

The University of the State of New York  
REGENTS HIGH SCHOOL EXAMINATION

# GEOMETRY (COMMON CORE)

Wednesday, August 12, 2015 — 8:30 to 11:30 a.m.

## MODEL RESPONSE SET

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**Question 25**

25 A wooden cube has an edge length of 6 centimeters and a mass of 137.8 grams. Determine the density of the cube, to the *nearest thousandth*.

State which type of wood the cube is made of, using the density table below.

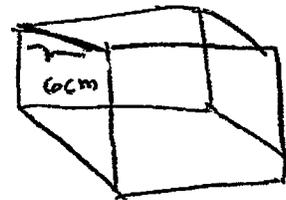
Type of Wood	Density (g/cm <sup>3</sup> )
Pine	0.373
Hemlock	0.431
Elm	0.554
Birch	0.601
<del>Ash</del>	0.638
Maple	0.676
Oak	0.711

~~density =~~  

$$d = \frac{\text{mass}}{\text{Volume}}$$
 density .

$6 \cdot 6 \cdot 6 = 216$

$d = \frac{m}{V}$



mass = 137.8

~~0.638~~  

$$0.637962963 \text{ round up} = \frac{137.8g}{216 \text{ cm}^3}$$
~~0.638~~  
 0.638

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

---

**Question 25**

---

**25** A wooden cube has an edge length of 6 centimeters and a mass of 137.8 grams. Determine the density of the cube, to the *nearest thousandth*.

State which type of wood the cube is made of, using the density table below.

Type of Wood	Density (g/cm <sup>3</sup> )
Pine	0.373
Hemlock	0.431
Elm	0.554
Birch	0.601
Ash	0.638
Maple	0.676
Oak	0.711

$$D = \frac{m}{V}$$

$$D = \frac{137.8}{6^3}$$

$$D = 0.637962963$$

**Score 1:** The student found the density of the wood, but did not state which type of wood the cube is made of.

**Question 25**

25 A wooden cube has an edge length of 6 centimeters and a mass of 137.8 grams. Determine the density of the cube, to the *nearest thousandth*.

State which type of wood the cube is made of, using the density table below.

Type of Wood	Density (g/cm <sup>3</sup> )
Pine	0.373
Hemlock	0.431
Elm	0.554
Birch	0.601
Ash	0.638
Maple	0.676
Oak	0.711

$$V = s^2$$

$$V = 6^2$$

$$V = 36$$

$$\frac{137.8}{36} = 3.8g/cm^3$$

Pine

**Score 0:** The student's response was completely incorrect.

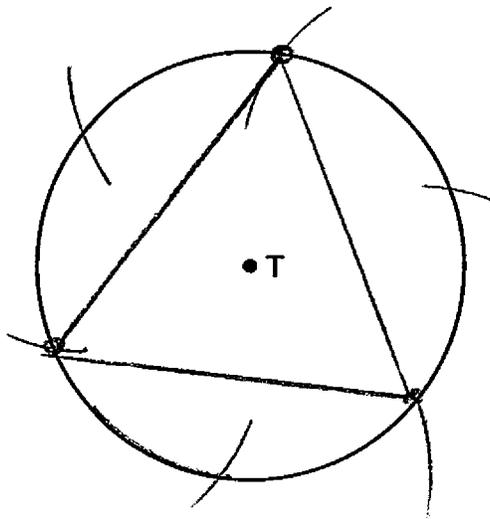
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**Question 26**

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**26** Construct an equilateral triangle inscribed in circle  $T$  shown below.

[Leave all construction marks.]

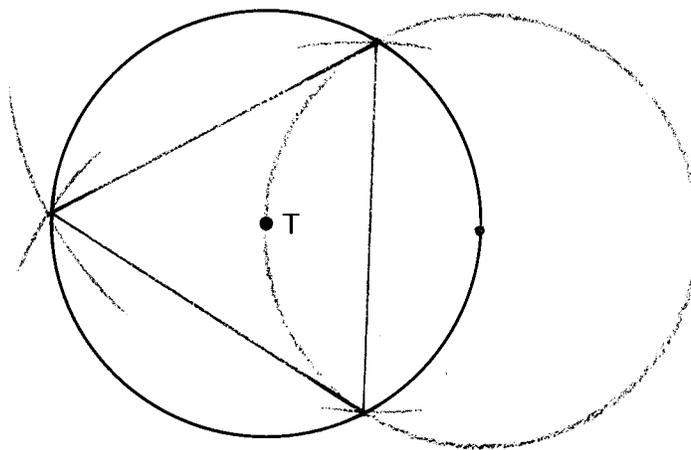


**Score 2:** The student drew a correct construction showing all appropriate construction marks.

**Question 26**

**26** Construct an equilateral triangle inscribed in circle  $T$  shown below.

[Leave all construction marks.]



**Score 2:** The student drew a correct construction showing all appropriate arcs.

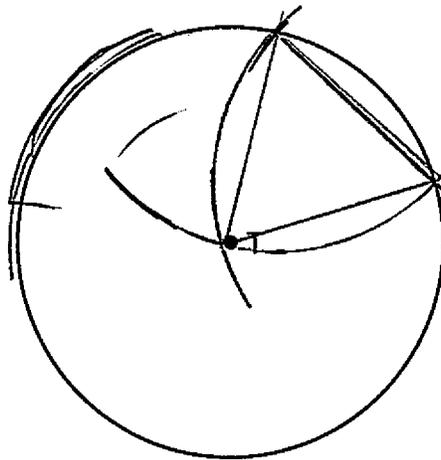
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**Question 26**

---

**26** Construct an equilateral triangle inscribed in circle  $T$  shown below.

[Leave all construction marks.]

