The University of the State of New York

REGENTS HIGH SCHOOL EXAMINATION

GEOMETRY

Wednesday, June 11, 2025 — 9:15 a.m. to 12:15 p.m., only

MODEL RESPONSE SET

Table of Contents

Question 25.....2
Question 26.....9
Question 27.....18
Question 28.....27
Question 29.....36
Question 30.....44
Question 31.....54
Question 32.....65
Question 33.....76
Question 34.....90
Question 35.....100

Question 25

25 In the year 2020, the village of Depew, New York had an area of 5.1 square miles and a population of 15,069. In the same year, the village of Lancaster, New York had an area of 2.7 square miles and a population of 10,087.

Which village had the larger population density in 2020? Justify your answer.

$5.1\ mi^2$ $15,069/5.1 = 2954.705...$

$2.7\ mi^2$ $10,087/2.7 = 3735.925...$

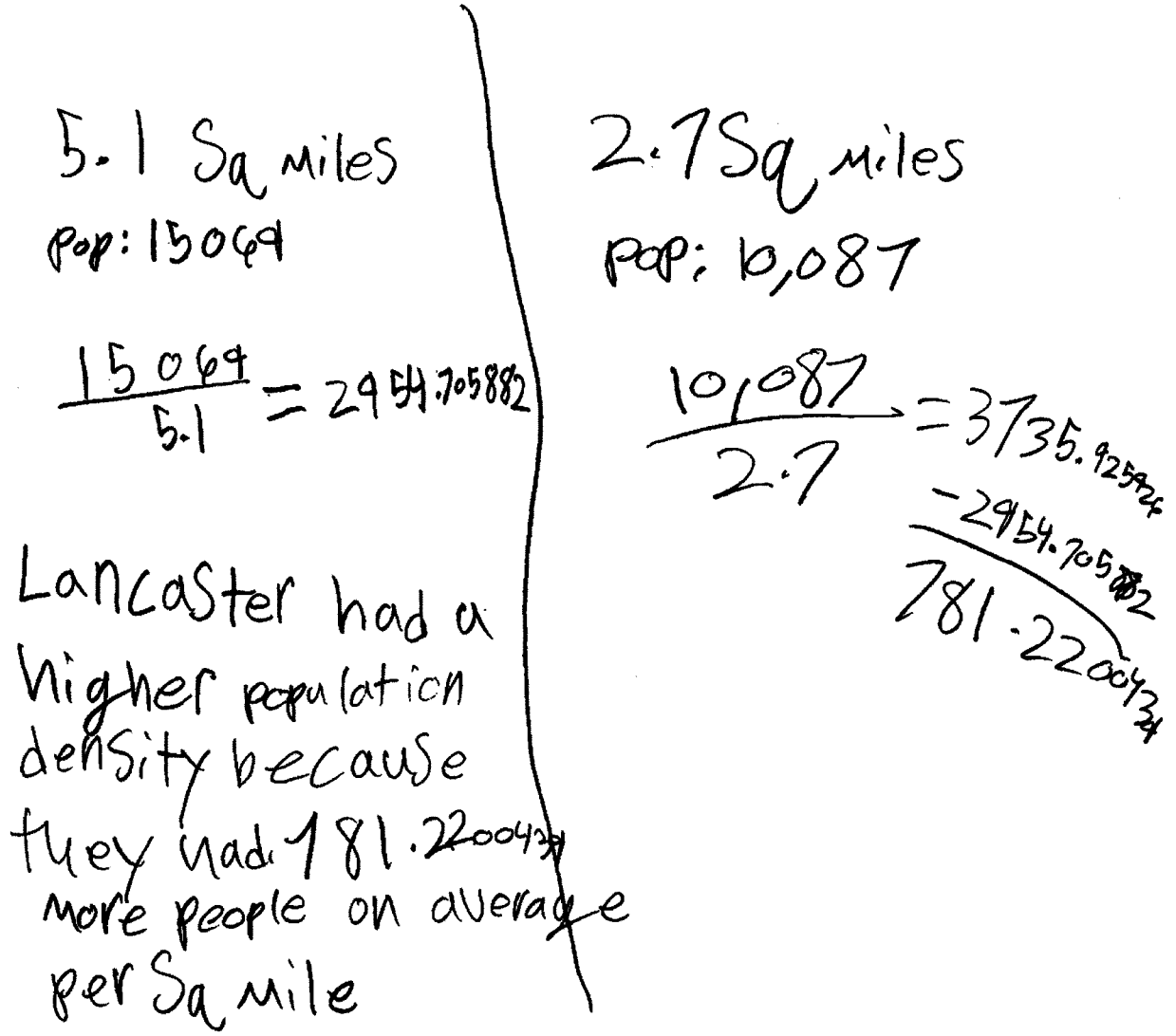
The village of Lancaster New York had the larger population density in 2020.

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

Question 25

25 In the year 2020, the village of Depew, New York had an area of 5.1 square miles and a population of 15,069. In the same year, the village of Lancaster, New York had an area of 2.7 square miles and a population of 10,087.

Which village had the larger population density in 2020? Justify your answer.



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

Question 25

25 In the year 2020, the village of Depew, New York had an area of 5.1 square miles and a population of 15,069. In the same year, the village of Lancaster, New York had an area of 2.7 square miles and a population of 10,087.

Which village had the larger population density in 2020? Justify your answer.

The village of lantcaseter because it had about 3736 every savvare mile whik the village of Depew had about 2955 per savvare mile

Score 1: The student wrote a correct answer, but did not show work.

Question 25

25 In the year 2020, the village of Depew, New York had an area of 5.1 square miles and a population of 15,069. In the same year, the village of Lancaster, New York had an area of 2.7 square miles and a population of 10,087.

Which village had the larger population density in 2020? Justify your answer.

15,069 / 5.1 = 2,955

10,087 / 2.7 = 3,736

Lancaster

Score 1: The student made the same computational error when determining the population densities, but stated an appropriate answer.

Question 25

25 In the year 2020, the village of Depew, New York had an area of 5.1 square miles and a population of 15,069. In the same year, the village of Lancaster, New York had an area of 2.7 square miles and a population of 10,087.

Which village had the larger population density in 2020? Justify your answer.

Depew New York

$5.1 \cdot 15,069$

76851.9

$\swarrow$

76,852 people

Lancaster, NY

$2.7 \cdot 10,087$

27234.9

$\swarrow$

27,235 people

Depew

Score 1: The student made a conceptual error when determining the population densities, but found an appropriate answer.

Question 25

25 In the year 2020, the village of Depew, New York had an area of 5.1 square miles and a population of 15,069. In the same year, the village of Lancaster, New York had an area of 2.7 square miles and a population of 10,087.

Which village had the larger population density in 2020? Justify your answer.

village of Lancaster because it had 2.7 square miles and had 10,087 people, while Depew had almost twice the square miles and had only about 5,000 more people

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

Question 25

25 In the year 2020, the village of Depew, New York had an area of 5.1 square miles and a population of 15,069. In the same year, the village of Lancaster, New York had an area of 2.7 square miles and a population of 10,087.

Which village had the larger population density in 2020? Justify your answer.

Depew: 5.1 / 15069 ≈ 3.4

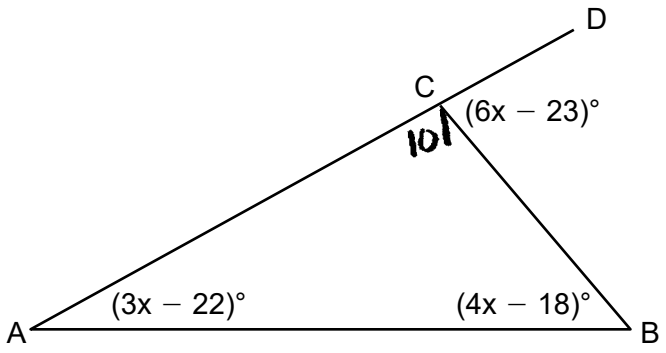
Lancaster: 2.7 / 10087 ≈ 2.7

Depew has a larger population Density than Lancaster.

Score 0: The student made the same conceptual error and the same computational error when determining the population densities.

Question 26

26 In $\triangle ABC$ below, $\overline{AC}$ is extended through C to D, $m\angle A = (3x - 22)°$, $m\angle B = (4x - 18)°$, and $m\angle BCD = (6x - 23)°$.



Determine and state $m\angle ACB$.

$3x - 22 + 4x - 18 = 6x - 23$

$7x - 40 = 6x - 23$

$-6x + 40 \quad -6x + 40$

$x = 17$

$6(17) - 23 = 79$

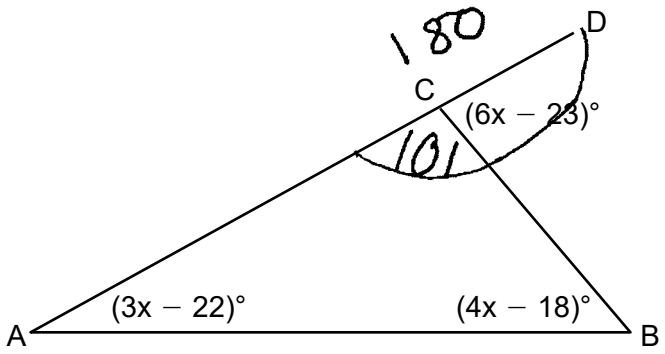
$180 - 79 = 101$

$m\angle ACB = 101°$

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

Question 26

26 In $\triangle ABC$ below, $\overline{AC}$ is extended through C to D, $m\angle A = (3x - 22)°$, $m\angle B = (4x - 18)°$, and $m\angle BCD = (6x - 23)°$.



Determine and state $m\angle ACB$.

$6x-23=3x-22+4x-18$

$6x-23=3x+4x-40$

$6x-23=7x-40$

$+23 \quad +23$

$6x=7x-17$

$-7x \quad -7x$

$\frac{-1x}{-1}=\frac{-17}{-1}$

$x=17$

$m\angle ACB$

$6(17)-23$

$102-23=79$

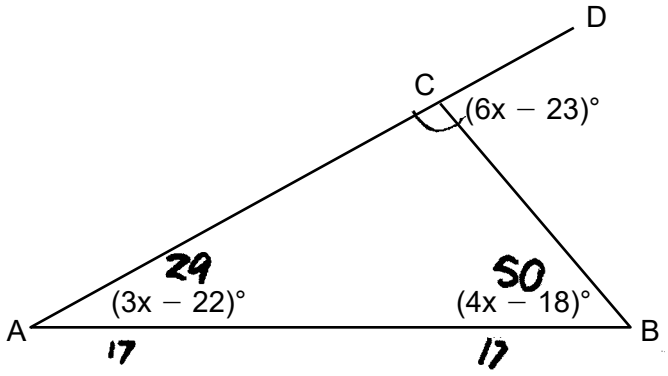
$79+101=180$

(101)

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

Question 26

26 In $\triangle ABC$ below, $\overline{AC}$ is extended through C to D, $m\angle A = (3x - 22)°$, $m\angle B = (4x - 18)°$, and $m\angle BCD = (6x - 23)°$.



180
- 29
- 50

Determine and state $m\angle ACB$.

m∠ACB = 101°

6x - 23 = 3x - 22 + 4x - 18

6x - 23 = 7x - 40

-7x -7x

-x - 23 = -40

+23 +23

-x = -17

x = 17

180

3(17) - 22 = 29 > 79

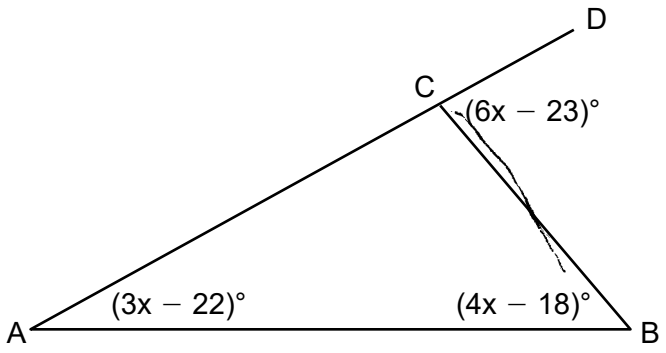
4(17) - 18 = 50

180 - 79 = 101

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

Question 26

26 In $\triangle ABC$ below, $\overline{AC}$ is extended through C to D, $m\angle A = (3x - 22)°$, $m\angle B = (4x - 18)°$, and $m\angle BCD = (6x - 23)°$.



Determine and state $m\angle ACB$.

$(3x-22)+(4x-18)=6x-23$

$7x-40=6x-23$

$-6x \quad -6x$

$x-40=-23$

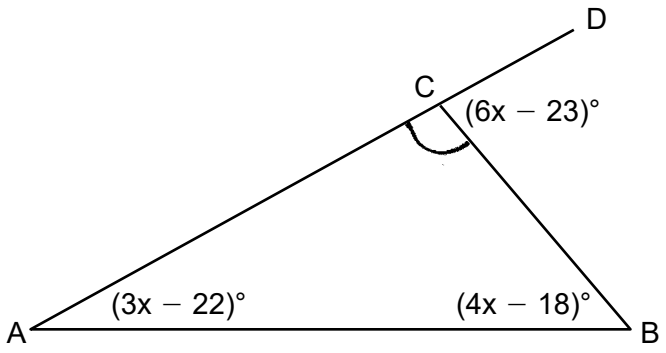
$+40 \quad +40$

$x=17$

Score 1: The student correctly determined the value of x.

Question 26

26 In $\triangle ABC$ below, $\overline{AC}$ is extended through C to D, $m\angle A = (3x - 22)°$, $m\angle B = (4x - 18)°$, and $m\angle BCD = (6x - 23)°$.



Determine and state $m\angle ACB$.

$3x - 22 + 4x - 18$

$7x + 40 = 6x - 23$

$-6x \quad -6x + 40$

$x = 17$

$3(17) - 22$

29

$4(17) - 18$

50

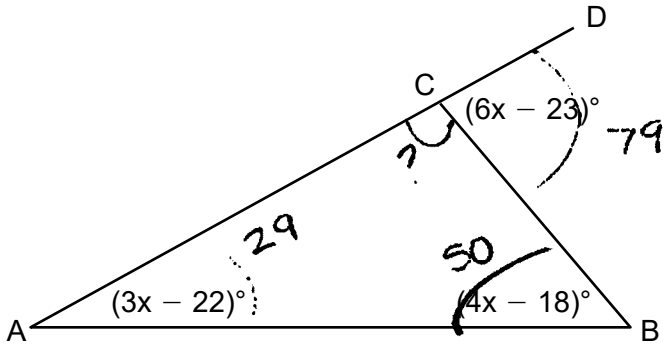
$6(17) - 23$

$m\angle ACB = 79$

Score 1: The student correctly determined the value of x.

Question 26

26 In $\triangle ABC$ below, $\overline{AC}$ is extended through C to D, $m\angle A = (3x - 22)°$, $m\angle B = (4x - 18)°$, and $m\angle BCD = (6x - 23)°$.



Determine and state $m\angle ACB$.

180 - 29 - 79
= 72°

3x - 22 + 4x - 18 = 6x - 23

7x - 40 = 6x - 23
123 +23

7x - 17 = 6x
-7x -7x

-17 = -1x
-1 -1

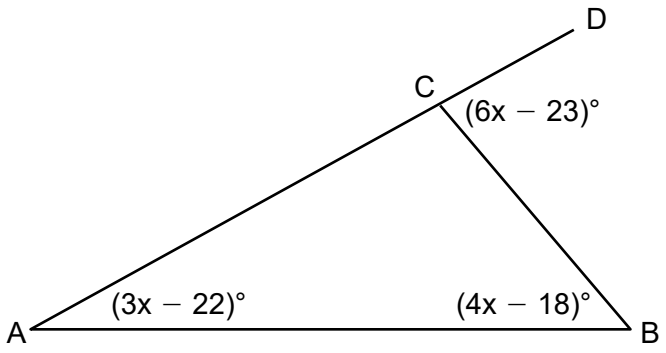
x = 17

m∠ACB = 72°

Score 1: The student correctly determined the value of x.

Question 26

26 In $\triangle ABC$ below, $\overline{AC}$ is extended through C to D, $m\angle A = (3x - 22)°$, $m\angle B = (4x - 18)°$, and $m\angle BCD = (6x - 23)°$.



Determine and state $m\angle ACB$.

$5x - 40 = 6x - 23$

$+23 \quad +23$

$5x - 17 = 6x$

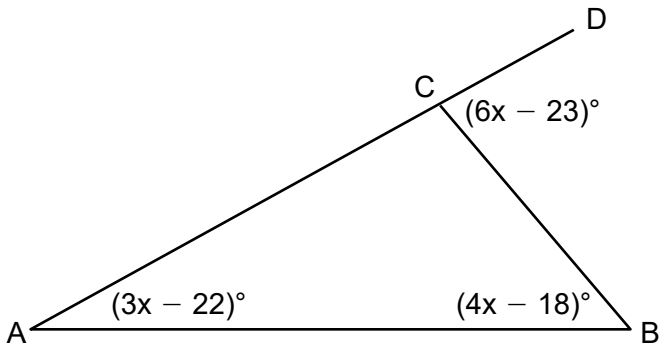
$-5x \quad -5x$

$-17 = x$

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

Question 26

26 In $\triangle ABC$ below, $\overline{AC}$ is extended through C to D, $m\angle A = (3x - 22)°$, $m\angle B = (4x - 18)°$, and $m\angle BCD = (6x - 23)°$.



Determine and state $m\angle ACB$.

$3x - 22 = 4x - 18$

$7x - 40 = 6x - 23$

$\frac{13x}{13} = \frac{-63}{13}$

$m\angle ACB = -4.846$

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

Question 26

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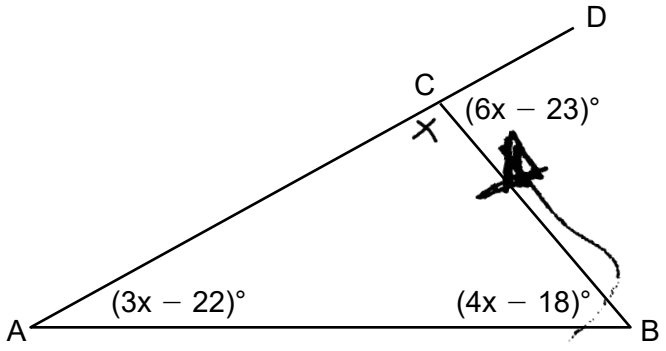


Determine and state $m\angle ACB$.

112°

$6x - 23 + x = 180$

$7x - 23 \quad -23$

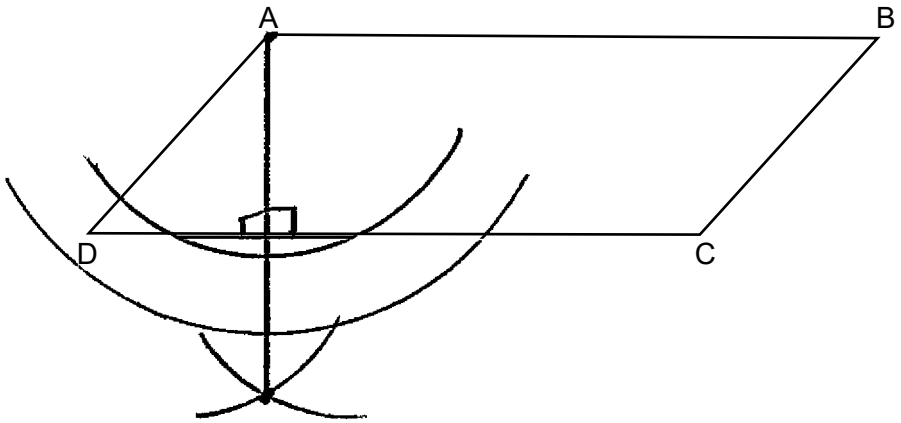
$7x = 157$

22.4

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

Question 27

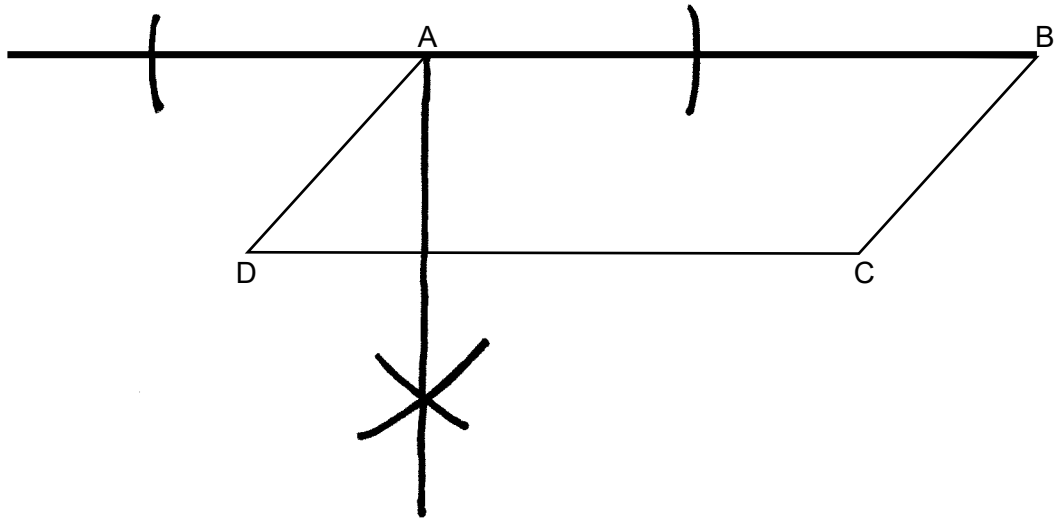
27 Parallelogram *ABCD* is shown below. Using a compass and straightedge, construct the altitude from point *A* to side $\overline{DC}$. [Leave all construction marks.]



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

Question 27

27 Parallelogram *ABCD* is shown below. Using a compass and straightedge, construct the altitude from point *A* to side $\overline{DC}$. [Leave all construction marks.]



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

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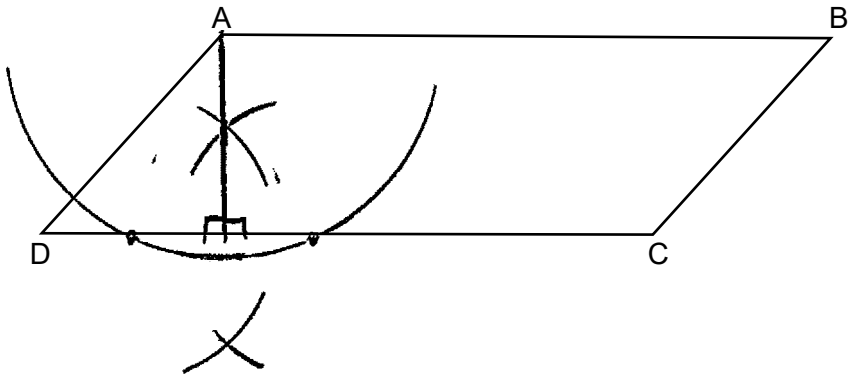

Score 2: The student gave a complete and correct response.

