The University of the State of New York

REGENTS HIGH SCHOOL EXAMINATION

GEOMETRY

Wednesday, January 23, 2019 — 9:15 a.m. to 12:15 p.m.

MODEL RESPONSE SET

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Question 25

25 Write an equation of the line that is parallel to the line whose equation is $3y + 7 = 2x$ and passes through the point (2,6).

$$3y + 7 = 2x$$
$$-7 \quad -7$$
$$\frac{3y}{3} = \frac{2x}{3} - \frac{7}{3}$$
$$y = \frac{2}{3}x - \frac{7}{3}$$
$$y - 6 = \frac{2}{3}(x - 2)$$

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

Question 25

25 Write an equation of the line that is parallel to the line whose equation is $3y + 7 = 2x$ and passes through the point (2,6).

$$3y + 7 = 2x$$
$$-7 \quad -7$$
$$\frac{3y}{3} = \frac{2x-7}{3}$$
$$y = \frac{2}{3}x - \frac{7}{3}$$

$$y = \frac{2}{3}x + \frac{14}{3}$$

$$6 = \frac{2}{3}(2) + b$$
$$6 = \frac{4}{3} + b$$
$$-\frac{4}{3} \quad -\frac{4}{3}$$
$$b = \frac{14}{3}$$

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

Question 25

25 Write an equation of the line that is parallel to the line whose equation is $3y + 7 = 2x$ and passes through the point (2,6).

same slope

$$3y + 7 = 2x$$
$$-7 \quad -7$$
$$\frac{3y}{3} = \frac{2x - 7}{3}$$
$$y = \frac{2}{3}x - \frac{7}{3}$$

$m = \frac{2}{3}$

$m\| = \frac{2}{3}$

(2,6)

$y = mx + b$

$$6 = \frac{2}{3} \cdot 2 + b$$
$$\frac{6}{\frac{4}{3}} = \frac{\frac{4}{3} + b}{\frac{4}{3}}$$
$$4.5 = b$$

$$y = \frac{2}{3}x + 4.5$$

Score 1: The student made an error in determining the y-intercept.

Question 25

25 Write an equation of the line that is parallel to the line whose equation is $3y + 7 = 2x$ and passes through the point (2,6).

$3y + 7 = 2x$
$\quad -7 \quad -7$

$\frac{3y}{3} = \frac{2x}{3} \frac{-7}{3}$

$y = \frac{2}{3}x - 7/3$

$y = \frac{2}{3}x + b$

$6 = 2/3(2) + b$

$6 = 1.3 + b$

$-1.3 \quad -1.3$

$b = 4.7$

$\boxed{y = \frac{2}{3}x + 4.7}$

Score 1: The student made one rounding error in determining the y-intercept.

25 Write an equation of the line that is parallel to the line whose equation is $3y + 7 = 2x$ and passes through the point (2,6).

$$3y + 7 = 2x$$
$$-7 \quad -7$$
$$\frac{3y = 2x - 7}{3}$$
$$y = \frac{2}{3}x - 2.\overline{3}$$
$$\boxed{y = \frac{2}{3}x - 6}$$

Score 1: The student made an error using the y-coordinate of the given point as the y-intercept.

Question 25

25 Write an equation of the line that is parallel to the line whose equation is $3y + 7 = 2x$ and passes through the point (2,6).

x y

$y = mx + b$

$y = 6$

$m = \frac{4}{3}$

$b = \frac{-7}{3}$

$\boxed{y = \frac{4}{3}x - \frac{7}{3}}$

$-7 \quad -7$

$\frac{3y}{3} = \frac{2x - 7}{3}$

$y = 2/3x - 7/3$

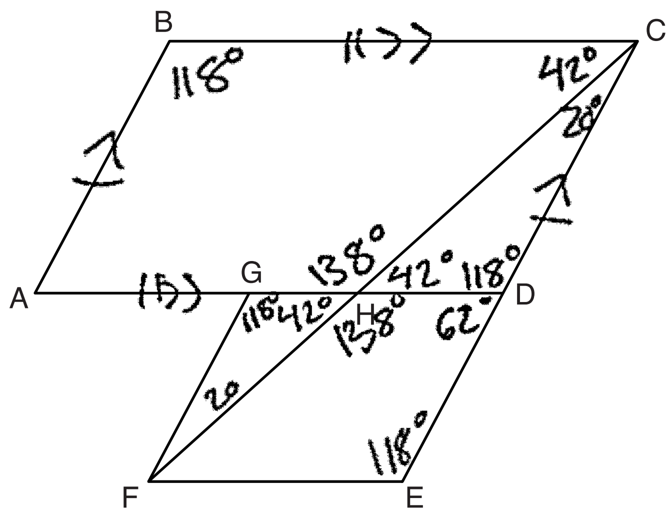
$6 = 2/3(2) - \frac{7}{3}$

$6 = \frac{4}{3} - \frac{7}{3}$

Score 0: The student did not show enough correct relevant work to receive any credit.

Question 26

26 Parallelogram *ABCD* is adjacent to rhombus *DEFG*, as shown below, and $\overline{FC}$ intersects $\overline{AGD}$ at *H*.



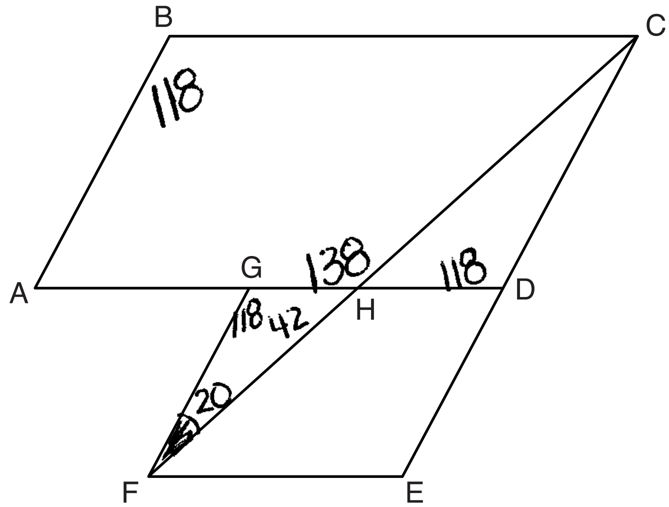
If m∠*B* = 118° and m∠*AHC* = 138°, determine and state m∠*GFH*.

m∠GFH = 20°

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

Question 26

26 Parallelogram $ABCD$ is adjacent to rhombus $DEFG$, as shown below, and $\overline{FC}$ intersects $\overline{AGD}$ at H.



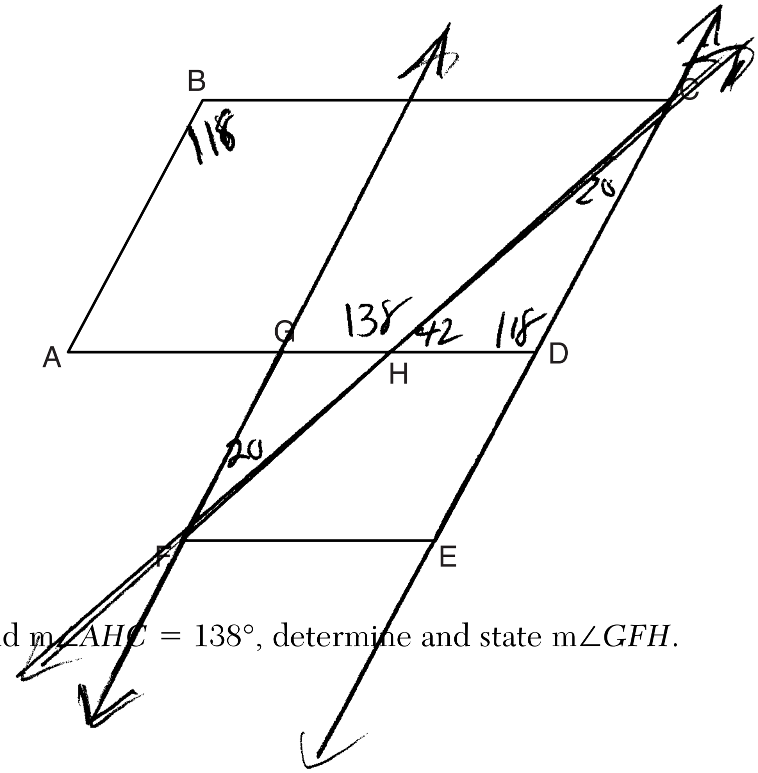
If $m\angle B = 118°$ and $m\angle AHC = 138°$, determine and state $m\angle GFH$.

$\angle GFH = 20°$

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

Question 26

26 Parallelogram $ABCD$ is adjacent to rhombus $DEFG$, as shown below, and $\overline{FC}$ intersects $\overline{AGD}$ at H.

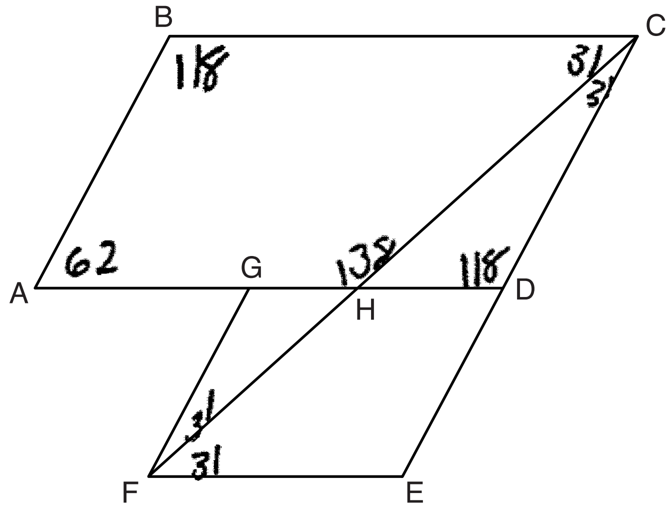


If m∠B = 118° and m∠AHC = 138°, determine and state m∠GFH.

M∡GFH = 20°

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

26 Parallelogram $ABCD$ is adjacent to rhombus $DEFG$, as shown below, and $\overline{FC}$ intersects $\overline{AGD}$ at H.



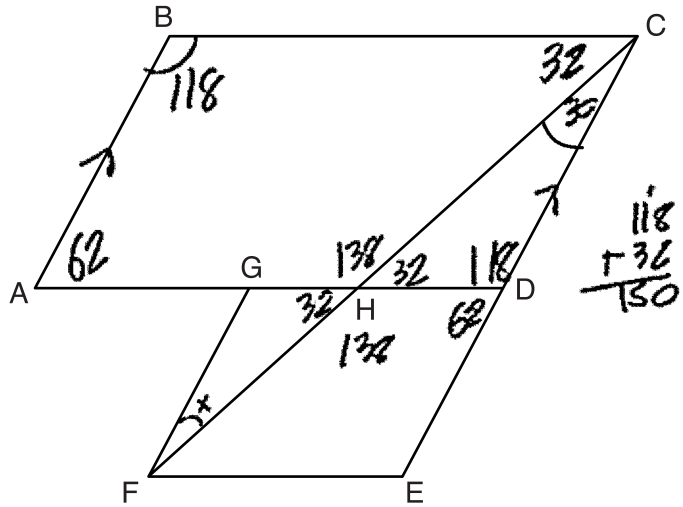
If $m\angle B = 118°$ and $m\angle AHC = 138°$, determine and state $m\angle GFH$.

$\measuredangle GFH = 31$

Score 1: The student made an error that $\overline{CF}$ bisects $\angle BCD$.

Question 26

26 Parallelogram *ABCD* is adjacent to rhombus *DEFG*, as shown below, and $\overline{FC}$ intersects $\overline{AGD}$ at *H*.



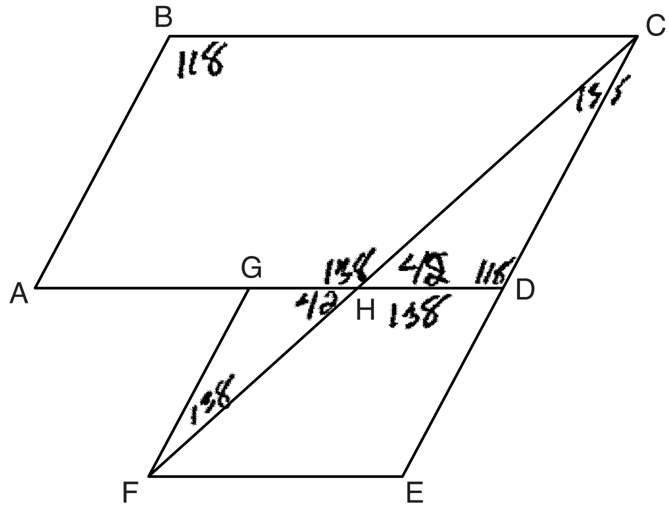
If m∠*B* = 118° and m∠*AHC* = 138°, determine and state m∠*GFH*.

m∠GFH=30°

Score 1: The student made a computational error in determining m∠*CHD*.

Question 26

26 Parallelogram $ABCD$ is adjacent to rhombus $DEFG$, as shown below, and $\overline{FC}$ intersects $\overline{AGD}$ at H.



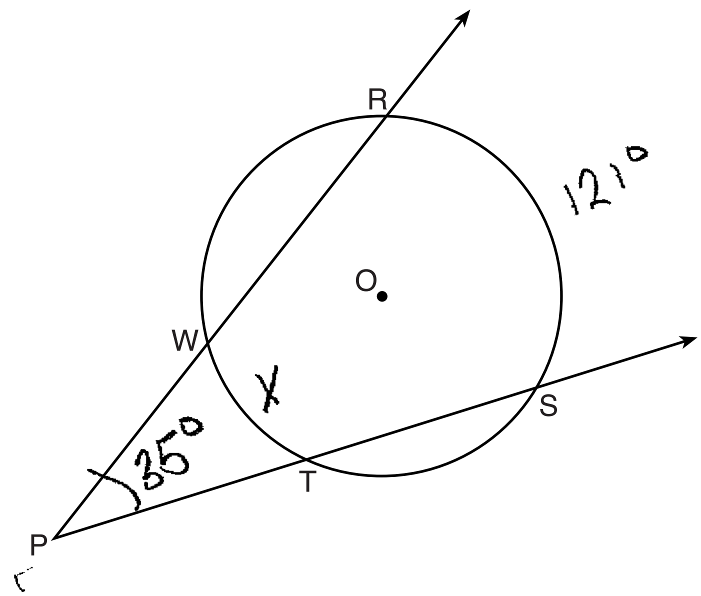
If m$\angle B$ = 118° and m$\angle AHC$ = 138°, determine and state m$\angle GFH$.

m∠GFH = 138° because opposite adjacent angles are congruent and because ∠ AHC = 138°, ∠C = 138° so ∠ GFH = 138°.

Score 0: The student did not show enough correct relevant work to receive any credit.

Question 27

27 As shown in the diagram below, secants $\overrightarrow{PWR}$ and $\overrightarrow{PTS}$ are drawn to circle O from external point P.



If $m\angle RPS = 35°$ and $m\widehat{RS} = 121°$, determine and state $m\widehat{WT}$.

$$\cancel{2} \cdot \frac{121 - x}{\cancel{2}} = 35 \cdot 2$$

$$121 - x = 70$$
$$-121 \qquad -121$$

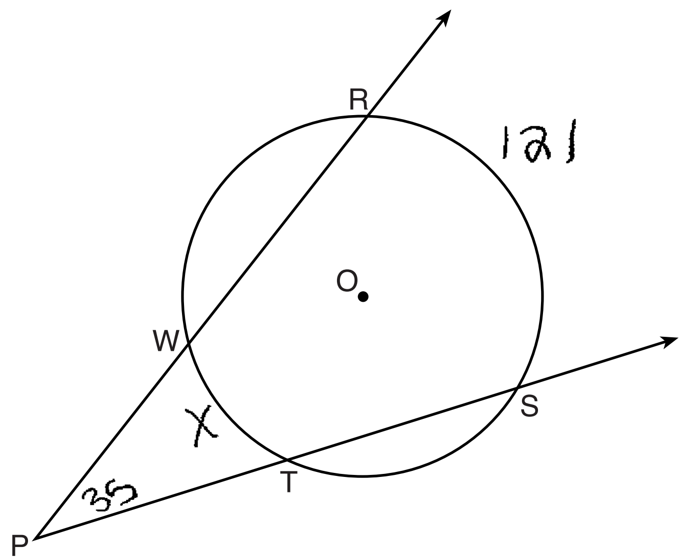
$$\frac{-x}{-1} = \frac{-51}{-1}$$

$$x = 51$$

$m\widehat{WT} = 51°$

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

27 As shown in the diagram below, secants $\overrightarrow{PWR}$ and $\overrightarrow{PTS}$ are drawn to circle O from external point P.



If $m\angle RPS = 35°$ and $m\widehat{RS} = 121°$, determine and state $m\widehat{WT}$.

$35 = \frac{1}{2}(121 - x)$

$35 = 60.5 - \frac{1}{2}x$

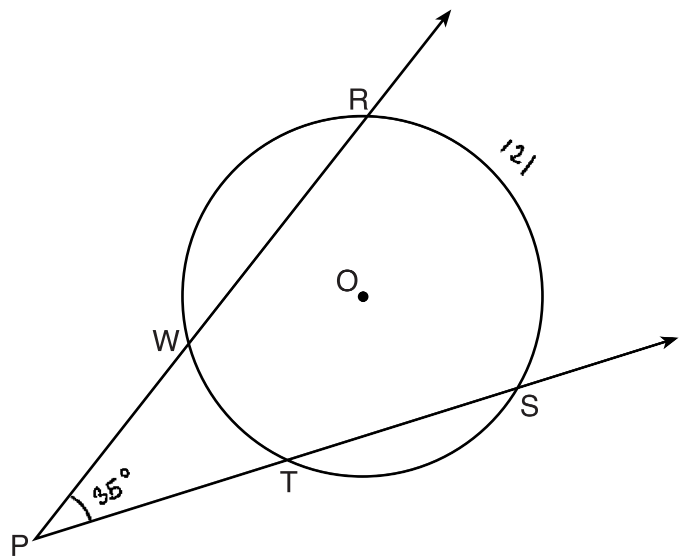
$-25.5 = -\frac{1}{2}x$

$\boxed{51 = x}$

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

Question 27

27 As shown in the diagram below, secants $\overrightarrow{PWR}$ and $\overrightarrow{PTS}$ are drawn to circle O from external point P.



If $m\angle RPS = 35°$ and $m\widehat{RS} = 121°$, determine and state $m\widehat{WT}$.