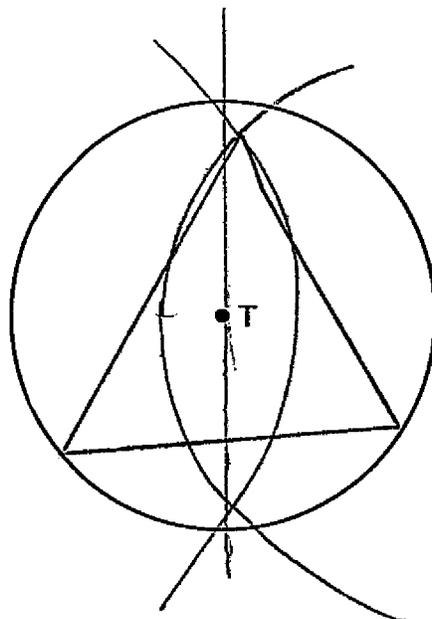


**Score 1:** The student constructed an equilateral triangle, but did not have it inscribed in circle  $T$ .

**Question 26**

**26** Construct an equilateral triangle inscribed in circle  $T$  shown below.

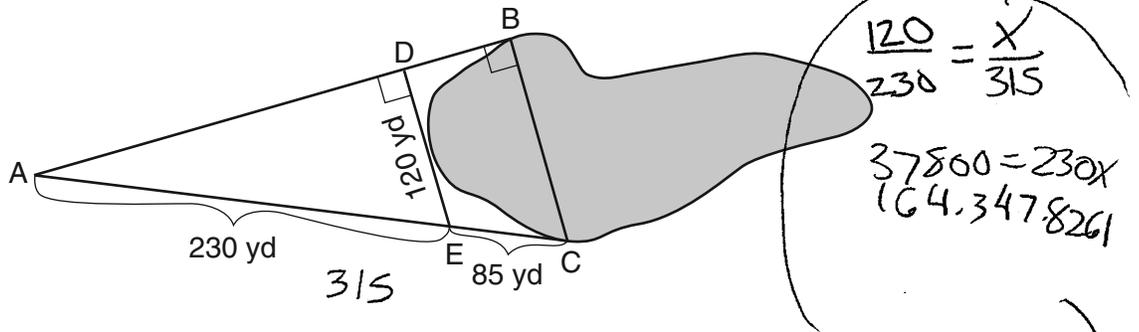
[Leave all construction marks.]



**Score 0:** The student made an incorrect construction.

**Question 27**

27 To find the distance across a pond from point  $B$  to point  $C$ , a surveyor drew the diagram below. The measurements he made are indicated on his diagram.



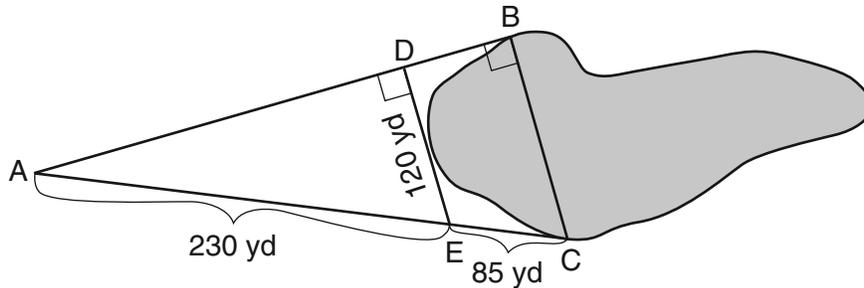
Use the surveyor's information to determine and state the distance from point  $B$  to point  $C$ , to the nearest yard.

$B$  to  $C \sim 164$  yards

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

**Question 27**

27 To find the distance across a pond from point  $B$  to point  $C$ , a surveyor drew the diagram below. The measurements he made are indicated on his diagram.



Use the surveyor's information to determine and state the distance from point  $B$  to point  $C$ , to the nearest yard.

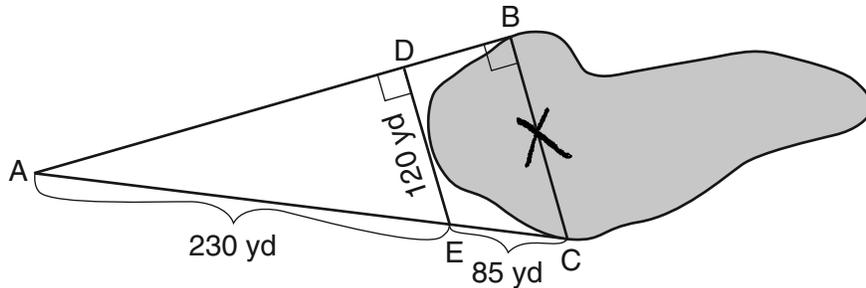
$$120/46 \quad AC/AE = 63/46$$

$$\begin{array}{r} \times 63 \\ \hline 164.3 \end{array} \quad BC = 164 \text{ yds}$$

**Score 2:** The student used a simplified ratio for  $\frac{AC}{AE}$  and solved arithmetically.

**Question 27**

27 To find the distance across a pond from point  $B$  to point  $C$ , a surveyor drew the diagram below. The measurements he made are indicated on his diagram.



Use the surveyor's information to determine and state the distance from point  $B$  to point  $C$ , to the nearest yard.