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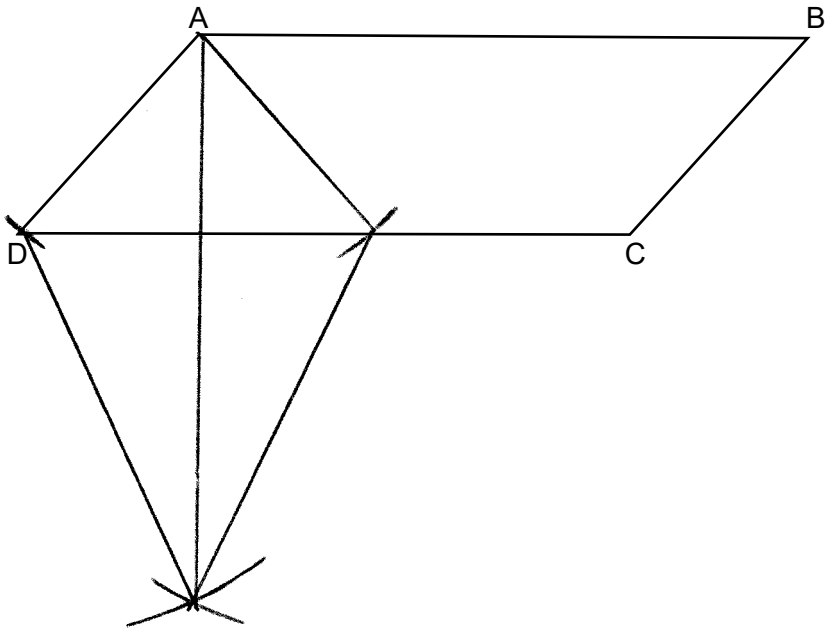

Score 2: The student gave a complete and correct response.

Question 27

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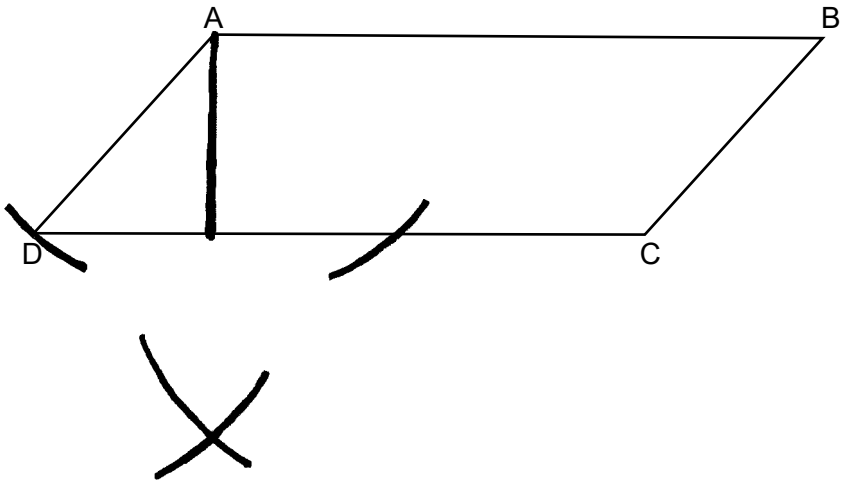
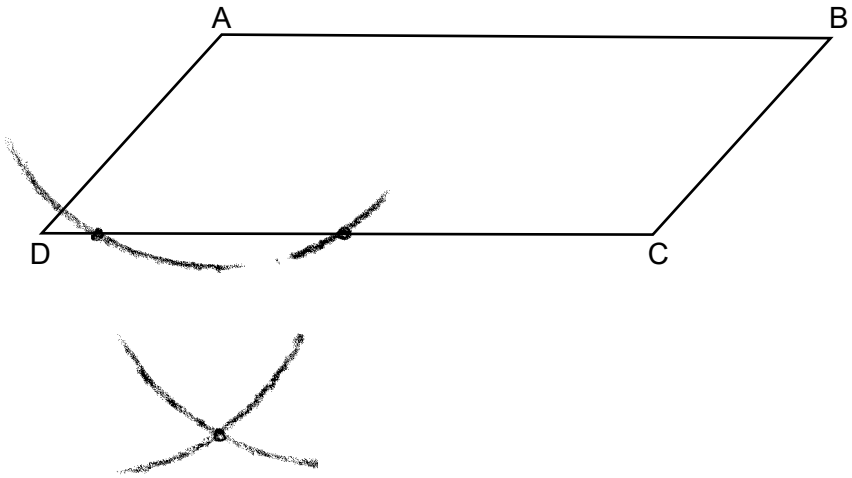


Score 2: The student gave a complete and correct response.

Question 27

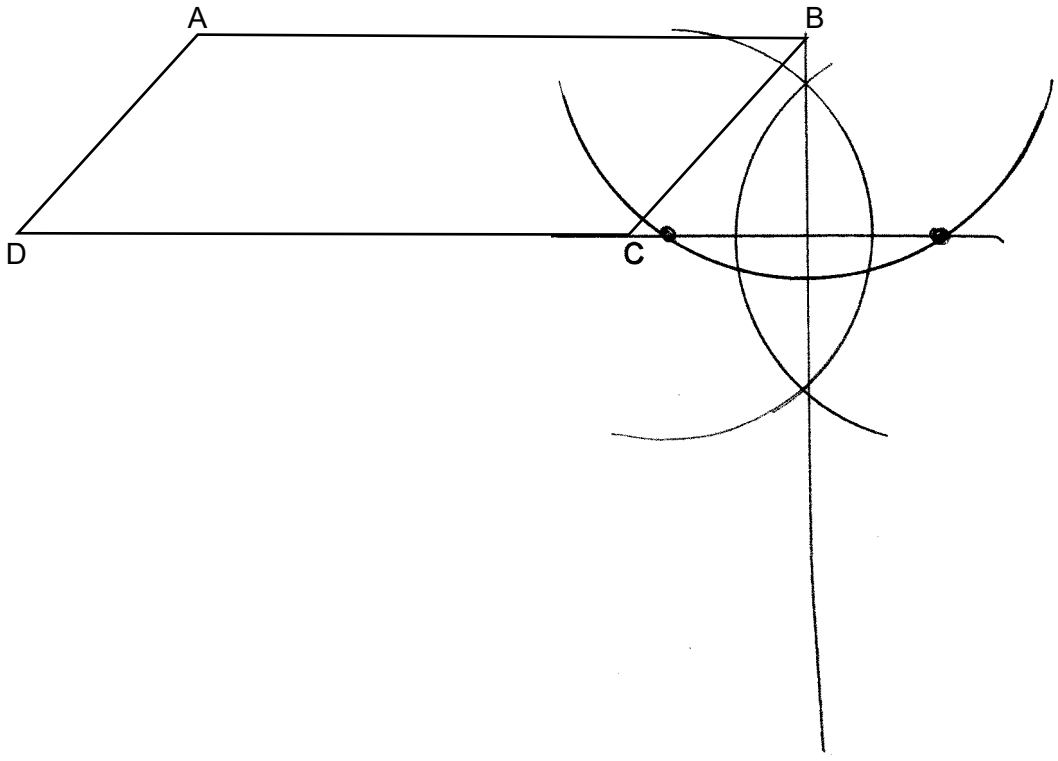
27 Parallelogram *ABCD* is shown below. Using a compass and straightedge, construct the altitude from point *A* to side $\overline{DC}$. [Leave all construction marks.]



Score 1: The student constructed all appropriate arcs, but did not draw the altitude.

Question 27

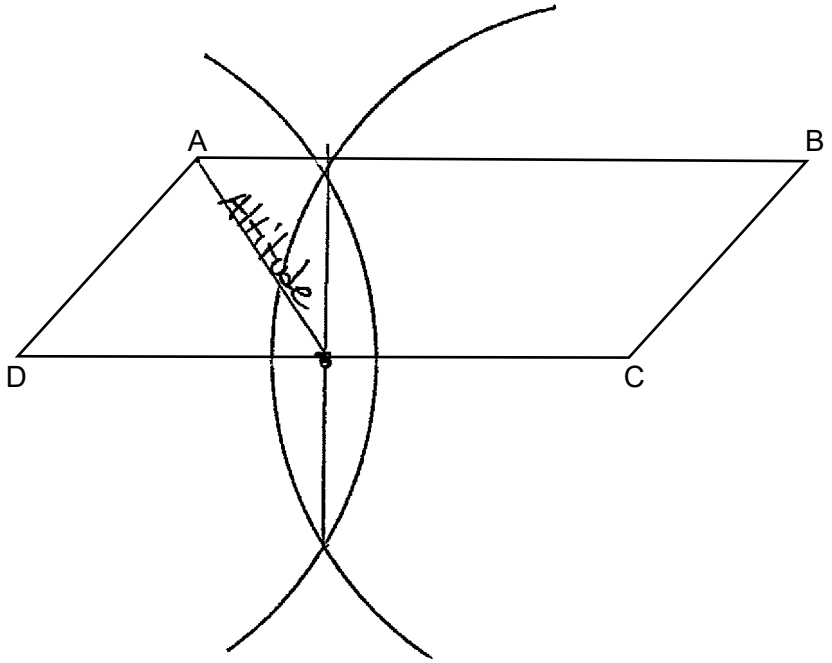
27 Parallelogram *ABCD* is shown below. Using a compass and straightedge, construct the altitude from point *A* to side $\overline{DC}$. [Leave all construction marks.]



Score 1: The student constructed the altitude from point *B*.

Question 27

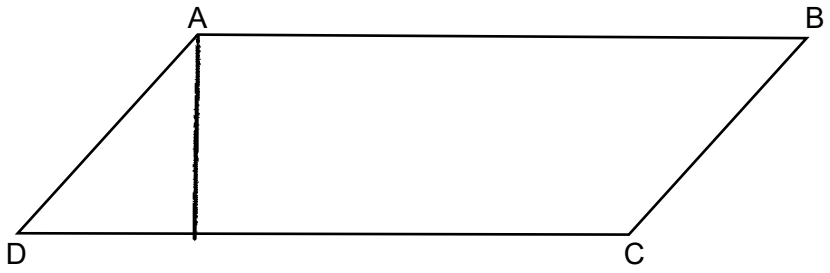
27 Parallelogram $ABCD$ is shown below. Using a compass and straightedge, construct the altitude from point A to side $\overline{DC}$. [Leave all construction marks.]



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

Question 27

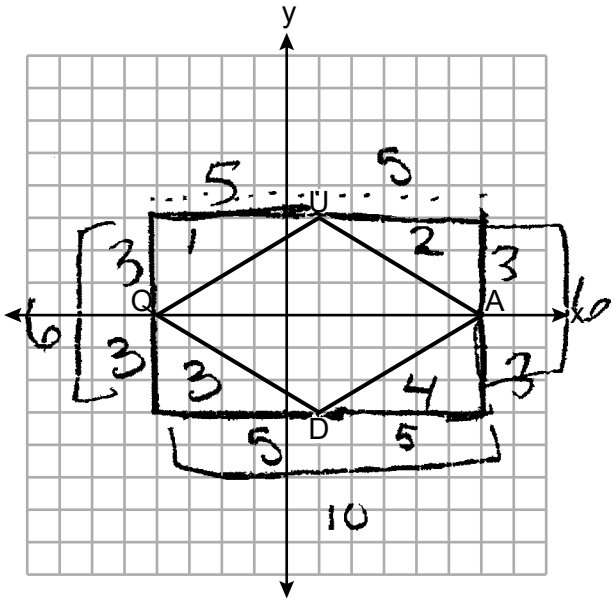
27 Parallelogram *ABCD* is shown below. Using a compass and straightedge, construct the altitude from point *A* to side $\overline{DC}$. [Leave all construction marks.]



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

Question 28

28 Quadrilateral *QUAD* is graphed on the set of axes below.



Determine and state the area of quadrilateral *QUAD*.

$A_R = 10(6) = 60$

60
30
30

A_1 A_2 A_3 A_4

$A = \frac{bh}{2}$ $A = \frac{bh}{2}$ $A = \frac{bh}{2}$ $A = \frac{bh}{2}$

$A = \frac{3(5)}{2}$ $A = \frac{5(3)}{2}$ $A = \frac{3(5)}{2}$ $A = \frac{5(3)}{2}$

$A = 7.5$ $A = 7.5$ $A = 7.5$ $A = 7.5$

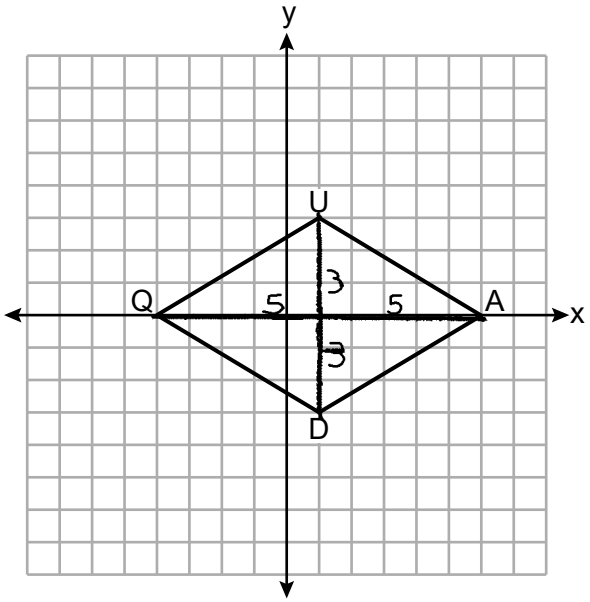
30

$A = 30$ units^2

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

Question 28

28 Quadrilateral *QUAD* is graphed on the set of axes below.



Determine and state the area of quadrilateral *QUAD*.

$A = \frac{1}{2}bh$

$= \frac{1}{2}(5)(3)$

$= \frac{1}{2}15$

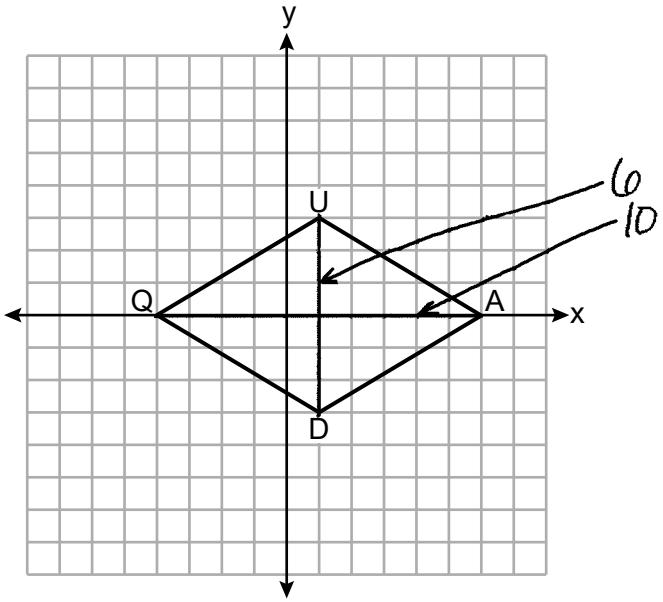
$= 7.5$

$A_{4\Delta's} = 7.5(4) = 30$

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

Question 28

28 Quadrilateral *QUAD* is graphed on the set of axes below.



Determine and state the area of quadrilateral *QUAD*.

$A = \frac{1}{2} d_1 \cdot d_2$

$A = \frac{1}{2}(6)(10)$

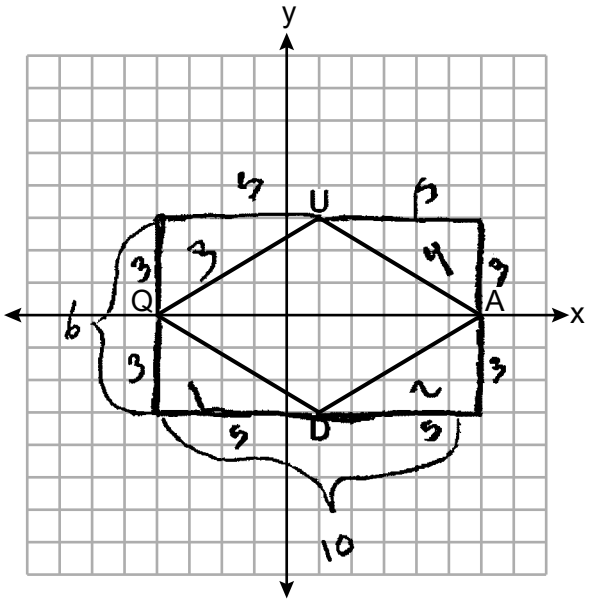
$A = 30$

30

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

Question 28

28 Quadrilateral *QUAD* is graphed on the set of axes below.



Determine and state the area of quadrilateral *QUAD*.

$A_{\Delta 1} = \frac{1}{2} 5 \cdot 3 = 7.5$
$A_{\Delta 2} = 7.5$
$A_{\Delta 3} = 7.5$
$A_{\Delta 4} = 7.5$

$A_D = 6.10$
$A_D = 60$

7.5
7.5
7.5
+ 7.5
30

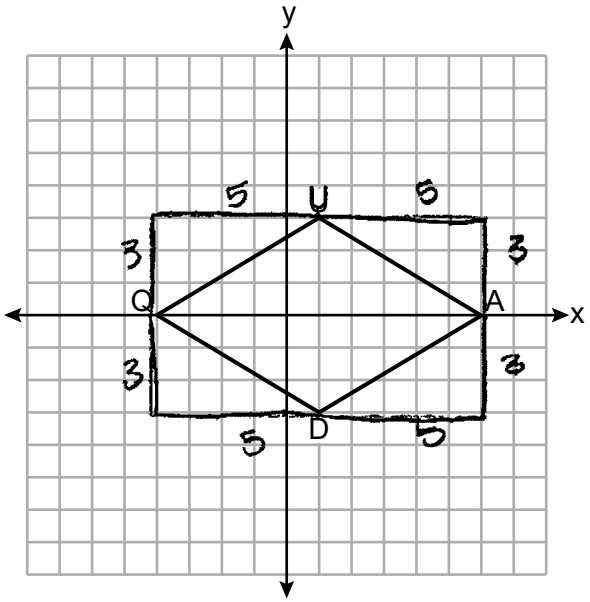
60
−30
30

A = 30

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

Question 28

28 Quadrilateral *QUAD* is graphed on the set of axes below.



Determine and state the area of quadrilateral *QUAD*.

$10(6) = 60$

$A_{\square} = 60$

$A_{4\triangle} = 30$

$A_{\triangle} = \frac{1}{2} \cdot 5 \cdot 3 = 7.5$

$A_{4\triangle} = 30$

$A_{\square} - A_{4\triangle} = A_{\diamond}$

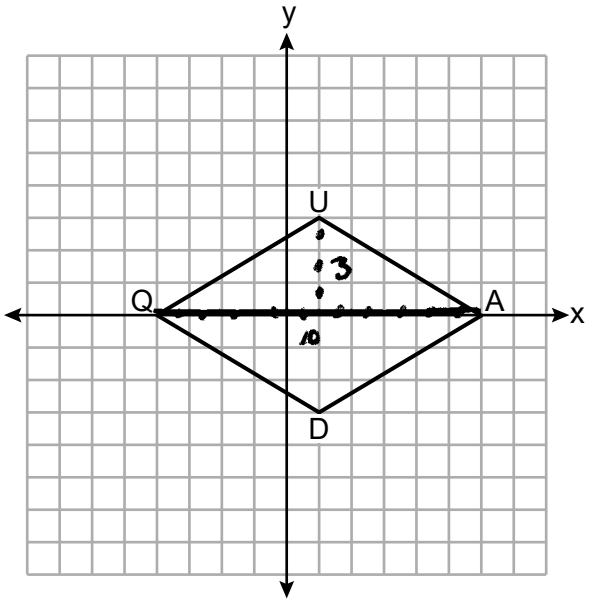
$60 - 30 = 30$

30

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

Question 28

28 Quadrilateral *QUAD* is graphed on the set of axes below.



Determine and state the area of quadrilateral *QUAD*.

$\triangle QUA \cong \triangle QDA$

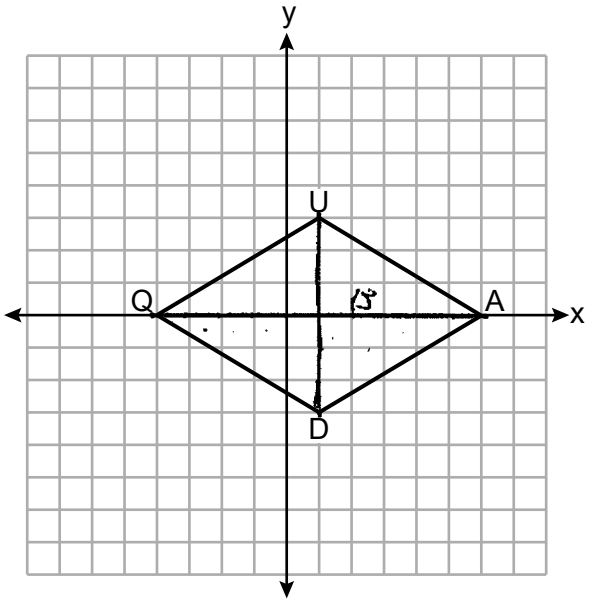
Find one and then double

$A = \frac{1}{2}(10)(3) = 15$

Score 1: The student made a computational error in not doubling the area of $\triangle QUA$.

Question 28

28 Quadrilateral *QUAD* is graphed on the set of axes below.

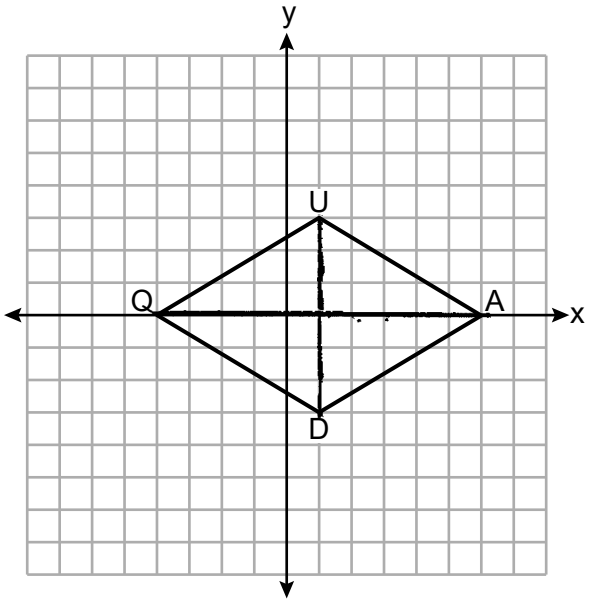


Determine and state the area of quadrilateral *QUAD*.

Score 1: The student wrote a correct answer, but did not show work.

Question 28

28 Quadrilateral *QUAD* is graphed on the set of axes below.



A (x_2, y_2) $(6, 0)$

D (x_1, y_1) $(1, -3)$

Determine and state the area of quadrilateral *QUAD*.

$A = bh$

$A = 6(5.8)$

$A = 34.8 \text{ units}^2$

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

$= \sqrt{(6-1)^2 + (0-(-3))^2}$

$= \sqrt{25 + 9}$

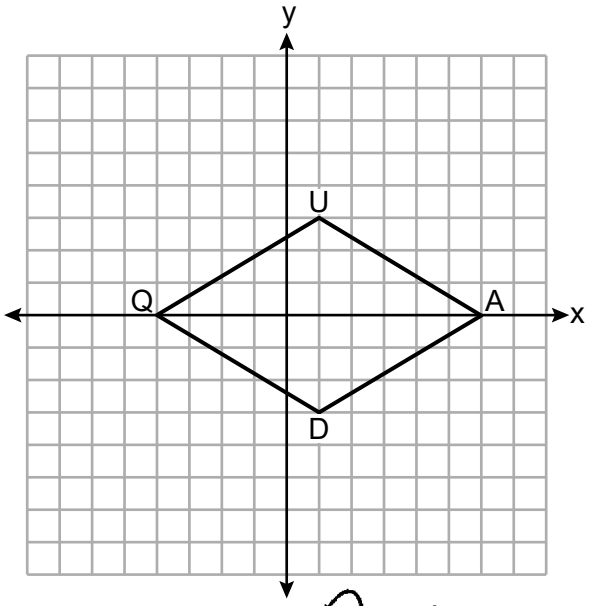
$= \sqrt{34} \approx 5.8\ldots$

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

Question 28

28 Quadrilateral *QUAD* is graphed on the set of axes below.

U(1, 3)
A(6, 0)
D(1, -3)
Q(-4, 0)



A = b · h

Determine and state the area of quadrilateral *QUAD*.