$35 = \frac{1}{2}(121 - ?)$

$35° = \frac{1}{2}(121 - 41)$

$35° = \frac{1}{2}(70)$

$35° = 35°$ ✓

$\boxed{m\widehat{WT} = 70°}$

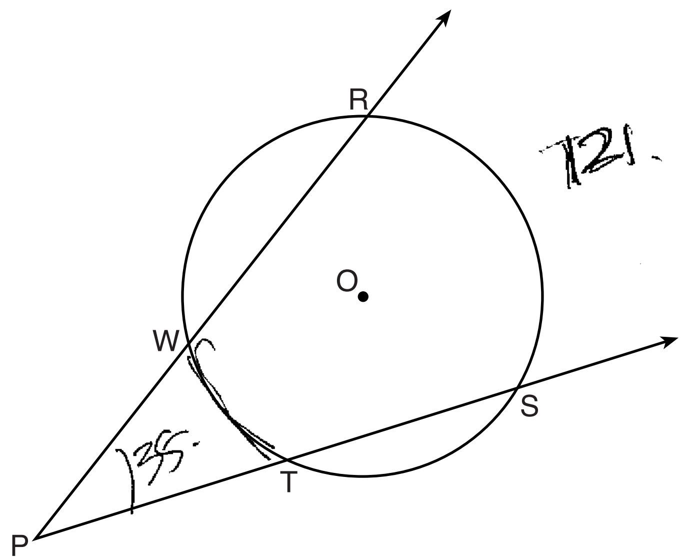
121
− 41
70

35
× 2
70

Score 1: The student wrote a correct equation.

Question 27

27 As shown in the diagram below, secants $\overrightarrow{PWR}$ and $\overrightarrow{PTS}$ are drawn to circle O from external point P.



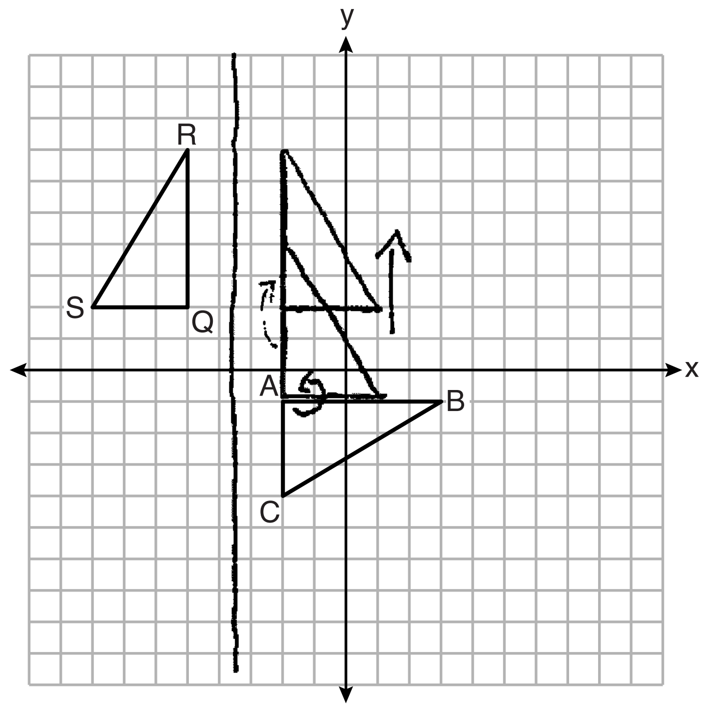
If $m\angle RPS = 35°$ and $m\widehat{RS} = 121°$, determine and state $m\widehat{WT}$.

$$\frac{35+121}{2} = 78.$$

Score 0: The student gave a completely incorrect response.

Question 28

28 On the set of axes below, $\triangle ABC$ is graphed with coordinates $A(-2,-1)$, $B(3,-1)$, and $C(-2,-4)$. Triangle QRS, the image of $\triangle ABC$, is graphed with coordinates $Q(-5,2)$, $R(-5,7)$, and $S(-8,2)$.



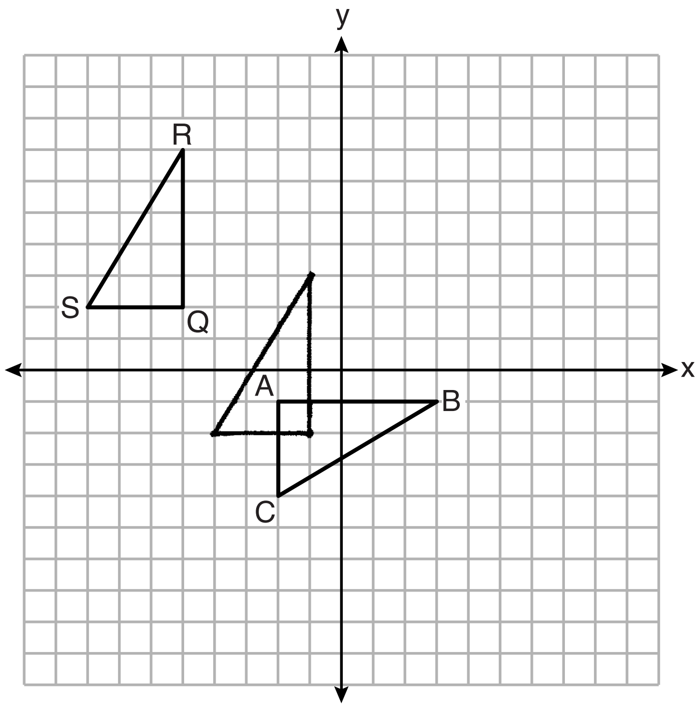
Describe a sequence of transformations that would map $\triangle ABC$ onto $\triangle QRS$.

Ans: A rotatation of 90° counterclockwise around point A, Then a transalation of 3 units up and finally a reflextion over the line x = -3.5, would map $\triangle ABC$ onto $\triangle QRS$.

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

Question 28

28 On the set of axes below, $\triangle ABC$ is graphed with coordinates $A(-2,-1)$, $B(3,-1)$, and $C(-2,-4)$. Triangle QRS, the image of $\triangle ABC$, is graphed with coordinates $Q(-5,2)$, $R(-5,7)$, and $S(-8,2)$.



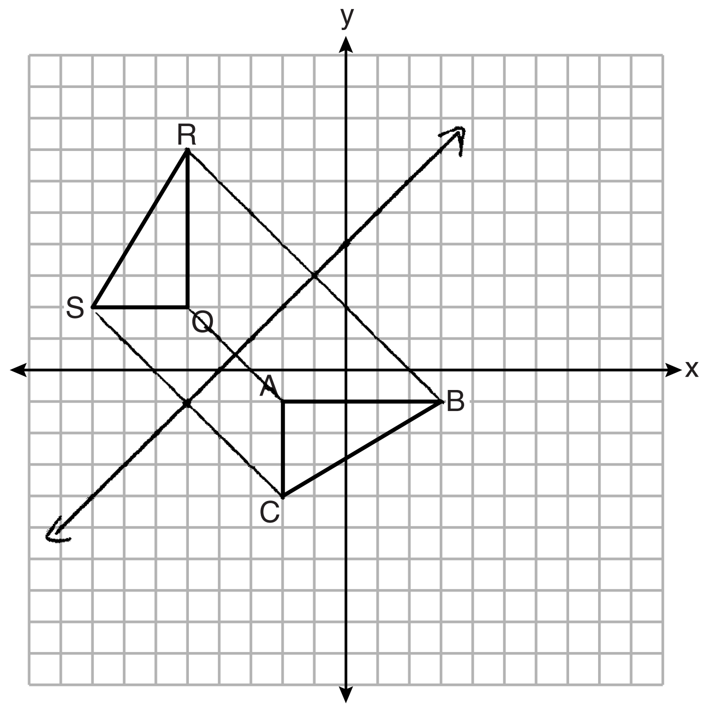
Describe a sequence of transformations that would map $\triangle ABC$ onto $\triangle QRS$.

Reflect over y=x then translate 4 left and 4 up.

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

Question 28

28 On the set of axes below, $\triangle ABC$ is graphed with coordinates $A(-2,-1)$, $B(3,-1)$, and $C(-2,-4)$. Triangle QRS, the image of $\triangle ABC$, is graphed with coordinates $Q(-5,2)$, $R(-5,7)$, and $S(-8,2)$.



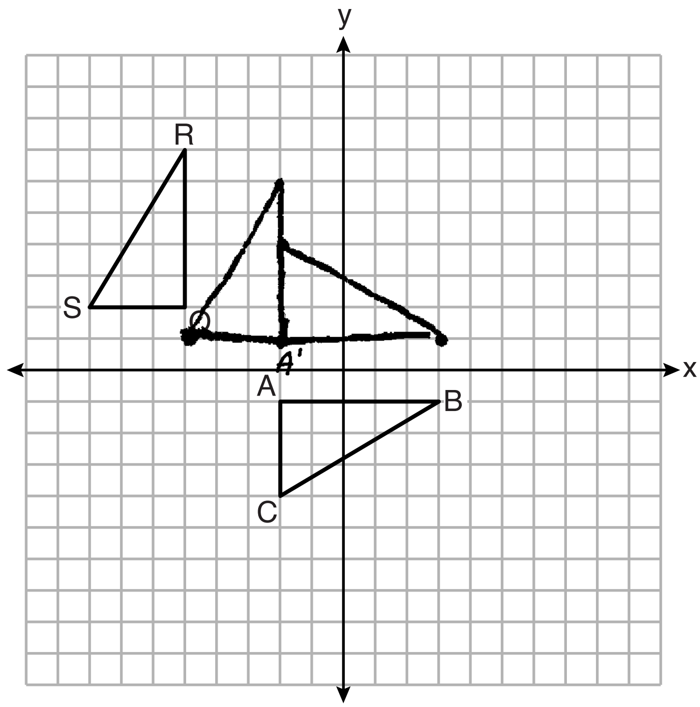
Describe a sequence of transformations that would map $\triangle ABC$ onto $\triangle QRS$.

Reflection over $y = x + 4$

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

Question 28

28 On the set of axes below, $\triangle ABC$ is graphed with coordinates $A(-2,-1)$, $B(3,-1)$, and $C(-2,-4)$. Triangle QRS, the image of $\triangle ABC$, is graphed with coordinates $Q(-5,2)$, $R(-5,7)$, and $S(-8,2)$.



Describe a sequence of transformations that would map $\triangle ABC$ onto $\triangle QRS$.

Reflection over x-axis

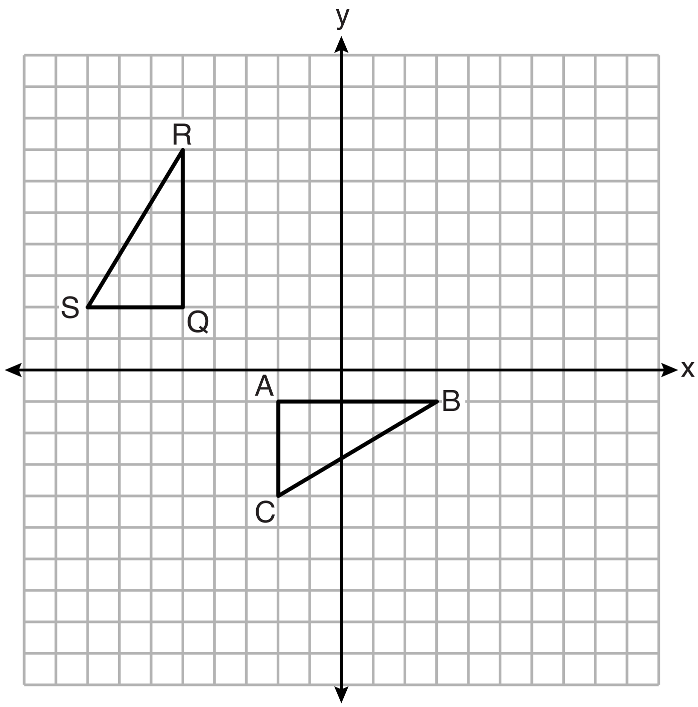
Rotate about point A' 90° counter clockwise, translate

3 left, and 1 up.

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

Question 28

28 On the set of axes below, $\triangle ABC$ is graphed with coordinates $A(-2,-1)$, $B(3,-1)$, and $C(-2,-4)$. Triangle QRS, the image of $\triangle ABC$, is graphed with coordinates $Q(-5,2)$, $R(-5,7)$, and $S(-8,2)$.



Describe a sequence of transformations that would map $\triangle ABC$ onto $\triangle QRS$.

Translation (-3,3)

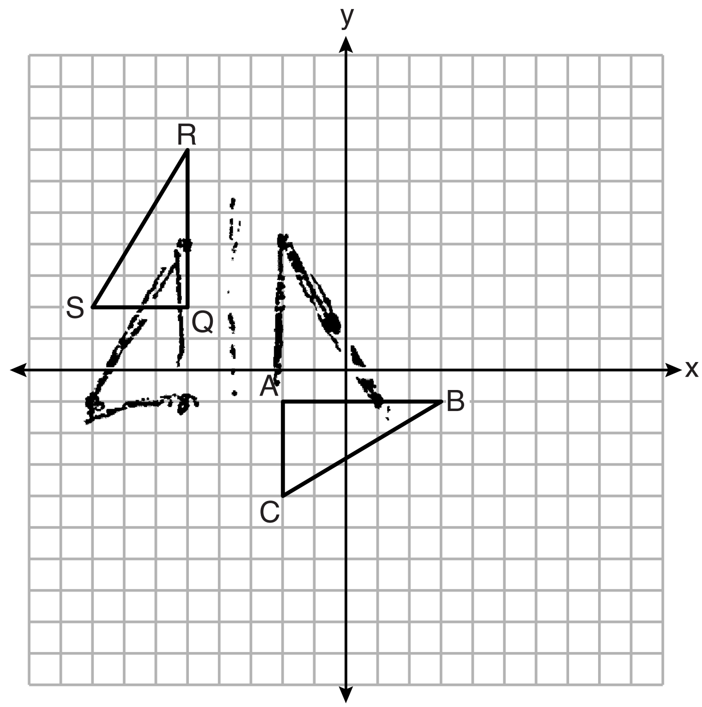
Rotation counter-clockwise 90°

Reflection over x=-5

Score 1: The student did not state the center of rotation.

Question 28

28 On the set of axes below, $\triangle ABC$ is graphed with coordinates $A(-2,-1)$, $B(3,-1)$, and $C(-2,-4)$. Triangle QRS, the image of $\triangle ABC$, is graphed with coordinates $Q(-5,2)$, $R(-5,7)$, and $S(-8,2)$.

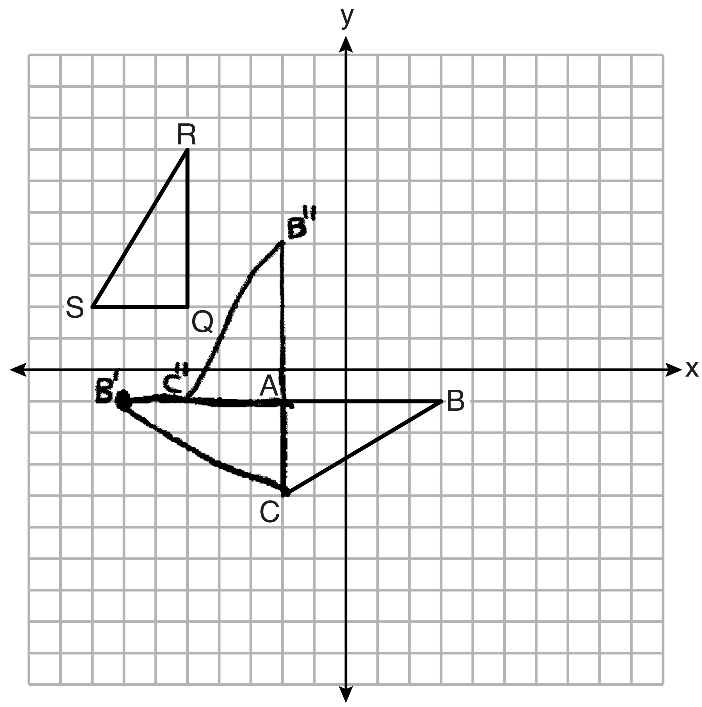


Describe a sequence of transformations that would map $\triangle ABC$ onto $\triangle QRS$.

- 90° counterclockwise rotation of $\triangle ABC$ on point A
- reflection across $x=3.5$
- translation of $(0,3)$

Score 1: The student wrote an incorrect line of reflection.

28 On the set of axes below, $\triangle ABC$ is graphed with coordinates $A(-2,-1)$, $B(3,-1)$, and $C(-2,-4)$. Triangle QRS, the image of $\triangle ABC$, is graphed with coordinates $Q(-5,2)$, $R(-5,7)$, and $S(-8,2)$.



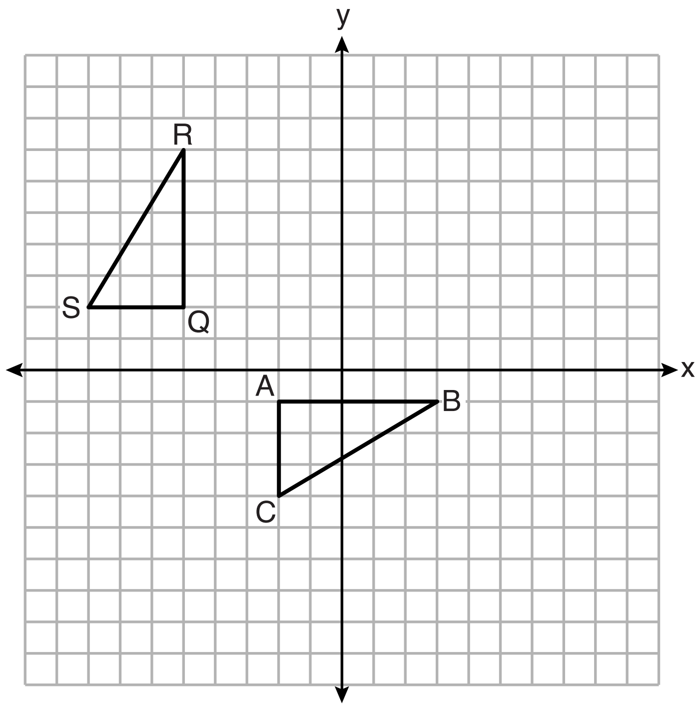
Describe a sequence of transformations that would map $\triangle ABC$ onto $\triangle QRS$.

Reflection
↓ Rotation
↓ Translation

Score 1: The student demonstrated the sequence graphically and wrote an appropriate sequence of transformations, but no specific description was written.