1641 yards

$$\begin{array}{r} 230 \\ + 85 \\ \hline 315 \end{array}$$

~~$$\begin{array}{r} 230 \\ \times 120 \\ \hline \end{array} = \begin{array}{r} 315 \\ \times X \\ \hline \end{array}$$~~

$$\frac{377400}{230} = \frac{230X}{230}$$

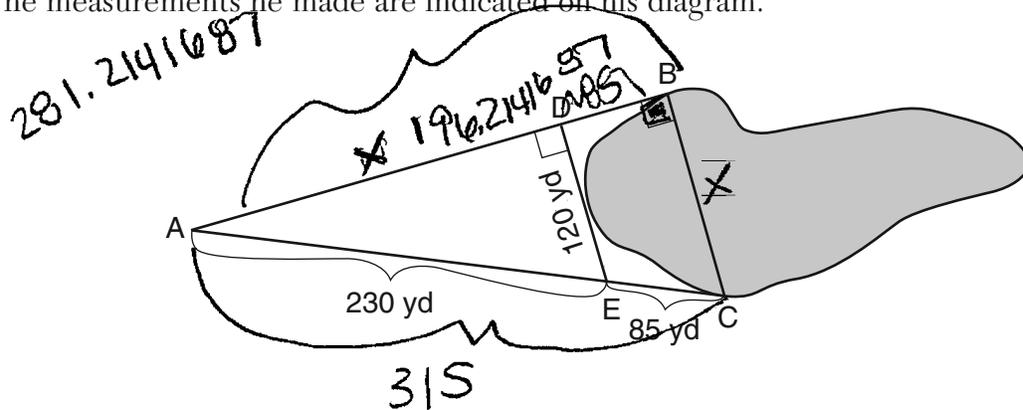
$$X \approx 1640.8$$

$$X = 1641$$

**Score 1:** The student made one computational error when multiplying 120 and 315.

Question 27

27 To find the distance across a pond from point  $B$  to point  $C$ , a surveyor drew the diagram below. The measurements he made are indicated on his diagram.



Use the surveyor's information to determine and state the distance from point  $B$  to point  $C$ , to the nearest yard.

$$\begin{aligned}
 120^2 + x^2 &= 230^2 \\
 -14400 + x^2 &= 52900 \\
 -14400 & \quad -14400 \\
 \hline
 \sqrt{x^2} &= \sqrt{38500} \\
 x &= 196.2141687
 \end{aligned}$$

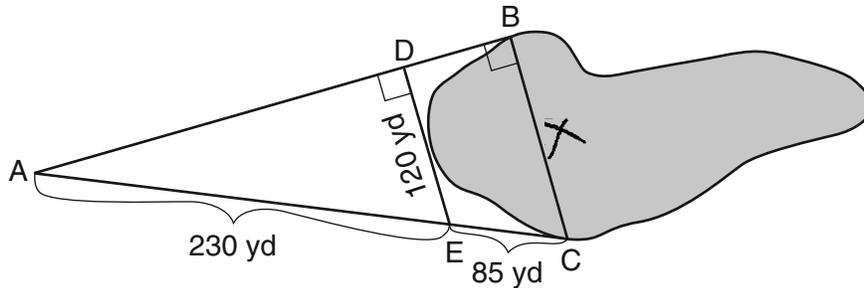
$$\begin{aligned}
 x^2 + 281.2141687^2 &= 315^2 \\
 x^2 + 79081.40868 &= 99225 \\
 x^2 &= 20143.59132 \\
 x &= \boxed{141.9281203}
 \end{aligned}$$

$$\boxed{BC = 142 \text{ yds.}}$$

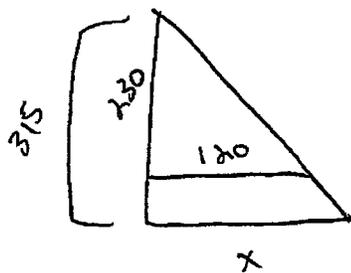
**Score 1:** The student made an error by assuming  $BD = EC$ , but found an appropriate length for  $\overline{BC}$ .

**Question 27**

27 To find the distance across a pond from point  $B$  to point  $C$ , a surveyor drew the diagram below. The measurements he made are indicated on his diagram.



Use the surveyor's information to determine and state the distance from point  $B$  to point  $C$ , to the nearest yard.



$$\frac{315}{230} = \frac{120}{x}$$

$$230 \cdot 120 = 315x$$

$$\frac{27600}{315} = \frac{315x}{315}$$

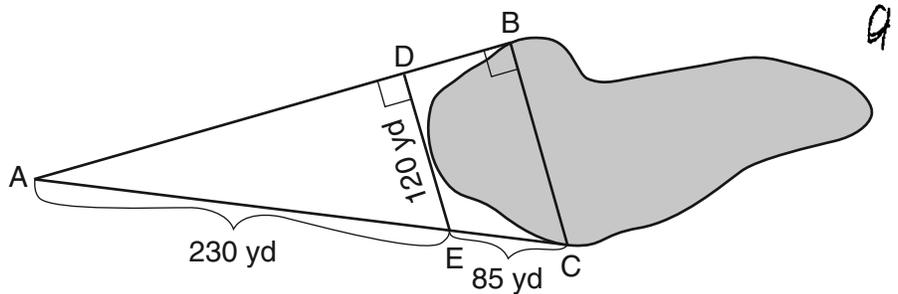
$$87.6 \approx$$

88 yards

**Score 1:** The student set up the proportion incorrectly, but found an appropriate length for  $\overline{BC}$ .

**Question 27**

27 To find the distance across a pond from point  $B$  to point  $C$ , a surveyor drew the diagram below. The measurements he made are indicated on his diagram.



Use the surveyor's information to determine and state the distance from point  $B$  to point  $C$ , to the nearest yard.