UQ

$\sqrt{(-4-1)^2+(0-3)^2}$

$\sqrt{5^2+3^2}$

$\sqrt{34}$

QD

$\sqrt{(-4-1)^2+(0-3)^2}$

$\sqrt{5^2+3^2}$

$\sqrt{34}$

PA

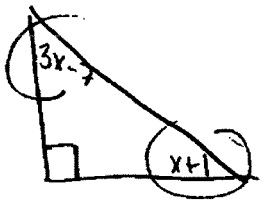
$A = \sqrt{34}$ units^2

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

Question 29

29 In a right triangle, the acute angles have the relationship $\sin(3x - 7)° = \cos(x + 1)°$.

Determine and state the value of x.



$90 + 3x - 7 + x + 1 = 180$

$83 \quad 4x$

84

$4x + 84 = 180$

$-84 \quad -84$

$\frac{4x}{4} = \frac{96}{4}$

$x = 24$

$90 + 3(24) - 7 + (24) + 1 = 180$

$180 = 180$ ✓

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

Question 29

29 In a right triangle, the acute angles have the relationship $\sin(3x - 7)° = \cos(x + 1)°$.

Determine and state the value of x.

$3x - 7 + x + 1 = 90$

$4x - 6 = 90$

$4x = 96$

$x = 24$

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

Question 29

29 In a right triangle, the acute angles have the relationship $\sin(3x - 7)° = \cos(x + 1)°$.

Determine and state the value of x.

$3x - 7 + x + 1 = 90$

$4x - 6 = 90$

$4x = 96$

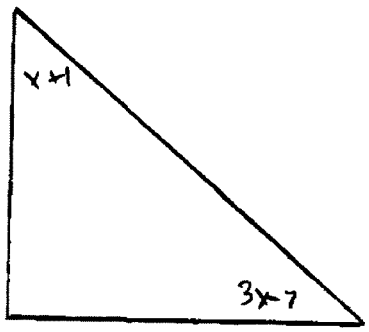
$x = 24$

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

Question 29

29 In a right triangle, the acute angles have the relationship $\sin(3x - 7)° = \cos(x + 1)°$.

Determine and state the value of x.



$3x - 7 = x + 1$
$+7 \quad +7$

$3x = x + 8$
$-x \quad -x$

$\frac{2x}{2} = \frac{8}{2}$

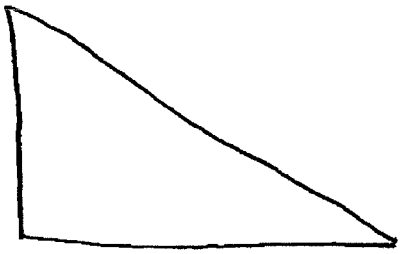
$x = 4$

Score 1: The student made a conceptual error using an incorrect equation, but found an appropriate answer.

Question 29

29 In a right triangle, the acute angles have the relationship $\sin(3x - 7)° = \cos(x + 1)°$.

Determine and state the value of x.



$x + 1 + 3x - 7 = 90$

$-x \quad -x$

$1 + 2x - 7 = 90$

$+7 \quad +7$

$8 + 2x = 90$

$-8 \quad -8$

$\frac{2x}{2x} = \frac{82}{2x}$

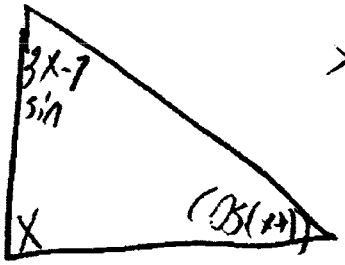
$x = 41$

Score 1: The student wrote a correct equation to determine the value of x.

Question 29

29 In a right triangle, the acute angles have the relationship $\sin(3x - 7)° = \cos(x + 1)°$.

Determine and state the value of x.



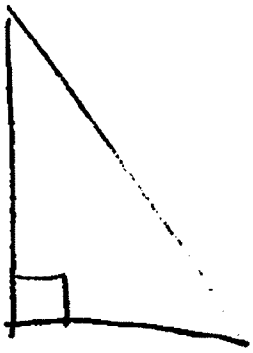
$x + \sin(3x-7) + \cos(x+1) = 180$

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

Question 29

29 In a right triangle, the acute angles have the relationship $\sin(3x - 7)° = \cos(x + 1)°$.

Determine and state the value of x.



$\sin(3x-7)^\circ : \cos(x+1)^\circ$

$\sin(3x-7)^\circ + \cos(x+1)^\circ = 90^\circ$

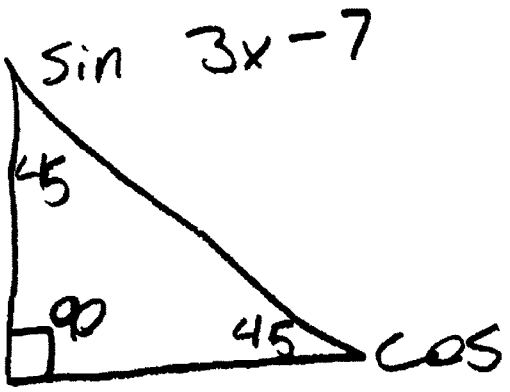
$180-90=90$

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

Question 29

29 In a right triangle, the acute angles have the relationship $\sin(3x - 7)° = \cos(x + 1)°$.

Determine and state the value of x.



.78

$3x = 52$

$x = 44$

.72

$\sin 3x-7 = 45$

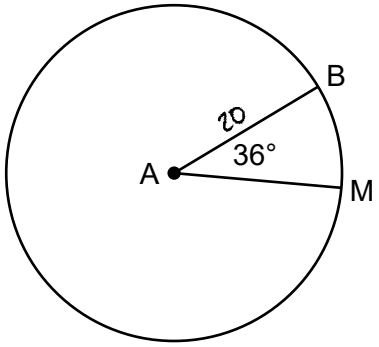
$\cos x+1 = 45$

$3x-7 = x+1 = 45$

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

Question 30

30 In circle A below, $m\angle BAM = 36°$.



If $AB = 20$, determine and state the length of $\overset{\frown}{MB}$.
[Leave your answer in terms of π.]

$AL = \frac{n}{360} \cdot \pi D$

$AL = \frac{36}{360} \cdot \pi(40)$

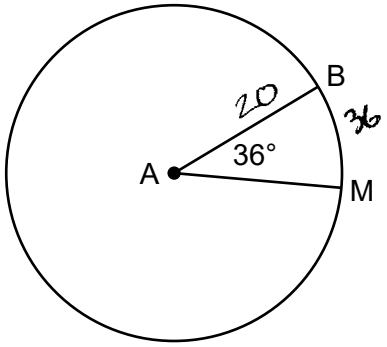
$AL = 4\pi$

$\overset{\frown}{MB} = 4\pi$

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

Question 30

30 In circle A below, $m\angle BAM = 36°$.



If $AB = 20$, determine and state the length of $\overset{\frown}{MB}$.
[Leave your answer in terms of π.]

$C = \pi(40)$
40π

$\frac{36}{360} = \frac{x}{40\pi}$

$36(40\pi) = 360x$

$\frac{1440\pi}{360} = \frac{360x}{360}$

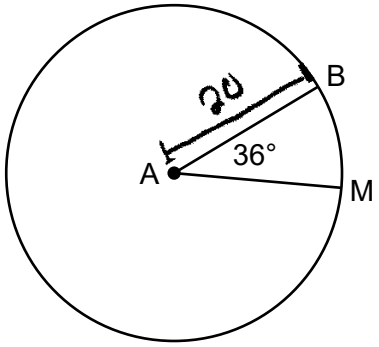
$x = 4\pi$

$\overset{\frown}{MB} = 4\pi$

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

Question 30

30 In circle A below, $m\angle BAM = 36°$.



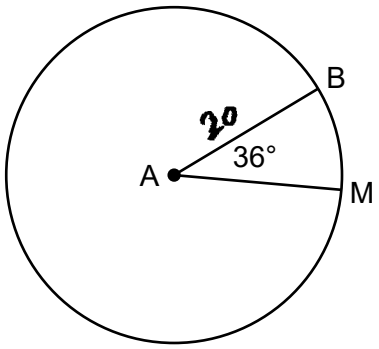
If $AB = 20$, determine and state the length of $\overset{\frown}{MB}$.
[Leave your answer in terms of π.]

$$\ell = \left(\frac{36}{360}\right)2\pi 20$$
$$= \left(\frac{36}{360}\right)40\pi$$
$$= \frac{1440\pi}{360}$$
$$= 4\pi$$

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

Question 30

30 In circle A below, $m\angle BAM = 36°$.



If $AB = 20$, determine and state the length of $\overset{\frown}{MB}$.
[Leave your answer in terms of π.]

$C = 2\pi($ $\frac{36}{360} \cdot \frac{40\pi}{1}$

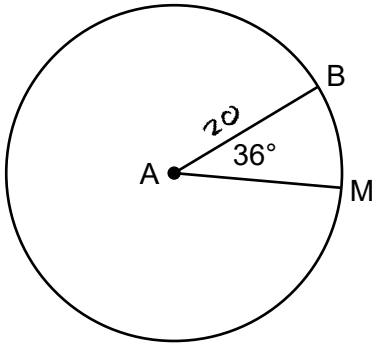
$C = 2\pi(20)$ $\frac{1440\pi}{360}$

$C = 40\pi$ 4π

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

Question 30

30 In circle A below, $m\angle BAM = 36°$.



If $AB = 20$, determine and state the length of $\overset{\frown}{MB}$.
[Leave your answer in terms of π.]

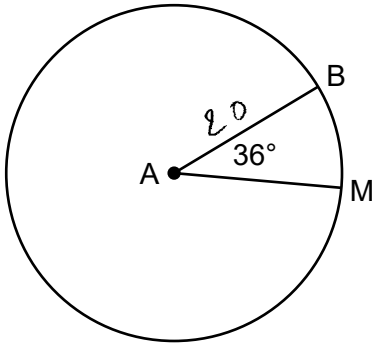
$\frac{36}{360} \cdot \pi(20)^2$

40π

Score 1: The student made a conceptual error in using the area formula.

Question 30

30 In circle A below, $m\angle BAM = 36°$.



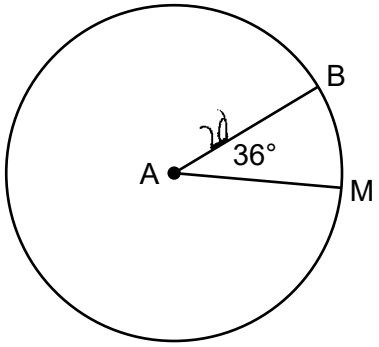
If $AB = 20$, determine and state the length of $\overset{\frown}{MB}$.
[Leave your answer in terms of π.]

4π

Score 1: The student wrote a correct answer, but did not show work.

Question 30

30 In circle A below, $m\angle BAM = 36°$.



If $AB = 20$, determine and state the length of $\overset{\frown}{MB}$.
[Leave your answer in terms of π.]

$A = \pi r^2$

$A = (20)^2 \pi$

400π

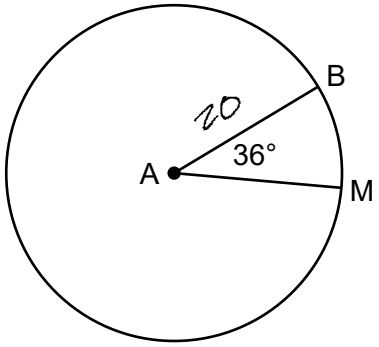
$\frac{36}{360} \quad \frac{400\pi}{1}$

$\frac{1440\pi}{360}$ 4π

Score 0: The student made a conceptual error using the area formula and made a computational error when squaring 20.

Question 30

30 In circle A below, $m\angle BAM = 36°$.



If $AB = 20$, determine and state the length of $\overset{\frown}{MB}$.
[Leave your answer in terms of π.]

$\frac{36}{360} = 2\pi 20$

$\frac{36}{360} = 40\pi$

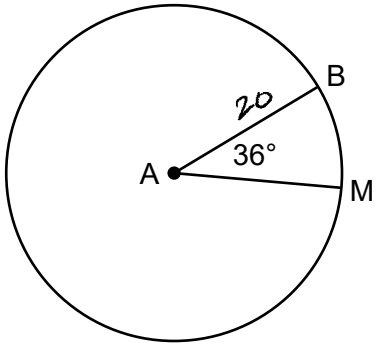
$\frac{36}{360} \cdot \frac{1}{1} = 40\pi$

~~39.9π~~ .

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

Question 30

30 In circle A below, $m\angle BAM = 36°$.



If $AB = 20$, determine and state the length of $\overset{\frown}{MB}$.
[Leave your answer in terms of π.]

$C = 2\pi r$

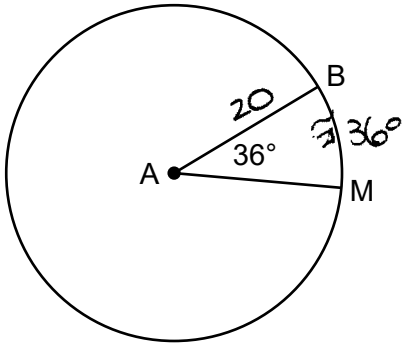
$C = 2\pi 20$

$C = 40\pi$

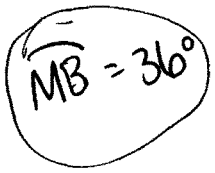
Score 0: The student did not show enough correct relevant course-level work to receive any credit.

Question 30

30 In circle A below, $m\angle BAM = 36°$.



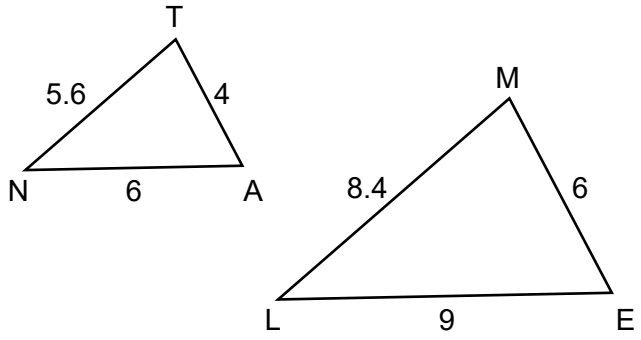
If $AB = 20$, determine and state the length of $\overset{\frown}{MB}$.
[Leave your answer in terms of π.]



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

Question 31

31 In triangles *ANT* and *ELM* below, $AN = 6$, $NT = 5.6$, $TA = 4$, $EL = 9$, $LM = 8.4$, and $ME = 6$.



Explain why $\triangle ANT \sim \triangle ELM$.

$\frac{NA}{LE} = \frac{6}{9} = \frac{2}{3}$

$\frac{TN}{ML} = \frac{5.6}{8.4} = \frac{2}{3}$

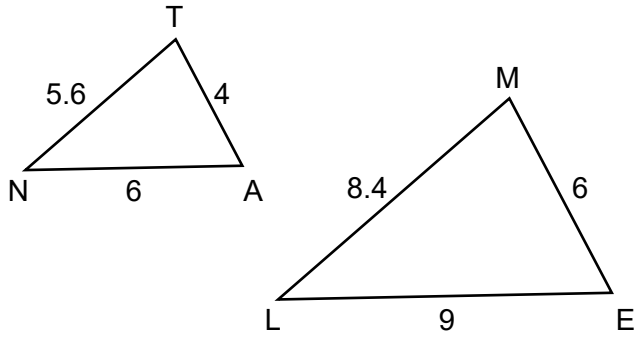
$\frac{TA}{ME} = \frac{4}{6} = \frac{2}{3}$

If the ratios of the 3 pairs of corresponding sides of the 2 triangles are all in the same proportion, the 2 triangles are similar. by SSS similarity $\triangle ANT \sim \triangle ELM$

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

Question 31

31 In triangles ANT and ELM below, $AN = 6$, $NT = 5.6$, $TA = 4$, $EL = 9$, $LM = 8.4$, and $ME = 6$.



Explain why $\triangle ANT \sim \triangle ELM$.

$\frac{9}{6} = \frac{6}{4} = \frac{8.4}{5.6}$

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

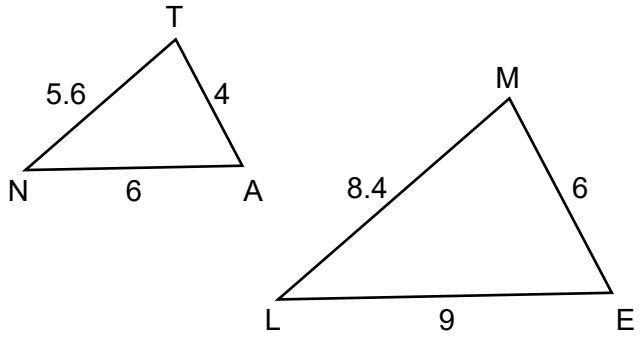
$\frac{LE}{NA} = \frac{ME}{TA} = \frac{ML}{TN}$

Since all 3 pairs of corresponding sides are in proportion, $\triangle ANT \sim \triangle ELM$ by SSS~

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

Question 31

31 In triangles ANT and ELM below, $AN = 6$, $NT = 5.6$, $TA = 4$, $EL = 9$, $LM = 8.4$, and $ME = 6$.



Explain why $\triangle ANT \sim \triangle ELM$.

$\frac{6}{9} = .\overline{6}$ $\frac{4}{6} = .\overline{6}$ $\frac{5.6}{8.4} = .\overline{6}$

The ratio of all pairs of corresponding sides of $\triangle ANT$ and $\triangle ELM$ equals $.\overline{6}$

so corresponding sides are in proportion.

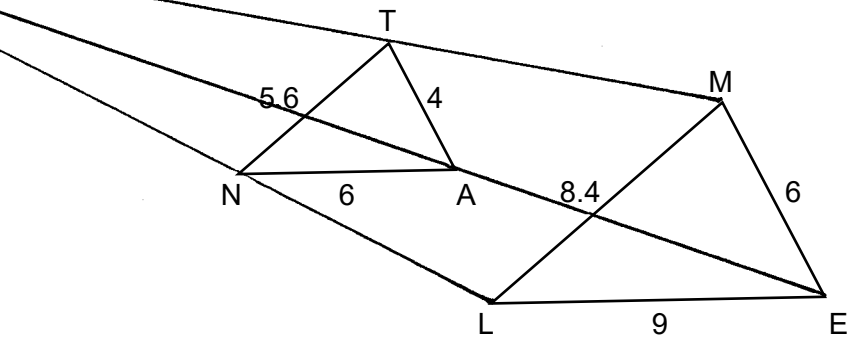
By SSS for similarity, $\triangle ANT \sim \triangle ELM$.

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

Question 31

31 In triangles *ANT* and *ELM* below, $AN = 6$, $NT = 5.6$, $TA = 4$, $EL = 9$, $LM = 8.4$, and $ME = 6$.

C



Explain why $\triangle ANT \sim \triangle ELM$.

$\frac{8.4}{5.6} = \frac{6}{4} = \frac{9}{6}$

$1.5 = 1.5 = 1.5$

I dilated $\triangle ANT$ by a scale factor of 1.5 centered at C to map $\triangle ANT$ onto $\triangle ELM$

Dilations preserve angle measure so

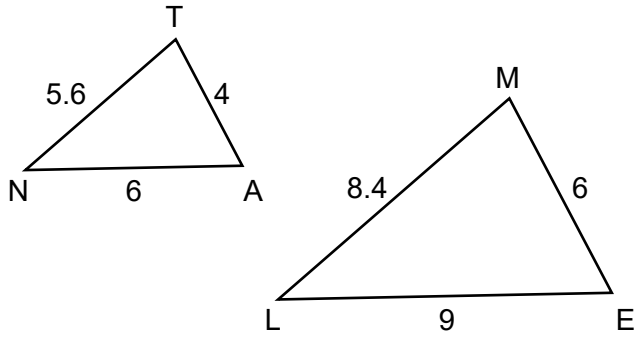
$\angle A \cong \angle E$ and $\angle T \cong \angle M$

$\triangle ANT \sim \triangle ELM$ by AA~

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

Question 31

31 In triangles *ANT* and *ELM* below, $AN = 6$, $NT = 5.6$, $TA = 4$, $EL = 9$, $LM = 8.4$, and $ME = 6$.



Explain why $\triangle ANT \sim \triangle ELM$.

$\frac{TA}{ME} = \frac{4}{6} = .\overline{6}$

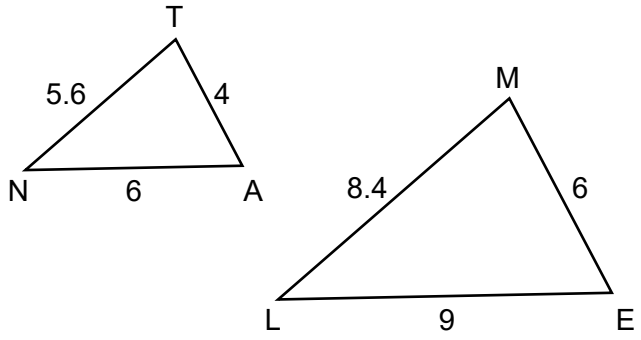
$\frac{AN}{EL} = \frac{6}{9} = .\overline{6}$

$\triangle ANT \sim \triangle ELM$ because 2 pairs of corresponding sides are in the same proportion. so they are similar by ~~AA~~ SS similarity.

Score 1: The student wrote a partially correct explanation by only comparing the ratios of two pairs of corresponding sides.

Question 31

31 In triangles ANT and ELM below, $AN = 6$, $NT = 5.6$, $TA = 4$, $EL = 9$, $LM = 8.4$, and $ME = 6$.



Explain why $\triangle ANT \sim \triangle ELM$.

$\frac{TA}{ME} = \frac{NA}{LE}$

$\frac{4}{6} = \frac{6}{9}$

$36 = 36$

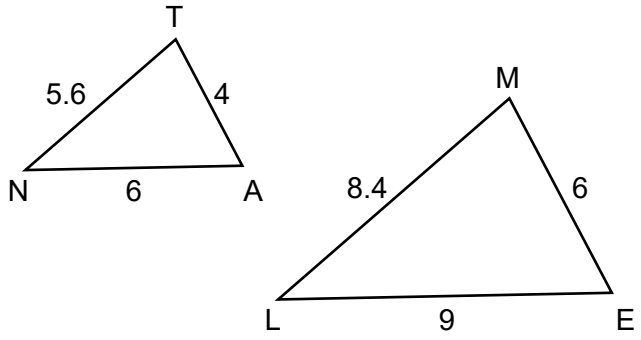
$\measuredangle A \cong \measuredangle E$

the triangles have corresponding side lengths with = cross products and the included angles are congruent. By SAS for similarity the triangles

Score 1: The student incorrectly assumed $\angle A \cong \angle E$, but wrote an appropriate explanation.

Question 31

31 In triangles *ANT* and *ELM* below, $AN = 6$, $NT = 5.6$, $TA = 4$, $EL = 9$, $LM = 8.4$, and $ME = 6$.



Explain why $\triangle ANT \sim \triangle ELM$.

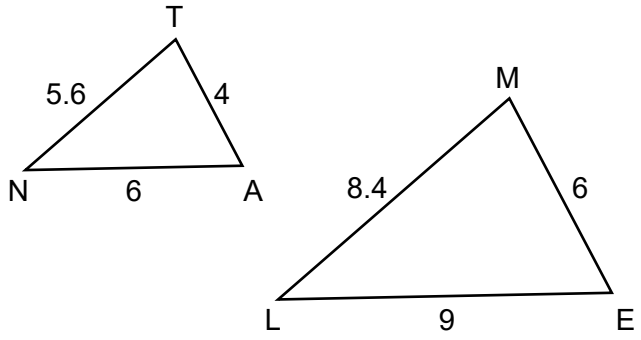
$\frac{6}{9} = .\overline{6}$ $\frac{4}{8.4} = .4762$ $\frac{5.6}{6} = .9\overline{3}$

Since the corresponding side lengths do not have the same ratio, they are not in proportion. The triangles are not similar.

