \cong \overline{BA}$.



In $\triangle DAB$, $m\angle D = x$, $m\angle DAB = 5x - 30$, and $m\angle DBA = 3x - 60$. In $\triangle ABC$, $AB = 6y - 8$ and $BC = 4y - 2$. [Only algebraic solutions can receive full credit.]

Find $m\angle D$.

30

Find $m\angle BAC$.

60

Find the length of $\overline{BC}$.

10

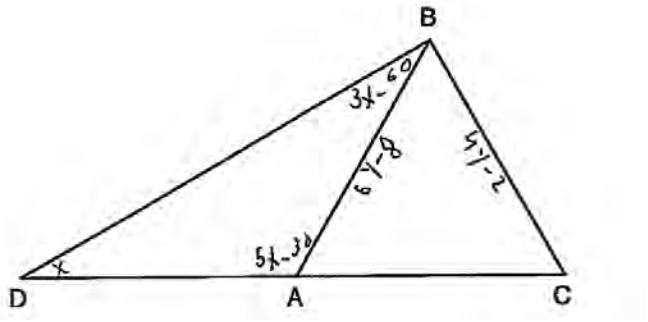
Find the length of $\overline{DC}$.

20

Score 1: The student showed no work, but stated four correct answers.

Question 35

35 In the diagram of $\triangle BCD$ shown below, $\overline{BA}$ is drawn from vertex B to point A on $\overline{DC}$, such that $\overline{BC} \cong \overline{BA}$.



In $\triangle DAB$, $m\angle D = x$, $m\angle DAB = 5x - 30$, and $m\angle DBA = 3x - 60$. In $\triangle ABC$, $AB = 6y - 8$ and $BC = 4y - 2$. [Only algebraic solutions can receive full credit.]

Find $m\angle D$.

$8x - 60 = 180$
$+60 \quad +60$
$\frac{8x}{8} = \frac{240}{8}$
$x = 30$

$x = 30$

Find $m\angle BAC$.

$10y - 6 = 180$
$+6 \quad +6$
$\frac{10y}{10} = \frac{186}{10}$
$y = 18.6$

$6x = 18.6$

Find the length of $\overline{BC}$.

$4y - 2 = 180$
$+2 \quad +2$
$\frac{4y}{4} = \frac{182}{4}$
$y = 45.5$

$y = 46.5$

Find the length of $\overline{DC}$.

$6x - 30 = 180$
$+30 \quad +30$
$\frac{6x}{6} = \frac{210}{6}$
$x = 35$

$x = 35$

Score 0: The student showed no correct work.

Question 36

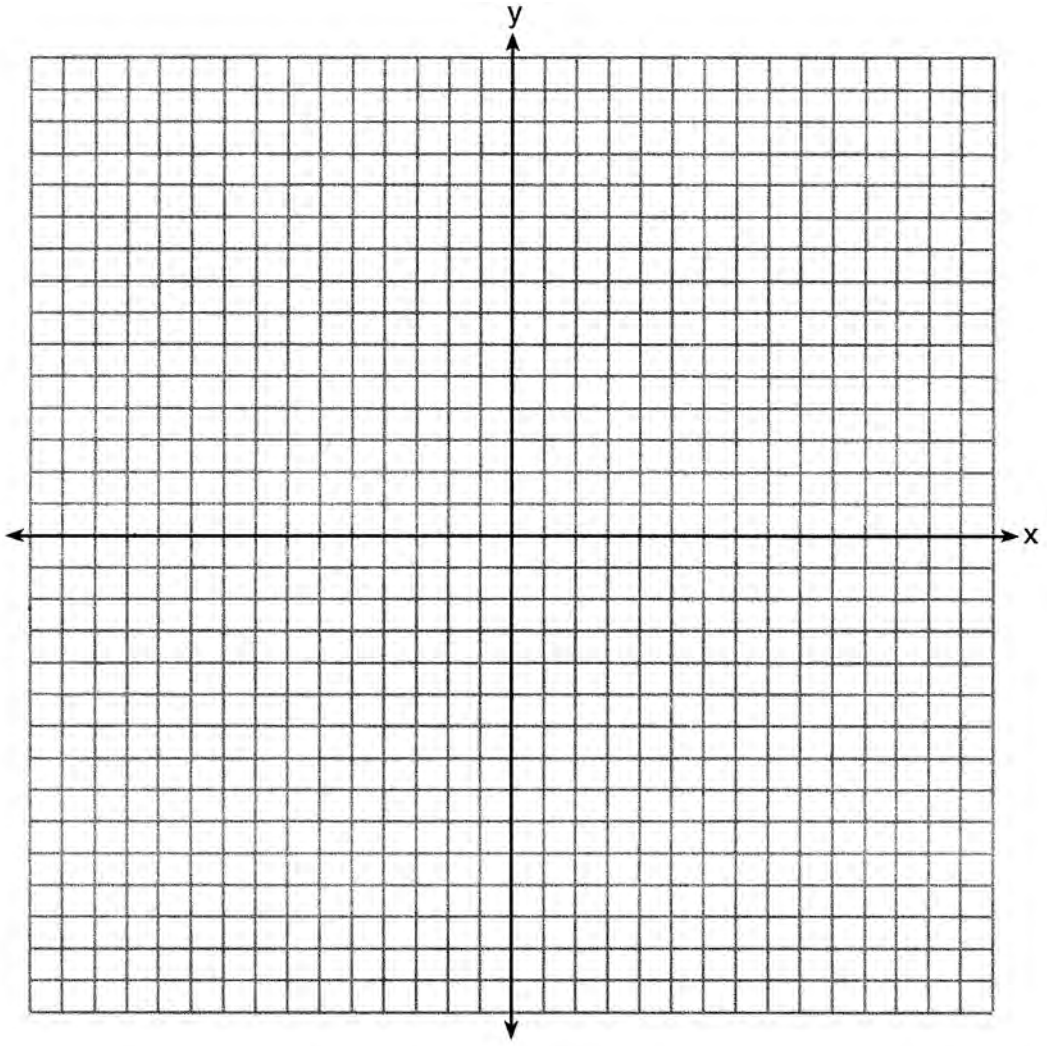
36 The coordinates of the vertices of $\triangle ABC$ are $A(-6,5)$, $B(-4,8)$, and $C(1,6)$. State and label the coordinates of the vertices of $\triangle A''B''C''$, the image of $\triangle ABC$ after the composition of transformations $T_{4,-5} \circ r_{y\text{-axis}}$.