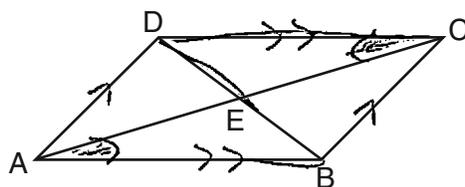
~~$(x+75)^2 + (y-85)^2 = 120^2$~~

$$\begin{aligned}
 a^2 + b^2 &= c^2 \\
 75^2 + b^2 &= 120^2 \\
 5625 + b^2 &= 14400 \\
 b^2 &= 14400 - 5625 \\
 b^2 &= 8775 \\
 b &= 85 \text{ yd}
 \end{aligned}$$

**Score 0:** The student's response was completely incorrect.

**Question 28**

28 In parallelogram  $ABCD$  shown below, diagonals  $\overline{AC}$  and  $\overline{BD}$  intersect at  $E$ .



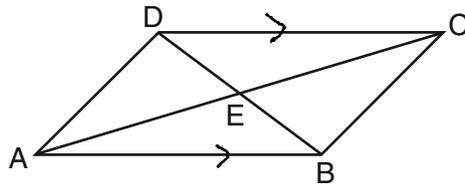
Prove:  $\angle ACD \cong \angle CAB$

statements	reasons
1) $ABCD$ is a parallelogram, diag. $\overline{AC}$ and $\overline{BD}$ intersect @ $E$	1) Given
2) $\overline{DC} \parallel \overline{AB}$ , $\overline{DA} \parallel \overline{CB}$	2) opp. sides of a parallelogram are $\parallel$ .
3) $\angle ACD \cong \angle CAB$	3) If 2 $\parallel$ lines are cut by a transversal, then alt. int. $\angle$ 's are $\cong$ .

**Score 2:** The student has written a complete and correct proof.

Question 28

28 In parallelogram  $ABCD$  shown below, diagonals  $\overline{AC}$  and  $\overline{BD}$  intersect at  $E$ .



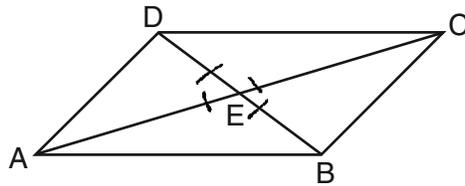
Prove:  $\angle ACD \cong \angle CAB$

Statement	Reason
1) $\overline{AC}$ and $\overline{BD}$ intersect at $E$	1) Given
2) $\overline{AB} \parallel \overline{DC}$	2) Opposite sides of a parallelogram are parallel
3) $\angle ACD \cong \angle CAB$	3) Parallel lines cut by a transversal form alternate interior angles.

**Score 1:** The student wrote one correct statement and reason.

Question 28

28 In parallelogram  $ABCD$  shown below, diagonals  $\overline{AC}$  and  $\overline{BD}$  intersect at  $E$ .



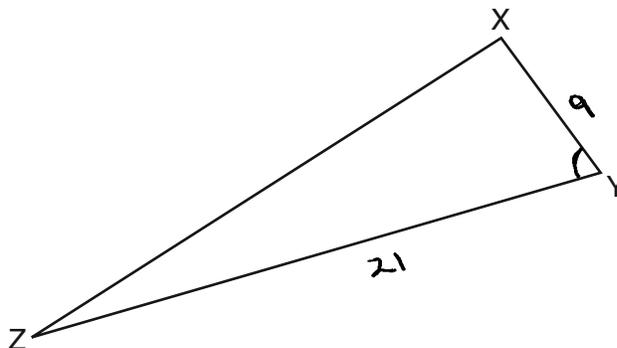
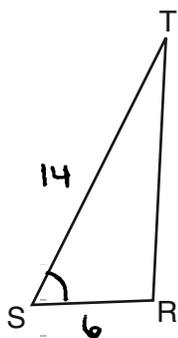
Prove:  $\angle ACD \cong \angle CAB$

Statements	Reasons
① Parallelogram $ABCD$ - diagonals $\overline{AC}$ and $\overline{BD}$ intersect at $E$	① Given
② $\overline{AC} \cong \overline{BD}$	② In a parallelogram, diagonals are congruent
③ $\angle ACD \cong \angle CAB$	③ Alternate interior angles are congruent in a parallelogram

Score 0: The student only wrote the given correctly.

Question 29

29 Triangles  $RST$  and  $XYZ$  are drawn below. If  $RS = 6$ ,  $ST = 14$ ,  $XY = 9$ ,  $YZ = 21$ , and  $\angle S \cong \angle Y$ , is  $\triangle RST$  similar to  $\triangle XYZ$ ? Justify your answer.



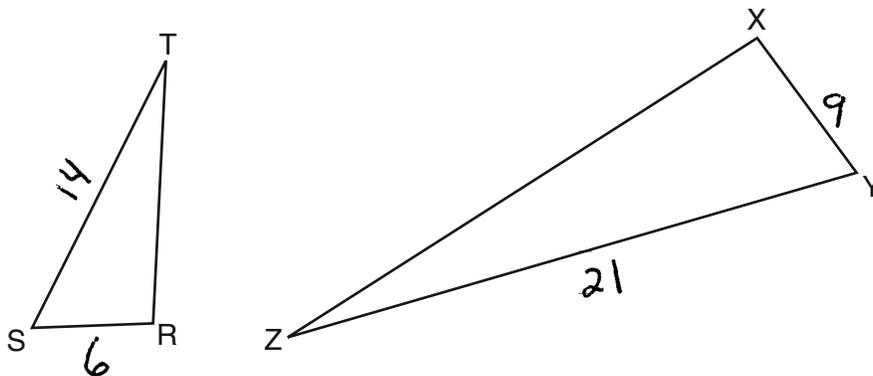
$$\frac{6}{14} = \frac{9}{21}$$
$$126 = 126$$

Yes, because of SAS similarity

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

**Question 29**

29 Triangles  $RST$  and  $XYZ$  are drawn below. If  $RS = 6$ ,  $ST = 14$ ,  $XY = 9$ ,  $YZ = 21$ , and  $\angle S \cong \angle Y$ , is  $\triangle RST$  similar to  $\triangle XYZ$ ? Justify your answer.