Score 1: The student made an error in not using corresponding sides for two ratios, but wrote an appropriate explanation.

Question 31

31 In triangles ANT and ELM below, $AN = 6$, $NT = 5.6$, $TA = 4$, $EL = 9$, $LM = 8.4$, and $ME = 6$.



Explain why $\triangle ANT \sim \triangle ELM$.

$\frac{9}{6} = \frac{6}{4} = \frac{8.4}{5.6} = \frac{3}{2}$

Translate $\triangle NAT$ so $\angle A$ maps onto $\angle E$, then dilate its image by a scale factor of $\frac{3}{2}$ centered at E.

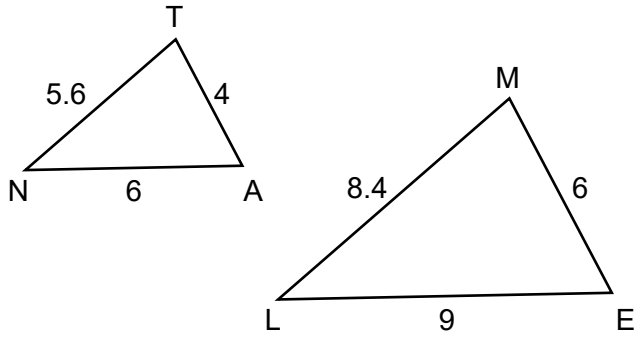
Dilations preserve angle measure, so $\angle T \cong \angle M$ and $\angle N \cong \angle L$.

By AA similarity, $\triangle ANT \sim \triangle ELM$.

Score 1: The student incorrectly assumed $\angle A \cong \angle E$, but wrote an appropriate explanation.

Question 31

31 In triangles ANT and ELM below, $AN = 6$, $NT = 5.6$, $TA = 4$, $EL = 9$, $LM = 8.4$, and $ME = 6$.



Explain why $\triangle ANT \sim \triangle ELM$.

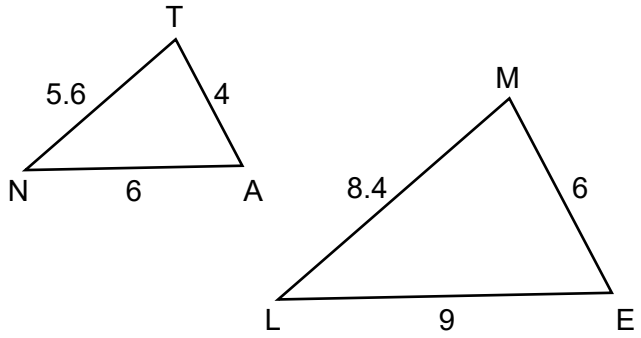
$\frac{6}{9} = \frac{4}{6} = \frac{5.6}{8.4}$

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

Score 0: The student wrote correct proportions, but the explanation is missing.

Question 31

31 In triangles *ANT* and *ELM* below, $AN = 6$, $NT = 5.6$, $TA = 4$, $EL = 9$, $LM = 8.4$, and $ME = 6$.



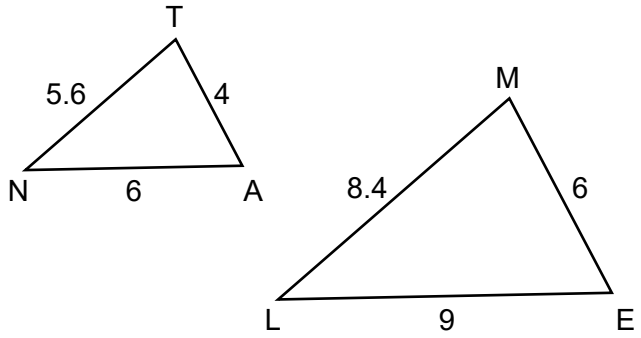
Explain why $\triangle ANT \sim \triangle ELM$.

$\triangle ANT \sim \triangle ELM$ because they are the same shape but different sizes.

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

Question 31

31 In triangles ANT and ELM below, $AN = 6$, $NT = 5.6$, $TA = 4$, $EL = 9$, $LM = 8.4$, and $ME = 6$.



Explain why $\triangle ANT \sim \triangle ELM$.

Because the side lengths are proportional.

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

Question 32

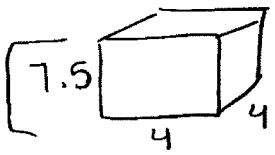
32 A store sells colored craft sand in the three different containers below.

Container 1: A square prism with a base length of 4 inches and a height of 7.5 inches.

Container 2: A cylinder with a diameter of 5 inches and a height of 6 inches.

Container 3: A cone with a diameter of 7.5 inches and a height of 8.5 inches.

If the containers are filled to the top, which container will hold the most sand? Justify your answer. VOLUME



$V = Bh$

$V = 4 \cdot 4 \cdot 7.5$

$V = 120$

the cone

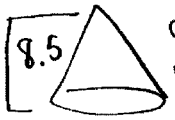
2.5 = r

$V = \pi r^2 h$

$V = \pi(2.5)^2(6)$

$V = 37.5\pi$

$V = 117.8097245\ldots$



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

$V = \frac{1}{3}\pi(3.75)^2(8.5)$

$V = 39.84375\pi$

$V = 125.1728323\ldots$

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

Question 32

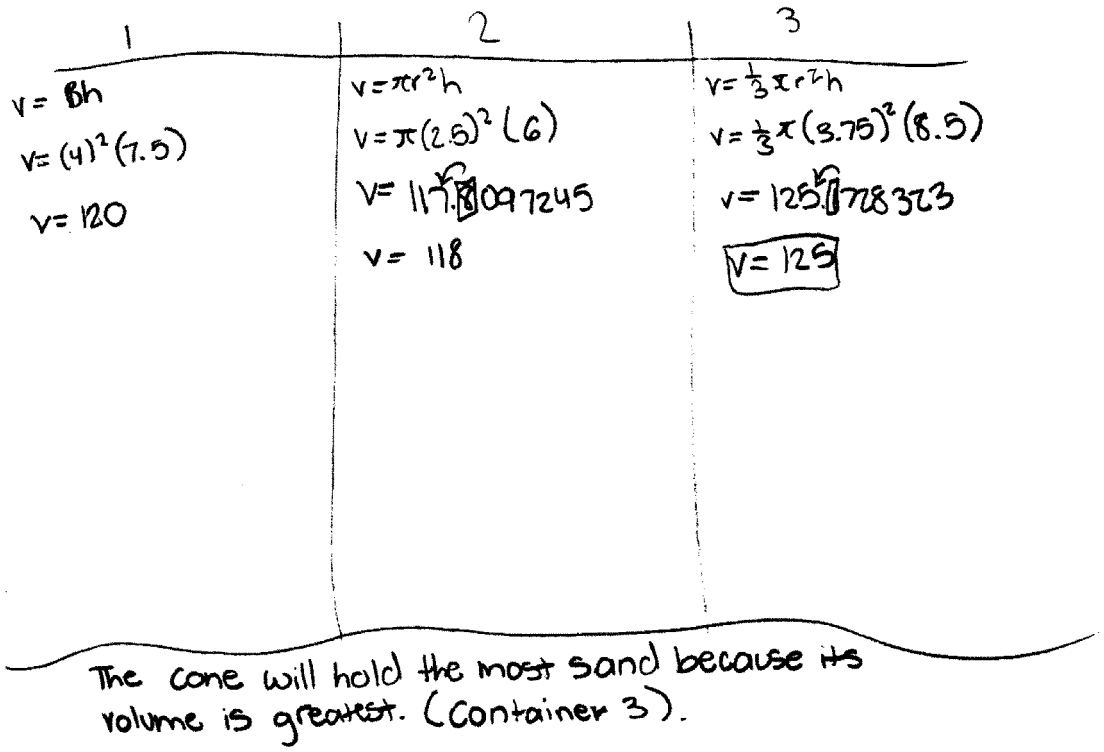
32 A store sells colored craft sand in the three different containers below.

Container 1: A square prism with a base length of 4 inches and a height of 7.5 inches.

Container 2: A cylinder with a diameter of 5 inches and a height of 6 inches.

Container 3: A cone with a diameter of 7.5 inches and a height of 8.5 inches.

If the containers are filled to the top, which container will hold the most sand? Justify your answer.



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

Question 32

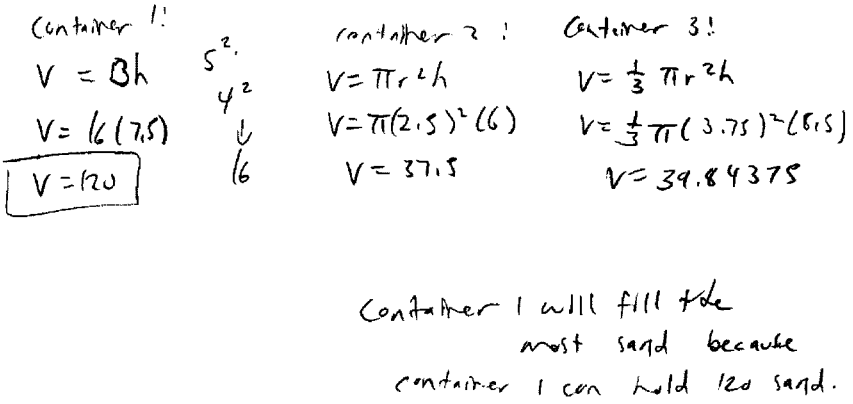
32 A store sells colored craft sand in the three different containers below.

Container 1: A square prism with a base length of 4 inches and a height of 7.5 inches.

Container 2: A cylinder with a diameter of 5 inches and a height of 6 inches.

Container 3: A cone with a diameter of 7.5 inches and a height of 8.5 inches.

If the containers are filled to the top, which container will hold the most sand? Justify your answer.



Score 3: The student made the same computational error by not multiplying by π when determining the volumes of the cylinder and the cone, but found an appropriate container.

Question 32

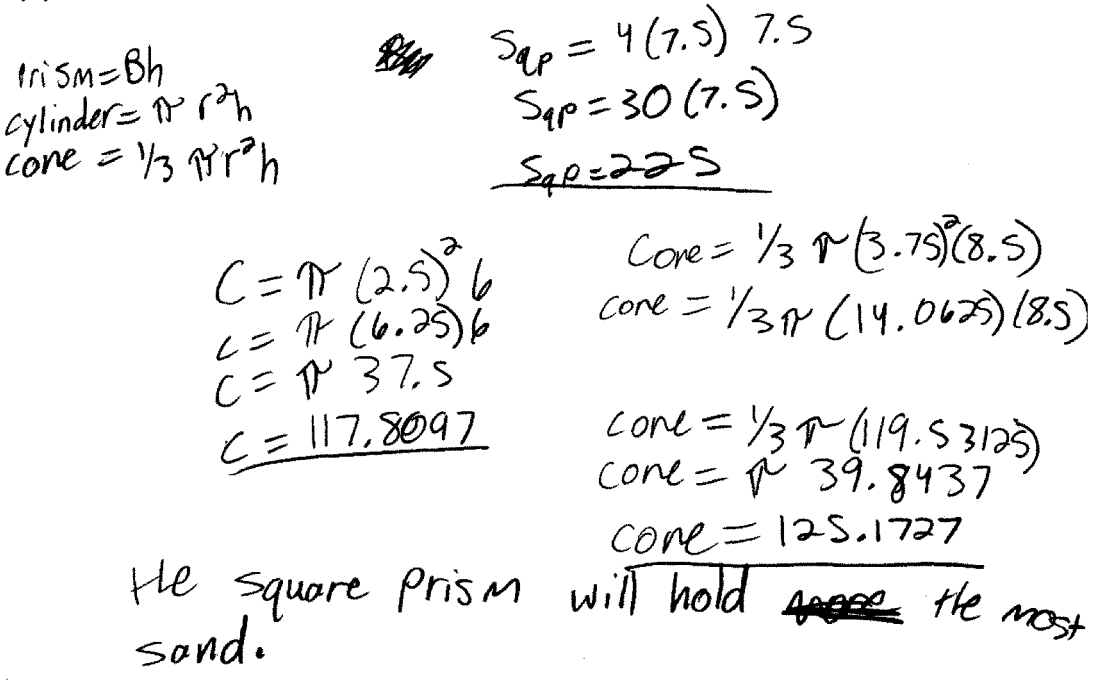
32 A store sells colored craft sand in the three different containers below.

Container 1: A square prism with a base length of 4 inches and a height of 7.5 inches.

Container 2: A cylinder with a diameter of 5 inches and a height of 6 inches.

Container 3: A cone with a diameter of 7.5 inches and a height of 8.5 inches.

If the containers are filled to the top, which container will hold the most sand? Justify your answer.



Score 3: The student made an error when determining the volume of the square prism, but found an appropriate container.

Question 32

32 A store sells colored craft sand in the three different containers below.

Container 1: A square prism with a base length of 4 inches and a height of 7.5 inches.

Container 2: A cylinder with a diameter of 5 inches and a height of 6 inches.

Container 3: A cone with a diameter of 7.5 inches and a height of 8.5 inches.

If the containers are filled to the top, which container will hold the most sand? Justify your answer.

$V_{square\ prism} = 2.5 \cdot 7.5$
$= 187.5$

$\pi 2.5^2 \cdot 6$
$V_{cylinder} = 117.81$

$V_{cone} = \frac{1}{3} \pi 3.75^2 \cdot 8.5$
$= 125.17$

Score 3: The student made an error when determining the volume of the square prism, but found an appropriate container.

Question 32

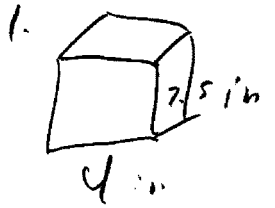
32 A store sells colored craft sand in the three different containers below.

Container 1: A square prism with a base length of 4 inches and a height of 7.5 inches.

Container 2: A cylinder with a diameter of 5 inches and a height of 6 inches.

Container 3: A cone with a diameter of 7.5 inches and a height of 8.5 inches.

If the containers are filled to the top, which container will hold the most sand? Justify your answer.



$6(4)^2(7.5)$

$V = 720$

$V = \pi r^2 h$

$\pi 2.5^2(6)$

$= 37.5\pi$

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

$= 39.8437\pi$

Container 1 will fill to the top the most

Score 3: The student made an error when determining the volume of the square prism, but found an appropriate container.

Question 32

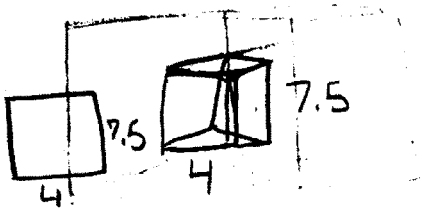
32 A store sells colored craft sand in the three different containers below.

Container 1: A square prism with a base length of 4 inches and a height of 7.5 inches.

Container 2: A cylinder with a diameter of 5 inches and a height of 6 inches.

Container 3: A cone with a diameter of 7.5 inches and a height of 8.5 inches.

If the containers are filled to the top, which container will hold the most sand? Justify your answer.

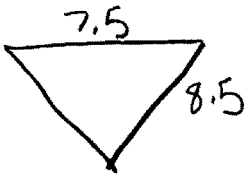


$V = 4 \times 7.5 = 30$ container 1

$V = \pi r^2 h$

$\pi 2.5^2 \times 6$

117.8097245



Container 2 would Hold the most Because it has the greatest volume.

$V = \frac{1}{3} \pi 3.75^2 \times 8.5$

125.1728323

Score 2: The student correctly determined the volume of the cylinder and cone.

Question 32

32 A store sells colored craft sand in the three different containers below.

Container 1: A square prism with a base length of 4 inches and a height of 7.5 inches.

Container 2: A cylinder with a diameter of 5 inches and a height of 6 inches.

Container 3: A cone with a diameter of 7.5 inches and a height of 8.5 inches.

If the containers are filled to the top, which container will hold the most sand? Justify your answer.

cont 1:
$V = Bh$
$V = 4(7.5)$
$V = 30$

cont 2:
$V = \pi r^2 h$
$V = \pi(2.5)^2(8.5)$
$V = 166.9$

cont 3:
$V = \frac{1}{3}\pi r^2 h$
$V = \frac{1}{3}\pi(3.75)^2(8.5)$
$V = 125.2$

Container 2 will hold the most sand

Score 2: The student made errors when determining the volumes of the square prism and cylinder, but found an appropriate container.

Question 32

32 A store sells colored craft sand in the three different containers below.

Container 1: A square prism with a base length of 4 inches and a height of 7.5 inches.

Container 2: A cylinder with a diameter of 5 inches and a height of 6 inches.

Container 3: A cone with a diameter of 7.5 inches and a height of 8.5 inches.

If the containers are filled to the top, which container will hold the most sand? Justify your answer.

Con 1: $4 \times 7.5 = 30$

con2 : $V = \pi r^2 h = \pi(2.236067775)^2(6) = 30$

Con 3: $\frac{1}{3} \pi r^2 h = \frac{1}{3} \pi (2.738612788^2)(8.5) = 66.75984389$

Container 3 would be able to hold the most bic its volume is greater than container 1 and 2.

Score 1: The student made errors when determining the volumes of the three containers, but found an appropriate container.

Question 32

32 A store sells colored craft sand in the three different containers below.

Container 1: A square prism with a base length of 4 inches and a height of 7.5 inches.

Container 2: A cylinder with a diameter of 5 inches and a height of 6 inches.

Container 3: A cone with a diameter of 7.5 inches and a height of 8.5 inches.

If the containers are filled to the top, which container will hold the most sand? Justify your answer.

container 3 becaus its larger

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

Question 32

32 A store sells colored craft sand in the three different containers below.

Container 1: A square prism with a base length of 4 inches and a height of 7.5 inches.

Container 2: A cylinder with a diameter of 5 inches and a height of 6 inches.

Container 3: A cone with a diameter of 7.5 inches and a height of 8.5 inches.

If the containers are filled to the top, which container will hold the most sand? Justify your answer.

1. 4x75 =30
2. 5x6 =30
3. 7.5x8.5=63.75

Cointainer 3
because its the
largest

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

Question 33

33 Quadrilateral *MIKE* has vertices with coordinates $M(-1,-3)$, $I(-3,3)$, $K(5,4)$, and $E(7,-2)$.

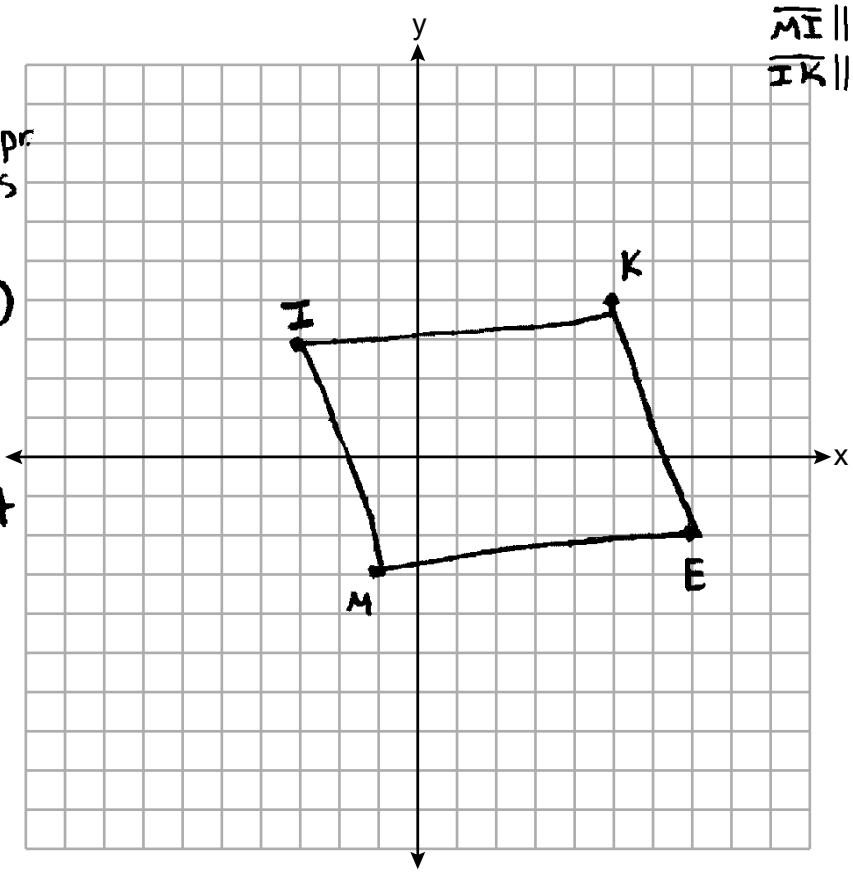
Prove *MIKE* is a parallelogram, and prove *MIKE* is *not* a rhombus.
[The use of the set of axes below is optional.]

$MI = \sqrt{(-1+3)^2+(-3-3)^2} = \sqrt{40}$
$IK = \sqrt{(-3-5)^2+(3-4)^2} = \sqrt{65}$
$KE = \sqrt{(5-7)^2+(4+2)^2} = \sqrt{40}$
$EM = \sqrt{(-1-7)^2+(-3+2)^2} = \sqrt{65}$

$m\overline{MI} = \frac{-3-3}{-1+3} = \frac{-6}{2} = -3$ $m\overline{KE} = \frac{-2-4}{7-5} = \frac{-6}{2} = -3$
$m\overline{IK} = \frac{4-3}{5+3} = 1/8$ $m\overline{EM} = \frac{-2+3}{7+1} = 1/8$

Quadrilateral MIKE is a parallelogram because both pr opposite sides are parallel (equal slopes) but isn't a rhombus because all 4 sides aren't congruent.

$\overline{MI} \parallel \overline{KE}$ same slope
$\overline{IK} \parallel \overline{EM}$ same slope



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

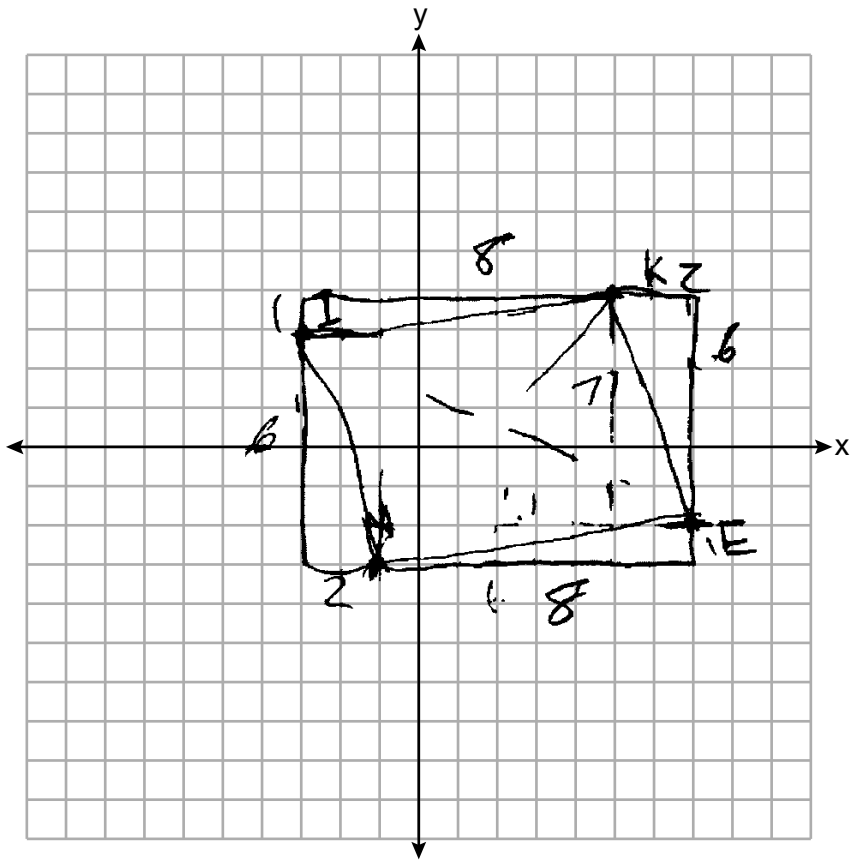
Question 33

33 Quadrilateral *MIKE* has vertices with coordinates $M(-1,-3)$, $I(-3,3)$, $K(5,4)$, and $E(7,-2)$.

Prove *MIKE* is a parallelogram, and prove *MIKE* is *not* a rhombus.
[The use of the set of axes below is optional.]

d MI: $\sqrt{6^2+2^2} = \sqrt{36+4} = \sqrt{40}$,
d KE: $\sqrt{6^2+2^2} = \sqrt{36+4} = \sqrt{40}$
d KI: $\sqrt{8^2+1^2} = \sqrt{64+1} = \sqrt{65}$
d ME: $\sqrt{8^2+1^2} = \sqrt{64+1} = \sqrt{65}$

MIKE is a parallelogram Because it has Both pr. opposite Sides that are congruent and MIKE is Not a Rhombus Because Not All of it's Sides are Congruent Therefore MIKE is a Parallelogram But not a Rhombus.