Question 28

28 On the set of axes below, $\triangle ABC$ is graphed with coordinates $A(-2,-1)$, $B(3,-1)$, and $C(-2,-4)$. Triangle QRS, the image of $\triangle ABC$, is graphed with coordinates $Q(-5,2)$, $R(-5,7)$, and $S(-8,2)$.



Describe a sequence of transformations that would map $\triangle ABC$ onto $\triangle QRS$.

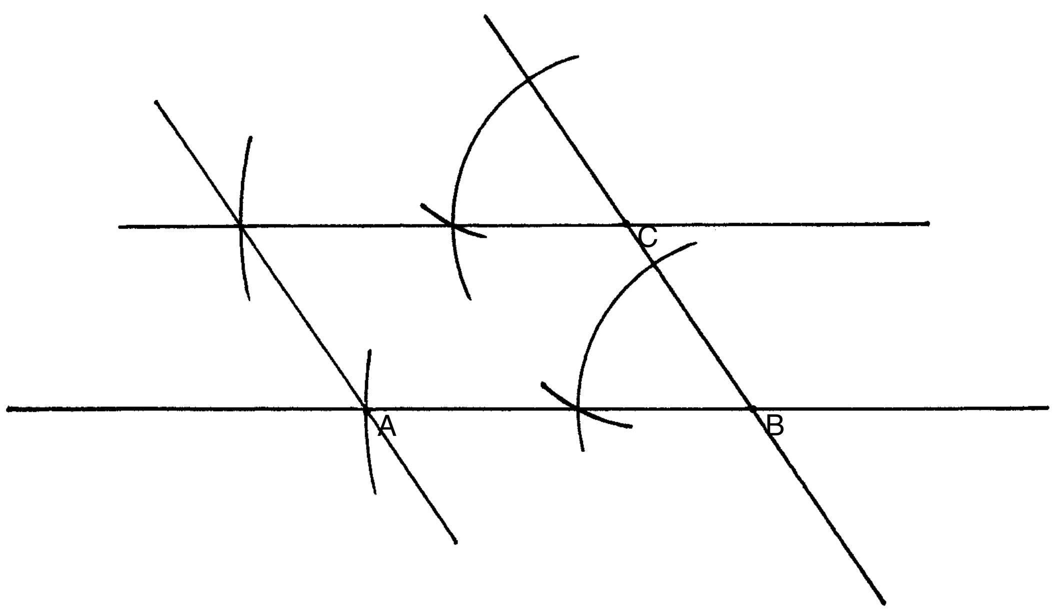
reflection over X axis

Score 0: The student wrote an incomplete description of a sequence of transformations.

Question 29

29 Given points A, B, and C, use a compass and straightedge to construct point D so that $ABCD$ is a parallelogram.

[Leave all construction marks.]

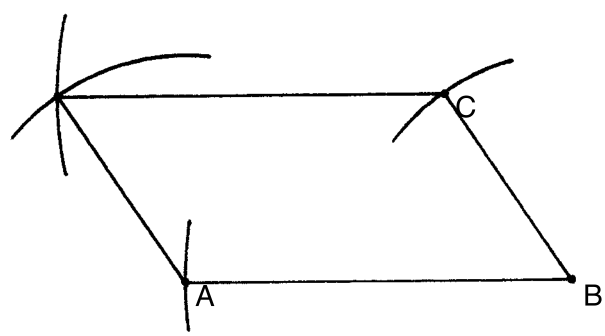


Score 2: The student gave a complete and correct response.

Question 29

29 Given points A, B, and C, use a compass and straightedge to construct point D so that $ABCD$ is a parallelogram.

[Leave all construction marks.]

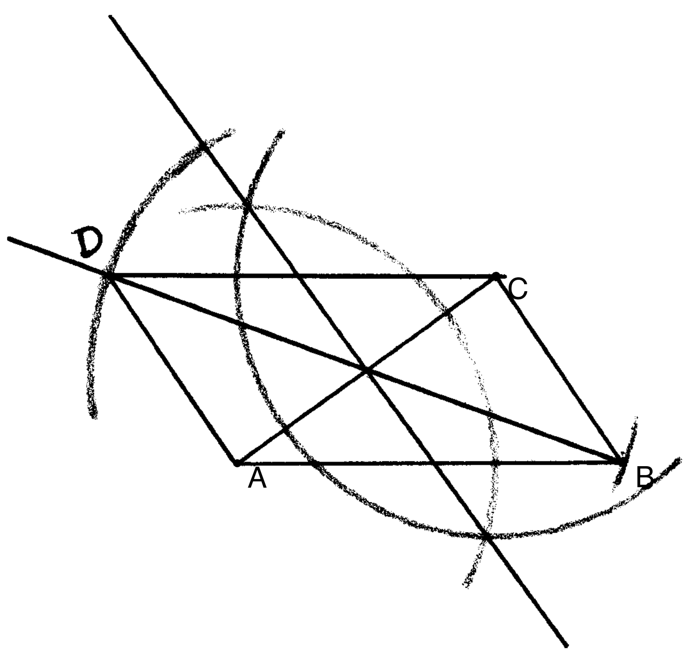


Score 2: The student gave a complete and correct response.

Question 29

29 Given points A, B, and C, use a compass and straightedge to construct point D so that $ABCD$ is a parallelogram.

[Leave all construction marks.]

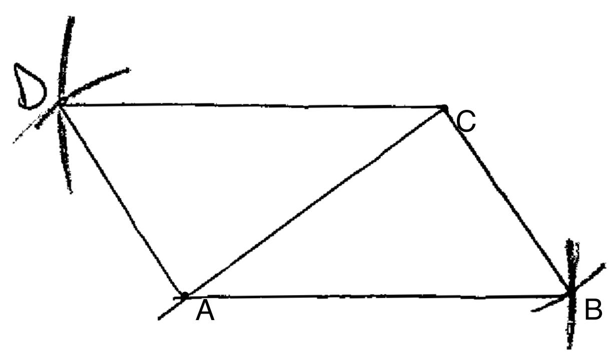


Score 2: The student gave a complete and correct response.

Question 29

29 Given points A, B, and C, use a compass and straightedge to construct point D so that $ABCD$ is a parallelogram.

[Leave all construction marks.]

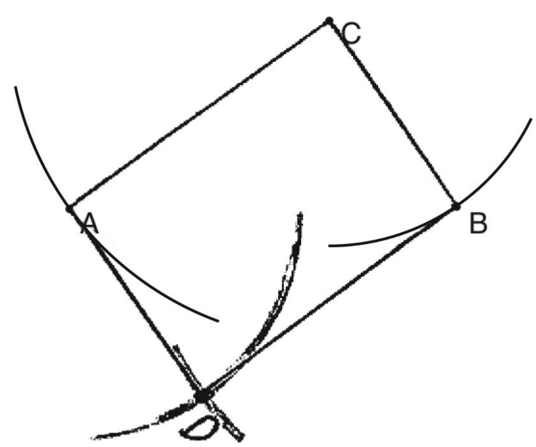


Score 2: The student gave a complete and correct response.

Question 29

29 Given points A, B, and C, use a compass and straightedge to construct point D so that $ABCD$ is a parallelogram.

[Leave all construction marks.]

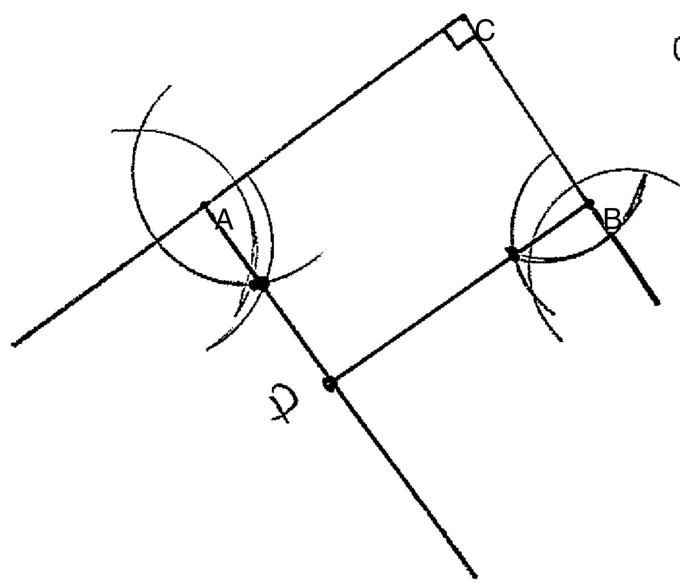


Score 1: The student constructed parallelogram $ADBC$ instead of parallelogram $ABCD$.

Question 29

29 Given points A, B, and C, use a compass and straightedge to construct point D so that $ABCD$ is a parallelogram.

[Leave all construction marks.]



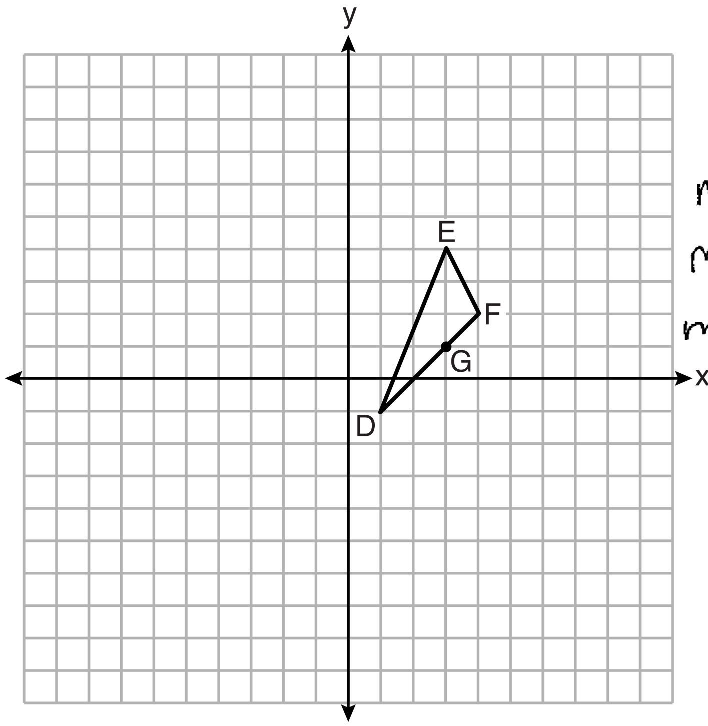
Create 2
⊥ lines
from pnt
A and B, intersect
at D

Score 0: The student made an error by constructing $ADBC$ and made an incorrect assumption that $m\angle C = 90°$.

Question 30

30 On the set of axes below, $\triangle DEF$ has vertices at the coordinates $D(1,-1)$, $E(3,4)$, and $F(4,2)$, and point G has coordinates $(3,1)$. Owen claims the median from point E must pass through point G.

Is Owen correct? Explain why.



$\overline{DF}$

$m = \left(\frac{x_1+x_2}{2}, \frac{y_1+y_2}{2}\right)$

$m = \left(\frac{1+4}{2}, \frac{-1+2}{2}\right)$

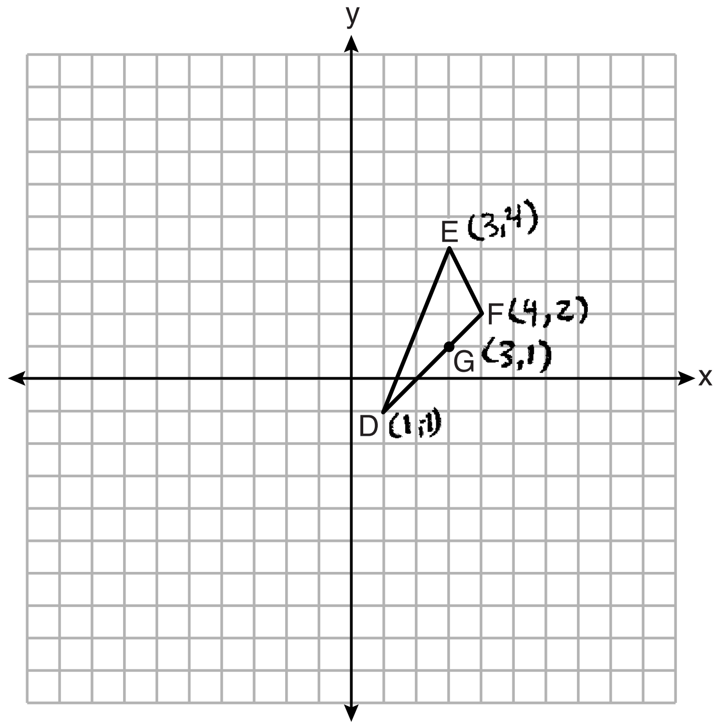
$m = \left(\frac{5}{2}, \frac{1}{2}\right)$

No, a median from point E would intersect the midpoint of $\overline{DF}$. The midpoint of $\overline{DF}$ is $(5/2, 1/2)$, not point G (3,1)

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

30 On the set of axes below, $\triangle DEF$ has vertices at the coordinates $D(1,-1)$, $E(3,4)$, and $F(4,2)$, and point G has coordinates $(3,1)$. Owen claims the median from point E must pass through point G.

Is Owen correct? Explain why.



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

$d\,\overline{DG} = \sqrt{(3-1)^2+(1++1)^2}$

$d\,\overline{DG} = \sqrt{4+4}$

$d\,\overline{DG} = \sqrt{8}$

$d\,\overline{DG} = 2\sqrt{2}$

$d\,\overline{FG} = \sqrt{(3-4)^2+(1-2)^2}$

$d\,\overline{FG} = \sqrt{1+1}$

$d\,\overline{FG} = \sqrt{2}$

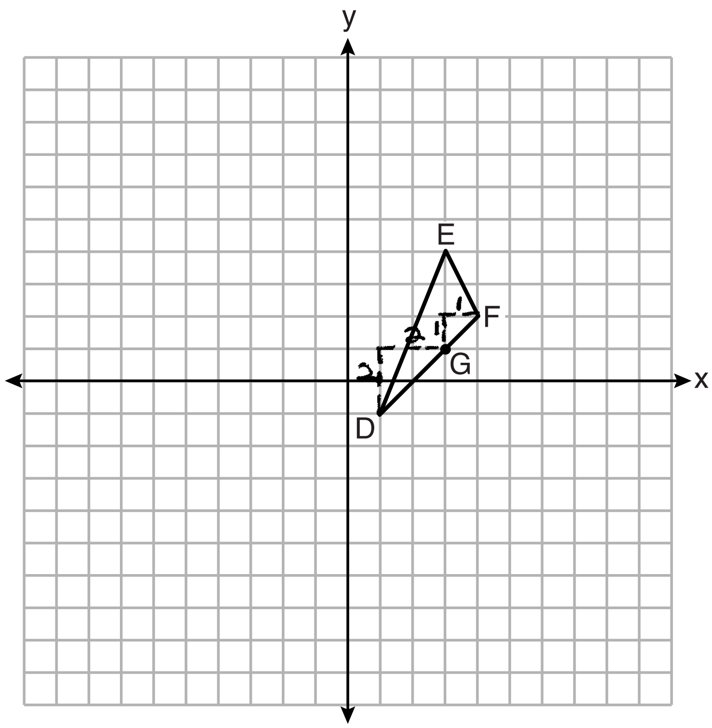
Owen is not correct the median intersects at the midpoint of the segment opposite the < its coming from Using distance formula I found that the distance of $\overline{DG} = 2\sqrt{2}$ and the distance of $\overline{FG}$ is $\sqrt{2}$ they are not equal ∴ G is not the midpoint.

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

Question 30

30 On the set of axes below, $\triangle DEF$ has vertices at the coordinates $D(1,-1)$, $E(3,4)$, and $F(4,2)$, and point G has coordinates $(3,1)$. Owen claims the median from point E must pass through point G.

Is Owen correct? Explain why.



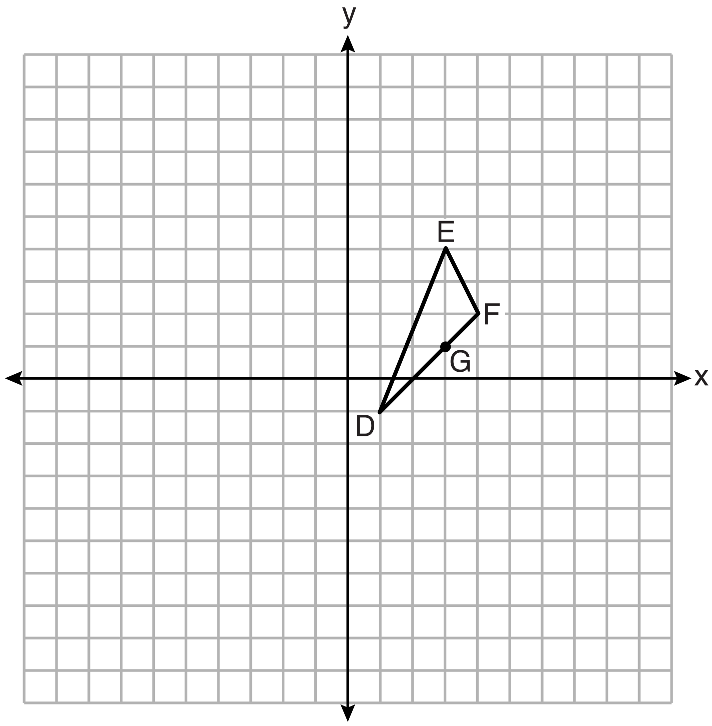
Owen is incorrect. G is not the midpoint of $\overline{DF}$ so $\overline{EG}$ would not be a median.

Score 2: The student gave a complete and correct response. The student supported their claim graphically that G is not the midpoint.

Question 30

30 On the set of axes below, $\triangle DEF$ has vertices at the coordinates $D(1,-1)$, $E(3,4)$, and $F(4,2)$, and point G has coordinates $(3,1)$. Owen claims the median from point E must pass through point G.

Is Owen correct? Explain why.



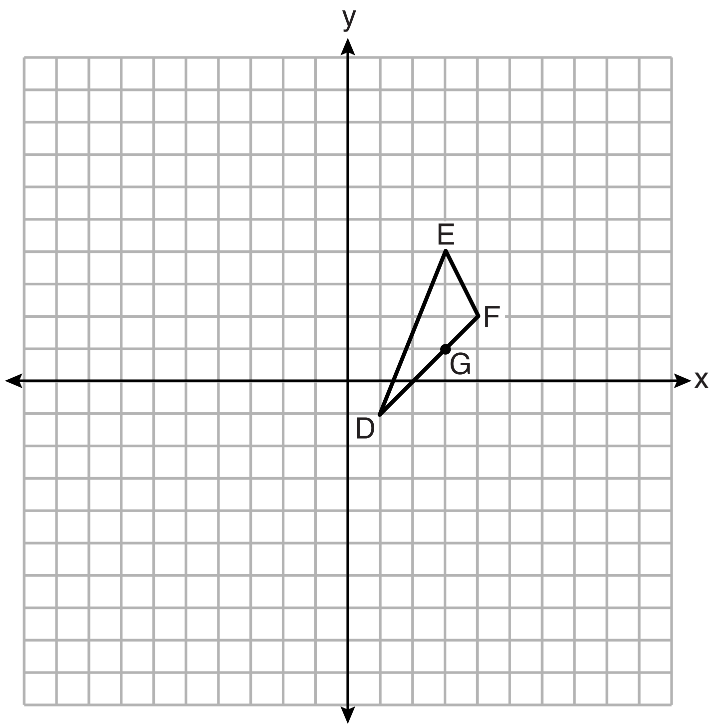
Owen is incorrect, the median from point E must pass through the midpoint of $\overline{DF}$ and G is not the midpoint.