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

A(-6,5)
A'(6,5)
A''(10,0)

B(-4,8)
B'(4,8)
B''(8,3)

C(1,6)
C'(-1,6)
C''(3,1)

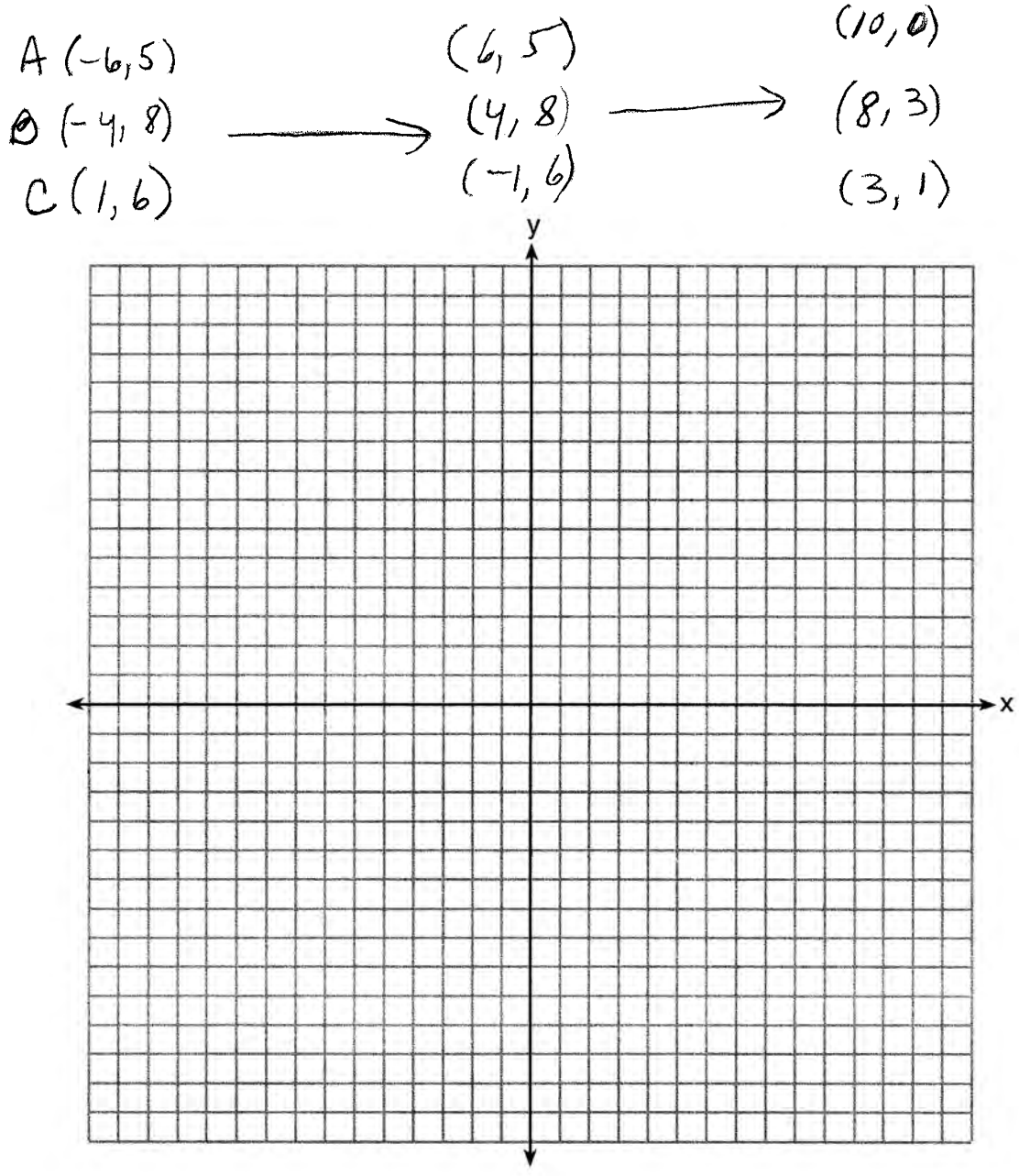


Score 4: The student has a complete and correct response. The student showed correct work to find the coordinates of A'', B'', and C''.

Question 36

36 The coordinates of the vertices of $\triangle ABC$ are $A(-6,5)$, $B(-4,8)$, and $C(1,6)$. State and label the coordinates of the vertices of $\triangle A''B''C''$, the image of $\triangle ABC$ after the composition of transformations $T_{4,-5} \circ r_{y\text{-axis}}$.

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



Score 4: The student has a complete and correct response. The student showed correct work to find the coordinates of the images of A, B, and C after $T_{4,-5} \circ r_{y\text{-}axis}$. The arrows indicate the mapping of $A(-6,5)$ onto $(6,5)$ onto $(10,0)$.

Question 36

36 The coordinates of the vertices of $\triangle ABC$ are $A(-6,5)$, $B(-4,8)$, and $C(1,6)$. State and label the coordinates of the vertices of $\triangle A''B''C''$, the image of $\triangle ABC$ after the composition of transformations $T_{4,-5} \circ r_{y\text{-axis}}$.