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

Question 33

33 Quadrilateral *MIKE* has vertices with coordinates $M(-1,-3)$, $I(-3,3)$, $K(5,4)$, and $E(7,-2)$.

Prove *MIKE* is a parallelogram, and prove *MIKE* is *not* a rhombus.
[The use of the set of axes below is optional.]

$IK = \sqrt{(5-(-3))^2+(4-3)^2} = \sqrt{65}$

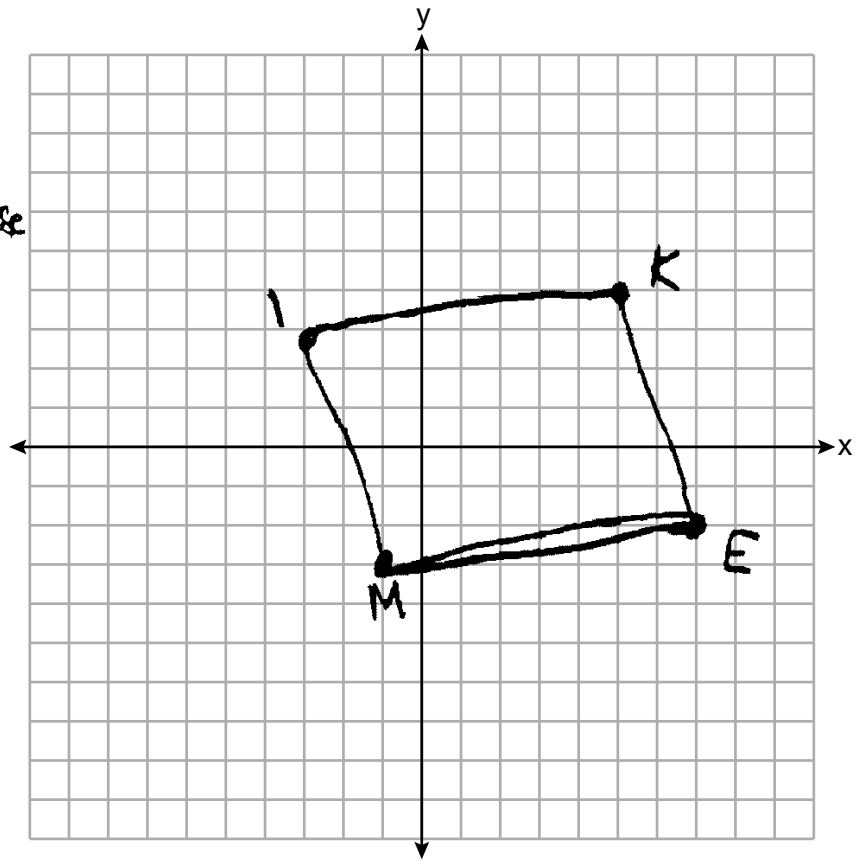
$ME = \sqrt{(7-(-1))^2+(-2-(-3))^2} = \sqrt{65}$

$IM = \sqrt{(-1-(-3))^2+(-3-3)^2} = \sqrt{40}$

$KE = \sqrt{(7-5)^2+(-2-4)^2} = \sqrt{40}$

MIKE is a p-gm because both pairs of opp. sides are ≅

MIKE is not a rhombus because not all sides are congruent



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

Question 33

33 Quadrilateral *MIKE* has vertices with coordinates $M(-1,-3)$, $I(-3,3)$, $K(5,4)$, and $E(7,-2)$.

Prove *MIKE* is a parallelogram, and prove *MIKE* is *not* a rhombus.
[The use of the set of axes below is optional.]

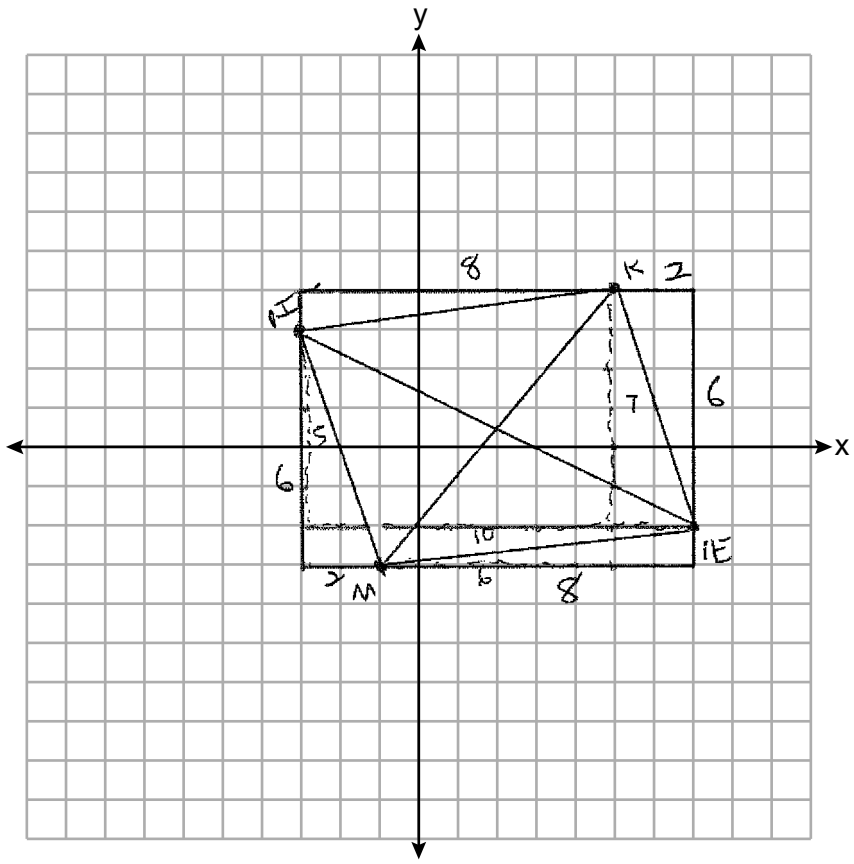
$m\overline{MI} = \frac{-6}{2} = -3$
$m\overline{KE} = \frac{-6}{2} = -3$
Same slopes → parallel

$m\overline{IK} = \frac{1}{8}$
$m\overline{ME} = \frac{1}{8}$
Same slopes → parallel

Since both pairs of opposite sides are parallel, MIKE is a parallelogram

$m\overline{KM} = \frac{7}{6}$
$m\overline{IE} = \frac{-5}{10} = -\frac{1}{2}$

Since the slopes of diagonals $\overline{KM}$ and $\overline{IE}$ are not negative reciprocals, they are not perpendicular. Since $\overline{KM}$ is not perpendicular to $\overline{IE}$, MIKE is not a rhombus.

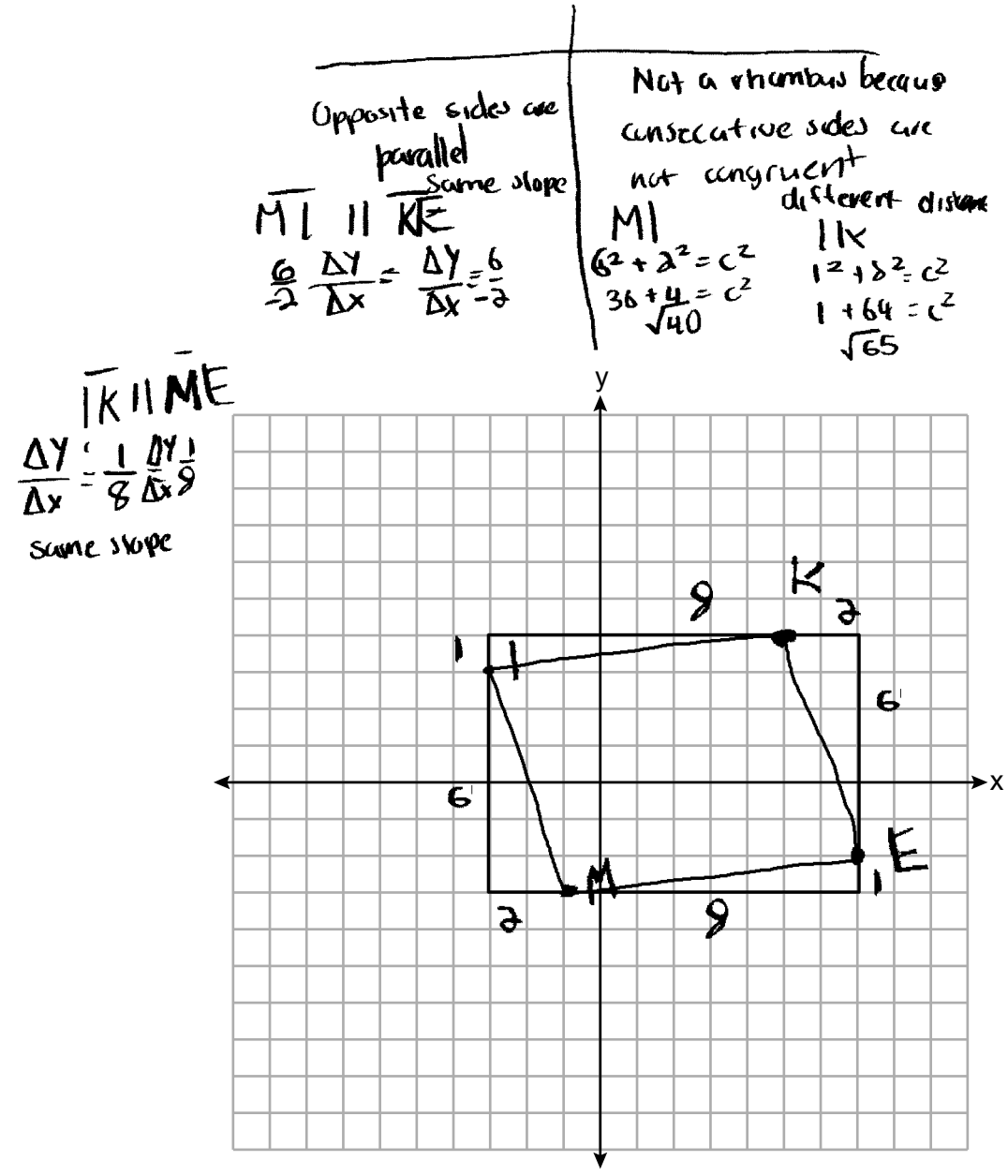


Score 4: The student gave a complete and correct response.

Question 33

33 Quadrilateral *MIKE* has vertices with coordinates $M(-1,-3)$, $I(-3,3)$, $K(5,4)$, and $E(7,-2)$.

Prove *MIKE* is a parallelogram, and prove *MIKE* is *not* a rhombus.
[The use of the set of axes below is optional.]



Score 3: The student wrote an incomplete concluding statement when proving the parallelogram.

Question 33

33 Quadrilateral *MIKE* has vertices with coordinates $M(-1,-3)$, $I(-3,3)$, $K(5,4)$, and $E(7,-2)$.

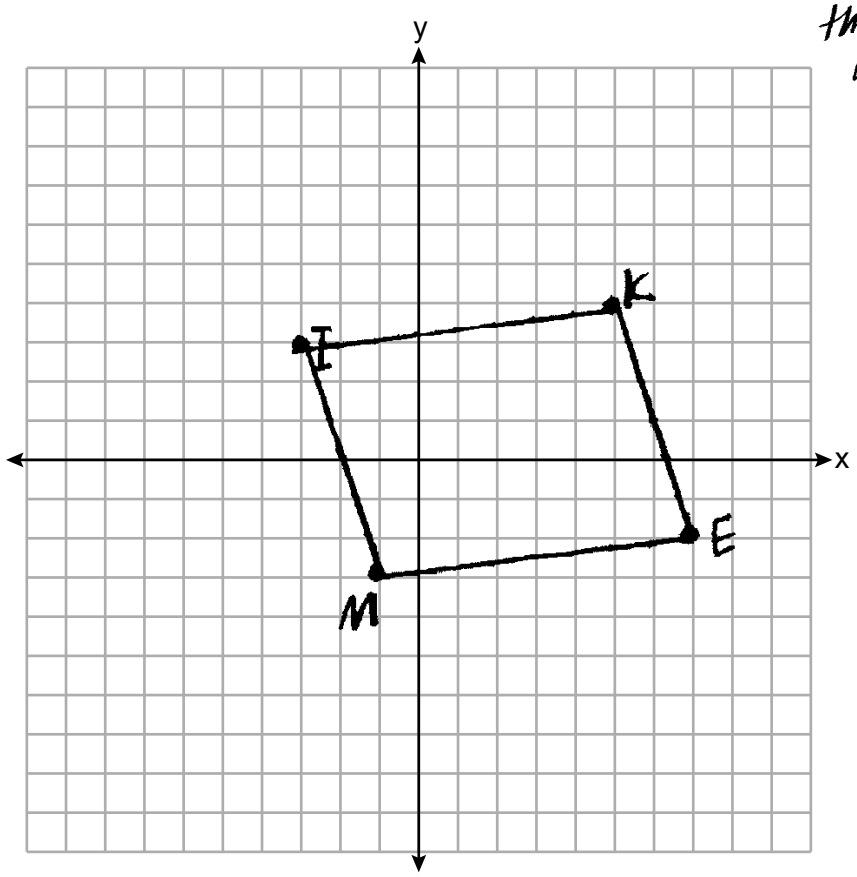
Prove *MIKE* is a parallelogram, and prove *MIKE* is *not* a rhombus.
[The use of the set of axes below is optional.]

Slope $\overline{MI} = \frac{3+3}{-3+1} = \frac{6}{-2} = -3$
Slope $\overline{KE} = \frac{-2-4}{7-5} = \frac{-6}{2} = -3$
D $\overline{IM}$ $\sqrt{(3+3)^2+(-3+1)^2}$
D$\sqrt{36+4}$
D$\sqrt{40}$

Slope $\overline{IK} = \frac{4-3}{5+3} = \frac{1}{8}$
Slope $\overline{ME} = \frac{-2+3}{7+1} = \frac{1}{8}$
D $\overline{ME}$ $\sqrt{(-2+3)^2+(7+1)^2}$
D$\sqrt{1+64}$
D$\sqrt{65}$

MIKE is a parallelogram because both pr. opposite sides are parallel

MIKE is not a rhombus because not all sides are the same length



Score 3: The student wrote an incomplete conclusion when proving the opposite sides of *MIKE* parallel.

Question 33

33 Quadrilateral *MIKE* has vertices with coordinates $M(-1,-3)$, $I(-3,3)$, $K(5,4)$, and $E(7,-2)$.

Prove *MIKE* is a parallelogram, and prove *MIKE* is *not* a rhombus.
[The use of the set of axes below is optional.]

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

$IK = \sqrt{(5-3)^2+(4-3)^2}$

$\sqrt{8^2+1^2}$

$IK = \sqrt{65}$

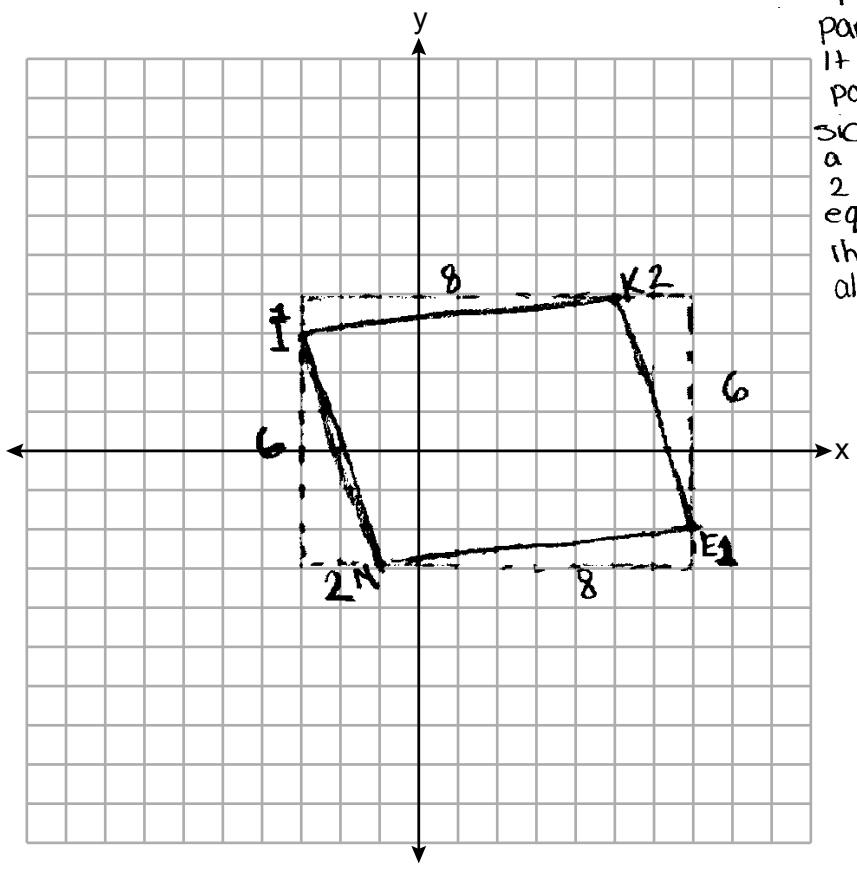
$IM = \sqrt{(-1--3)^2+(-3-3)^2}$

$IM = \sqrt{2^2+0^2}$ $IM = \sqrt{4}$ $IM = 2$

Slope $\overline{IK}$ $\frac{1}{8}$] same slope $\parallel$
Slope $\overline{ME}$ $\frac{1}{8}$

Slope $\overline{IM}$ $\frac{-6}{2}$] same slope $\parallel$
Slope $\overline{KE}$ $\frac{-6}{2}$

Quadrilateral MIKE is a parallelogram b/c it has two pairs of parallel opp. sides. It is not a rhombus b/c 2 sides are not equal, and a rhombus has all equal sides.



Score 3: The student made a computational error when determining the length of $\overline{IM}$.

Question 33

33 Quadrilateral *MIKE* has vertices with coordinates $M(-1,-3)$, $I(-3,3)$, $K(5,4)$, and $E(7,-2)$.

Prove *MIKE* is a parallelogram, and prove *MIKE* is *not* a rhombus.
[The use of the set of axes below is optional.]

$m\overline{IK} = \frac{4-3}{5-(-3)} = \frac{1}{8}$

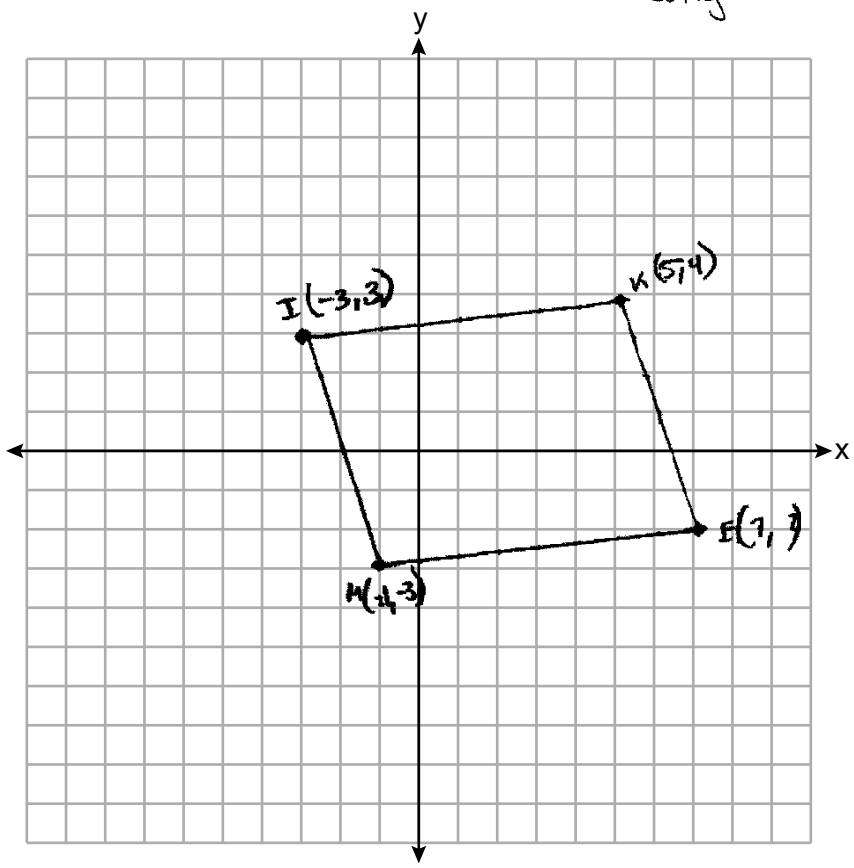
$m\overline{ME} = \frac{-2-(-3)}{7-(-1)} = \frac{1}{8}$

Opposite sides are parallel

$IM = \sqrt{(-1-(-3))^2+(-3-3)^2} = \sqrt{40}$

$IK = \sqrt{(5-(-3))^2+(4-3)^2} = \sqrt{64+1} = \sqrt{65}$

It's not a rhombus because all sides aren't congruent.



Score 2: The student proved *MIKE* is not a rhombus.

Question 33

33 Quadrilateral *MIKE* has vertices with coordinates $M(-1,-3)$, $I(-3,3)$, $K(5,4)$, and $E(7,-2)$.

Prove *MIKE* is a parallelogram, and prove *MIKE* is *not* a rhombus.
[The use of the set of axes below is optional.]