Score 1: The student did not support their claim that point G is not the midpoint.

Question 30

30 On the set of axes below, $\triangle DEF$ has vertices at the coordinates $D(1,-1)$, $E(3,4)$, and $F(4,2)$, and point G has coordinates $(3,1)$. Owen claims the median from point E must pass through point G.

Is Owen correct? Explain why.



$m\overline{DE} = 5/2$

$m\overline{EF} = -2$

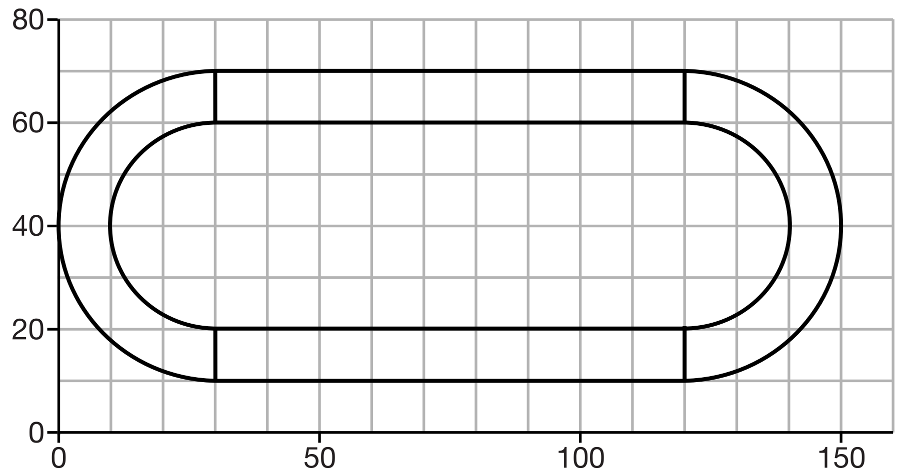
$m\overline{DF} = 1$

he is incorrect because $\overline{EF}$ and $\overline{ED}$ do not have opposite slopes, so because of that, G would not be on the line that would be the median for E.

Score 0: The student did not show enough correct relevant work to receive any credit.

Question 31

31 A walking path at a local park is modeled on the grid below where the length of each grid square is 10 feet. The town needs to submit paperwork to pave the walking path. Determine and state, to the *nearest square foot*, the area of the walking path.



$A = Lw$
$= 90 \cdot 60$
$= 5400$

$A = Lw$
$= 90 \cdot 40$
$= 3600$

$A = 1800$

$A = \pi r^2$
$= \pi \cdot 30^2$
$= 900\pi$

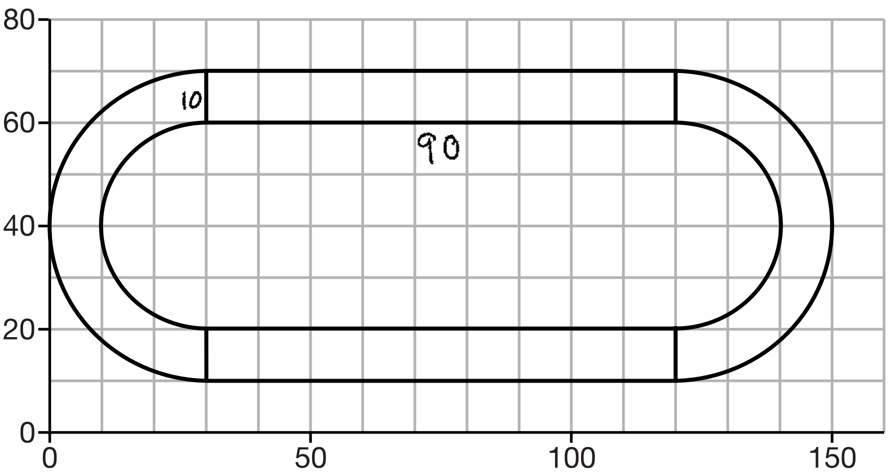
$A = \pi r^2$
$= \pi 20^2$
$= 400\pi$

$A = 500\pi$
$= 1570.79$

$A = 1800 + 1570.79$
$= 3371 \text{ ft}^2$

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

31 A walking path at a local park is modeled on the grid below where the length of each grid square is 10 feet. The town needs to submit paperwork to pave the walking path. Determine and state, to the *nearest square foot*, the area of the walking path.



Rectangles $= A = 2(b \cdot h)$

$= 2(90 \cdot 10)$

$= 2(900)$

$A = 1800$

Lg curve

$A = \frac{1}{2}\pi r^2$

$= \frac{1}{2}\pi 3^2$

$= \frac{1}{2}\pi 9$

$A = 4.5\pi$

Sm curve

$A = \frac{1}{2}\pi r^2$

$= \frac{1}{2}\pi 2^2$

$= \frac{1}{2}\pi 4$

$A = 2\pi$

4.5π
$- 2\pi$
2.5π

$2(2.5\pi) = 5\pi$

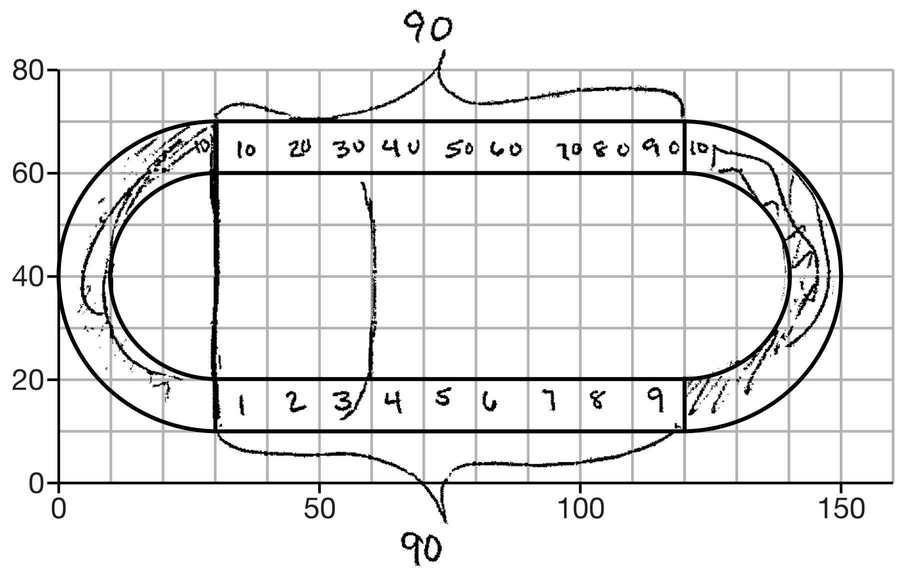
$A = 1800 + 5\pi$

$\approx 1815.707\ldots$

$A \approx 1816 \text{ ft}^2$

Score 1: The student made a scale error in determining the radii of the two concentric circles.

31 A walking path at a local park is modeled on the grid below where the length of each grid square is 10 feet. The town needs to submit paperwork to pave the walking path. Determine and state, to the *nearest square foot*, the area of the walking path.



$A = lw$

$A = 90 \cdot 10$

$A = 900(2)$

$A = \frac{\pi r^2}{2}$

$A = \pi \cdot 30^2$

$A = 900\pi$

$A \approx \frac{2826}{2}$

$A \approx 1413$

$A = \pi r^2$

$A = \pi \cdot 20^2$

$A = 400\pi$

$A \approx \frac{1256}{2}$

$A \approx 628$

$A \approx 1413 - 628 = 785$

$A = 785(2)$

$A = 1570$

$1800 + 1570 = 3370$

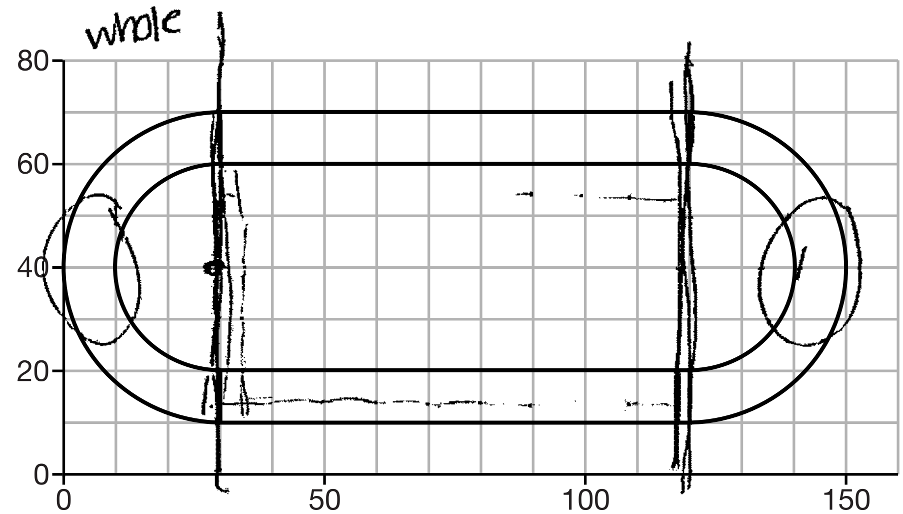
$900 + 900 = 1800$

$A = 3370 \text{ ft}^2$

Score 1: The student rounded incorrectly by using π = 3.14, which resulted in an incorrect final answer.

Question 31

31 A walking path at a local park is modeled on the grid below where the length of each grid square is 10 feet. The town needs to submit paperwork to pave the walking path. Determine and state, to the *nearest square foot*, the area of the walking path.



whole — inside

πr^2 − πr^2 $\quad$ $l \cdot w$ − $l \cdot w$

$\pi 30^2$ $\quad$ $\pi 20^2$ $\quad$ $90 \cdot 60$ $\quad$ $90 \cdot 50$

900π − 400π $\quad$ 5400 − 4500

500π + $900 = 2470.80$

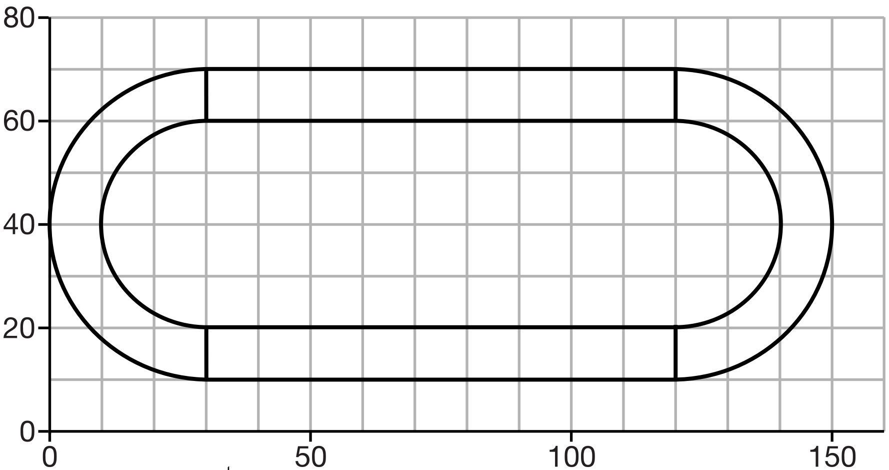
The area of the walk way is

2,470 ft²

Score 1: The student found the correct areas of the two concentric circles.

Question 31

31 A walking path at a local park is modeled on the grid below where the length of each grid square is 10 feet. The town needs to submit paperwork to pave the walking path. Determine and state, to the *nearest square foot*, the area of the walking path.



Semicircle

$A = \frac{1}{2}\pi r^2$

$A = \frac{1}{2}\pi 30^2$

$A = \frac{1}{2} 900\pi$

$A = 450\pi$

Semicircle

$A = \frac{1}{2}\pi r^2$

$A = \frac{1}{2}\pi 20^2$

$A = \frac{1}{2} 400\pi$

$A = 200\pi$

Rectangle

$A = 90 \times 10$

$A = 900$

$A = 450\pi - 200\pi$

$A = 250\pi$

$A = 250\pi + 900$

$A = 785.398 + 900$

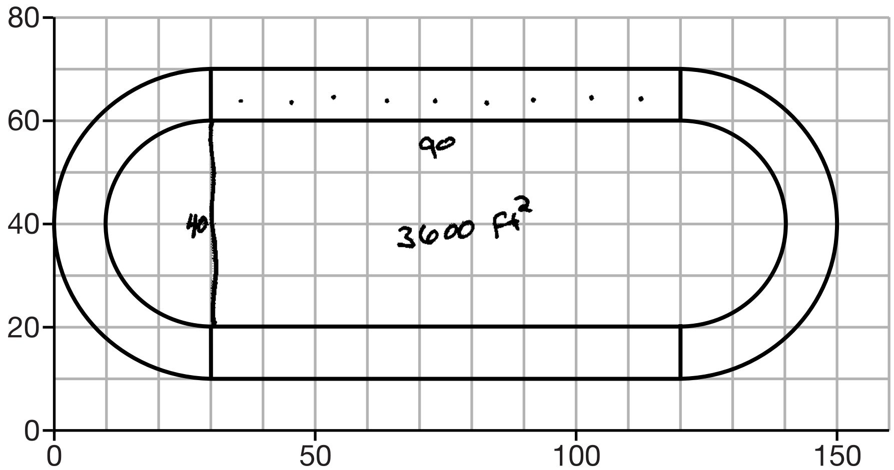
$A = 1685.398$

$A = 1685 \text{ ft}^2$

Score 1: The student found the correct areas of two concentric semicircles.

Question 31

31 A walking path at a local park is modeled on the grid below where the length of each grid square is 10 feet. The town needs to submit paperwork to pave the walking path. Determine and state, to the *nearest square foot*, the area of the walking path.



$A = \pi(20)^2$

$A = 1256.64$

$A = \pi(30)^2$

$A = 2827.43$

180

$2827.43 - 1256.64 = 1570.79$

$3600 \text{ ft} - 180 = 3420$

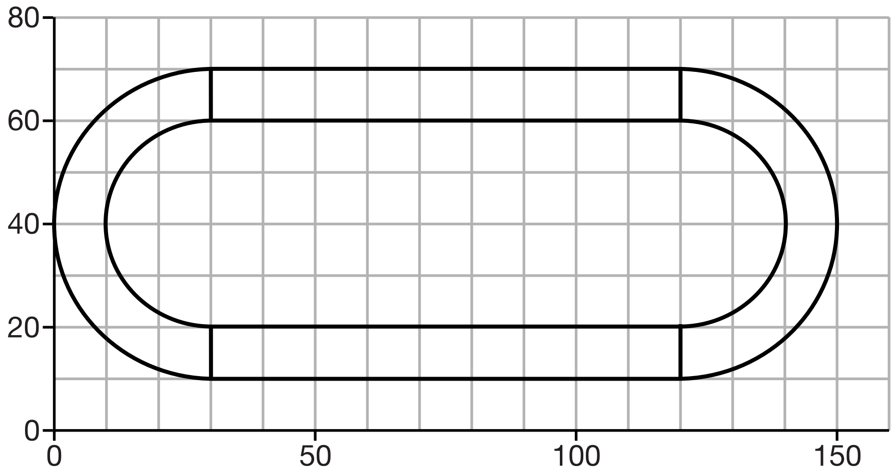
$3420 + 1570.79 = 4990.79$

~~4990~~ 4991 ft²

Score 1: The student found appropriate areas of the two concentric circles.

Question 31

31 A walking path at a local park is modeled on the grid below where the length of each grid square is 10 feet. The town needs to submit paperwork to pave the walking path. Determine and state, to the *nearest square foot*, the area of the walking path.



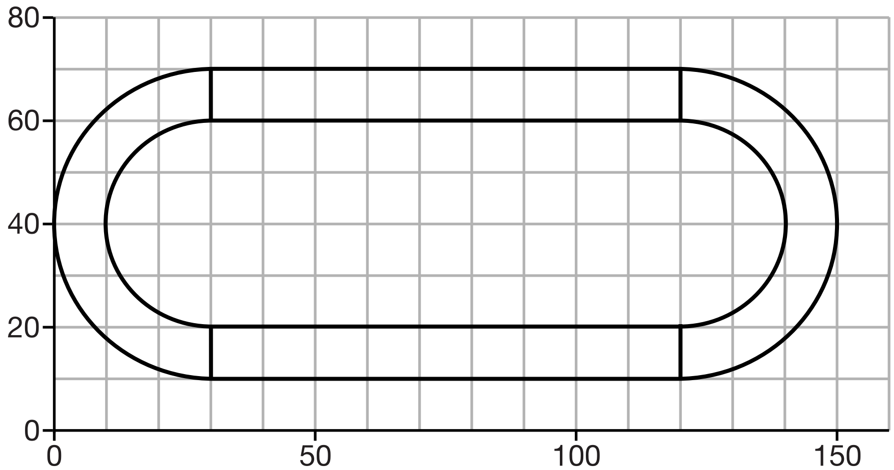
Rectangles: $90 \cdot 10 = 900 \cdot 2 = 18000 \text{ ft}^2$

Circle $= \pi r^2 = \pi \cdot 30^2 = 900\pi$

Score 0: The student did not show enough correct relevant work to receive any credit.

Question 31

31 A walking path at a local park is modeled on the grid below where the length of each grid square is 10 feet. The town needs to submit paperwork to pave the walking path. Determine and state, to the *nearest square foot*, the area of the walking path.



$90(10)(2) = 1800$

Score 0: The student did not show enough correct relevant work to receive any credit.