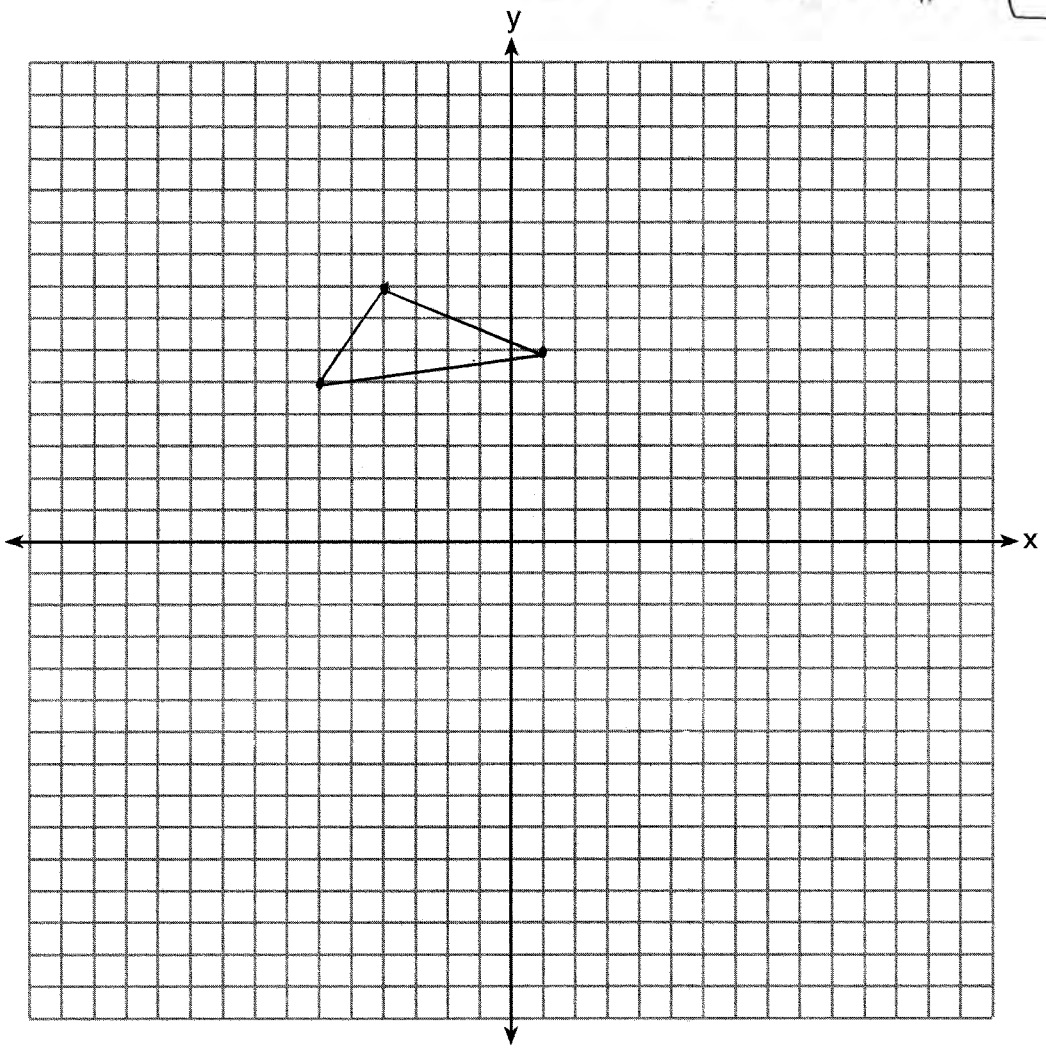
[The use of the set of axes below is optional.]

$T_{4,-5} \cdot r_{y\text{-axis}}$

$A(-6,5) \xrightarrow{r_{y\text{-axis}}} A'(6,5) \xrightarrow{T_{4,-5}} A''(10,0)$

$B(-4,8) \xrightarrow{r_{y\text{-axis}}} B'(4,8) \xrightarrow{T_{4,-5}} B''(8,3)$

$C(1,6) \xrightarrow{r_{y\text{-axis}}} C'(1,6) \xrightarrow{T_{4,-5}} C''(5,1)$



Score 3: The student made an error reflecting one point (C) over the y-axis, but did the transformation correctly.