$$\frac{14}{21} = \frac{6}{9}$$

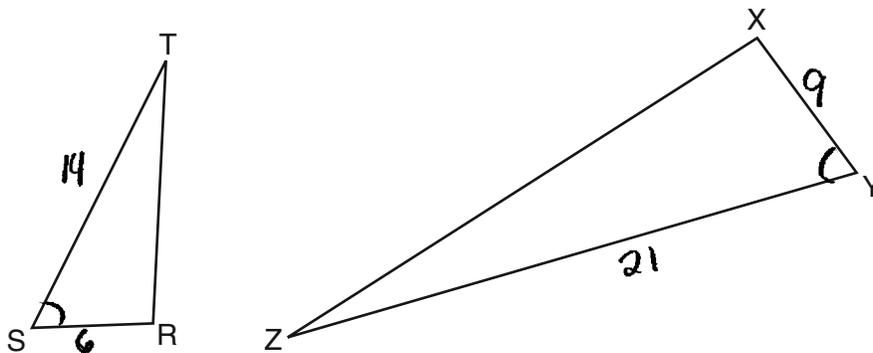
$$126 = 126$$

$\triangle RST$  is similar to  $\triangle XYZ$  because the corresponding sides come equal to value in the equation  $\frac{14}{21} = \frac{6}{9}$ . Also,  $m\angle S \cong m\angle Y$ . Side  $\overline{ST} \sim \overline{YZ}$  in triangles  $RST$  and  $XYZ$ .  $\overline{XY} \sim \overline{RS}$  in those triangles as well.

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

Question 29

29 Triangles  $RST$  and  $XYZ$  are drawn below. If  $RS = 6$ ,  $ST = 14$ ,  $XY = 9$ ,  $YZ = 21$ , and  $\angle S \cong \angle Y$ , is  $\triangle RST$  similar to  $\triangle XYZ$ ? Justify your answer.



$$\frac{14}{6} = \frac{21}{9}$$

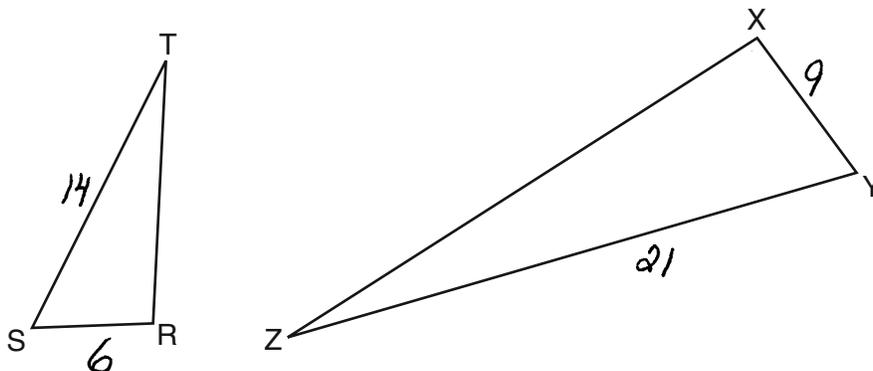
$$126 = 126 \checkmark$$

Yes

**Score 1:** The student gave an incomplete justification. No relationship between the proportion and the included angle was stated.

Question 29

29 Triangles  $RST$  and  $XYZ$  are drawn below. If  $RS = 6$ ,  $ST = 14$ ,  $XY = 9$ ,  $YZ = 21$ , and  $\angle S \cong \angle Y$ , is  $\triangle RST$  similar to  $\triangle XYZ$ ? Justify your answer.



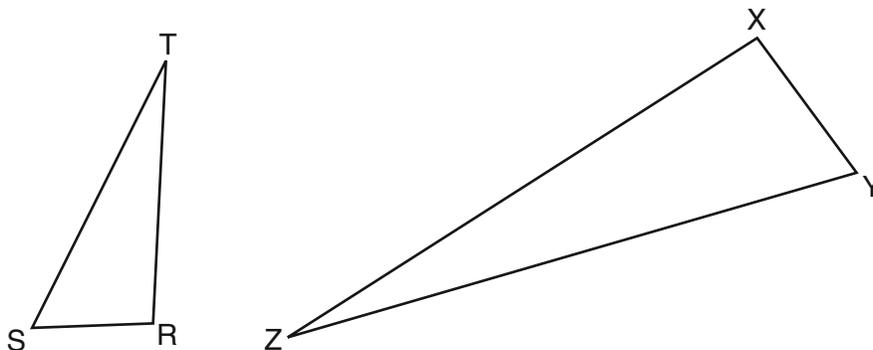
$$\begin{array}{ccc} 126 & \frac{14}{21} = \frac{6}{9} & 120 \end{array}$$

No,  $\triangle RST$  is not similar to  $\triangle XYZ$  because its cross-products are not equal

**Score 1:** The student gave an appropriate answer based on a computational error.

**Question 29**

**29** Triangles  $RST$  and  $XYZ$  are drawn below. If  $RS = 6$ ,  $ST = 14$ ,  $XY = 9$ ,  $YZ = 21$ , and  $\angle S \cong \angle Y$ , is  $\triangle RST$  similar to  $\triangle XYZ$ ? Justify your answer.