Question 32

32 A triangle has vertices $A(-2,4)$, $B(6,2)$, and $C(1,-1)$.

Prove that $\triangle ABC$ is an isosceles right triangle.
[The use of the set of axes below is optional.]

$$d_{\overline{AC}} = \sqrt{(1--2)^2+(-1-4)^2} = \sqrt{3^2+(-5)^2} = \sqrt{9+25} = \sqrt{34}$$

$$d_{\overline{AB}} = \sqrt{(6--2)^2+(2-4)^2} = \sqrt{8^2+(-2)^2} = \sqrt{64+4} \quad \sqrt{68}$$

$$d_{\overline{BC}} = \sqrt{(1-6)^2+(-1-2)^2} = \sqrt{(-5)^2+(-3)^2} = \sqrt{25+9} = \sqrt{34}$$

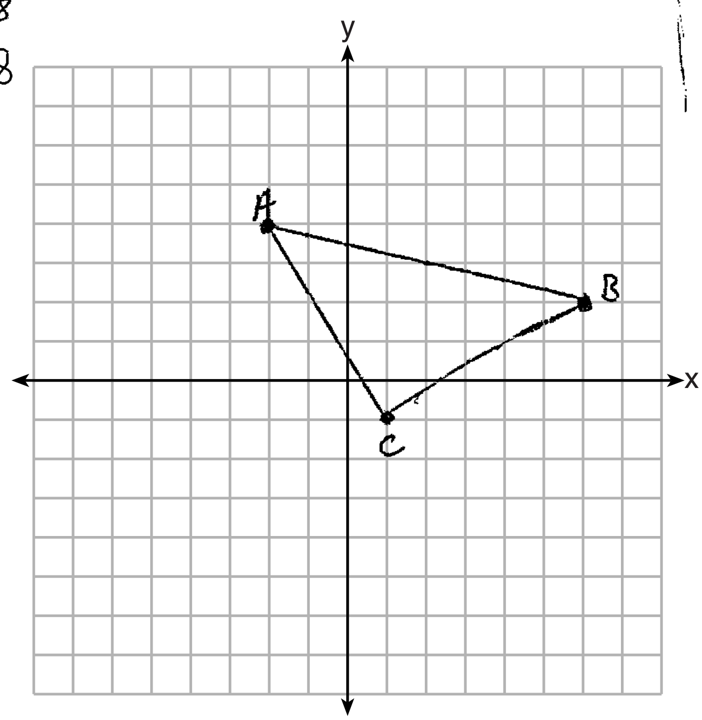
$\overline{AC} \cong \overline{BC}$

$(\sqrt{34})^2 + (\sqrt{34})^2 = (\sqrt{68})^2$

$34+34=68$

$68=68$

1. $\overline{AC} \cong \overline{BC}$	1. distance formula
2. $\triangle ABC$ is a r$\triangle$	2. r$\triangle$s work with the pythag. theorem.
3. $\triangle ABC$ is isos.	3. Isos. $\triangle$ have two congruent sides



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

Question 32

32 A triangle has vertices $A(-2,4)$, $B(6,2)$, and $C(1,-1)$.

Prove that $\triangle ABC$ is an isosceles right triangle.
[The use of the set of axes below is optional.]

$m_{\overline{AC}} = \frac{-1-4}{1-2} = \frac{-5}{3}$

$m_{\overline{BC}} = \frac{-1-2}{1-6} = \frac{-3}{-5} = \frac{3}{5}$

∴ neg. reciprocal slopes

∴ $\overline{AC} \perp \overline{BC}$

∴ $\measuredangle C$ is a rt $\measuredangle$

∴ $\triangle ABC$ is a rt $\triangle$ since it has a rt $\measuredangle$ at C.

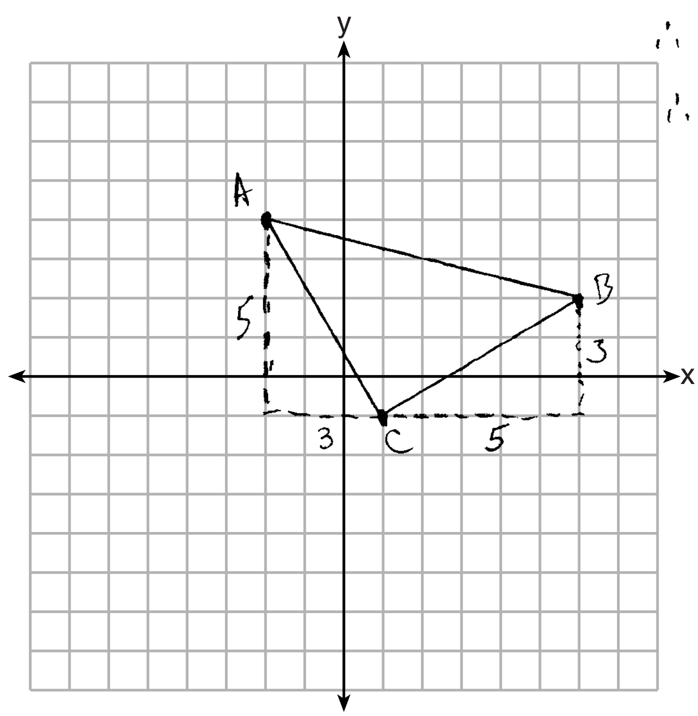
$AC = \sqrt{(-2-1)^2+(4--1)^2} = \sqrt{(-3)^2+(5)^2} = \sqrt{34}$

$BC = \sqrt{(6-1)^2+(2-1)^2} = \sqrt{5^2+3^2} = \sqrt{34}$

∴ $AC = BC$

∴ $\triangle ABC$ has 2 $\cong$ sides

∴ $\triangle ABC$ is an isosceles $\triangle$



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

Question 32

32 A triangle has vertices $A(-2,4)$, $B(6,2)$, and $C(1,-1)$.

Prove that $\triangle ABC$ is an isosceles right triangle.
[The use of the set of axes below is optional.]

I WILL PROVE $\triangle ABC$ AN ISOSCELES RIGHT TRIANGLE USING SLOPE + DISTANCE FORMULAS.

$m(\overline{AC})$: $d = \sqrt{(1--2)^2+(-1-4)^2} = \sqrt{34}$

$m(BC)$: $d = \sqrt{(1-6)^2+(-1-2)^2} = \sqrt{34}$

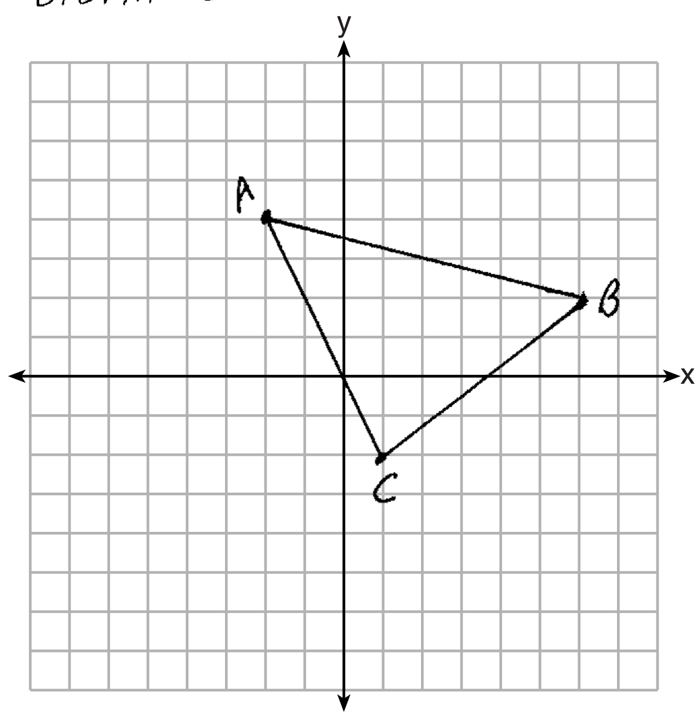
slope $\overline{AC}$: $\frac{-1-4}{1--2} = \frac{-5}{3}$

slope $\overline{BC}$: $\frac{-1-2}{1-6} = \frac{-3}{-5} = \frac{3}{5}$

$\overline{AC} \perp \overline{BC}$ b/c SLOPES ARE OPPOSITE, +

$\overline{AC} \cong BC$ b/c DISTANCE IS THE SAME.

THEREFORE, $\triangle ABC$ IS AN ISOSCELES RIGHT TRIAGLE.



Score 3: The student wrote an incomplete conclusion when proving $\triangle ABC$ is a right triangle. The student's proof does not rely on the graph, therefore the graphing error is not penalized.

Question 32

32 A triangle has vertices $A(-2,4)$, $B(6,2)$, and $C(1,-1)$.

Prove that $\triangle ABC$ is an isosceles right triangle.
[The use of the set of axes below is optional.]

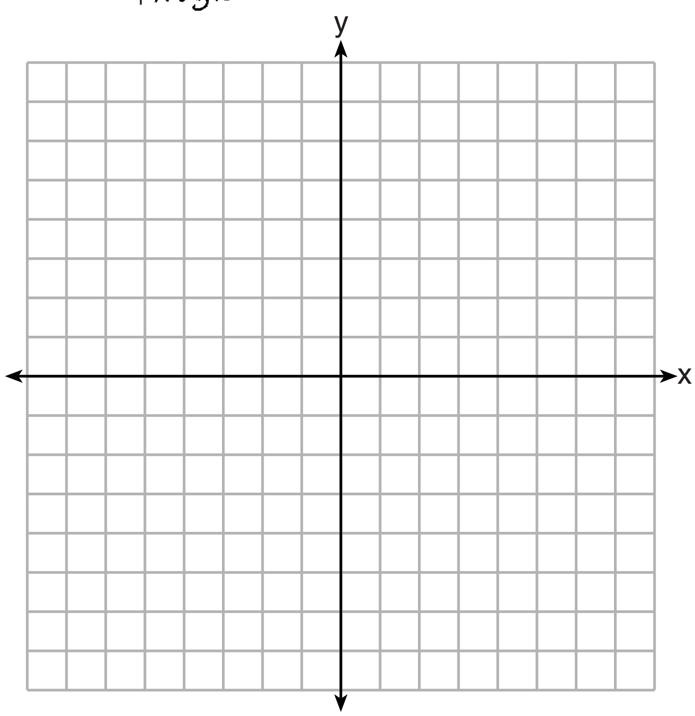
$(-2,4)\ (6,2)$
$d=\sqrt{(x_2-x_1)^2+(y_2-y_1)^2}$
$d=\sqrt{(6+2)^2+(2-4)^2}$
$d=\sqrt{(8)^2+(-2)^2}$
$d=\sqrt{64+4}$
$d=\sqrt{68}$

$(1,-1)\ (6,2)$
$d=\sqrt{(x_2-x_1)^2+(y_2-y_1)^2}$
$d=\sqrt{(6-1)^2+(2+1)^2}$
$d=\sqrt{5^2+3^2}$
$d=\sqrt{25+9}$
$d=\sqrt{34}$

$(-2,4)\ (1,-1)$
$d=\sqrt{(x_2-x_1)^2+(y_2-y_1)^2}$
$d=\sqrt{(1+2)^2+(-1-4)^2}$
$d=\sqrt{3^2+(-5)^2}$
$d=\sqrt{9+25}$
$d=\sqrt{34}$

$\overline{AB}=\sqrt{68}$
$\overline{AC}=\sqrt{34}$
$\overline{BC}=\sqrt{34}$

Since the distances of $\overline{AC}$ and $\overline{BC}$ are equal, and $\overline{AB}$ is different in value, Triangle ABC must be isosceles.



Score 2: The student correctly proved $\triangle ABC$ is isosceles, but no further correct work was shown.

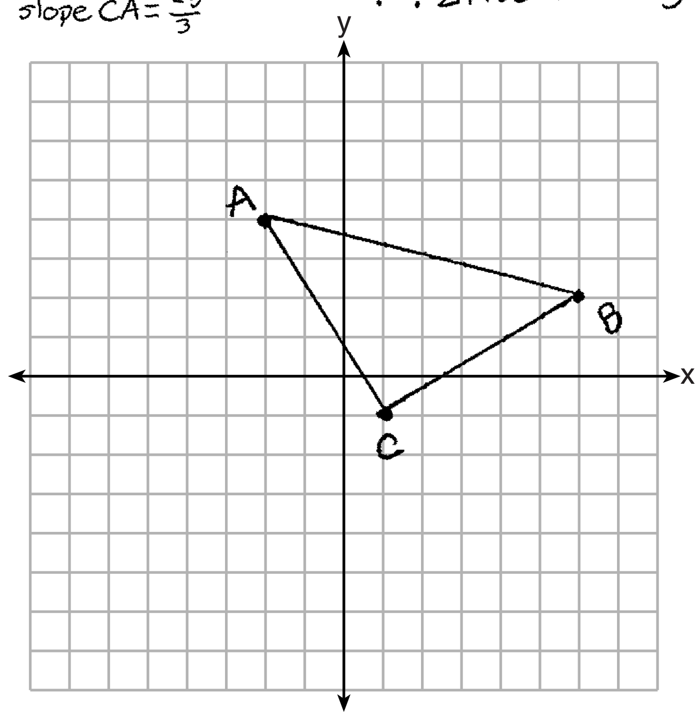
Question 32

32 A triangle has vertices $A(-2,4)$, $B(6,2)$, and $C(1,-1)$.

Prove that $\triangle ABC$ is an isosceles right triangle.
[The use of the set of axes below is optional.]

slope $\overline{AB} = \frac{\Delta y}{\Delta x}$
$= \frac{4-2}{-2-6}$
$= \frac{2}{-8}$
slope $\overline{AB} = \frac{-1}{4}$
slope $\overline{BC} = \frac{\Delta y}{\Delta x}$
$= \frac{2--1}{6-1}$
slope $\overline{BC} = \frac{3}{5}$
slope $\overline{CA} = \frac{\Delta y}{\Delta x}$
$= \frac{-1-4}{1--2}$
slope $\overline{CA} = \frac{-5}{3}$

Conclusion:
Using the slope formula:
slope $\overline{AB} = \frac{-1}{4}$, slope $\overline{BC} = \frac{3}{5}$
slope $\overline{CA} = \frac{-5}{3}$
If two lines have negative reciprocal slopes, then they are $\perp$
$\therefore \overline{CA} \perp \overline{BC}$
If two $\perp$ lines intersect, then they form a right $\angle$
$\therefore \angle C$ is a right $\angle$
If a triangle has one right $\angle$, then it is a right Δ
$\therefore \Delta ABC$ is a right Δ



Score 2: The student correctly proved $\triangle ABC$ is a right triangle, but no further correct work was shown.

Question 32

32 A triangle has vertices $A(-2,4)$, $B(6,2)$, and $C(1,-1)$.

Prove that $\triangle ABC$ is an isosceles right triangle.
[The use of the set of axes below is optional.]

I will prove ΔABC an isosceles right triangle using slope & distance formulas.

$\overline{AC}$: $\frac{-1-4}{1--2} = \boxed{\frac{-5}{3}}$

$\overline{BC}$: $\frac{-1-2}{1-6}$ $\frac{-3}{-5} = \boxed{\frac{3}{5}}$

$\overline{AC}$: $d = \sqrt{(1--2)^2+(-1-4)^2}$

$d = \sqrt{9+25}$

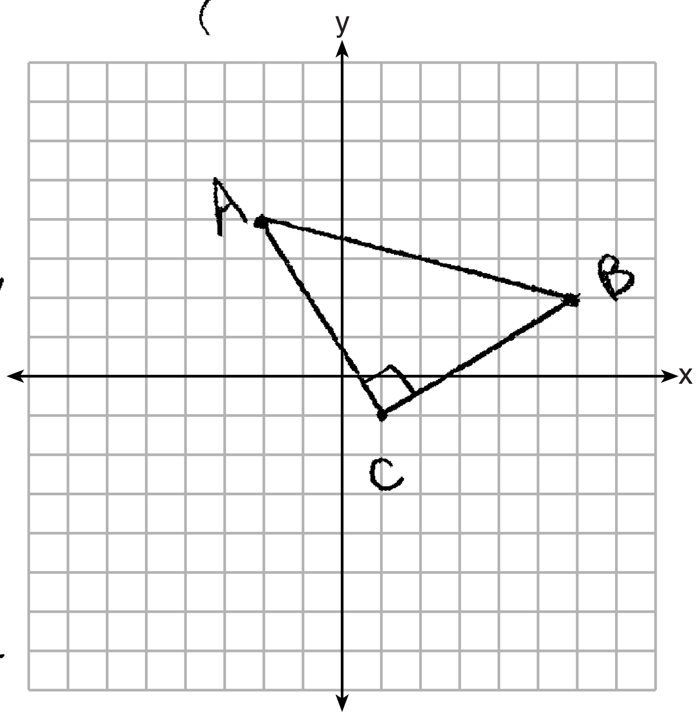
$d = \sqrt{34}$

$\overline{BC}$: $d = \sqrt{(1-6)^2+(-1-2)^2}$

$d = \sqrt{25+9}$

$d = \sqrt{34}$

$\overline{AC} \perp \overline{BC}$ b/c slopes are opposite reciprocal, & $\overline{AC} \parallel \overline{BC}$ b/c distance is the same. therefore, ΔABC is a isosceles right triangle



Score 2: The student wrote one incomplete conclusion and one incorrect conclusion.

32 A triangle has vertices $A(-2,4)$, $B(6,2)$, and $C(1,-1)$.

Prove that $\triangle ABC$ is an isosceles right triangle.
[The use of the set of axes below is optional.]

AB

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

$\sqrt{68}$

$\sqrt{4}\sqrt{17}$

$2\sqrt{17}$

BC

$D = \sqrt{(6-1)^2+(2--1)^2}$

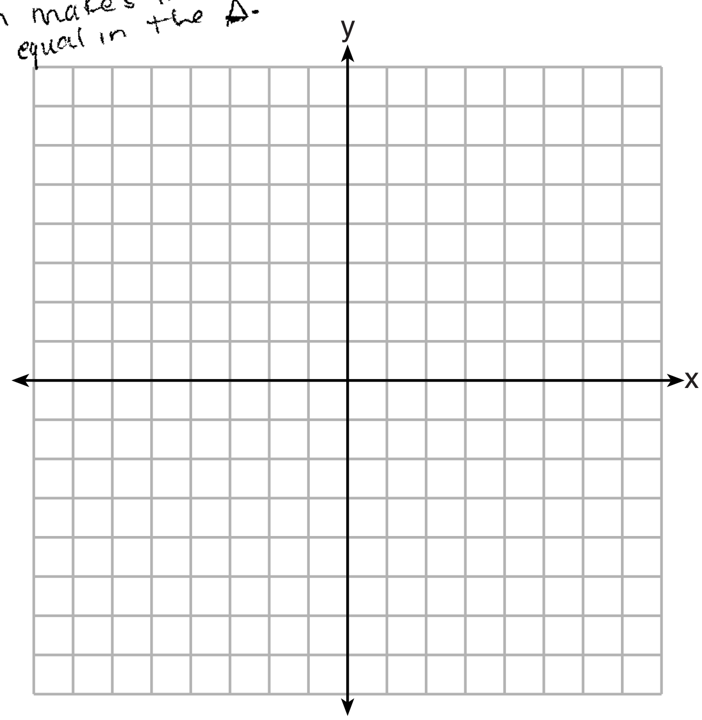
$\sqrt{34}$

AC

$D = \sqrt{(-2-1)^2+(4--1)^2}$

$\sqrt{34}$

$\overline{AC}$ & $\overline{BC}$ has the same distance, which makes two sides equal in the Δ.