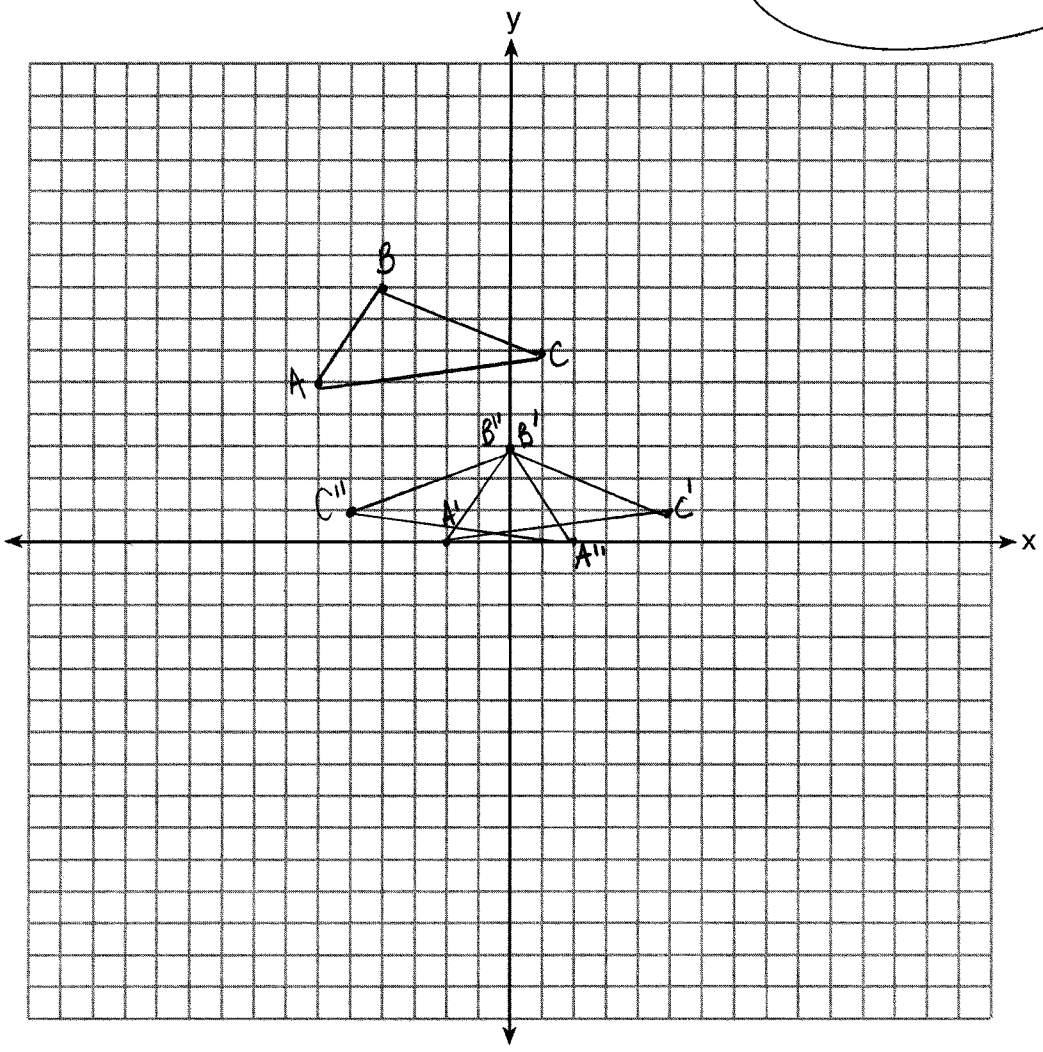
Question 36

36 The coordinates of the vertices of $\triangle ABC$ are $A(-6,5)$, $B(-4,8)$, and $C(1,6)$. State and label the coordinates of the vertices of $\triangle A''B''C''$, the image of $\triangle ABC$ after the composition of transformations $T_{4,-5} \circ r_{y\text{-axis}}$.

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

$A' = (-2,0)$
$B' = (0,3)$
$C' = (5,1)$

$A'' = (2,0)$
$B'' = (0,3)$
$C'' = (-5,1)$



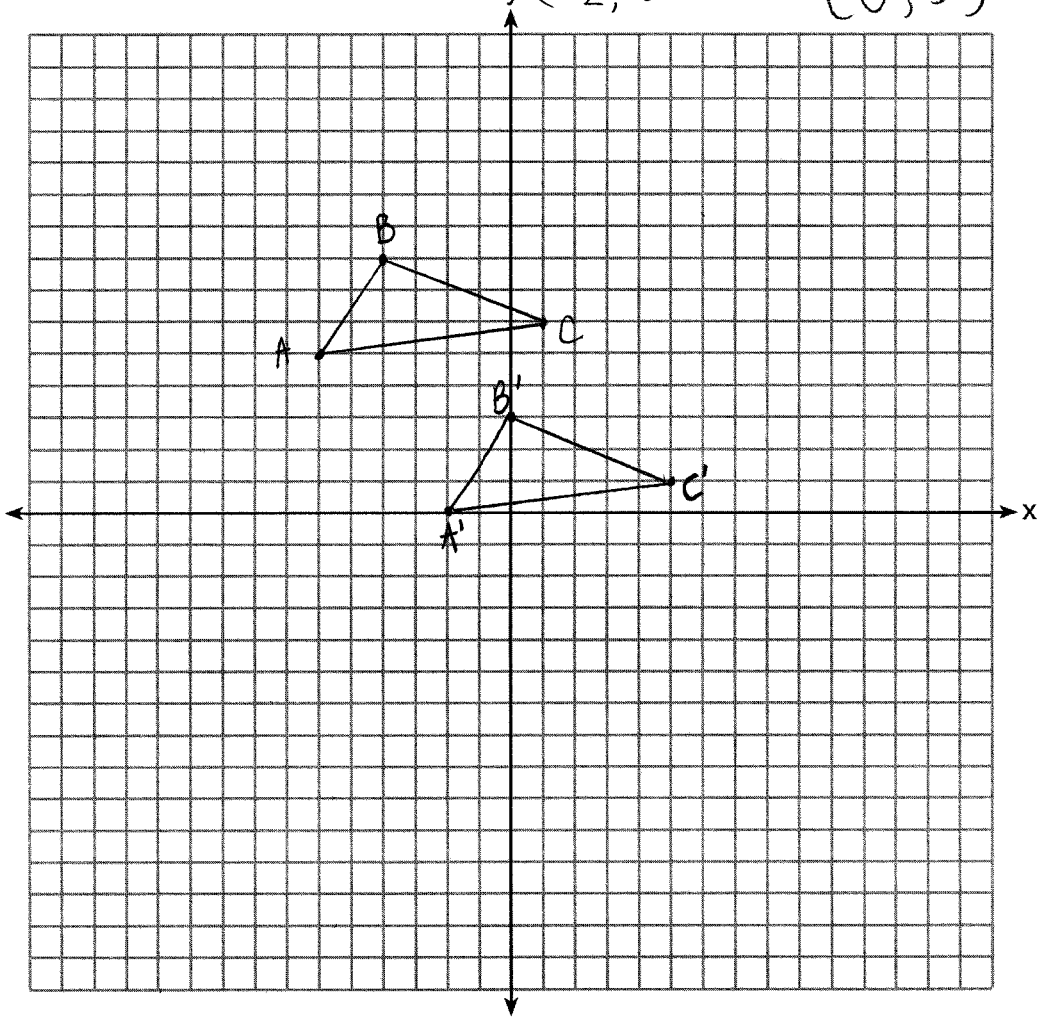
Score 2: The student made a conceptual error by doing the composition in the wrong order.

Question 36

36 The coordinates of the vertices of $\triangle ABC$ are $A(-6,5)$, $B(-4,8)$, and $C(1,6)$. State and label the coordinates of the vertices of $\triangle A''B''C''$, the image of $\triangle ABC$ after the composition of transformations $T_{4,-5} \circ r_{y\text{-axis}}$.