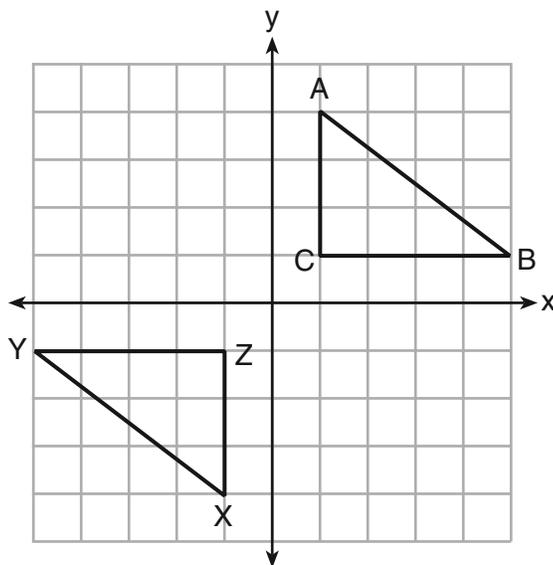


The triangle are similar  
because  $\angle S$  and  $\angle y$  are  
congruent and similar  $\Delta$ 's  
have congruent  $\angle$ 's

**Score 0:** The student's response was completely incorrect.

**Question 30**

30 In the diagram below,  $\triangle ABC$  and  $\triangle XYZ$  are graphed.



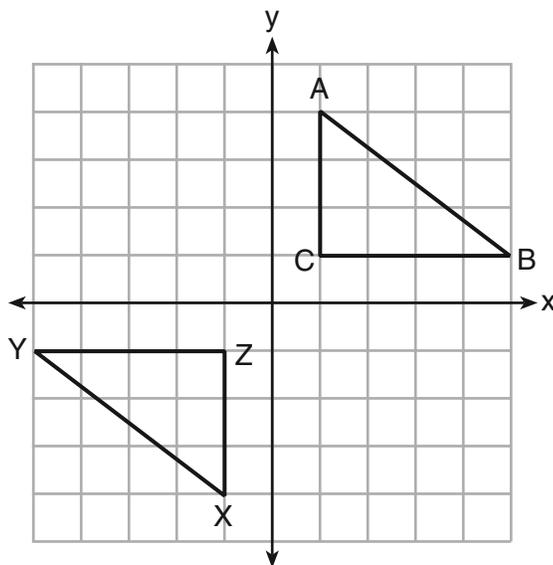
Use the properties of rigid motions to explain why  $\triangle ABC \cong \triangle XYZ$ .

$\triangle XYZ$  is the image of  $\triangle ABC$  after a rotation of  $180^\circ$  about the origin which means  $\triangle ABC$  can be mapped onto  $\triangle XYZ$  and distance is preserved in any rotation. Rotations are also rigid motions and then the triangles are congruent.

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

**Question 30**

30 In the diagram below,  $\triangle ABC$  and  $\triangle XYZ$  are graphed.



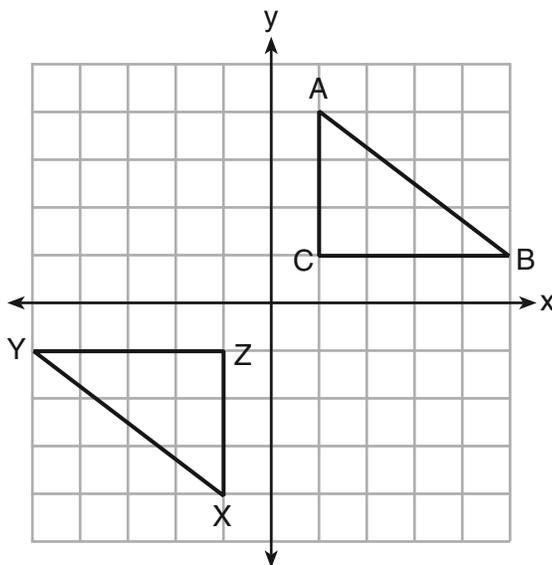
Use the properties of rigid motions to explain why  $\triangle ABC \cong \triangle XYZ$ .

Because when rotating  
around the origin  
distance is preserved  
therefore  $\cong$ ence is  
preserved

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

**Question 30**

30 In the diagram below,  $\triangle ABC$  and  $\triangle XYZ$  are graphed.



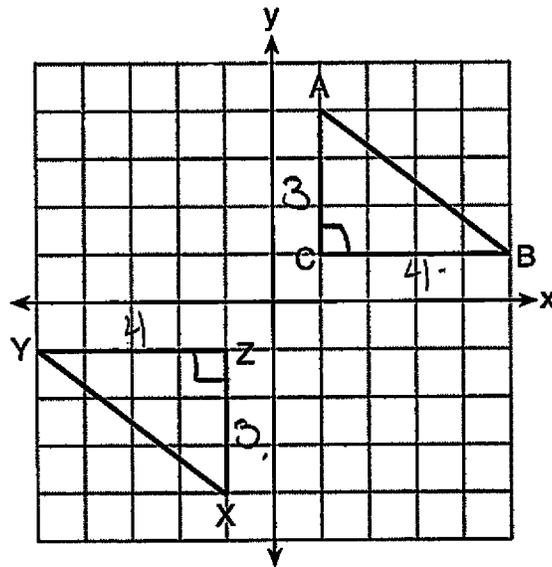
Use the properties of rigid motions to explain why  $\triangle ABC \cong \triangle XYZ$ .

$\triangle ABC \cong \triangle XYZ$  because it is a rotation and a rotation is a rigid motion.

**Score 1:** The student had an appropriate explanation but did not explain using the properties of rigid motions.

**Question 30**

30 In the diagram below,  $\triangle ABC$  and  $\triangle XYZ$  are graphed.



Use the properties of rigid motions to explain why  $\triangle ABC \cong \triangle XYZ$ .

State ments	Reasons
① $AC \cong ZX$	① Both sides are 3 units
② $CB \cong YZ$	① Both sides are 4 units.
③ $\angle Z \cong \angle C$	③ right angles are congruent
④ $\triangle ABC \cong \triangle XYZ$	④ SAS congruence Postulate.

**Score 0:** The student did not use the properties of rigid motions to explain the congruence.

**Question 31**

31 The endpoints of  $\overline{DF}$  are  $D(1,4)$  and  $F(16,14)$ . Determine and state the coordinates of point  $E$ , if  $DE:EF = 2:3$ .