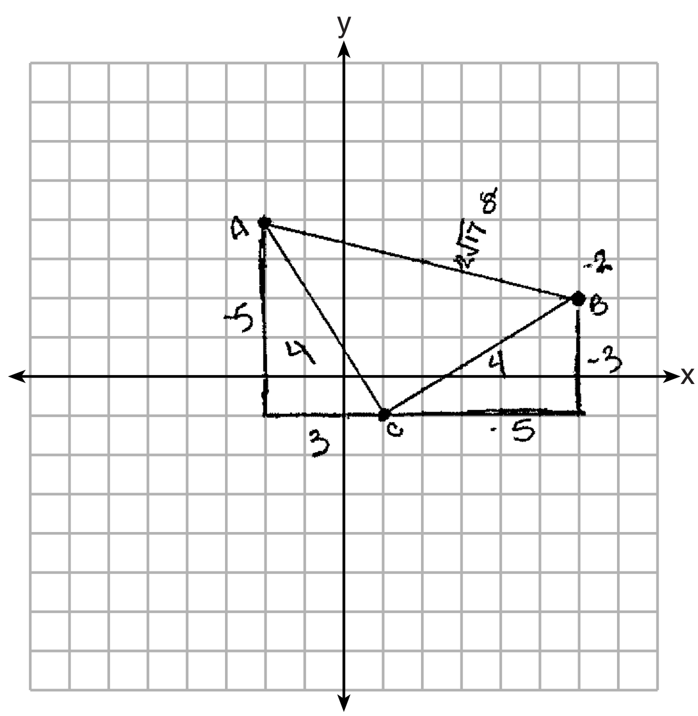
Score 1: The student wrote an incomplete conclusion when proving $\triangle ABC$ is isosceles. No further correct work was shown.

Question 32

32 A triangle has vertices $A(-2,4)$, $B(6,2)$, and $C(1,-1)$.

Prove that $\triangle ABC$ is an isosceles right triangle.
[The use of the set of axes below is optional.]

$\triangle ABC$ is an isosceles right triangle because $\overline{AC} \cong \overline{BC}$, they have the same length of 4. $\overline{AC}$ and $\overline{BC}$ make up a 90° angle. So $\triangle ABC$ is an isosceles right triangle.



Score 1: The student used a Pythagorean Triple incorrectly, but made an appropriate conclusion. No further correct work was shown.

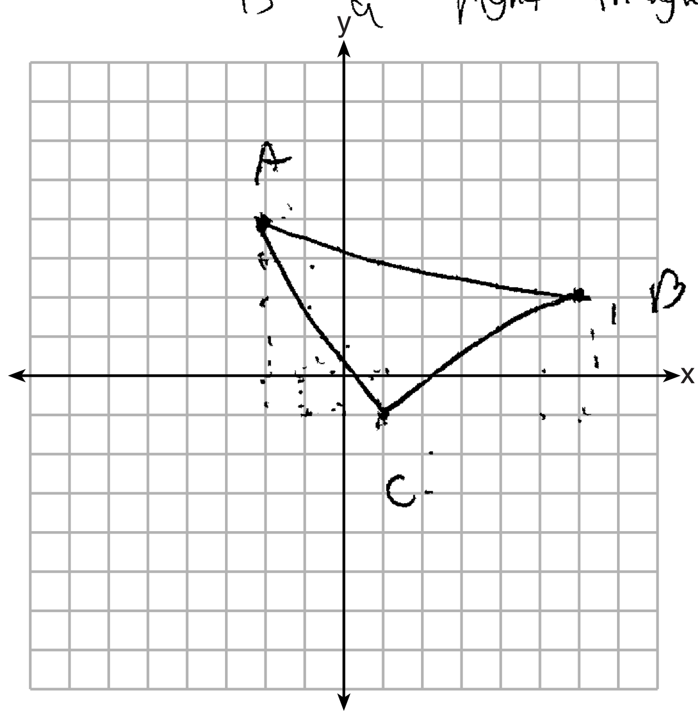
Question 32

32 A triangle has vertices $A(-2,4)$, $B(6,2)$, and $C(1,-1)$.

Prove that $\triangle ABC$ is an isosceles right triangle.
[The use of the set of axes below is optional.]

Slope formula AC: the slope is (3,5)
Slope formula CB: the slope is (5,3)

When the slope's are opposite it means that the lines are perpidicular Meaning $\triangle$ ABC is a right triangle



Score 0: The student did not show enough correct relevant work to receive any credit.

Question 33

33 Theresa has a rectangular pool 30 ft long, 15 ft wide, and 4 ft deep. Theresa fills her pool using city water at a rate of \$3.95 per 100 gallons of water.

Nancy has a circular pool with a diameter of 24 ft and a depth of 4 ft. Nancy fills her pool with a water delivery service at a rate of \$200 per 6000 gallons.

3 ft 6 in = 3.5

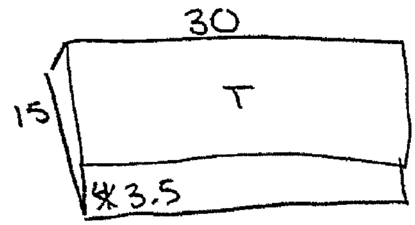
If Theresa and Nancy both fill their pools 6 inches from the top of the pool, determine and state who paid more to fill her pool. [1 ft^3 water = 7.48 gallons]

$V = l \times w \times h$

$V = 30 \times 15 \times 3.5$

$V = 1575 \text{ ft}^3 = 11781 \text{ g}$

$11781 \times .0395 = \$465.35$

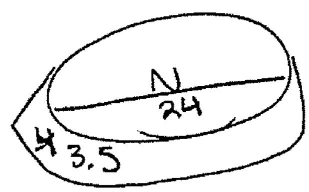


$V = \pi r^2 h$

$V = \pi 12^2 3.5$

$V = 1583.36 \text{ ft}^3 = 11843.55 \text{ g}$

$(\pi 12^2 3.5 \times 7.48) \times .03\overline{3} = \$394.79$



$\frac{3.95}{100} = 0.0395$ per g

$\frac{200}{6000} = .03\overline{3}$ per g

Theresa paid more to fill her pool than Nancy did.

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

Question 33

33 Theresa has a rectangular pool 30 ft long, 15 ft wide, and 4 ft deep. Theresa fills her pool using city water at a rate of \$3.95 per 100 gallons of water.

Nancy has a circular pool with a diameter of 24 ft and a depth of 4 ft. Nancy fills her pool with a water delivery service at a rate of \$200 per 6000 gallons.

If Theresa and Nancy both fill their pools 6 inches from the top of the pool, determine and state who paid more to fill her pool. [1 ft^3 water = 7.48 gallons]

$V=30(15)(3.5)$

$V=1575$

$1575(7.48)=11781$

$11781(3.95)\div 100$

\$465.35

$V=\pi 24^2(3.5)$

$V=2016\pi$

$2016\pi(7.48)=$

47374.21191

$$\frac{47374.21191(200)}{6000}$$

\$1579.14

Nancy

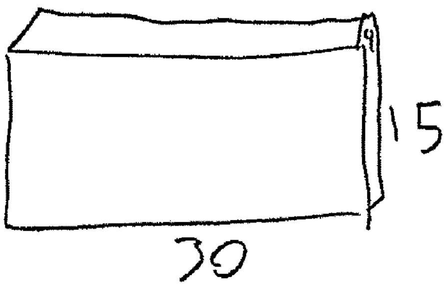
Score 3: The student used 24, the diameter, as the radius of Nancy's pool.

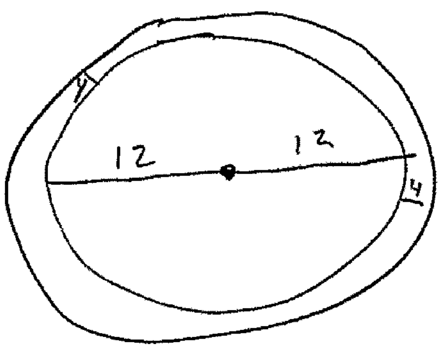
Question 33

33 Theresa has a rectangular pool 30 ft long, 15 ft wide, and 4 ft deep. Theresa fills her pool using city water at a rate of \$3.95 per 100 gallons of water.

Nancy has a circular pool with a diameter of 24 ft and a depth of 4 ft. Nancy fills her pool with a water delivery service at a rate of \$200 per 6000 gallons.

If Theresa and Nancy both fill their pools 6 inches from the top of the pool, determine and state who paid more to fill her pool. [1 ft^3 water = 7.48 gallons]





$30 \cdot 15 \cdot 4$

$1800 ft^3$

$1800 \cdot 7.84 = \dfrac{14112}{100}$

Theresa paid more

141.12×3.95

\$557.42

$4\pi r^2 h$

$4\pi(12)^2 \cdot 4$

$1809.5574 ft^3$

$1809.5574 \cdot 7.84 = \dfrac{14186.9300}{6000}$

$2.3645 \cdot 200$

\$472.90

Score 2: The student made an error in using 4 feet for the depth. The student made a transcription error by using 7.84 when converting to gallons.

Question 33

33 Theresa has a rectangular pool 30 ft long, 15 ft wide, and 4 ft deep. Theresa fills her pool using city water at a rate of \$3.95 per 100 gallons of water.

Nancy has a circular pool with a diameter of 24 ft and a depth of 4 ft. Nancy fills her pool with a water delivery service at a rate of \$200 per 6000 gallons.

If Theresa and Nancy both fill their pools 6 inches from the top of the pool, determine and state who paid more to fill her pool. [1 ft^3 water = 7.48 gallons]

Theresa rectangle
30 ft long
15 ft wide
4 ft deep
3.95 per 100 gallons

\$7110

Nancy circle
24 ft across
4 ft deep
200 per 6000 gallons

\$60.32

$V = Bh$
$V = (30)(15)(4)$
1800

$V = \pi r^2 h$
$V = \pi 12^2 (4)$
$V = 1809.557368$

Nancy's pool costed \$60.32.

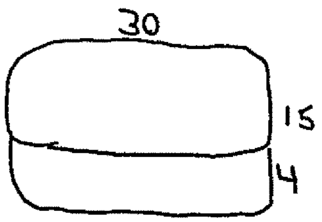
Score 1: The student found both volumes using 4 feet for the depth.

Question 33

33 Theresa has a rectangular pool 30 ft long, 15 ft wide, and 4 ft deep. Theresa fills her pool using city water at a rate of \$3.95 per 100 gallons of water.

Nancy has a circular pool with a diameter of 24 ft and a depth of 4 ft. Nancy fills her pool with a water delivery service at a rate of \$200 per 6000 gallons.

If Theresa and Nancy both fill their pools 6 inches from the top of the pool, determine and state who paid more to fill her pool. [1 ft^3 water = 7.48 gallons]



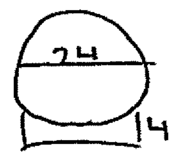
$V = l \cdot w \cdot h$

$V = 30 \cdot 15 \cdot 4$

$V = 1800$

$$\begin{array}{r} 1800 \\ \times 7.48 \\ \hline 13464 \end{array} \text{ gallons}$$

\$531.43



$V = \frac{1}{3}\pi r^2 h$

$V = \frac{1}{3}\pi (12)^2 (4)$

$V = \frac{1}{3}\pi\, 144 \cdot 4$

$V = \frac{1}{3}\pi\, 576$

$V = 192\pi$

$V = 603.14$

$$\begin{array}{r} 603.14 \\ \times\ 7.48 \\ \hline 4511.7464 \end{array}$$

Theresa paid more because her pool is bigger.

Score 1: The student made a conceptual error using the volume of a cone for the volume of the cylinder. The student made a computational error using 4 feet for the depth.

33 Theresa has a rectangular pool 30 ft long, 15 ft wide, and 4 ft deep. Theresa fills her pool using city water at a rate of \$3.95 per 100 gallons of water.

Nancy has a circular pool with a diameter of 24 ft and a depth of 4 ft. Nancy fills her pool with a water delivery service at a rate of \$200 per 6000 gallons.

If Theresa and Nancy both fill their pools 6 inches from the top of the pool, determine and state who paid more to fill her pool. [1 ft^3 water = 7.48 gallons]

$V = 30'(15')(3.5')$

$V = 1575\ ft^3$

$\#\ gallons = \frac{1575\ ft^3}{7.48} = 210.56\ gal.$

$Cost = 210.56(\$3.95)$

$Cost = \$831.72$

$V = \frac{1}{3}\pi(24')^2(3.5')$

$V = 2111.150623\ ft^3$

$\#\ gallons = \frac{2111.150625\ ft^3}{7.48}$

$= 282.23934\ gal.$

$Cost = \frac{\$56447.868}{6000}$

$= \$9.41$

Score 1: The student found the correct volume of water in one pool, but no further correct work was shown.

Question 33

33 Theresa has a rectangular pool 30 ft long, 15 ft wide, and 4 ft deep. Theresa fills her pool using city water at a rate of \$3.95 per 100 gallons of water.

Nancy has a circular pool with a diameter of 24 ft and a depth of 4 ft. Nancy fills her pool with a water delivery service at a rate of \$200 per 6000 gallons.

If Theresa and Nancy both fill their pools 6 inches from the top of the pool, determine and state who paid more to fill her pool. [1 ft^3 water = 7.48 gallons]

1,800

Theresa = 531.828

Nancy = 451.829

Theresa paid more to fill her pool because the depth of each pool would have been the same and when you compare volume to cost, Theresa paid ~~79~~.999

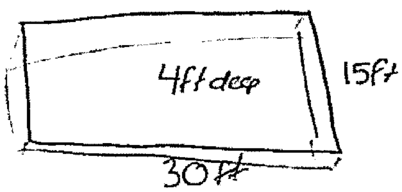
Score 0: The student did not show enough correct relevant work to receive any credit.

Question 33

33 Theresa has a rectangular pool 30 ft long, 15 ft wide, and 4 ft deep. Theresa fills her pool using city water at a rate of $3.95 per 100 gallons of water.

Nancy has a circular pool with a diameter of 24 ft and a depth of 4 ft. Nancy fills her pool with a water delivery service at a rate of $200 per 6000 gallons.

If Theresa and Nancy both fill their pools 6 inches from the top of the pool, determine and state who paid more to fill her pool. [1 ft^3 water = 7.48 gallons]



$V = Bh$

$V = 450(4)$

$V = 1800$

$7.48 \cdot 4 = 29.92g^3$

2678.4 ,57549

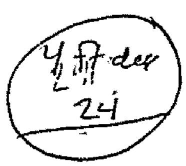
$3.95

$= 60.16042781$

~~237.6336898~~

$1057.990732

Theresa = $1057.99



$V = \frac{4}{3}\pi r^3$

$V = \frac{4}{3}\pi(12)^3$

$V = 4/3\,\pi(1728)$

$V = 7238.229474$

$7.48 \cdot 4 = 29.92g$

~~= 241.9194343~~

~~995.5817655~~

200

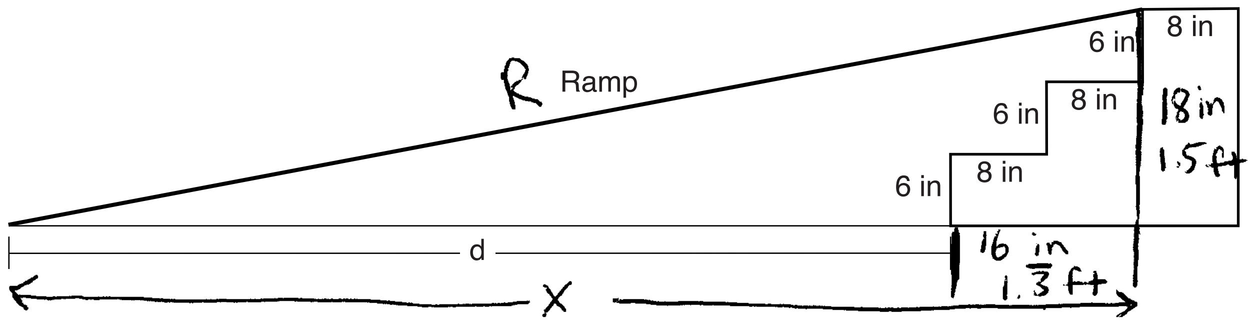
$892.815183

Nancy = $892.81

Teresa paid more to fill her pool.

Score 0: The student gave a completely incorrect response.

34 As modeled in the diagram below, an access ramp starts on flat ground and ends at the beginning of the top step. Each step is 6 inches tall and 8 inches deep.



If the angle of elevation of the ramp is 4.76°, determine and state the length of the ramp, to the *nearest tenth of a foot*.

$\sin 4.76 = \frac{1.5}{R}$

$R = \frac{1.5}{\sin 4.76}$ $\quad R = 18.07617886$

18.1

Determine and state, to the *nearest tenth of a foot*, the horizontal distance, *d*, from the bottom of the stairs to the bottom of the ramp.

$\cos 4.76 = \frac{X}{18.1}$

$X = 18.1 \cos 4.76$

$X = 18.03757373$

$d = 18.03757373 - 1.\overline{3}$

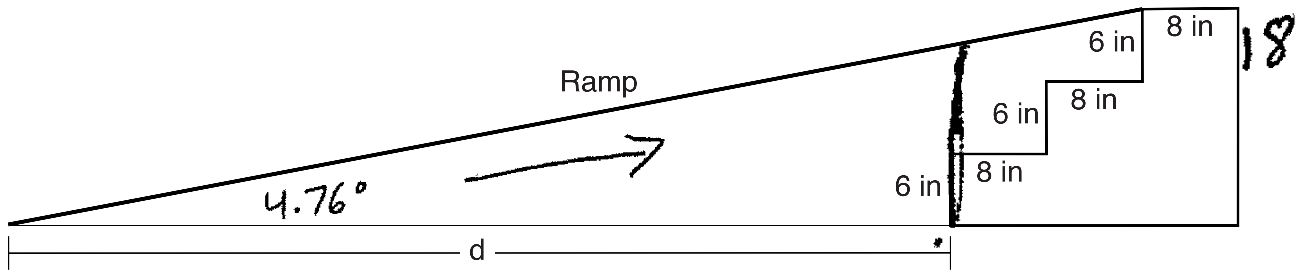
$d = 16.70424039$

16.7

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

Question 34

34 As modeled in the diagram below, an access ramp starts on flat ground and ends at the beginning of the top step. Each step is 6 inches tall and 8 inches deep.