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

A' (-6,5) B' (-4,8) C' (1,6)
+4 -5 +4 -5 +4 -5
(-2,0) (0,3) (5,1)

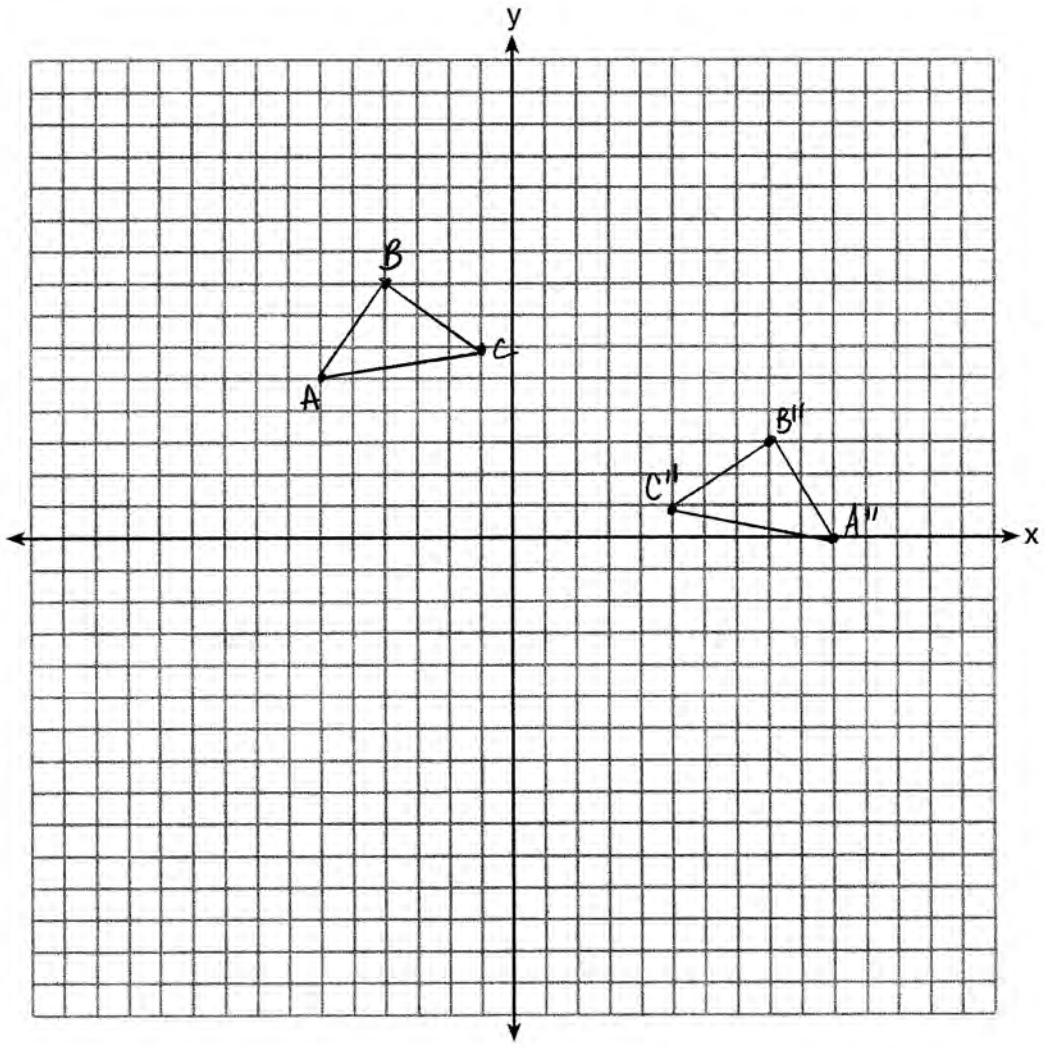


Score 1: The student did the translation on the vertices of $\triangle ABC$ correctly.

Question 36

36 The coordinates of the vertices of $\triangle ABC$ are $A(-6,5)$, $B(-4,8)$, and $C(1,6)$. State and label the coordinates of the vertices of $\triangle A''B''C''$, the image of $\triangle ABC$ after the composition of transformations $T_{4,-5} \circ r_{y\text{-axis}}$.

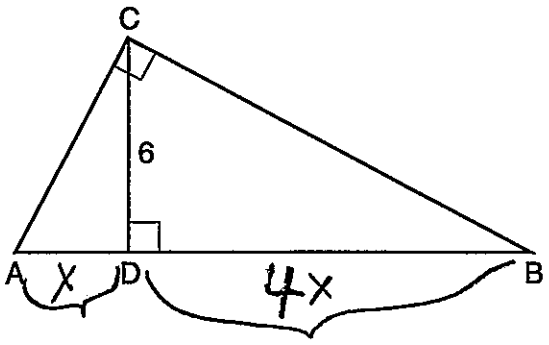
[The use of the set of axes below is optional.]



Score 0: The student did no correct work.

Question 37

37 In right triangle ABC below, $\overline{CD}$ is the altitude to hypotenuse $\overline{AB}$. If $CD = 6$ and the ratio of AD to AB is 1:5, determine and state the length of $\overline{BD}$.
[Only an algebraic solution can receive full credit.]



4(3)=12

$\frac{6}{x} = \frac{4x}{6}$

$4x^2 = 36$

$\frac{4}{4} \quad \frac{4}{4}$

$\sqrt{x^2} = \sqrt{9}$

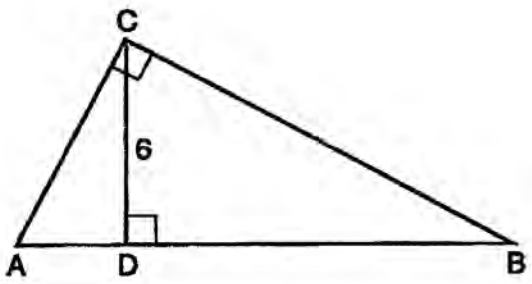
$x = 3$

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

Question 37

37 In right triangle ABC below, $\overline{CD}$ is the altitude to hypotenuse $\overline{AB}$. If $CD = 6$ and the ratio of AD to AB is 1:5, determine and state the length of $\overline{BD}$.

[Only an algebraic solution can receive full credit.]



$\frac{x}{6} = \frac{6}{4x}$

$4x^2 = 36$

$x^2 = 9$

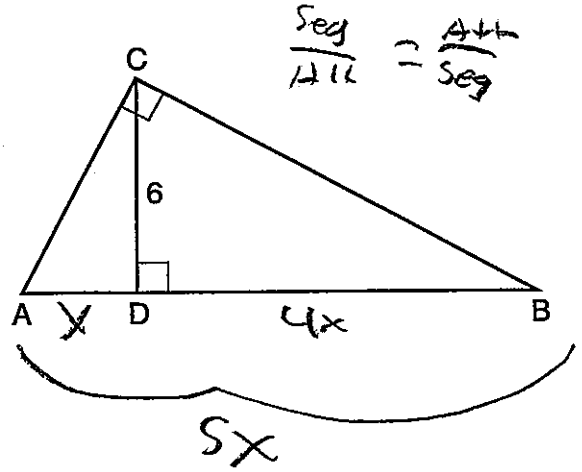
$x = 3$

Score 3: The student correctly solved the proportion for x, the length of $\overline{AD}$, but did not find the length of $\overline{BD}$.