$\overline{DF}$

$D(1, 4)$   $F(16, 14)$

- ① List coordinates (x goes from 1-16, y from 4-14)
- ② Chunk your x and y values into 5<sup>th</sup>

<table border="0"> <tr><td></td><td>1</td><td></td></tr> <tr><td></td><td>2</td><td></td></tr> <tr><td></td><td>3</td><td></td></tr> <tr><td>→</td><td>4</td><td></td></tr> <tr><td></td><td>5</td><td></td></tr> <tr><td></td><td>6</td><td></td></tr> <tr><td>→</td><td>7</td><td></td></tr> <tr><td></td><td>8</td><td></td></tr> <tr><td></td><td>9</td><td></td></tr> <tr><td>→</td><td>10</td><td></td></tr> <tr><td></td><td>11</td><td></td></tr> <tr><td></td><td>12</td><td></td></tr> <tr><td>→</td><td>13</td><td></td></tr> <tr><td></td><td>14</td><td></td></tr> <tr><td></td><td>15</td><td></td></tr> <tr><td>→</td><td>16</td><td></td></tr> </table>		1			2			3		→	4			5			6		→	7			8			9		→	10			11			12		→	13			14			15		→	16		<table border="0"> <tr><td></td><td>4</td><td></td></tr> <tr><td></td><td>5</td><td></td></tr> <tr><td></td><td>6</td><td>←</td></tr> <tr><td></td><td>7</td><td></td></tr> <tr><td></td><td>8</td><td>←</td></tr> <tr><td></td><td>9</td><td></td></tr> <tr><td></td><td>10</td><td>←</td></tr> <tr><td></td><td>11</td><td></td></tr> <tr><td></td><td>12</td><td>←</td></tr> <tr><td></td><td>13</td><td></td></tr> <tr><td></td><td>14</td><td>←</td></tr> </table>		4			5			6	←		7			8	←		9			10	←		11			12	←		13			14	←	<p><math>(4, 6)</math> would be <math>1/5</math></p> <p><math>(7, 8)</math> would be <math>2/5</math></p> <p><math>(10, 10)</math> would be <math>3/5</math></p> <p><math>(13, 12)</math> would be <math>4/5</math></p> <p><math>(16, 14)</math> would be <math>5/5</math></p>	<p>← <math>E</math> has to be <math>(7, 8)</math> because</p> <p><math>DE : EF</math> is <math>2 : 3</math></p>
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**Score 2:** The student has a complete and correct response.

Question 31

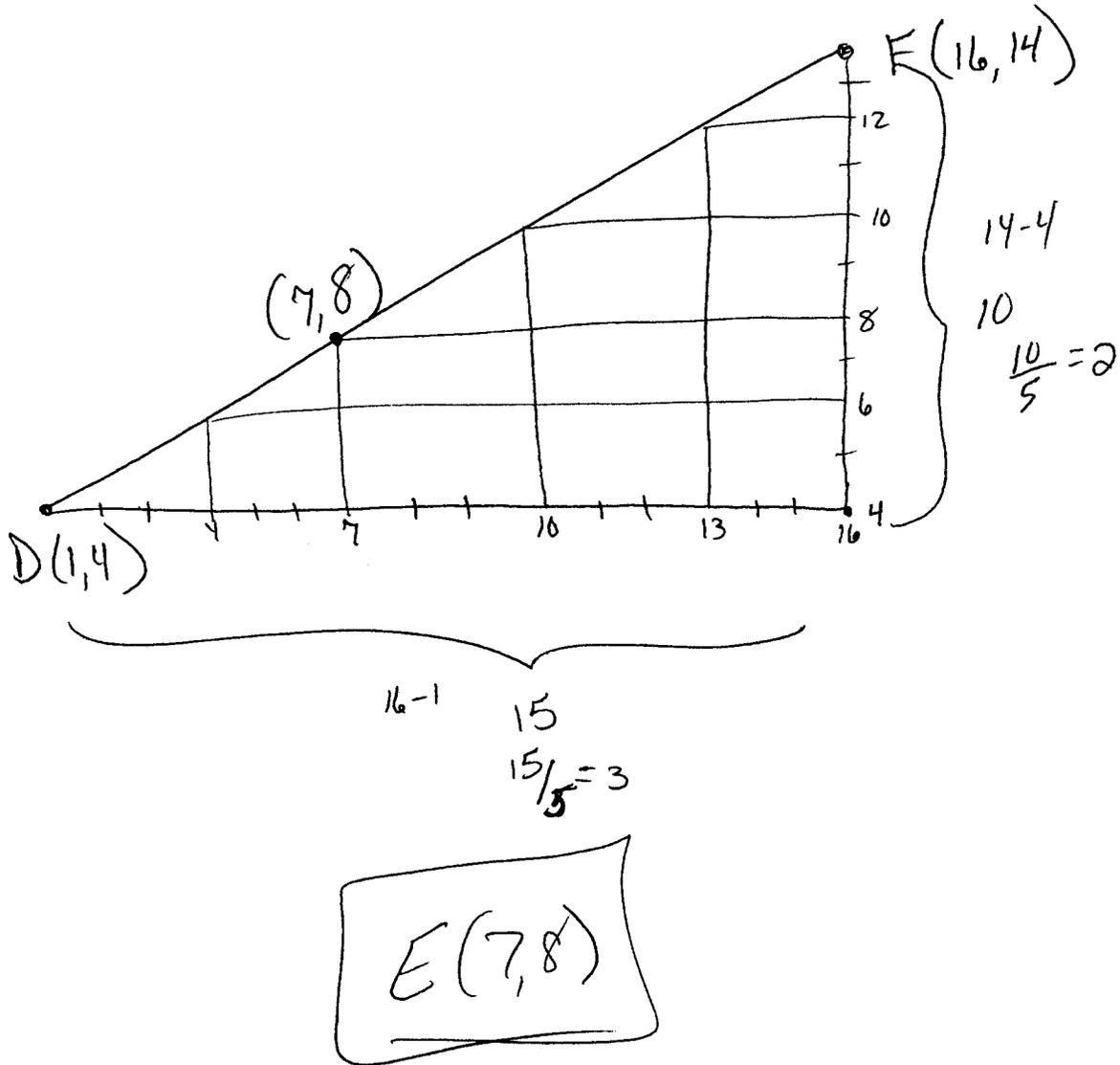
31 The endpoints of  $\overline{DEF}$  are  $D(1,4)$  and  $F(16,14)$ . Determine and state the coordinates of point  $E$ , if  $DE:EF = 2:3$ .