If the angle of elevation of the ramp is 4.76°, determine and state the length of the ramp, to the *nearest tenth of a foot*.

$\sin 4.76 = \frac{18}{x}$

$x = 216.9141463 / 12$

$x = 18.07617886$

The ramp is 18.1 feet long.

Determine and state, to the *nearest tenth of a foot*, the horizontal distance, *d*, from the bottom of the stairs to the bottom of the ramp.

$\left(\tan 4.76 = \frac{18}{y}\right)$

$d = 216.1660169 - 16$

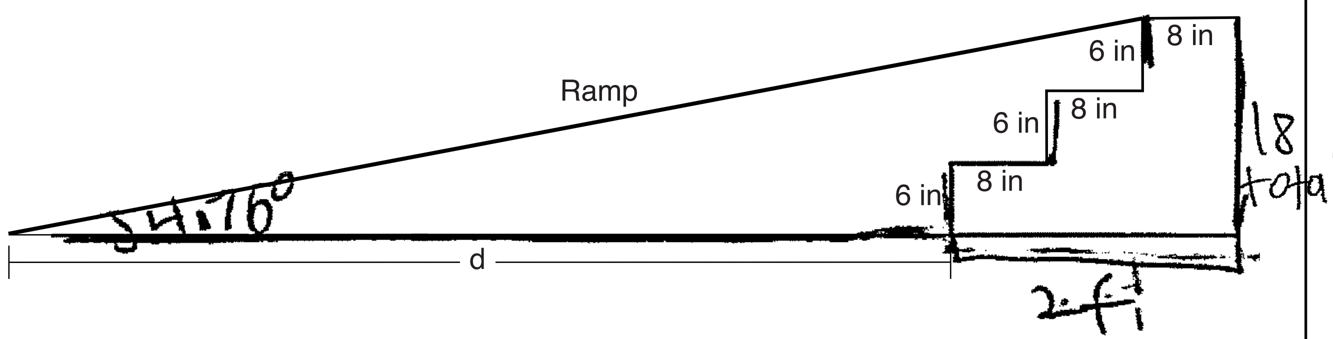
$d = 200.1660169 / 12$

$d = 16.6805041$

The distance from the bottom of the stairs to the bottom of the ramp is 16.7 feet long.

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

34 As modeled in the diagram below, an access ramp starts on flat ground and ends at the beginning of the top step. Each step is 6 inches tall and 8 inches deep.



If the angle of elevation of the ramp is 4.76°, determine and state the length of the ramp, to the *nearest tenth of a foot*.

$\frac{\sin 4.76}{} = \frac{18}{x}$

$\frac{18 = .08298213471x}{.08298213471}$

$x = \frac{216.9 \text{ inches}}{12}$

$\boxed{18.1 \text{ ft}}$

Determine and state, to the *nearest tenth of a foot*, the horizontal distance, *d*, from the bottom of the stairs to the bottom of the ramp.

$\boxed{16.0 \text{ feet}}$

$\frac{\tan 4.76}{1} = \frac{18}{y}$

length in inches

$\frac{18}{\tan 4.76} = \frac{(\tan 4.76)y}{\tan 4.76}$

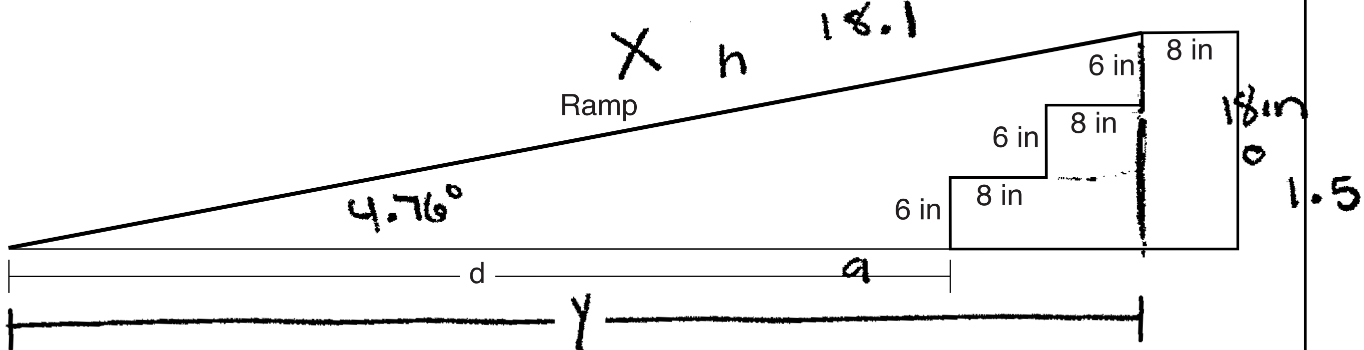
$y = \frac{216.1660169 \text{ in}}{12}$

length of stairs

18 ft total
−2 ft

Score 3: The student incorrectly subtracted 2 feet in determining the horizontal distance.

34 As modeled in the diagram below, an access ramp starts on flat ground and ends at the beginning of the top step. Each step is 6 inches tall and 8 inches deep.



If the angle of elevation of the ramp is 4.76°, determine and state the length of the ramp, to the *nearest tenth of a foot*.

$\sin 4.76 = \frac{18}{x}$

$\sin 4.76(x) = 18$

$\frac{18}{\sin 4.76} = x$

$x = 216.914 \text{in}$

$12\overline{)216.9}$

RAMP LENGTH IS 18.1 FT.

Determine and state, to the *nearest tenth of a foot*, the horizontal distance, *d*, from the bottom of the stairs to the bottom of the ramp.

$1.5^2 + y^2 = 18.1^2$

$2.25 + y^2 = 327.61$
$-2.25 \qquad - 2.25$

$y^2 = 325.36$

$y = 18.03$

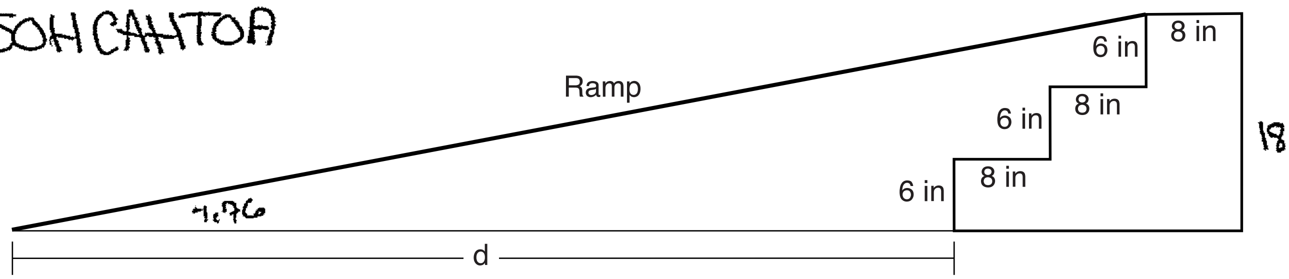
$y \approx 18.0$ FEET

Score 3: The student did not subtract 16 inches when determining the horizontal distance.

Question 34

34 As modeled in the diagram below, an access ramp starts on flat ground and ends at the beginning of the top step. Each step is 6 inches tall and 8 inches deep.

SOH CAHTOA



If the angle of elevation of the ramp is 4.76°, determine and state the length of the ramp, to the *nearest tenth of a foot*.

$\sin(4.76) = \frac{18}{x}$

$x = 216.9 \text{ in}$

$216.9 \text{ in} = 18.1 \text{ ft}$

Determine and state, to the *nearest tenth of a foot*, the horizontal distance, *d*, from the bottom of the stairs to the bottom of the ramp.

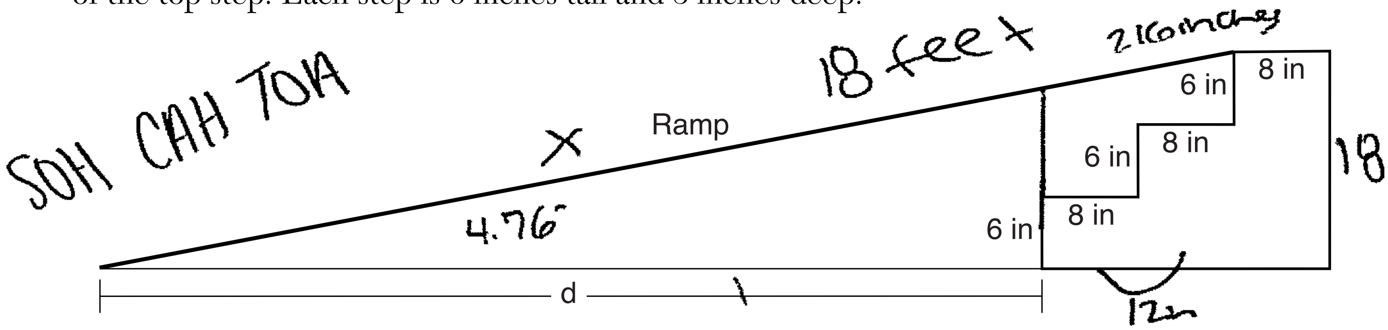
$\cos(4.76) = \frac{2}{18}$

$d = 17.9$

Score 2: The student found the correct length of the ramp, but no further correct work was shown.

Question 34

34 As modeled in the diagram below, an access ramp starts on flat ground and ends at the beginning of the top step. Each step is 6 inches tall and 8 inches deep.



If the angle of elevation of the ramp is 4.76°, determine and state the length of the ramp, to the *nearest tenth of a foot*.

$6 \times 3 = 18$ height $= 18$ in

$\tan 4.76 = \frac{18}{x}$

$x = \frac{18}{\tan 4.76} = \frac{216.16 \text{ inches}}{12 \text{ inches}}$

18.013

$\boxed{\text{length} = 18.0 \text{feet}}$

Determine and state, to the *nearest tenth of a foot*, the horizontal distance, *d*, from the bottom of the stairs to the bottom of the ramp.

$18\text{ft} = 216$ inches
$- 12$ inches

$\frac{204}{12} = 17\text{ft}$

$\cos 4.76 = \frac{d}{17}$

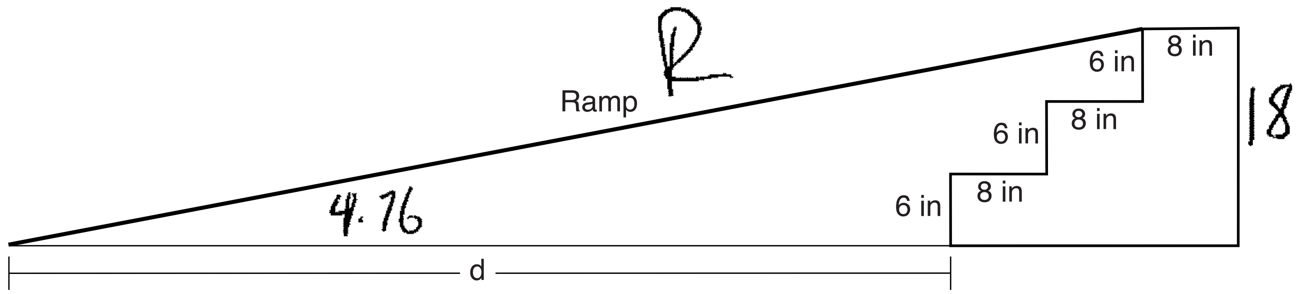
$d = \cos 4.76 (17) = 16.9413$

$\boxed{16.9 \text{feet}}$

Score 2: The student used an incorrect trigonometric equation when determining the length of the ramp. The student incorrectly subtracted 12 inches when determining the horizontal distance.

Question 34

34 As modeled in the diagram below, an access ramp starts on flat ground and ends at the beginning of the top step. Each step is 6 inches tall and 8 inches deep.

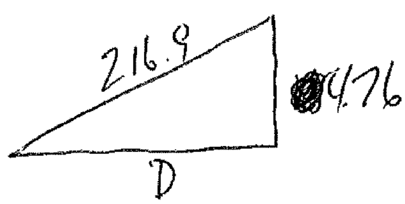


If the angle of elevation of the ramp is 4.76°, determine and state the length of the ramp, to the *nearest tenth of a foot*.

$$\sin 4.76 = \frac{18}{R} \qquad \frac{R \sin 4.76}{\sin 4.76} = \frac{18}{\sin 4.76}$$

$$R \approx 216.9 \text{ ft}$$

Determine and state, to the *nearest tenth of a foot*, the horizontal distance, *d*, from the bottom of the stairs to the bottom of the ramp.



$$(4.76)^2 + (D)^2 = (216.9)^2$$

$$22.6576 + D^2 = 47045.61$$

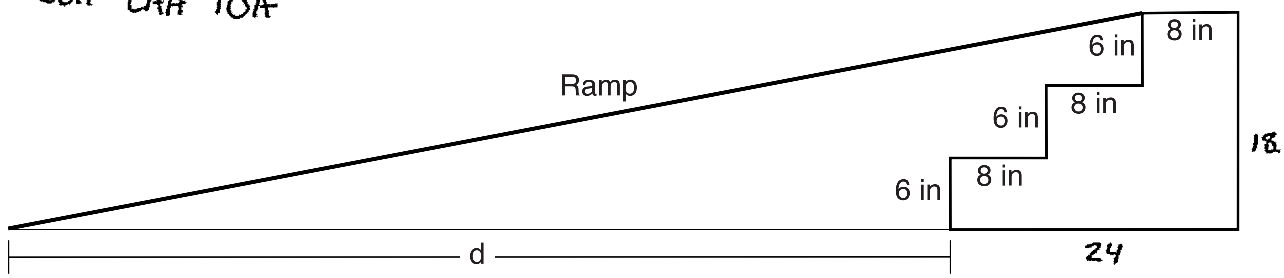
$$D^2 = 47022.9524$$

$$\boxed{D = 216.8}$$

Score 1: The student wrote one correct trigonometric equation, but no further correct work was shown.

34 As modeled in the diagram below, an access ramp starts on flat ground and ends at the beginning of the top step. Each step is 6 inches tall and 8 inches deep.

SOH CAH TOA



If the angle of elevation of the ramp is 4.76°, determine and state the length of the ramp, to the *nearest tenth of a foot*.

$\tan x = \frac{18}{24}$

$\tan^{-1}\left(\frac{18}{24}\right) = 36.8699$

36.9 Ft

Determine and state, to the *nearest tenth of a foot*, the horizontal distance, *d*, from the bottom of the stairs to the bottom of the ramp.

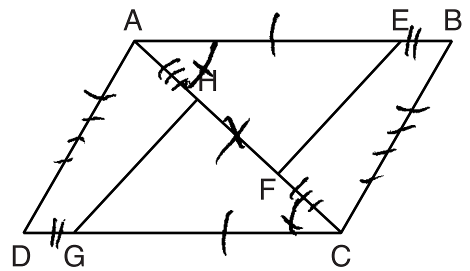
$\sin x = \frac{18}{36.9}$

$\sin^{-1}\left(\frac{18}{36.9}\right) = 29.1694$

29.2Ft

Score 0: The student gave a completely incorrect response.

35 In the diagram of quadrilateral *ABCD* with diagonal $\overline{AC}$ shown below, segments *GH* and *EF* are drawn, $\overline{AE} \cong \overline{CG}$, $\overline{BE} \cong \overline{DG}$, $\overline{AH} \cong \overline{CF}$, and $\overline{AD} \cong \overline{CB}$.



Prove: $\overline{EF} \cong \overline{GH}$

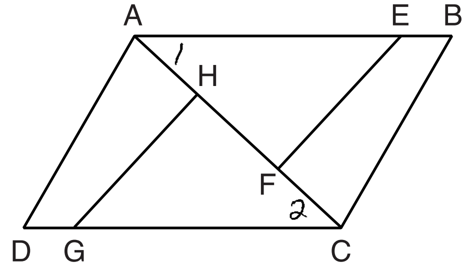
Given $\overline{AE} \cong \overline{CG}$ + $\overline{BE} \cong \overline{DG}$ $\overline{AH} \cong \overline{CF}$. If we add the $\cong$ parts $\overline{AE} + \overline{EB} \cong \overline{CG} + \overline{GD}$ by the addition postulate $\overline{AB} \cong \overline{CD}$. We were also given $\overline{AD} \cong \overline{BC}$ therefore ABCD is a P'gram as it has opposite sides $\cong$ Therefore $\overline{AB} \parallel \overline{DC}$ and $\overline{AC}$ is a diagonal so the alternate interior angles along this diagonal $\angle EAF + \angle HCG$ are $\cong$. By reflexive property $\overline{HF} \cong \overline{HF}$, using the addition postulate again $\overline{AH} + \overline{HF} \cong \overline{HF} + \overline{FC}$ ($\overline{AF} \cong \overline{CH}$). So, along with given $\overline{CG} \cong \overline{AE}$, by SAS $\cong$ SAS $\triangle AEF \cong \triangle CGH$. Their corresponding parts $\overline{EF}$ + $\overline{GH}$ are congruent as well by CPCTC.

Work space for question 35 is continued on the next page.

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

Question 35

35 In the diagram of quadrilateral $ABCD$ with diagonal $\overline{AC}$ shown below, segments GH and EF are drawn, $\overline{AE} \cong \overline{CG}$, $\overline{BE} \cong \overline{DG}$, $\overline{AH} \cong \overline{CF}$, and $\overline{AD} \cong \overline{CB}$.



Prove: $\overline{EF} \cong \overline{GH}$

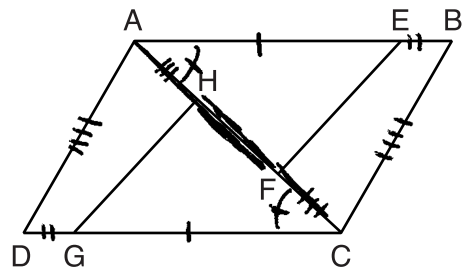
Statements	Reasons
1. Quad $ABCD$ w/ diagonal $\overline{AC}$, $\overline{GH}$ & $\overline{EF}$, $\overline{AE} \cong \overline{CG}$, $\overline{BE} \cong \overline{DG}$, $\overline{AH} \cong \overline{CF}$, $\overline{AD} \cong \overline{CB}$	1. Given
2. $\overline{HF} \cong \overline{HF}$, $\overline{AC} \cong \overline{AC}$	2. Reflexive (PIC)
3. $\overline{AH} + \overline{HF} \cong \overline{CF} + \overline{HF}$, $\overline{AF} \cong \overline{CH}$	3. Addition (1,2)
4. $\overline{AE} + \overline{BE} \cong \overline{CG} + \overline{DG}$, $\overline{AB} \cong \overline{CD}$	4. Addition (1)
5. $\triangle ABC \cong \triangle CDA$	5. SSS ≅ SSS (1,2,4)
6. $\angle 1 \cong \angle 2$	6. CPCTC (5)
7. $\triangle AEF \cong \triangle CGH$	7. SAS ≅ SAS (1,6,3)
8. $\overline{EF} \cong \overline{GH}$	8. CPCTC (7)

Work space for question 35 is continued on the next page.