Question 37

37 In right triangle ABC below, $\overline{CD}$ is the altitude to hypotenuse $\overline{AB}$. If $CD = 6$ and the ratio of AD to AB is 1:5, determine and state the length of $\overline{BD}$.

[Only an algebraic solution can receive full credit.]



Seg / Alt = Alt / Seg

$\frac{x}{6} = \frac{6}{4x}$

$5x = 36$

$\frac{5x}{5} = \frac{36}{5}$

$x = 7.2$

$\overline{BD} = 4x$

$\overline{BD} = 4(7.2)$

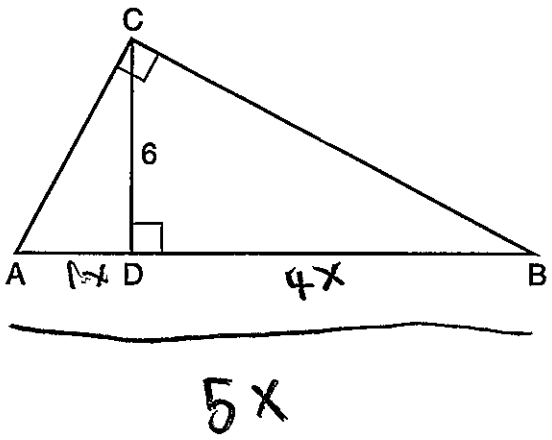
$\overline{BD} = 28.8$

Score 2: The student made a conceptual error in multiplying ($x \cdot 4x = 5x$), but found an appropriate length of $\overline{BD}$.

Question 37

37 In right triangle ABC below, $\overline{CD}$ is the altitude to hypotenuse $\overline{AB}$. If $CD = 6$ and the ratio of AD to AB is 1:5, determine and state the length of $\overline{BD}$.

[Only an algebraic solution can receive full credit.]



$\frac{1x}{6}$ $\frac{6}{4x}$

$5x = 36$

$\frac{5x}{5} = \frac{36}{5}$

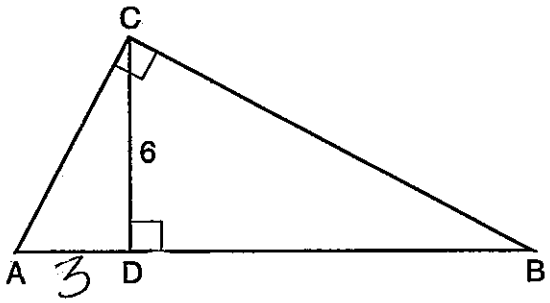
$x = 7.2$

Score 1: The student made a conceptual error in multiplying ($x \cdot 4x = 5x$), and did not find an appropriate length of $\overline{BD}$.

Question 37

37 In right triangle ABC below, $\overline{CD}$ is the altitude to hypotenuse $\overline{AB}$. If $CD = 6$ and the ratio of AD to AB is 1:5, determine and state the length of $\overline{BD}$.

[Only an algebraic solution can receive full credit.]



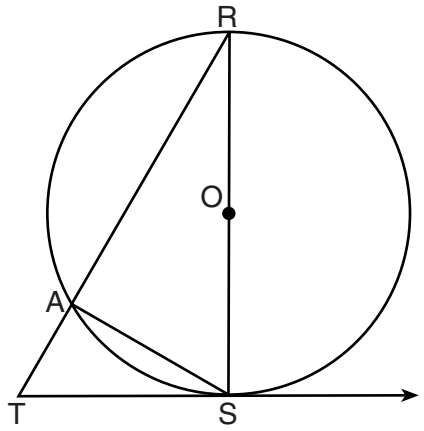
(34) = 12

DB = 12

Score 0: The student got the correct answer by a completely incorrect method.

Question 38

38 In the diagram of circle O below, diameter $\overline{RS}$, chord $\overline{AS}$, tangent $\overrightarrow{TS}$, and secant $\overline{TAR}$ are drawn.



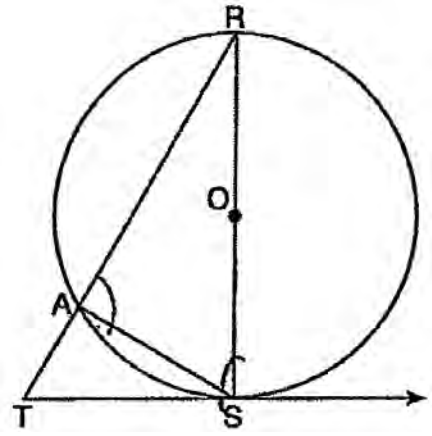
Complete the following proof to show $(RS)^2 = RA \bullet RT$

Statements	Reasons
1. circle O, diameter $\overline{RS}$, chord $\overline{AS}$, tangent $\overrightarrow{TS}$, and secant $\overline{TAR}$	1. Given
2. $\overline{RS} \perp \overrightarrow{TS}$	2. a tangent is ⊥ to the radius of the ⊙ at the point of tangency
	3. ⊥ lines form right angles
3. $\angle RST$ is a right angle	4. ∠s in a ⊙ that's inscribed in a semicircle are rt. angles
4. $\angle RAS$ is a right angle	5. all rt. ∠s are ≅.
5. $\angle RST \cong \angle RAS$	6. Reflexive property
	7. $AA \cong AA$
6. $\angle R \cong \angle R$	8. corresponding sides of ~ △s are proportional to one another.
7. $\triangle RST \sim \triangle RAS$	9. the product of the means are = to the product of the extremes
8. $\frac{RS}{RA} = \frac{RT}{RS}$	
9. $(RS)^2 = RA \bullet RT$	

Score 6: The student has a complete and correct response by writing six correct reasons.