Rhombus = all sides same length slope = $\frac{y_2-y_1}{x_2-x_1}$

$\overline{MI}$ slope: -3
$\overline{IK}$ slope: $\frac{1}{8}$
$\overline{KE}$ slope: -3
$\overline{ME}$ slope: $\frac{1}{8}$

$\overline{MI} \parallel \overline{KE}$
$\overline{IK} \parallel \overline{ME}$

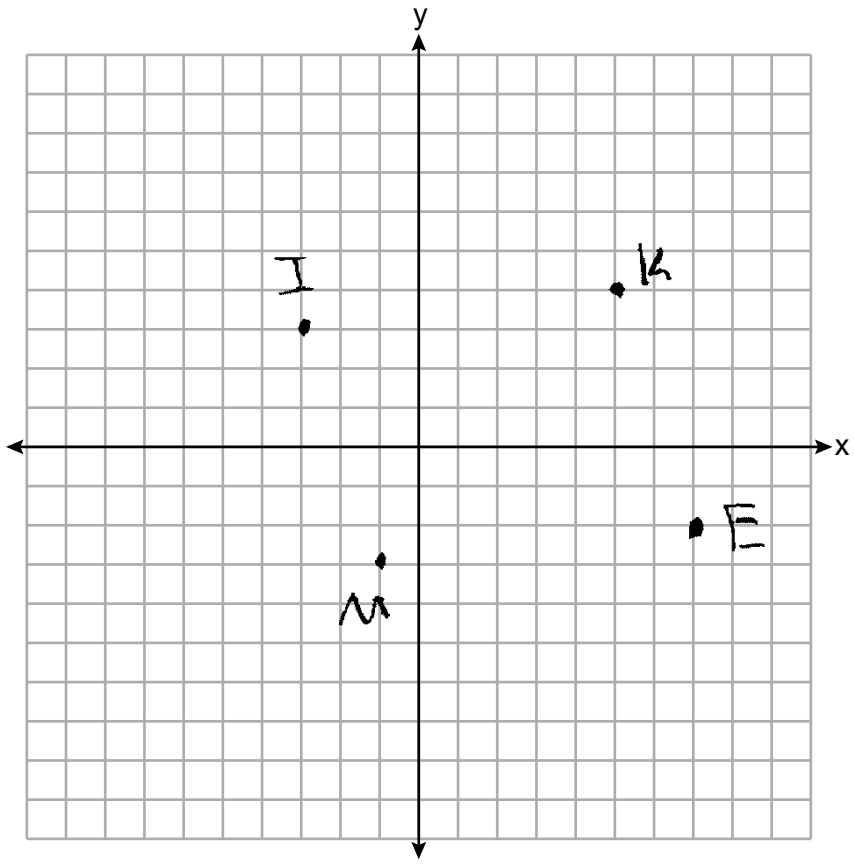
$\overline{MI}$ $\frac{3+3}{-3+1} = \frac{6}{-2} = -3$

$\overline{IK}$ $\frac{4-3}{5+3} = \frac{1}{8}$

$\overline{KE}$ $\frac{-2-4}{7-5} = \frac{-6}{2} = -3$

$\overline{ME}$ $\frac{-2+3}{7+1} = \frac{1}{8}$

MIKE is a parallelogram because it has two prs. of parallel sides ($\overline{MI} \parallel \overline{KE}$ $\overline{IK} \parallel \overline{ME}$) but not a rhombus because not all sides are the same length.



Score 2: The student proved *MIKE* was a parallelogram, but no further correct work was shown.

Question 33

33 Quadrilateral *MIKE* has vertices with coordinates $M(-1,-3)$, $I(-3,3)$, $K(5,4)$, and $E(7,-2)$.

Prove *MIKE* is a parallelogram, and prove *MIKE* is *not* a rhombus.
[The use of the set of axes below is optional.]

$m = \frac{y_2 - y_1}{x_2 - x_1}$

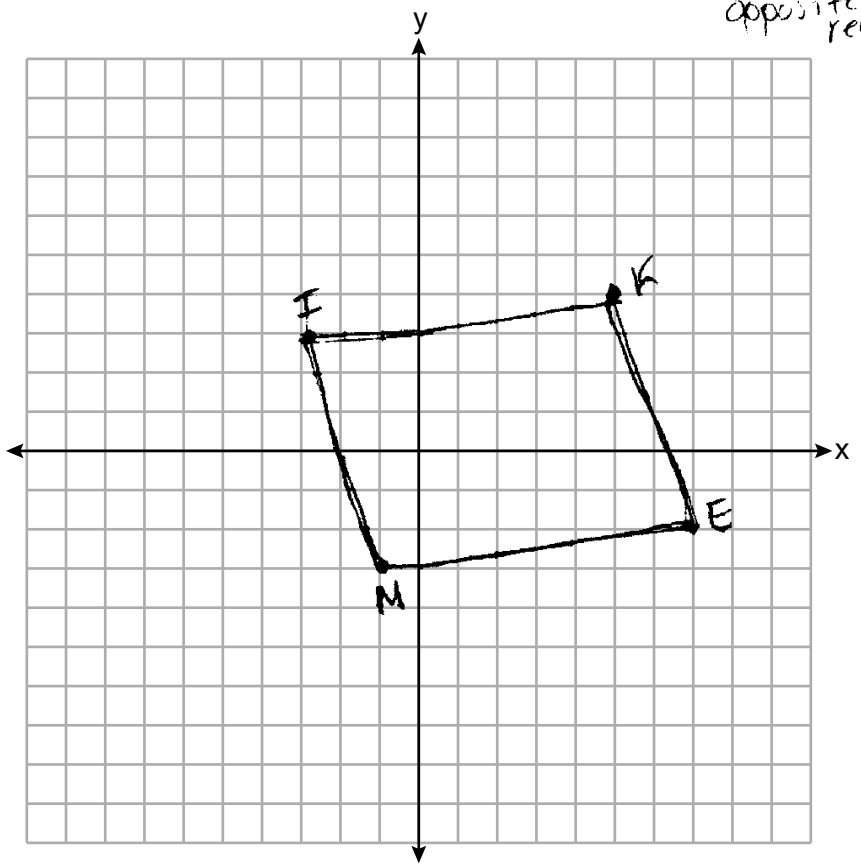
$\overline{IK}$ (-3,3) (5,4) $m = \frac{4-3}{5--3} = \frac{1}{8}$

$\overline{KE}$ (5,4) (7,-2) $m = \frac{-2-4}{7-5} = \frac{-6}{2}$

$\overline{IM}$ (-3,3) (-1,3) $m = \frac{-3-3}{-1--3} = \frac{-6}{2}$

$\overline{ME}$ (-1,-3) (7,-2) $m = \frac{-2--3}{7-1} = \frac{1}{8}$

* MIke is a parallelogram because opposite lines are ||, it's not a rhombus because the opposite lines are not opposite reciprocal.



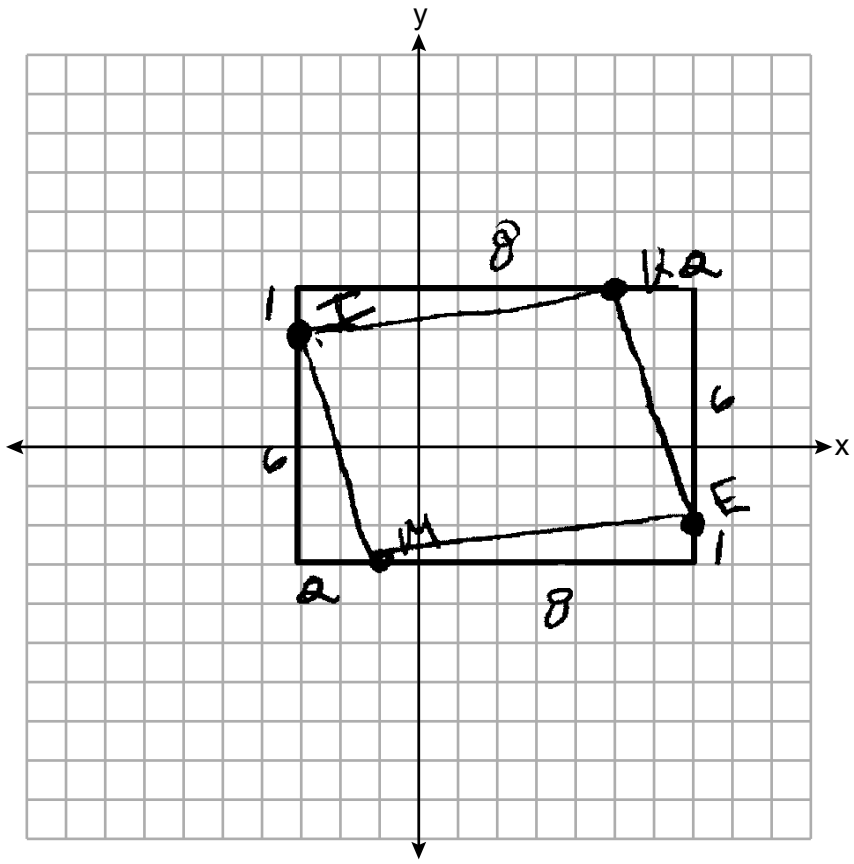
Score 1: The student correctly determined the slopes of all four sides of *MIKE*. No further correct work was shown.

Question 33

33 Quadrilateral *MIKE* has vertices with coordinates $M(-1,-3)$, $I(-3,3)$, $K(5,4)$, and $E(7,-2)$.

Prove *MIKE* is a parallelogram, and prove *MIKE* is *not* a rhombus.
[The use of the set of axes below is optional.]

Slope	Distance
$\overline{MI}: \frac{6}{-2}$	$\sqrt{6^2+2^2} = \sqrt{40}$
$\overline{IK}: \frac{1}{8}$	$\sqrt{12+8^2} = \sqrt{65}$
$\overline{KE}: -\frac{6}{2}$	$\sqrt{6^2+2^2} = \sqrt{40}$
$\overline{EM}: -\frac{8}{1}$	$\sqrt{8^2+1^2} = \sqrt{65}$



Score 1: The student made an error when determining the slope of $\overline{EM}$. The student did not write concluding statements.

Question 33

33 Quadrilateral *MIKE* has vertices with coordinates $M(-1,-3)$, $I(-3,3)$, $K(5,4)$, and $E(7,-2)$.

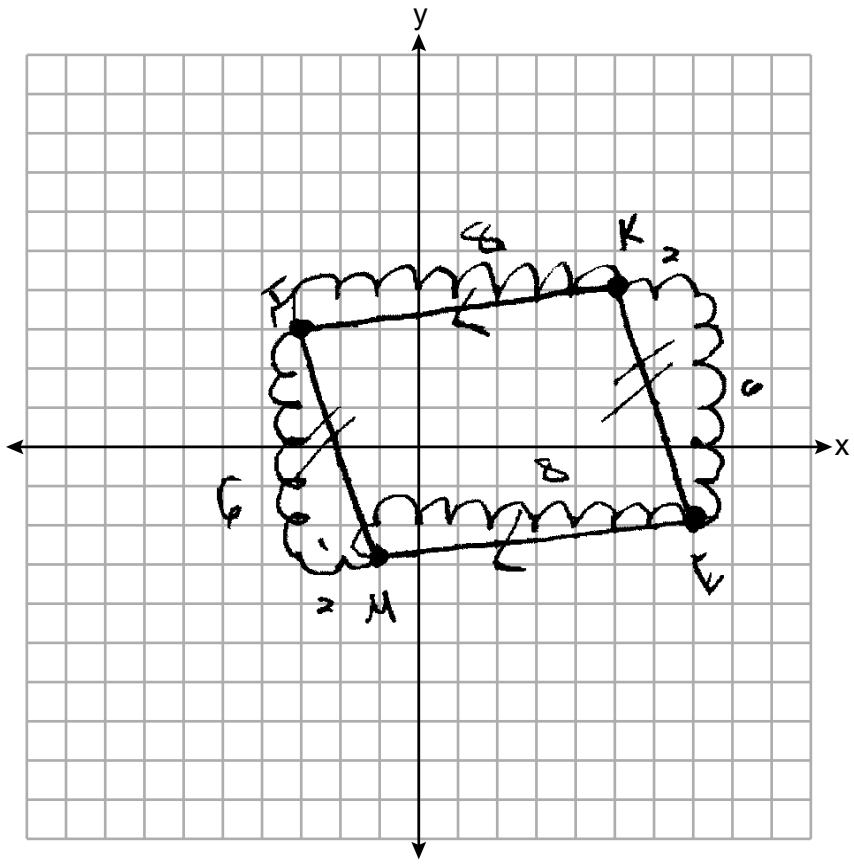
Prove *MIKE* is a parallelogram, and prove *MIKE* is *not* a rhombus.
[The use of the set of axes below is optional.]

$m\overline{IK} = \frac{1}{8}$

$m\overline{ME} = \frac{1}{8}$

$m\overline{MI} = -\frac{6}{2} = -3$

$m\overline{KE} = -\frac{6}{2} = -3$



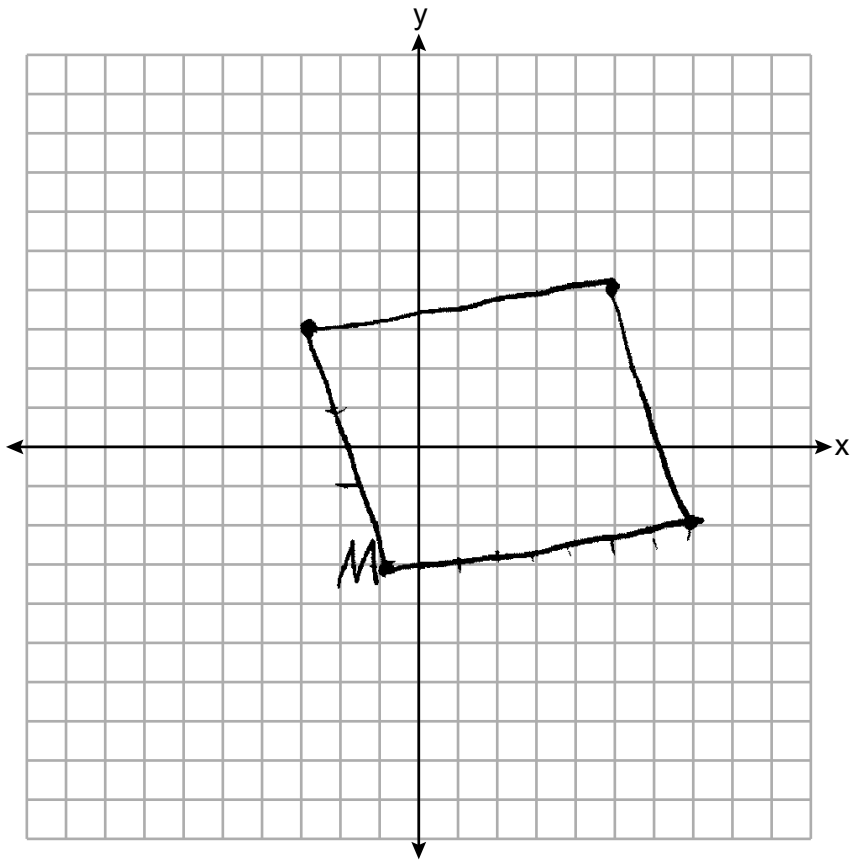
Score 1: The student correctly determined the slopes of the four sides of *MIKE*.

Question 33

33 Quadrilateral *MIKE* has vertices with coordinates $M(-1,-3)$, $I(-3,3)$, $K(5,4)$, and $E(7,-2)$.

Prove *MIKE* is a parallelogram, and prove *MIKE* is *not* a rhombus.
[The use of the set of axes below is optional.]

A parallelogram doesn't have all sides $\cong$ but a rhombus does. The image below does not have $\cong$ sides



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

Question 33

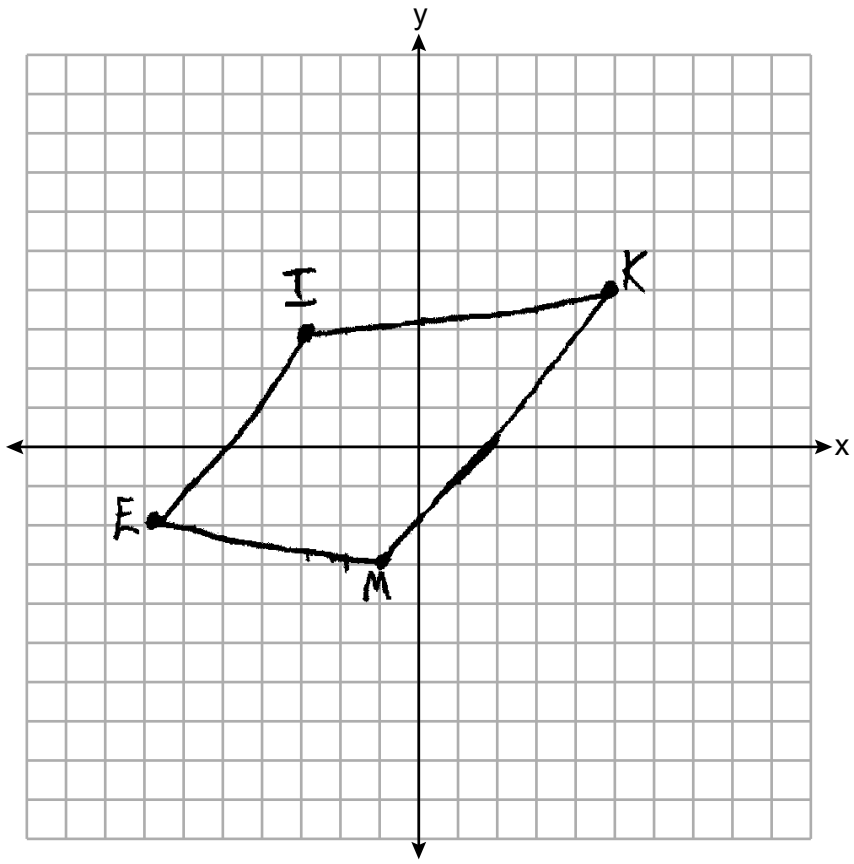
33 Quadrilateral *MIKE* has vertices with coordinates $M(-1,-3)$, $I(-3,3)$, $K(5,4)$, and $E(7,-2)$.

Prove *MIKE* is a parallelogram, and prove *MIKE* is *not* a rhombus.
[The use of the set of axes below is optional.]

x/x2 y/y2 x/x2 y/y2

$\left(\frac{-1+-3}{2}, \frac{-3+-2}{2}\right)$ $\left(\frac{5+4}{2}, \frac{4+-3}{2}\right)$

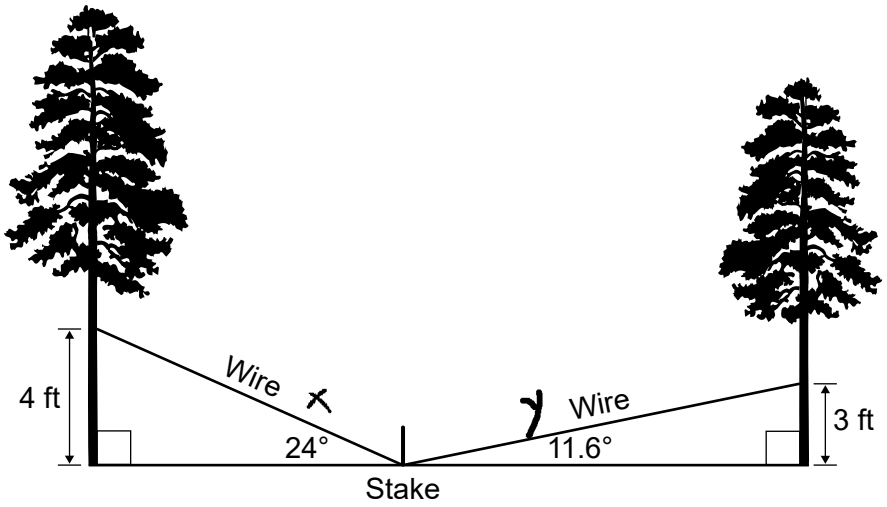
$(-2, -\frac{5}{2})$ $(4.5, 0.5)$



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

Question 34

34 A park ranger needs to secure two different trees with wire. A wire is to be attached from a stake in the ground to each tree. The wire is attached at two different heights and two different angles of elevation, as indicated in the model below.



The park ranger has 20 feet of wire. Does the park ranger have enough wire to secure both trees? Justify your answer.

$\sin 24 = \frac{4}{x}$

$4 = \sin 24\,(x)$

$x = 9.83\text{ft}$

$\sin 11.6 = \frac{3}{y}$

$3 = \sin 11.6\,(y)$

$y = 14.92$

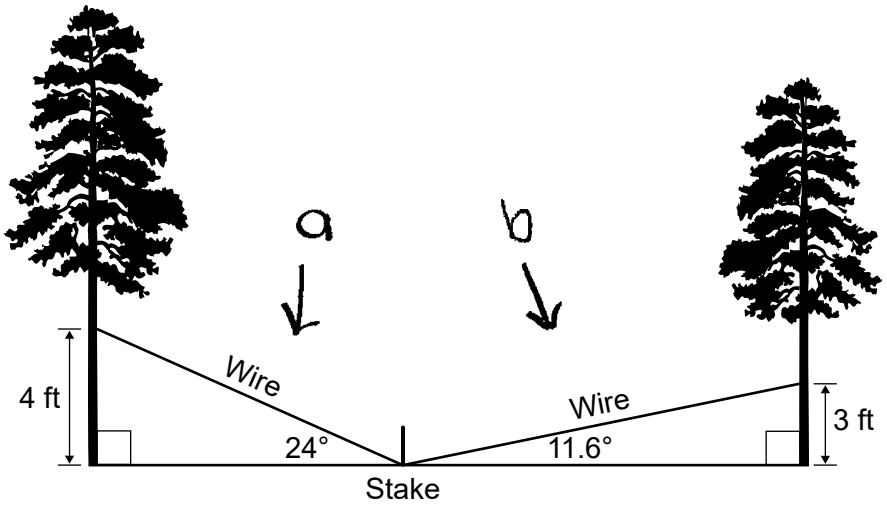
$9.83 + 14.92 = 24.75$

No he does not have enough wire for the trees.

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

Question 34

34 A park ranger needs to secure two different trees with wire. A wire is to be attached from a stake in the ground to each tree. The wire is attached at two different heights and two different angles of elevation, as indicated in the model below.



The park ranger has 20 feet of wire. Does the park ranger have enough wire to secure both trees? Justify your answer.

9.8344
+14.9196
24.7540

no, The Park ranger will need about 5 more feet of wire

$a : \frac{\sin(24)}{1} = \frac{4}{a}$

$\frac{4}{\sin(24)} = \frac{a \cdot \sin(24)}{\sin(24)}$

$a = 9.8344$

$b : \frac{\sin(11.6)}{1} = \frac{3}{b}$

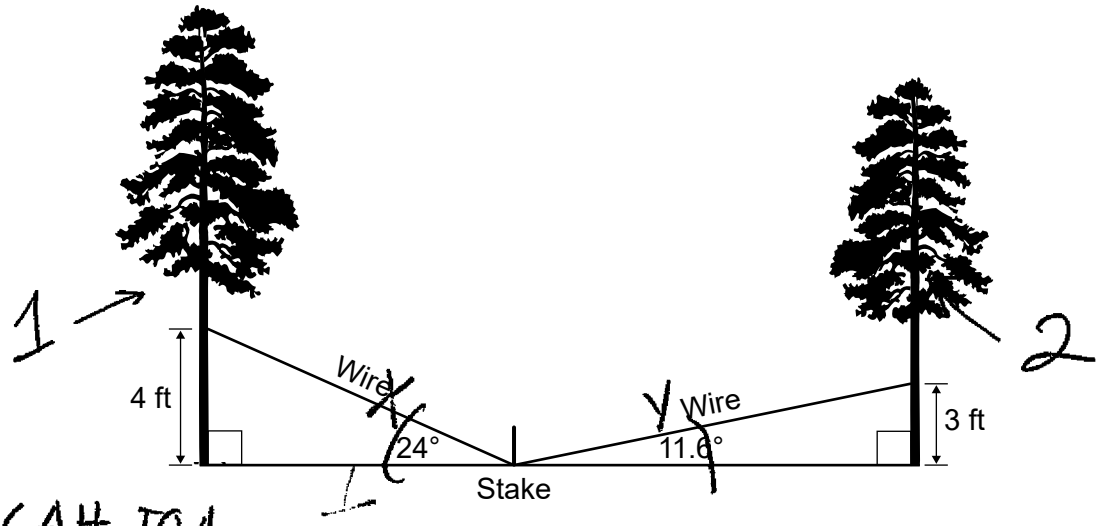
$\frac{3}{\sin(11.6)} = \frac{b \cdot \sin(11.6)}{\sin(11.6)}$

$b = 14.9196$

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

Question 34

34 A park ranger needs to secure two different trees with wire. A wire is to be attached from a stake in the ground to each tree. The wire is attached at two different heights and two different angles of elevation, as indicated in the model below.