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

Question 35

35 In the diagram of quadrilateral *ABCD* with diagonal $\overline{AC}$ shown below, segments *GH* and *EF* are drawn, $\overline{AE} \cong \overline{CG}$, $\overline{BE} \cong \overline{DG}$, $\overline{AH} \cong \overline{CF}$, and $\overline{AD} \cong \overline{CB}$.



make ▱,
△'s ≅

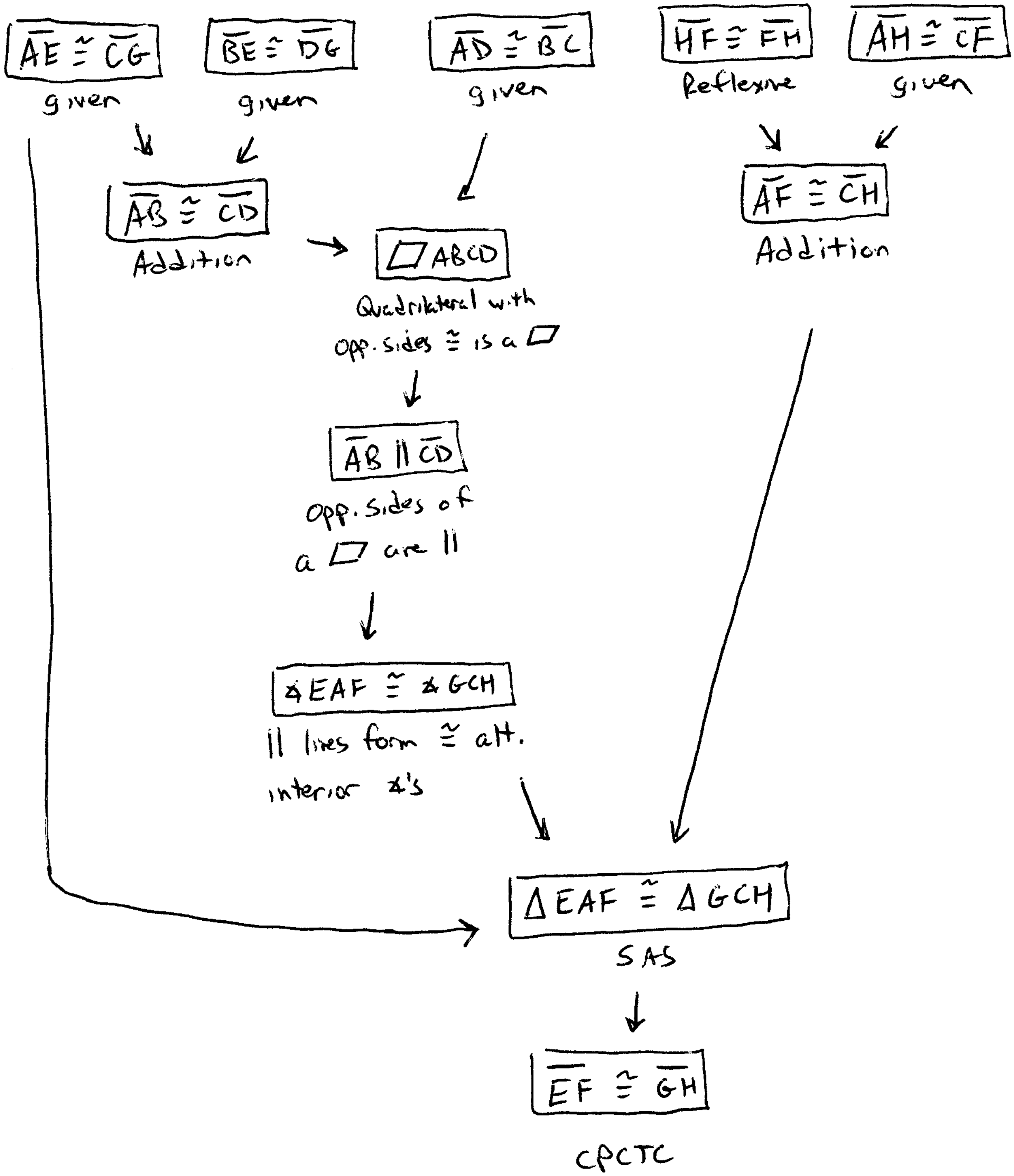
Prove: $\overline{EF} \cong \overline{GH}$

Work space for question 35 is continued on the next page.

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

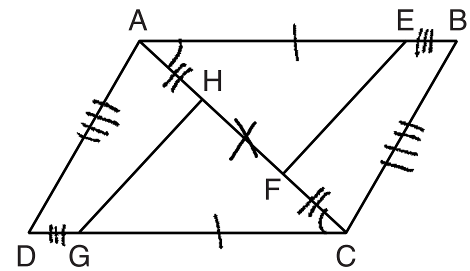
Question 35

Question 35 continued



Question 35

35 In the diagram of quadrilateral *ABCD* with diagonal $\overline{AC}$ shown below, segments *GH* and *EF* are drawn, $\overline{AE} \cong \overline{CG}$, $\overline{BE} \cong \overline{DG}$, $\overline{AH} \cong \overline{CF}$, and $\overline{AD} \cong \overline{CB}$.



Prove: $\overline{EF} \cong \overline{GH}$

S	R
① quadrilateral ABCD; diag $\overline{AC}$; $\overline{GH}$ and $\overline{EF}$; $\overline{AE} \cong \overline{CG}$; $\overline{AH} \cong \overline{CF}$; $\overline{BE} \cong \overline{DG}$; $\overline{AD} \cong \overline{CB}$	① Given
② $\overline{HF} \cong \overline{HF}$	② reflexive
③ $\overline{AH} + \overline{HF} \cong \overline{CF} + \overline{HF}$ or $\overline{AF} \cong \overline{CH}$; $\overline{AE} + \overline{BE} \cong \overline{CG} + \overline{GD}$ or $\overline{BA} \cong \overline{CD}$	③ addition
④ quad ABCD is a ▱	④ if both pairs of opp. sides are ≅, the quad. is a ▱.
⑤ $\overline{AB} \parallel \overline{CD}$	⑤ opp. sides of a ▱ are ∥
⑥ ∡ BAF ≅ ∡ DCA	⑥ alt. int. ∡s are ≅.
⑦ △ AEF ≅ △CGH	⑦ SAS ≅ SAS
⑧ $\overline{EF} \cong \overline{GH}$	⑧ cpctc

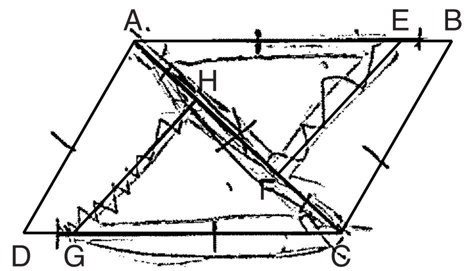
Work space for question 35 is continued on the next page.

Score 5: The student had an incomplete reason in step 6.

Question 35

35 In the diagram of quadrilateral $ABCD$ with diagonal $\overline{AC}$ shown below, segments GH and EF are drawn, $\overline{AE} \cong \overline{CG}$, $\overline{BE} \cong \overline{DG}$, $\overline{AH} \cong \overline{CF}$, and $\overline{AD} \cong \overline{CB}$.

SAS



Prove: $\overline{EF} \cong \overline{GH}$

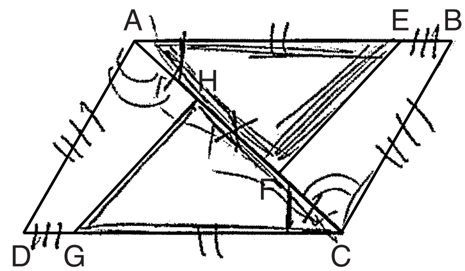
Statements	Reasons
① $\overline{AH} \cong \overline{CF}$	① given
② $\overline{HF} \cong \overline{HF}$	② reflexive prop.
S ③ $\overline{AF} \cong \overline{CH}$	③ addition postulate of equality
④ quadrilateral ABCD	④ given
⑤ $\overline{AB} \parallel \overline{CD}$	⑤ If quad. then opp. sides $\parallel$
⑥ diagonal $\overline{AC}$	⑥ given
A ⑦ $\angle FAE \cong \angle HCG$	⑦ If 2 $\parallel$ lines are crossed by a transversal, then alt. int. $\angle$s are $\cong$
S ⑧ $\overline{AE} \cong \overline{CG}$	⑧ given
⑨ $\triangle AFE \cong \triangle CHG$	⑨ SAS $\cong$
⑩ $\overline{EF} \cong \overline{GH}$	⑩ CPCTC

Work space for question 35 is continued on the next page.

Score 4: The student made a conceptual error by claiming parallel sides came from the quadrilateral in step 5.

Question 35

35 In the diagram of quadrilateral $ABCD$ with diagonal $\overline{AC}$ shown below, segments GH and EF are drawn, $\overline{AE} \cong \overline{CG}$, $\overline{BE} \cong \overline{DG}$, $\overline{AH} \cong \overline{CF}$, and $\overline{AD} \cong \overline{CB}$.



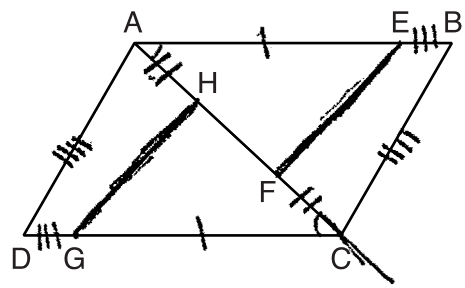
Prove: $\overline{EF} \cong \overline{GH}$

Statement	Reason
① Quadrilateral ABCD with diagnol $\overline{AC}$, segments GH + EF $\overline{AE} \cong \overline{CG}$, $\overline{AH} \cong \overline{CF}$, $\overline{BE} \cong \overline{DG}$ $\overline{AD} \cong \overline{CB}$	① Given
② $\overline{HF} \cong \overline{HF}$	② Reflexive property
③ $\overline{AF} \cong \overline{HC}$	③ Addition postulate
④ $\overline{AB} \cong \overline{DC}$	④ Addition postulate
⑤ ABCD is a parallelogram	⑤ both pairs of opposite sides are congruent
⑥ $\overline{AD} \parallel \overline{BC}$	⑥ ABCD is a parallelogram with ∥ sides
⑦ $\angle EAF \cong \angle ACG$	⑦ alternate exterior angles are congruent
⑧ $\triangle AFE \cong \triangle CHG$	⑧ SAS≅SAS
⑨ $\overline{EF} \cong \overline{GH}$	⑨ CPCTC

Work space for question 35 is continued on the next page.

Score 4: The student stated the wrong parallel sides in step 6, followed by an incorrect reason in step 7.

35 In the diagram of quadrilateral *ABCD* with diagonal $\overline{AC}$ shown below, segments *GH* and *EF* are drawn, $\overline{AE} \cong \overline{CG}$, $\overline{BE} \cong \overline{DG}$, $\overline{AH} \cong \overline{CF}$, and $\overline{AD} \cong \overline{CB}$.



$\Delta FAE \cong \Delta HGC$
CPCTC

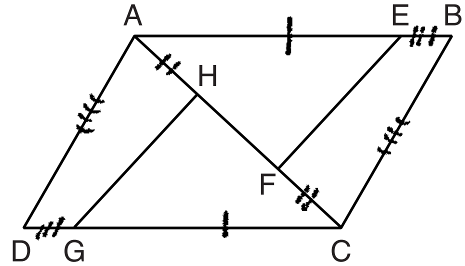
Prove: $\overline{EF} \cong \overline{GH}$

Statements	Reasons
① $\overline{AE} \cong \overline{GC}$	① Given
② $\overline{AH} \cong \overline{FC}$	② Given
③ $\overline{HF} \cong \overline{HF}$	③ Reflexive
④ AH + HF = AF; FC + HF = HC	④ partition
⑤ AH + HF = HF + FC	⑤ Addition property of equality
S ⑥ $\overline{AF} \cong \overline{HC}$	⑥ substitution
⑦ $\overline{GH} \parallel \overline{EF}$	⑦ Given
⑧ ∠HAE ≅ ∠FCG	⑧ If 2 ∥ lines crossed by transv... opposite interior ∠'s ≅
⑨. ΔFAE ≅ ΔHCG	⑨ SAS
⑩ $\overline{EF} \cong \overline{GH}$	⑩ CPCTC.

Work space for question 35 is continued on the next page.

Score 3: The student made a conceptual error by assuming $\overline{GH} \parallel \overline{EF}$ in step 7 and wrote an incorrect statement in step 8 based on the wrong parallel sides.

35 In the diagram of quadrilateral $ABCD$ with diagonal $\overline{AC}$ shown below, segments GH and EF are drawn, $\overline{AE} \cong \overline{CG}$, $\overline{BE} \cong \overline{DG}$, $\overline{AH} \cong \overline{CF}$, and $\overline{AD} \cong \overline{CB}$.



Prove: $\overline{EF} \cong \overline{GH}$

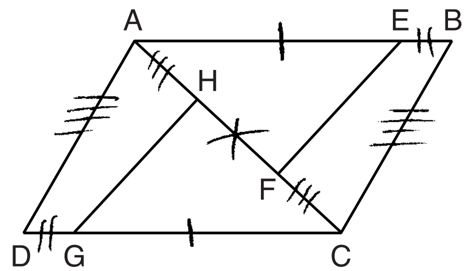
S	R
1) $\overline{AE} \cong \overline{CG}$, $\overline{AH} \cong \overline{CF}$, $\overline{BE} \cong \overline{DG}$, $\overline{AD} \cong \overline{CB}$	1) Given
2) $\overline{AE}+\overline{EB} \cong \overline{CG}+\overline{DG}$, $\overline{AB} \cong \overline{CD}$	2) segment addition postulate
3) ▱ABCD	3) opposite sides are congruent, then it's a parallelogram
4) $AC = AC$	4) reflexive propeRty
5) $\triangle ADC \cong \triangle BCA$	5) SSS
6) $\overline{GH} \cong \overline{EF}$	6) CPCTC

Work space for question 35 is continued on the next page.

Score 2: The student combined two different approaches by proving $ABCD$ is a parallelogram and $\triangle ADC \cong \triangle BCA$, but no further relevant work was shown.

Question 35

35 In the diagram of quadrilateral $ABCD$ with diagonal $\overline{AC}$ shown below, segments GH and EF are drawn, $\overline{AE} \cong \overline{CG}$, $\overline{BE} \cong \overline{DG}$, $\overline{AH} \cong \overline{CF}$, and $\overline{AD} \cong \overline{CB}$.



Prove: $\overline{EF} \cong \overline{GH}$

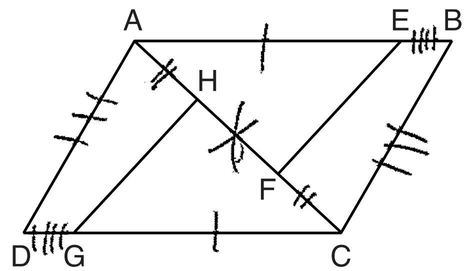
Statement	Reason
① Quad ABCD with diagonal $\overline{AC}$, $\overline{GH}$ & $\overline{EF}$ $\overline{AE} \cong \overline{CG}$, $\overline{BE} \cong \overline{DG}$ $\overline{AH} \cong \overline{CF}$, $\overline{AD} \cong \overline{CB}$	① Given
② $\overline{AB} \cong \overline{DC}$	② Addition Postulate
③ $\overline{AC} \cong \overline{AC}$	③ Reflexive
④ $\triangle ACD \cong \triangle CAB$	④ SSS
⑤ $\overline{GH} \cong \overline{EF}$	⑤ CPCTC

Work space for question 35 is continued on the next page.

Score 2: The student proved $\triangle ACD \cong \triangle CAB$, but no further correct work was shown.

Question 35

35 In the diagram of quadrilateral *ABCD* with diagonal $\overline{AC}$ shown below, segments *GH* and *EF* are drawn, $\overline{AE} \cong \overline{CG}$, $\overline{BE} \cong \overline{DG}$, $\overline{AH} \cong \overline{CF}$, and $\overline{AD} \cong \overline{CB}$.



Prove: $\overline{EF} \cong \overline{GH}$

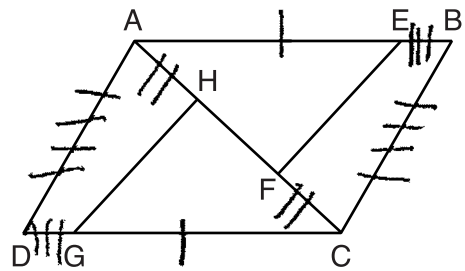
Statement	Reason
1. $\overline{AE} \cong \overline{CG}$, $\overline{AH} \cong \overline{CF}$, $\overline{BE} \cong \overline{DG}$, $\overline{AD} \cong \overline{CB}$	1. Given
2. $\overline{HF} \cong \overline{FH}$	2. Reflexive Property

Work space for question 35 is continued on the next page.

Score 1: The student had one correct relevant statement and reason.

Question 35

35 In the diagram of quadrilateral $ABCD$ with diagonal $\overline{AC}$ shown below, segments GH and EF are drawn, $\overline{AE} \cong \overline{CG}$, $\overline{BE} \cong \overline{DG}$, $\overline{AH} \cong \overline{CF}$, and $\overline{AD} \cong \overline{CB}$.



Prove: $\overline{EF} \cong \overline{GH}$

S	R
1. $\overline{AE} \cong \overline{CG}$, $\overline{AH} \cong \overline{CF}$, $\overline{BE} \cong \overline{DG}$, and $\overline{AD} \cong \overline{CB}$	1. Given
2. $\angle ADC$ and $\angle CBA$ are vertical ∠'s	2. Intersecting lines form vertical ∠'s
3. $\angle ADC \cong \angle CBA$	3. All vertical ∠'s are ≅
4. $\triangle ADC \cong \triangle CBA$	4. SSS ≅ SSS
5. $\overline{EF} \cong \overline{GH}$	5. CPCTC

Work space for question 35 is continued on the next page.

Score 0: The student did not show enough correct relevant work to receive any credit.