Question 38

38 In the diagram of circle O below, diameter $\overline{RS}$, chord $\overline{AS}$, tangent $\overrightarrow{TS}$, and secant $\overline{TAR}$ are drawn.



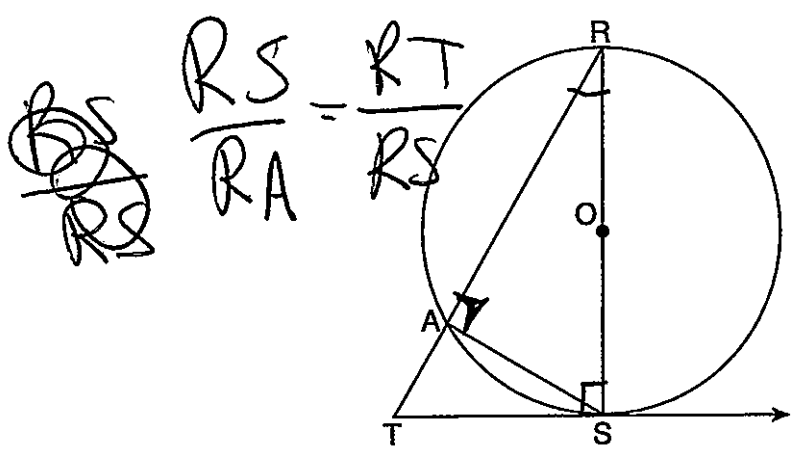
Complete the following proof to show $(RS)^2 = RA \bullet RT$

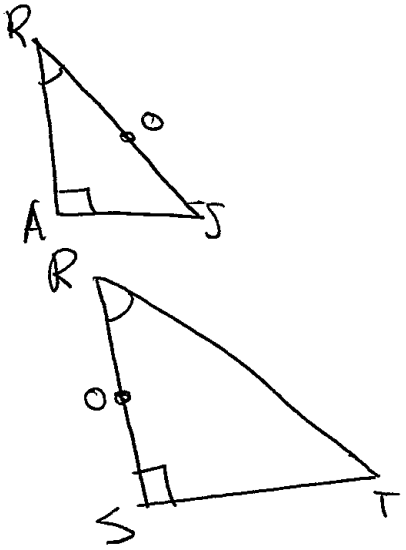
Statements	Reasons
1. circle O, diameter $\overline{RS}$, chord $\overline{AS}$, tangent $\overrightarrow{TS}$, and secant $\overline{TAR}$	1. Given
2. $\overline{RS} \perp \overrightarrow{TS}$	2. diameter drawn to point of tangency is ⊥ to tangent line
3. $\angle RST$ is a right angle	3. ⊥ lines form right angles
4. $\angle RAS$ is a right angle	4. ∡'s inscribed in semicircle are rt. ∡'s
5. $\angle RST \cong \angle RAS$	5. all rt. ∡s ≅
6. $\angle R \cong \angle R$	6. Reflexive property
7. $\triangle RST \sim \triangle RAS$	7. AA ~
8. $\frac{RS}{RA} = \frac{RT}{RS}$	8. corresponding sides are proportional in ~△'s
9. $(RS)^2 = RA \bullet RT$	9. multiplication

Score 5: The student wrote five correct reasons (2, 4, 5, 7, 8).

Question 38

38 In the diagram of circle O below, diameter $\overline{RS}$, chord $\overline{AS}$, tangent $\overleftrightarrow{TS}$, and secant $\overline{TAR}$ are drawn.





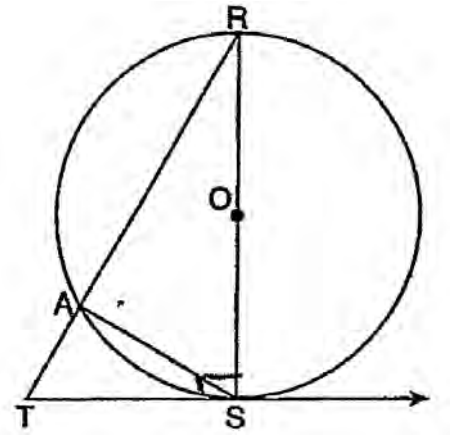
Complete the following proof to show $(RS)^2 = RA \bullet RT$

Statements	Reasons
1. circle O, diameter $\overline{RS}$, chord $\overline{AS}$, tangent $\overleftrightarrow{TS}$, and secant $\overline{TAR}$	1. Given
2. $\overline{RS} \perp \overleftrightarrow{TS}$	2. Tangent $\overleftrightarrow{TS}$ and the diameter intersect half the circle making the $\angle RAS$ is $\cong$ to 180 $\perp$ lines form right angles
3. $\angle RST$ is a right angle	3. $\perp$ lines form right angles
4. $\angle RAS$ is a right angle	4. half the circle, $\overline{RS}$, is 180° so $\angle RAS$ is half of the chord it intercepts.
5. $\angle RST \cong \angle RAS$	5. All right $\angle$s are $\cong$.
6. $\angle R \cong \angle R$	6. Reflexive property
7. $\triangle RST \sim \triangle RAS$	7. ~~SAA~~ AA $\sim$ AA
8. $\frac{RS}{RA} = \frac{RT}{RS}$	8. Corresponding sides in $\sim$ $\triangle$s are in proportion.
9. $(RS)^2 = RA \bullet RT$	9. The product of the extremes is $\cong$ to the product of the means.

Score 4: The student wrote four correct reasons (5, 7, 8, 9).

Question 38

38 In the diagram of circle O below, diameter $\overline{RS}$, chord $\overline{AS}$, tangent $\overrightarrow{TS}$, and secant $\overline{TAR}$ are drawn.