SOH CAH TOA

The park ranger has 20 feet of wire. Does the park ranger have enough wire to secure both trees? Justify your answer.

1) $\sin(24) = \frac{4}{x}$ $x = 9.8343...$

2) $\sin(11.6) = \frac{3}{y}$ $y = 14.9196...$

$+$

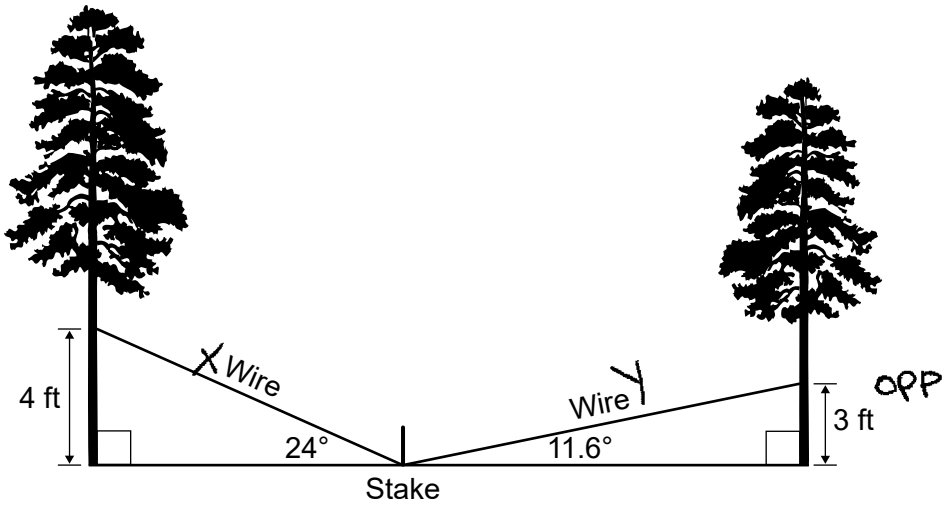
24.75 ft

No he doesnt have enough wire because he only has 20 when he needs 24.75 ft

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

Question 34

34 A park ranger needs to secure two different trees with wire. A wire is to be attached from a stake in the ground to each tree. The wire is attached at two different heights and two different angles of elevation, as indicated in the model below.



The park ranger has 20 feet of wire. Does the park ranger have enough wire to secure both trees? Justify your answer.

No, she would need about 7 more feet of wire because the length from the stakes is greater than the 20 ft of wire

$\sin 24 = \frac{4}{x}$

$\frac{x \sin 24}{\sin 24} = \frac{4}{\sin 24}$

$x = \frac{4}{\sin 24}$

$x = 9.834373342$

$\sin 11.6 = \frac{3}{y}$

$\frac{y \sin 11.6}{\sin 11.6} = \frac{3}{\sin 11.6}$

$y = \frac{3}{\sin 11.6}$

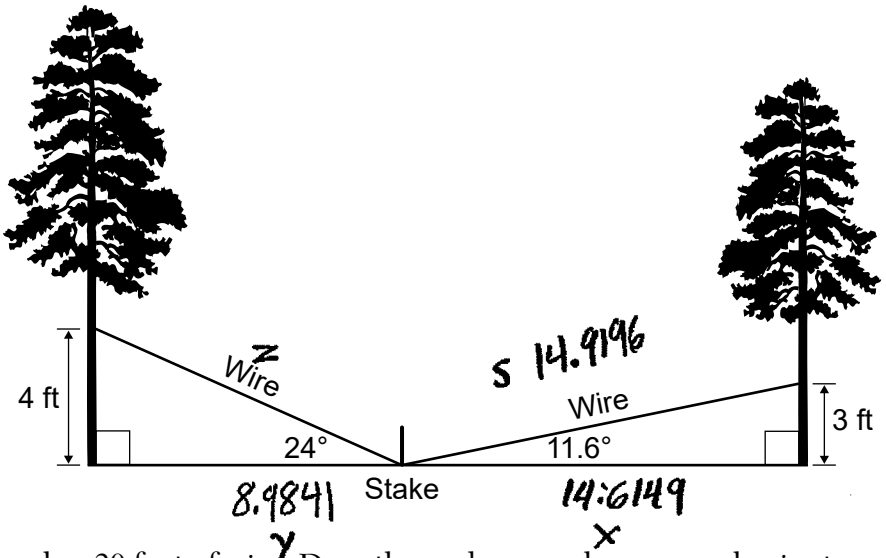
$y = 16.30275681$

$16.30275681 + 9.834373342 = 26.13713015$

Score 3: The student made a computational error in determining y.

Question 34

34 A park ranger needs to secure two different trees with wire. A wire is to be attached from a stake in the ground to each tree. The wire is attached at two different heights and two different angles of elevation, as indicated in the model below.



The park ranger has 20 feet of wire. Does the park ranger have enough wire to secure both trees? Justify your answer.

$\frac{\tan 24}{1} \times \frac{4}{y}$

$\frac{4 = \tan 24\, y}{\tan 24}$

$8.9841 = y$

$4^2 + 8.9841^2 = z^2$

$\sqrt{96.7141 = z^2}$

$9.8343 = z$

$\frac{\tan 11.6}{1} \times \frac{3}{x}$

$\frac{3 = \tan 11.6\, x}{\tan 11.6}$

$14.6149 = x$

$3^2 + 14.6149^2 = s^2$

$\sqrt{222.5953 = s^2}$

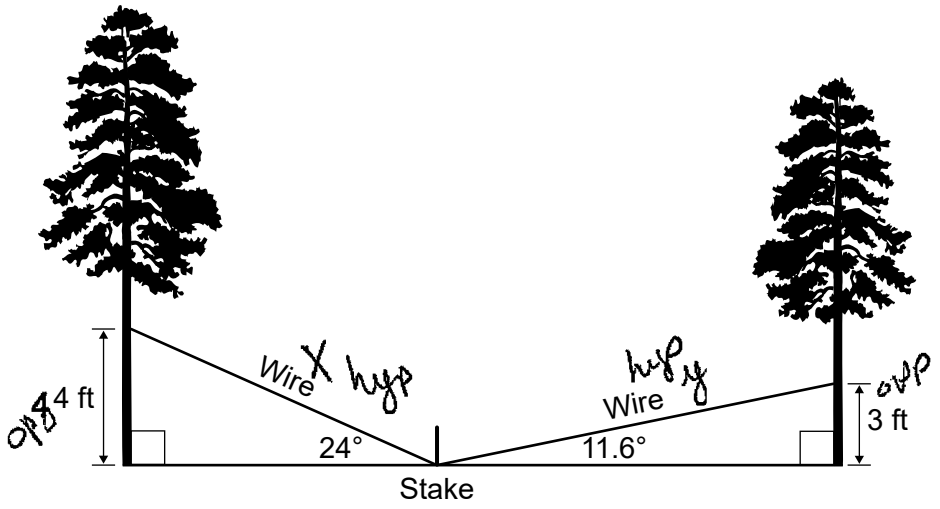
$14.9196 = s$

Score 3: The student correctly determined the length of both wires.

Question 34

34 A park ranger needs to secure two different trees with wire. A wire is to be attached from a stake in the ground to each tree. The wire is attached at two different heights and two different angles of elevation, as indicated in the model below.

SOH



The park ranger has 20 feet of wire. Does the park ranger have enough wire to secure both trees? Justify your answer.

$\frac{\sin 24}{1} = \frac{4}{x}$

$\frac{4}{\sin 24} = \frac{x \sin 24}{\sin 24}$

$x = 9.834$

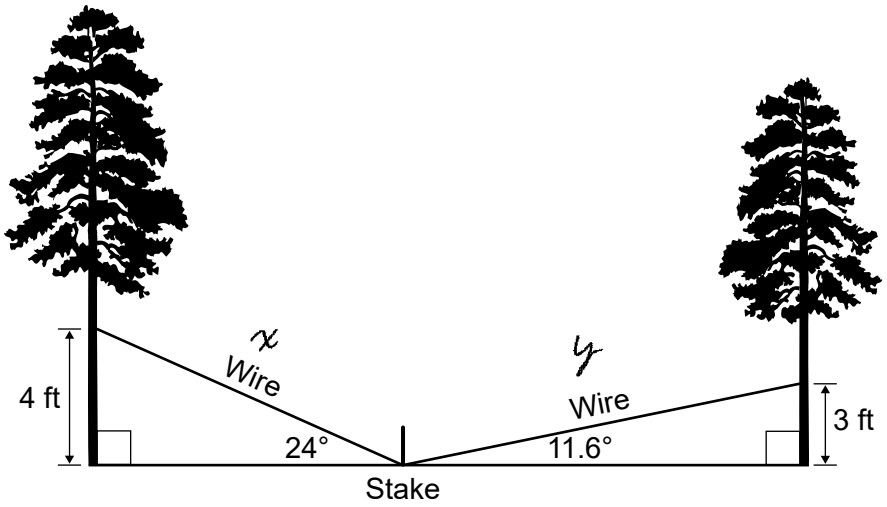
$\frac{\sin 11.6}{1} = \frac{3}{y}$

$3 = y \sin 11.6$

Score 2: The student correctly determined the length of one wire.

Question 34

34 A park ranger needs to secure two different trees with wire. A wire is to be attached from a stake in the ground to each tree. The wire is attached at two different heights and two different angles of elevation, as indicated in the model below.



The park ranger has 20 feet of wire. Does the park ranger have enough wire to secure both trees? Justify your answer.

$\cos(24) = \frac{4}{x}$

$x = 4 \div \cos(24)$

$x = 4 \div 0.9135$

$x = 4.3788$

$\cos(11.6) = \frac{3}{y}$

$y = 3 \div \cos(11.6)$

$y = 3 \div .9796$

$y = 3.0625$

$4.3788 + 3.0625$

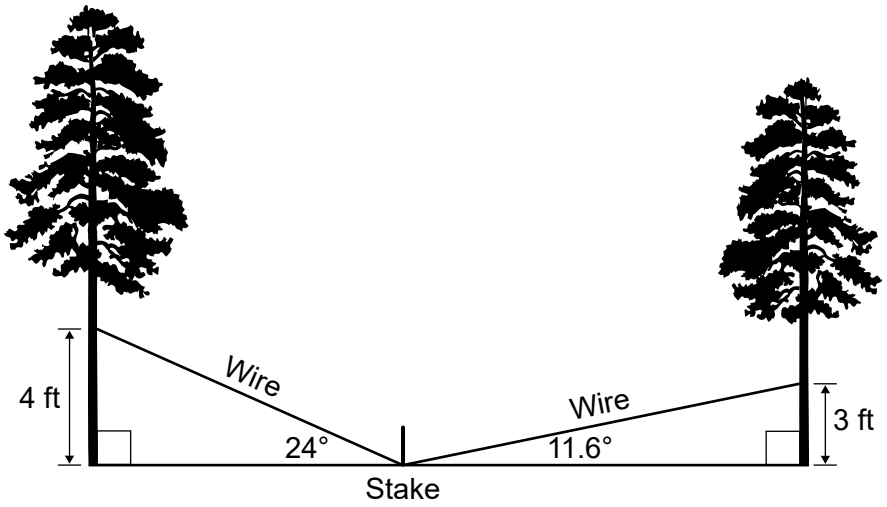
7.4413

yes, the park ranger has more wire than 7.4413.

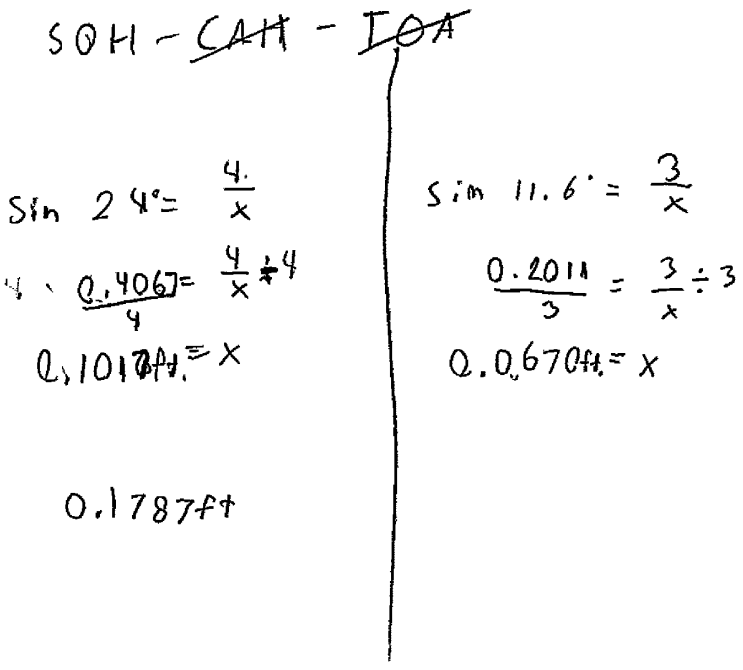
Score 2: The student made a conceptual error using cosine.

Question 34

34 A park ranger needs to secure two different trees with wire. A wire is to be attached from a stake in the ground to each tree. The wire is attached at two different heights and two different angles of elevation, as indicated in the model below.



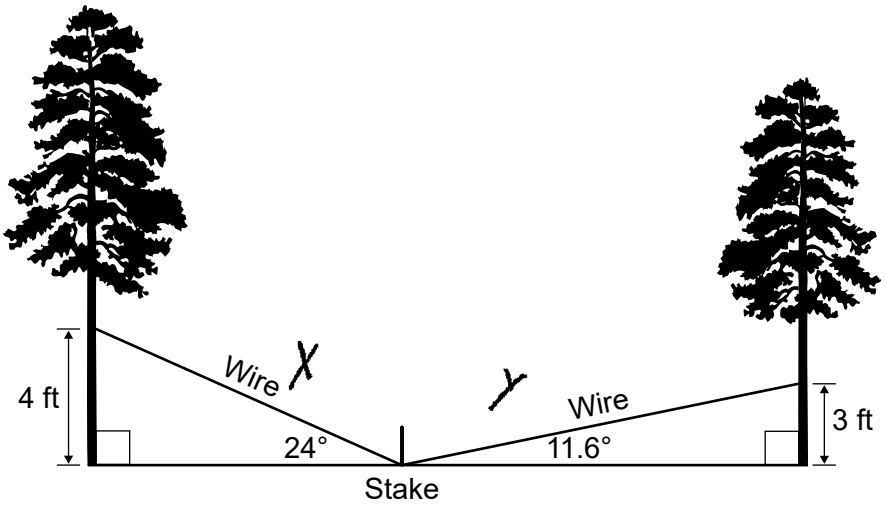
The park ranger has 20 feet of wire. Does the park ranger have enough wire to secure both trees? Justify your answer.



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

Question 34

34 A park ranger needs to secure two different trees with wire. A wire is to be attached from a stake in the ground to each tree. The wire is attached at two different heights and two different angles of elevation, as indicated in the model below.



The park ranger has 20 feet of wire. Does the park ranger have enough wire to secure both trees? Justify your answer.

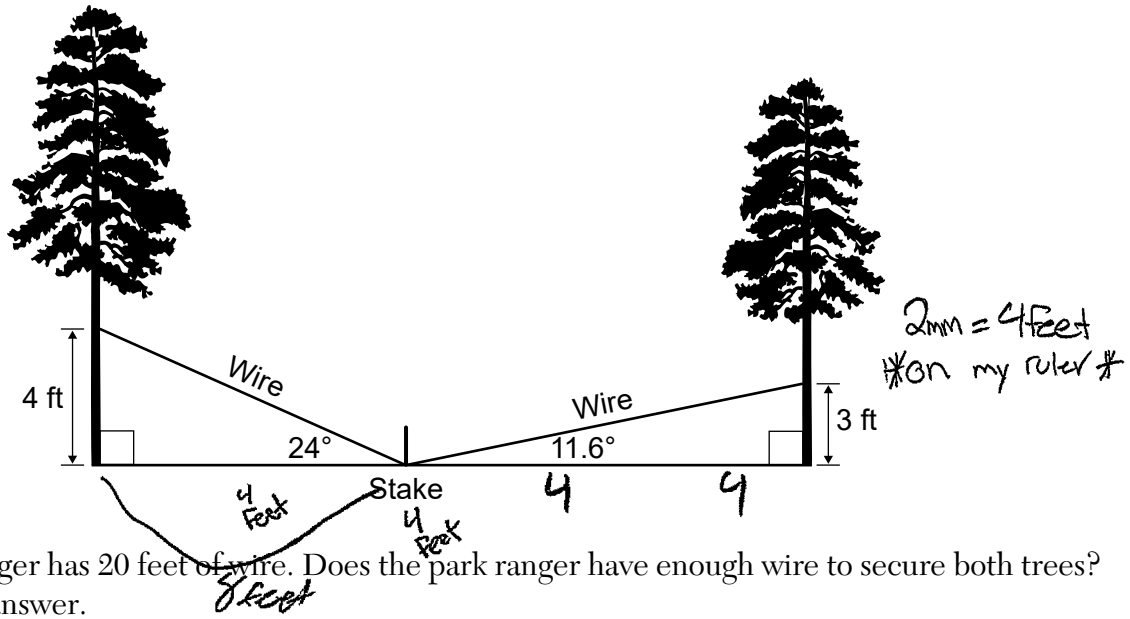
$\sin(24) = \frac{4}{X}$

$\sin(11.6) = \frac{3}{Y}$

Score 1: The student wrote correct relevant trigonometric equations.

Question 34

34 A park ranger needs to secure two different trees with wire. A wire is to be attached from a stake in the ground to each tree. The wire is attached at two different heights and two different angles of elevation, as indicated in the model below.



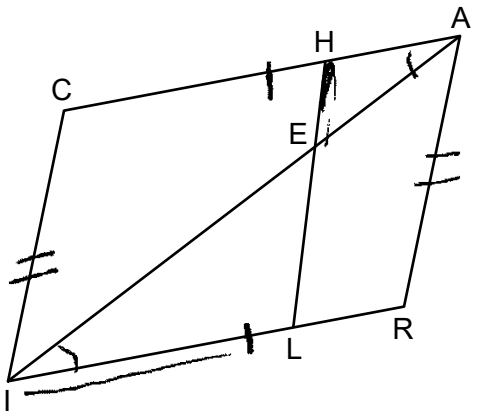
The park ranger has 20 feet of wire. Does the park ranger have enough wire to secure both trees? Justify your answer.

yes the ranger will have enough wire because both trees are 8 feet away from the stake

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

Question 35

35 Given: Quadrilateral $CARI$ with $\overline{CA} \cong \overline{RI}$ and $\overline{CI} \cong \overline{RA}$, and $\overline{AEI}$ and $\overline{LEH}$ are drawn



Prove: $HA \cdot EL = LI \cdot EH$

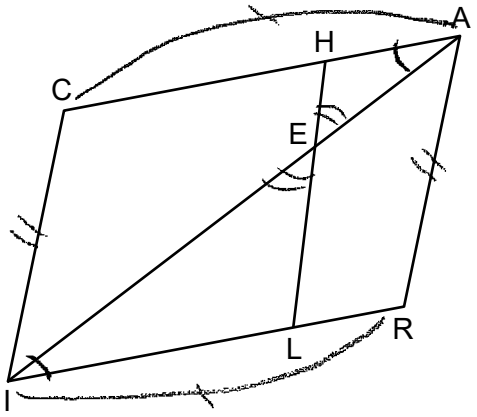
quad CARI

1.) $\overline{CA} \cong \overline{RI}$, $\overline{CI} \cong \overline{RA}$, $\overline{AEI}$, $\overline{LEH}$	1) Given
2.) CARI is a parallelogram	2) a quadrilateral with 2 opposite sides congruent pairs of is a parallelogram
3.) $\overline{CA} \parallel \overline{IR}$	3.) opposite sides of a parallelogram are $\parallel$
4.) $\angle HAE \cong \angle LIE$	4.) If lines are $\parallel$, alternate interior $\angle$s are $\cong$
5.) $\angle HEA \cong \angle LEI$	5.) vertical $\angle$s are $\cong$
6.) $\triangle HEA \sim \triangle LEI$	6.) AA~
7.) $\frac{HA}{HE} = \frac{IL}{EL}$	7.) corresponding sides of ~ $\triangle$s are proportional
8.) $HA \cdot EL = IL \cdot HE$	8) The product of the means = the product of the extremes

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

Question 35

35 Given: Quadrilateral $CARI$ with $\overline{CA} \cong \overline{RI}$ and $\overline{CI} \cong \overline{RA}$, and $\overline{AEI}$ and $\overline{LEH}$ are drawn



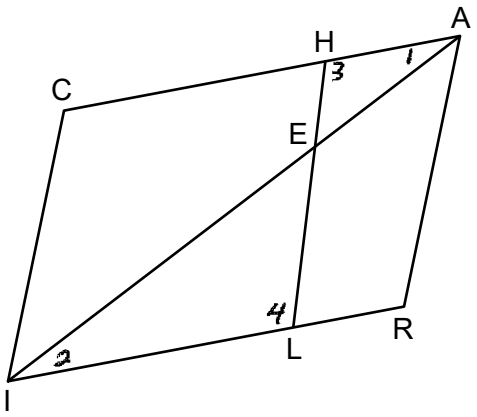
Prove: $HA \cdot EL = LI \cdot EH$

STATEMENTS	Reasons
(1) Quadrilateral CARI $\overline{CA} \cong \overline{RI}$, $\overline{CI} \cong \overline{RA}$ $\overline{AEI}$ & $\overline{LEH}$ DRAWN	(1) GIVEN
(2) $\overline{AI} \cong \overline{AI}$	(2) Reflexive
(3) $\triangle ACI \cong \triangle IRA$	(3) SSS CONGRUENCE
(4) $\angle CAI \cong \angle RIA$	(4) CPCTC
(5) $\angle HEA \cong \angle LEI$	(5) Vertical $\angle$s are $\cong$
(6) $\triangle AHE \sim \triangle ILE$	(6) AA Similarity
(7) $\frac{HA}{LI} = \frac{EH}{EL}$	(7) Corresponding sides of similar $\triangle$s are in proportion
(8) $HA \cdot EL = LI \cdot EH$	(8) The product of the means = the product of the extremes

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

Question 35

35 Given: Quadrilateral $CARI$ with $\overline{CA} \cong \overline{RI}$ and $\overline{CI} \cong \overline{RA}$, and $\overline{AEI}$ and $\overline{LEH}$ are drawn



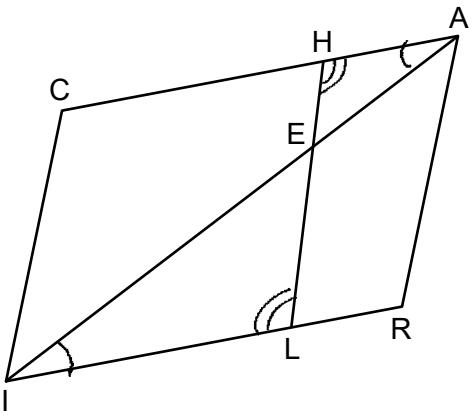
Prove: $HA \cdot EL = LI \cdot EH$

We were given quad CARI with $\overline{CA} \cong \overline{RI}$ and $\overline{CI} \cong \overline{RA}$ and $\overline{AEI}$ and $\overline{LEH}$ are drawn, so CARI is a ▱ cause there are 2 pairs of opp. sides $\cong$. Since it's a ▱ $\overline{CA} \parallel \overline{RI}$ so alternate interior $\angle$s are therefore $\cong$ ($\angle 1 \cong \angle 2$ and $\angle 3 \cong 4$). With 2 pairs of corresponding $\angle$s $\cong$, the $\triangle$s HEA and LEI are similar. Corresponding sides of similar $\triangle$s are in proportion so working backward from the "Prove" statement, $\frac{HA}{LI} = \frac{EH}{EL}$. This proportion then gives us $HA \cdot EL = LI \cdot EH$ because in a proportion the product of the means equals the product of the extremes.

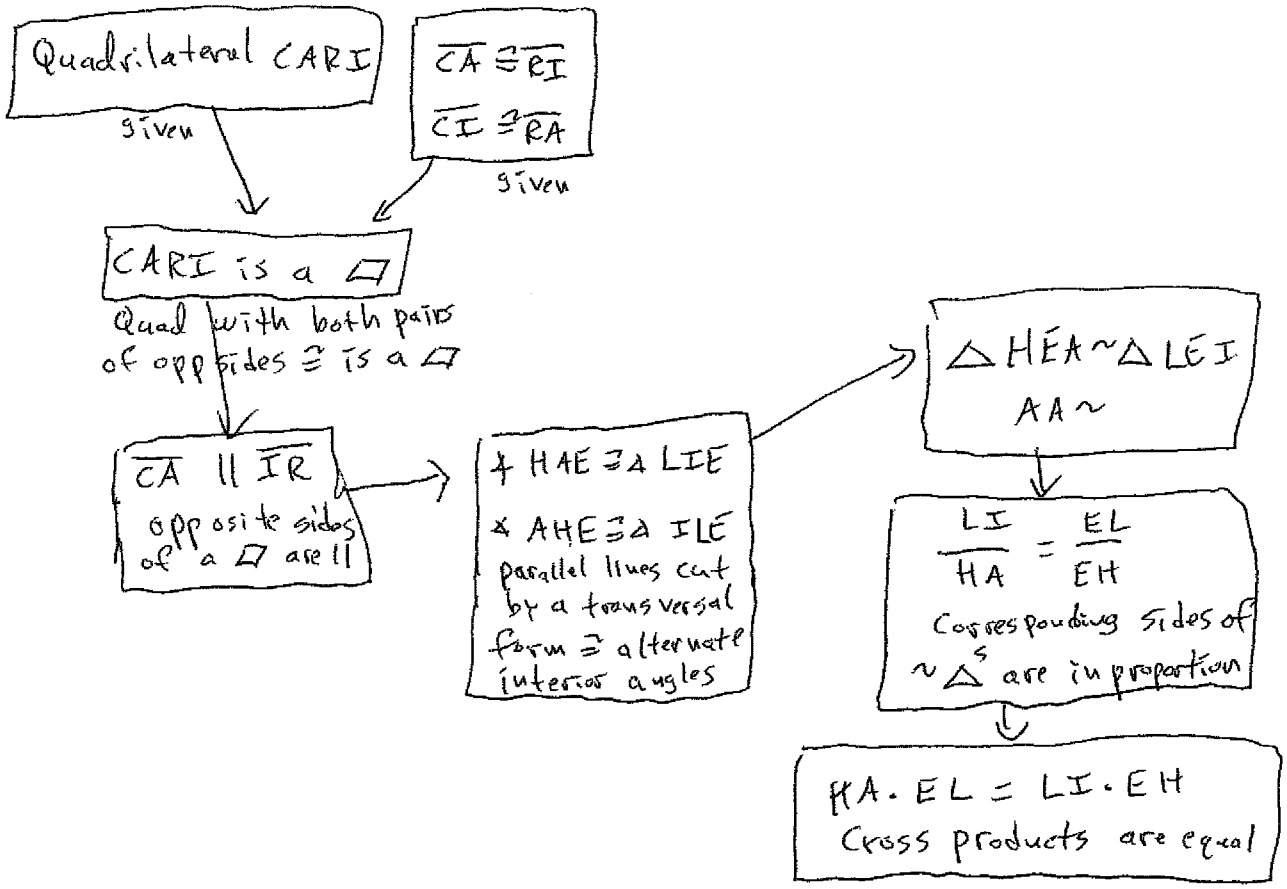
Score 6: The student gave a complete and correct response.

Question 35

35 Given: Quadrilateral $CARI$ with $\overline{CA} \cong \overline{RI}$ and $\overline{CI} \cong \overline{RA}$, and $\overline{AEI}$ and $\overline{LEH}$ are drawn



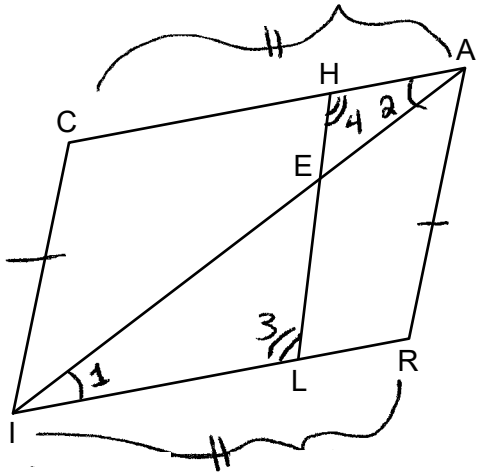
Prove: $HA \cdot EL = LI \cdot EH$



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

Question 35

35 Given: Quadrilateral $CARI$ with $\overline{CA} \cong \overline{RI}$ and $\overline{CI} \cong \overline{RA}$, and $\overline{AEI}$ and $\overline{LEH}$ are drawn



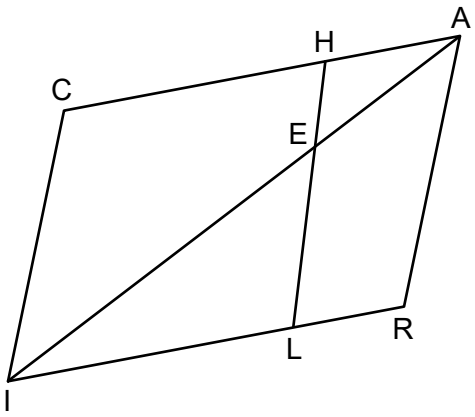
Prove: $HA \cdot EL = LI \cdot EH$

Qaud CARI	1. Given
1. $\overline{CA} \cong \overline{RI}$ $\overline{CI} \cong \overline{RA}$	2. both pr. opp sides $\cong$ → p-gram
2. CARI is a p-gram	3. p-gram → opp sides //
3. $\overline{CA} \parallel \overline{IR}$	4. // lines → $\cong$ alt. int $\measuredangle$s.
4. $\measuredangle 1 \cong \measuredangle 2$ $\measuredangle 3 \cong \measuredangle 4$	5. AA ~
5. $\triangle IEL \sim \triangle AEH$ (similar)	6. Similar $\triangle$s → corresp. sides are proportional
6. $\frac{HA}{IL} = \frac{HE}{EL}$	7. Cross multiply.
7. $HA \cdot EL = IL \cdot HE$	

Score 5: The student had an incorrect reason in step 7.

Question 35

35 Given: Quadrilateral $CARI$ with $\overline{CA} \cong \overline{RI}$ and $\overline{CI} \cong \overline{RA}$, and $\overline{AEI}$ and $\overline{LEH}$ are drawn



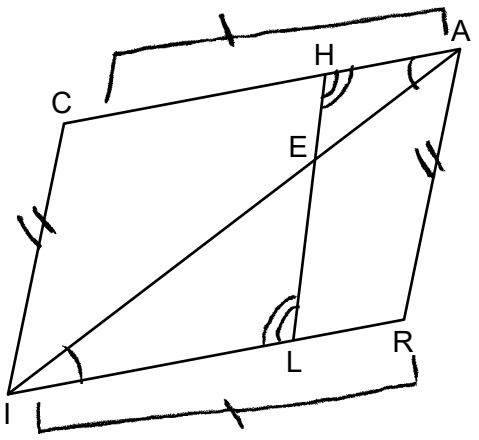
Prove: $HA \cdot EL = LI \cdot EH$

Statements	Reasons
1. $\overline{CA} \cong \overline{RI}$, $\overline{CI} \cong \overline{RA}$, $\overline{AEI}$, $\overline{LEH}$ quad CARI	1. Givens
2. CARI is a [P]	2. 2 pairs opp sides $\cong$ → [P]
3. $\overline{CA} \parallel \overline{RI}$	3. [P] → opp sides $\parallel$
4. $\angle HAE \cong \angle LIE$	4. Alternate interior $\angle$s $\cong$
5. $\angle HEA \cong \angle LEI$	5. vertical $\angle$s $\cong$
6. $\triangle AHE \sim \triangle ILE$	6. AA ~
7. $\frac{HA}{LI} = \frac{EH}{EL}$	7. Corresponding sides of similar triangles are in proportion
8. $HA \cdot EL = LI \cdot EH$	8. The product of the means equals the product of the extremes.

Score 5: The student had an incomplete reason in step 4.

Question 35

35 Given: Quadrilateral *CARI* with $\overline{CA} \cong \overline{RI}$ and $\overline{CI} \cong \overline{RA}$, and $\overline{AEI}$ and $\overline{LEH}$ are drawn



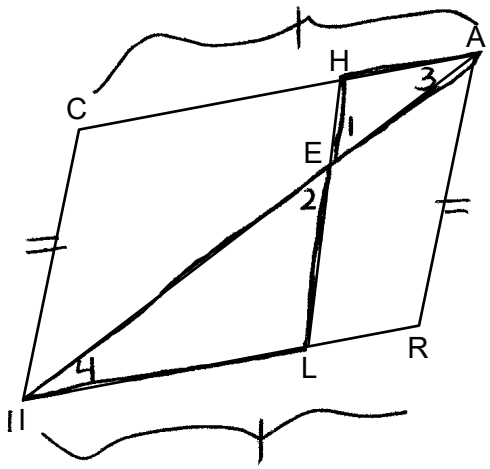
Prove: $HA \cdot EL = LI \cdot EH$

S	R
① Quadrilateral CARI $\overline{CA} \cong \overline{RI}$, $\overline{CI} \cong \overline{RA}$	① Given
② $\overline{CA} \parallel \overline{RI}$	② Opposite sides of parallelogram are parallel.
③ $\angle CAI \cong \angle RIA$ $\angle AHE \cong \angle ILE$	③ Parallel lines form $\cong$ alternate interior angles when cut by a transversal.
④ $\triangle AHE \sim \triangle ILE$	④ AA similarity
⑤ $\frac{HA}{LI} = \frac{EH}{EL}$	⑤ Corresponding sides of similar $\triangle$s are in proportion
⑥ $HA \cdot EL = LI \cdot EH$	⑥ Product of means equal product of extremes

Score 4: The student made a conceptual error in not proving *CARI* was a parallelogram.

Question 35

35 Given: Quadrilateral $CARI$ with $\overline{CA} \cong \overline{RI}$ and $\overline{CI} \cong \overline{RA}$, and $\overline{AEI}$ and $\overline{LEH}$ are drawn



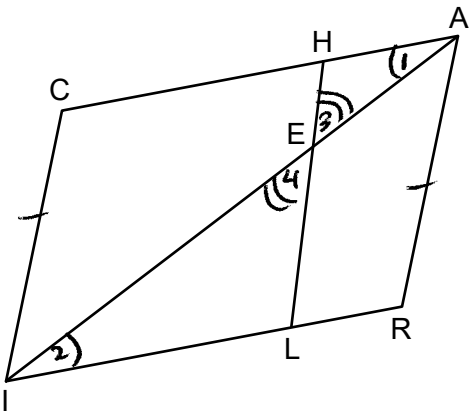
Prove: $HA \cdot EL = LI \cdot EH$

Statements	Reasons
(1) Quad. CARI, $\overline{CA} \cong \overline{RI}$, $\overline{CI} \cong \overline{RA}$	(1) Given
(2) CARI is a p-gram	(2) Both pairs of opp. sides $\cong$ → p-gram
(3) $\overline{CA} \parallel \overline{RI}$	(3) Opp. sides p-gram are $\parallel$
(4) $\angle 1 \cong \angle 2$	(4) vertical $\angle$'s are $\cong$
(5) $\angle 3 \cong \angle 4$	(5) $\parallel$ lines → alt. int. $\angle$'s $\cong$
(6) $\triangle IEL \sim \triangle AEH$	(6) AA~
(7) $HA \cdot EL = IL \cdot HE$	(7) CPCTC

Score 4: The student proved $\triangle IEL \sim \triangle AEH$, but had no correct work after step 6.

Question 35

35 Given: Quadrilateral $CARI$ with $\overline{CA} \cong \overline{RI}$ and $\overline{CI} \cong \overline{RA}$, and $\overline{AEI}$ and $\overline{LEH}$ are drawn



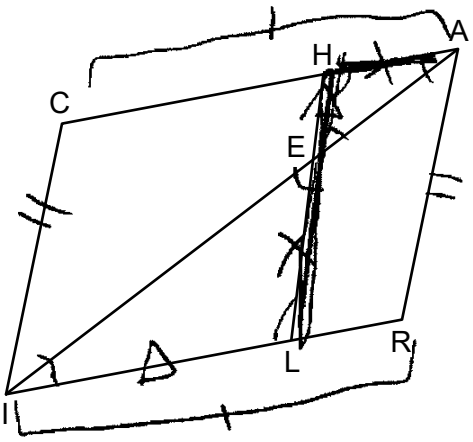
Prove: $HA \cdot EL = LI \cdot EH$

Statements	Reasons
1. Quad. CARI; $\overline{CA} \cong \overline{RI}$ $\overline{CI} \cong \overline{RA}$	1. Given
2. CARI is a ▱	2. If both pr. of opp. sides of a Quad are ≅, then its a ▱
3. $\angle 1 \cong \angle 2$	3. alt. interior $\angle$s of ∥ lines are ≅
4. $\angle 3 \cong \angle 4$	4. vertical $\angle$s are ≅
5. $\triangle AHE \sim \triangle ILE$	5. AA. ≅ A.A.
6. $\frac{HE}{EL} = \frac{AE}{EI}$	6. CPCTC

Score 3: The student had a missing statement and reason to prove step 3. The student had no correct work after step 5.

Question 35

35 Given: Quadrilateral *CARI* with $\overline{CA} \cong \overline{RI}$ and $\overline{CI} \cong \overline{RA}$, and $\overline{AEI}$ and $\overline{LEH}$ are drawn



Prove: $HA \cdot EL = LI \cdot EH$

quad CARI

1) $\overline{CA} \cong \overline{RI}$, $\overline{CI} \cong \overline{RA}$ | 1) Given

2) CARI is a parallelogram | 2) Both pairs of opposite sides are congruent, then its a parallelogram

3) $\measuredangle HAE \cong \measuredangle ELI$
$\measuredangle AHE \cong \measuredangle ILE$ | 3) parallel lines cut by a transversal create $\cong$ alternate interior angles

4) $\measuredangle HEA \cong \measuredangle IEL$ | 4) Vertical angles are $\cong$

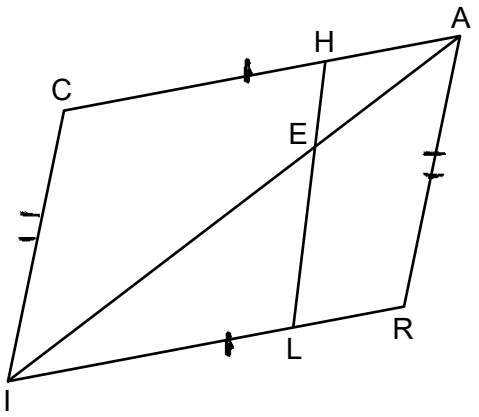
5) $\triangle IEL \sim \triangle AEH$ | 5) AAA $\sim$

6) $HA \cdot EL = LI \cdot HE$ | 6) Smaller parts of ~~copies~~ Smaller triangle are $\sim$

Score 3: The student had a missing statement and reason to prove step 3. The student had no correct work after step 5.

Question 35

35 Given: Quadrilateral *CARI* with $\overline{CA} \cong \overline{RI}$ and $\overline{CI} \cong \overline{RA}$, and $\overline{AEI}$ and $\overline{LEH}$ are drawn



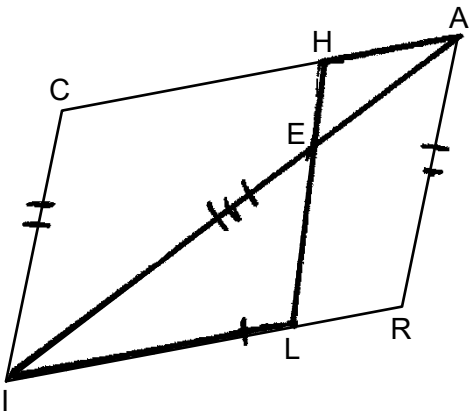
Prove: $HA \cdot EL = LI \cdot EH$

1. $\overline{CA} \cong \overline{RI}$, $\overline{CI} \cong \overline{RA}$, Quad CARI — 1. Given
2. Quadrilateral CARI is a parallelogram — 2. Two pairs of opp. congruent sides form a parallelogram
3. $\angle HAE \cong \angle EIL$, $\angle AHE \cong \angle ILE$ — 3. parallel lines then Alt int. angles are congruent
4. $\triangle HEA \cong \triangle LEI$ — 4. AA
5. $HA \cdot EL = IL \cdot HE$ — 5. CPCTC

Score 2: The student had a missing statement and reason to prove step 3. The student had an incorrect statement in step 4. The student had no correct work after step 4.

Question 35

35 Given: Quadrilateral $CARI$ with $\overline{CA} \cong \overline{RI}$ and $\overline{CI} \cong \overline{RA}$, and $\overline{AEI}$ and $\overline{LEH}$ are drawn



$\frac{HA}{IL} \times \frac{HE}{EL}$

Prove: $HA \cdot EL = LI \cdot EH$

1) $\overline{CA} \cong \overline{RI}$ and $\overline{CI} \cong \overline{RA}$ 1) given

2) $\overline{IA} \cong \overline{IA}$ 2) reflexive prop

3) $\triangle CAI \cong \triangle RIA$ 3) SSS

[illegible]

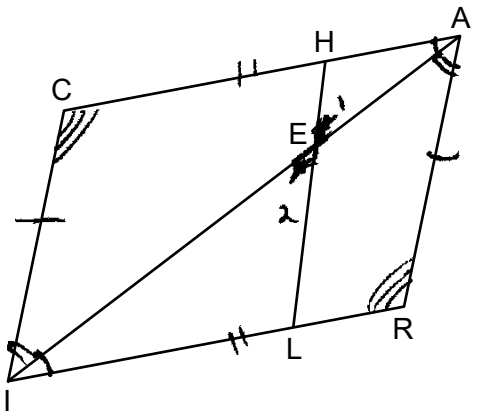
4) $\frac{HA}{IL} \times \frac{HE}{EL}$ 4) CPCTC

5) $HA \cdot EL = IL \cdot HE$ 5) cross-products

Score 2: The student proved $\triangle CAI \cong \triangle RIA$, but had no further correct work after step 3.

Question 35

35 Given: Quadrilateral *CARI* with $\overline{CA} \cong \overline{RI}$ and $\overline{CI} \cong \overline{RA}$, and $\overline{AEI}$ and $\overline{LEH}$ are drawn



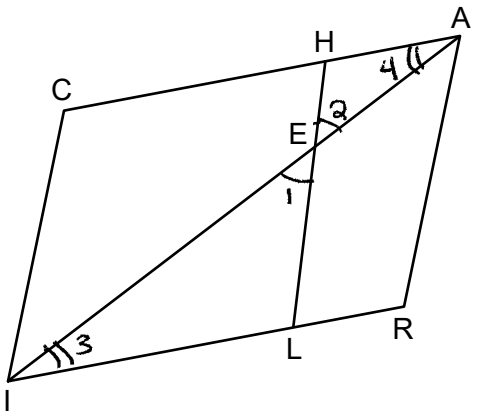
Prove: $HA \cdot EL = LI \cdot EH$

① $\overline{CA} \cong \overline{RI}$ & $\overline{CI} \cong \overline{RA}$ ① given
② $\angle 1 \cong \angle 2$ ② vertical angles are $\cong$
③ $\angle EIL = \angle HAE$ ③ opp. int. $\angle$s are $\cong$
④ $\triangle HAE \cong \triangle IEL$ ④ AA $\cong$
⑤ $HA \cdot EL = IL \cdot HE$ ⑤ CPCTC

Score 1: The student only had one correct statement and reason in step 2.

Question 35

35 Given: Quadrilateral $CARI$ with $\overline{CA} \cong \overline{RI}$ and $\overline{CI} \cong \overline{RA}$, and $\overline{AEI}$ and $\overline{LEH}$ are drawn



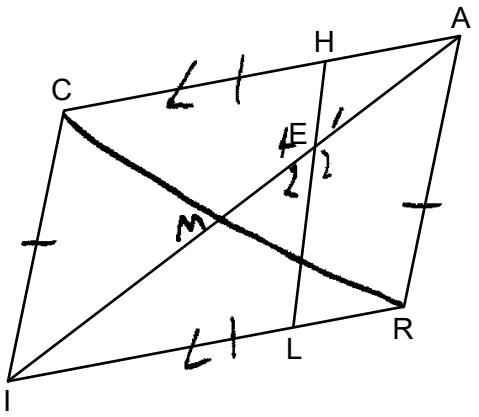
Prove: $HA \cdot EL = LI \cdot EH$

1. $\overline{CA} \cong \overline{RI}$, $\overline{CI} \cong \overline{RA}$	1. Given
2. $\angle 1 \cong \angle 2$	2. Vertical $\angle$s are $\cong$
3. $\angle 3 \cong \angle 4$	3. Alt. interior $\angle$s
4. $\triangle IEL \cong \triangle AEH$	4. AA $\sim$
5. $HA \cdot EL = IL \cdot HE$	5. Similar triangles

Score 1: The student only had one correct statement and reason in step 2.

Question 35

35 Given: Quadrilateral $CARI$ with $\overline{CA} \cong \overline{RI}$ and $\overline{CI} \cong \overline{RA}$, and $\overline{AEI}$ and $\overline{LEH}$ are drawn



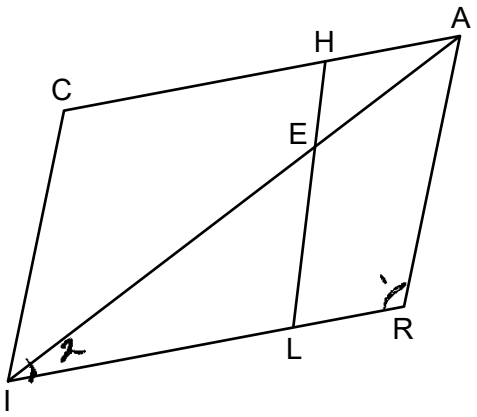
Prove: $HA \cdot EL = LI \cdot EH$

1 $\overline{CI} \cong \overline{AR}$ $\overline{CA} \cong \overline{IR}$	1 Given
2 $CIAR$ is a ▱	2 opposite congruent & sided shape ▱
3 Angles intersect	3
4 CMA is isosceles	4 ∠'s of ▱
5 CPCTC $\angle CMA \cong \angle IMR$	5 CPCTC
6 Ratio is ratio	6 $\frac{HA}{EL} = \frac{IL}{HE}$

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

Question 35

35 Given: Quadrilateral *CARI* with $\overline{CA} \cong \overline{RI}$ and $\overline{CI} \cong \overline{RA}$, and $\overline{AEI}$ and $\overline{LEH}$ are drawn



Prove: $HA \cdot EL = LI \cdot EH$

Statements	Reasons
1. $\overline{CA} \cong \overline{RI}$ & $\overline{CI} \cong \overline{RA}$	1 Given
2. $\angle R \sim \angle I$	2. Perpendicular $\angle$'s are $\sim$
3. $\frac{HA}{IL} = \frac{HE}{EL}$	3. AA
4. $HA * EL = IL * HE$	4. CPCTC

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