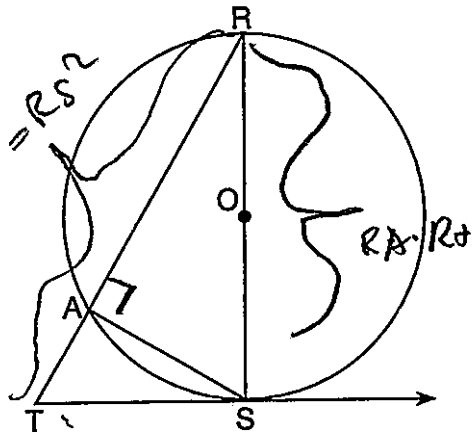
Complete the following proof to show $(RS)^2 = RA \bullet RT$

Statements	Reasons
1. circle O, diameter $\overline{RS}$, chord $\overline{AS}$, tangent $\overrightarrow{TS}$, and secant $\overline{TAR}$	1. Given
2. $\overline{RS} \perp \overrightarrow{TS}$	2. a diameter & tangent meet
3. $\angle RST$ is a right angle	3. $\perp$ lines form right angles
4. $\angle RAS$ is a right angle	4. if a chord & secant meet, right $\angle$s is formed.
5. $\angle RST \cong \angle RAS$	5. all right $\angle$s are $\cong$
6. $\angle R \cong \angle R$	6. Reflexive property
7. $\triangle RST \sim \triangle RAS$	7. AA~
8. $\frac{RS}{RA} = \frac{RT}{RS}$	8. if 2 $\triangle$s ~, corresponding thair sides are in proportion
9. $(RS)^2 = RA \bullet RT$	9. if sides are in proportion, the extremes = the mean

Score 3: The student wrote three correct reasons (5, 7, 8).

Question 38

38 In the diagram of circle O below, diameter $\overline{RS}$, chord $\overline{AS}$, tangent $\overrightarrow{TS}$, and secant $\overline{TAR}$ are drawn.



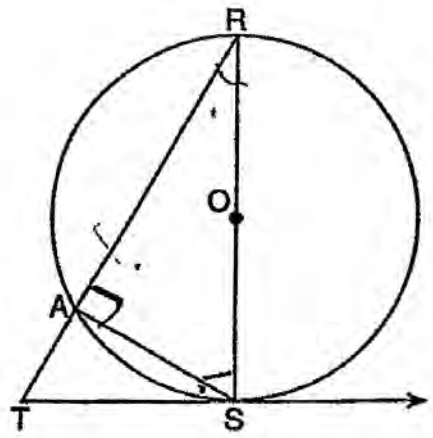
Complete the following proof to show $(RS)^2 = RA \bullet RT$

Statements	Reasons
1. circle O, diameter $\overline{RS}$, chord $\overline{AS}$, tangent $\overrightarrow{TS}$, and secant $\overline{TAR}$	1. Given
2. $\overline{RS} \perp \overrightarrow{TS}$	2. def of a tangent
	intersecting
	3. $\perp$ lines form right angles
3. $\angle RST$ is a right angle	4. $\angle$'s inscribed in a $\odot$ are right $\angle$'s
4. $\angle RAS$ is a right angle	5. $\cong$ arcs $\cong$ angles
5. $\angle RST \cong \angle RAS$	6. Reflexive property
	7. AA~
6. $\angle R \cong \angle R$	8. Similar $\triangle$'s similar proportions
7. $\triangle RST \sim \triangle RAS$	
8. $\frac{RS}{RA} = \frac{RT}{RS}$	9. product of the means = products of the extremes
9. $(RS)^2 = RA \bullet RT$	

Score 2: The student wrote two correct reasons (7, 9).

Question 38

38 In the diagram of circle O below, diameter $\overline{RS}$, chord $\overline{AS}$, tangent $\overrightarrow{TS}$, and secant $\overline{TAR}$ are drawn.



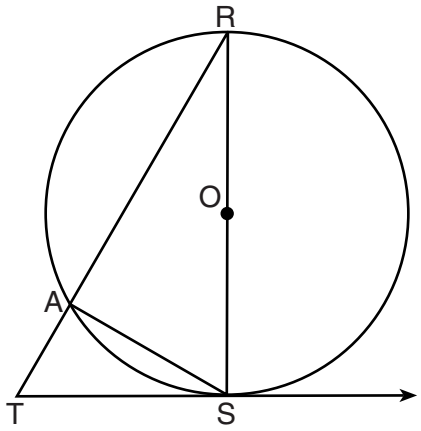
Complete the following proof to show $(RS)^2 = RA \bullet RT$

Statements	Reasons
1. circle O, diameter $\overline{RS}$, chord $\overline{AS}$, tangent $\overrightarrow{TS}$, and secant $\overline{TAR}$	1. Given
2. $\overline{RS} \perp \overrightarrow{TS}$	2. when a diameter & tangent meet
3. $\angle RST$ is a right angle	3. $\perp$ lines form right angles
4. $\angle RAS$ is a right angle	4. when 2 chords meet at 1 point they form 90°
5. $\angle RST \cong \angle RAS$	5. all right angles $\cong$
6. $\angle R \cong \angle R$	6. Reflexive property
7. $\triangle RST \sim \triangle RAS$	7. all angles the same
8. $\frac{RS}{RA} = \frac{RT}{RS}$	8. what?
9. $(RS)^2 = RA \bullet RT$	9. CPCTC

Score 1: The student wrote one correct reason (5).

Question 38

38 In the diagram of circle O below, diameter $\overline{RS}$, chord $\overline{AS}$, tangent $\overrightarrow{TS}$, and secant $\overline{TAR}$ are drawn.



Complete the following proof to show $(RS)^2 = RA \bullet RT$

Statements	Reasons
1. circle O, diameter $\overline{RS}$, chord $\overline{AS}$, tangent $\overrightarrow{TS}$, and secant $\overline{TAR}$	1. Given
2. $\overline{RS} \perp \overrightarrow{TS}$	2. Two lines that form right angles are perpendicular.
3. $\angle RST$ is a right angle	3. $\perp$ lines form right angles
4. $\angle RAS$ is a right angle	4. _____
	5. _____
5. $\angle RST \cong \angle RAS$	6. Reflexive property
	7. _____
6. $\angle R \cong \angle R$	8. _____
7. $\triangle RST \sim \triangle RAS$	_____
8. $\frac{RS}{RA} = \frac{RT}{RS}$	9. _____
9. $(RS)^2 = RA \bullet RT$	

Score 0: The student has no correct reasons.