$$\frac{DE}{DF} = \frac{2}{5}$$
$$\frac{2}{5} \cdot 15 = \frac{2}{5} \cdot 10$$
$$\frac{30}{5} = \frac{20}{5}$$
$$6 = 4$$
$$1+6 = 4+4$$
$$(7, 8)$$

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

Question 31

31 The endpoints of  $\overline{DF}$  are  $D(1,4)$  and  $F(16,14)$ . Determine and state the coordinates of point  $E$ , if  $DE:EF = 2:3$ .



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

**Question 31**

31 The endpoints of  $\overline{DEF}$  are  $D(1,4)$  and  $F(16,14)$ . Determine and state the coordinates of point  $E$ , if  $DE:EF = 2:3$ .

$$k = \frac{3}{5}$$

$$P = \left(1 + \frac{3}{5}(15), 4 + \frac{3}{5}(10)\right)$$

$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{14 - 4}{16 - 1} = \frac{10}{15}$$

$$P = (1 + 9, 4 + 6)$$

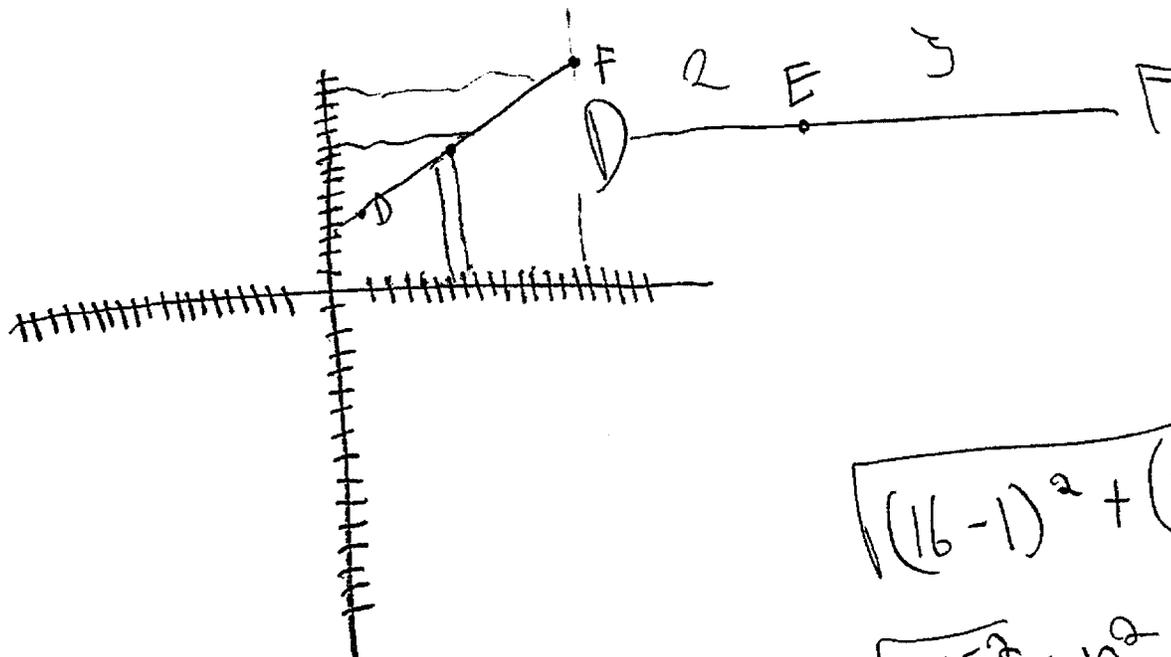
$$P = (10, 10)$$

$$E(10, 10)$$

**Score 1:** The student made an error in using  $\frac{3}{5}$  instead of  $\frac{2}{5}$ . The answer is appropriate for the mistake made.

Question 31

31 The endpoints of  $\overline{DF}$  are  $D(1,4)$  and  $F(16,14)$ . Determine and state the coordinates of point  $E$ , if  $DE:EF = 2:3$ .



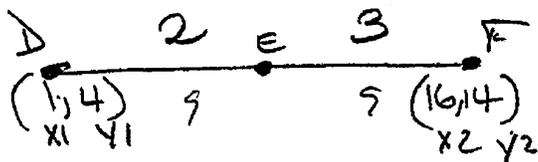
$$\sqrt{(16-1)^2 + (14-4)^2}$$
$$\sqrt{15^2 + 10^2}$$
$$\sqrt{225 + 100}$$
$$\sqrt{325}$$

$$E = (7, 6)$$

**Score 0:** The student expressed an incorrect response without appropriate justification.

Question 31

31 The endpoints of  $\overline{DF}$  are  $D(1,4)$  and  $F(16,14)$ . Determine and state the coordinates of point  $E$ , if  $DE:EF = 2:3$ .



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

$$(16 - 1)^2 + (14 - 4)^2$$

$$(15)^2 + (10)^2$$

$$225 + 100$$

$$\sqrt{325}$$

$$18.0$$

$$\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}$$

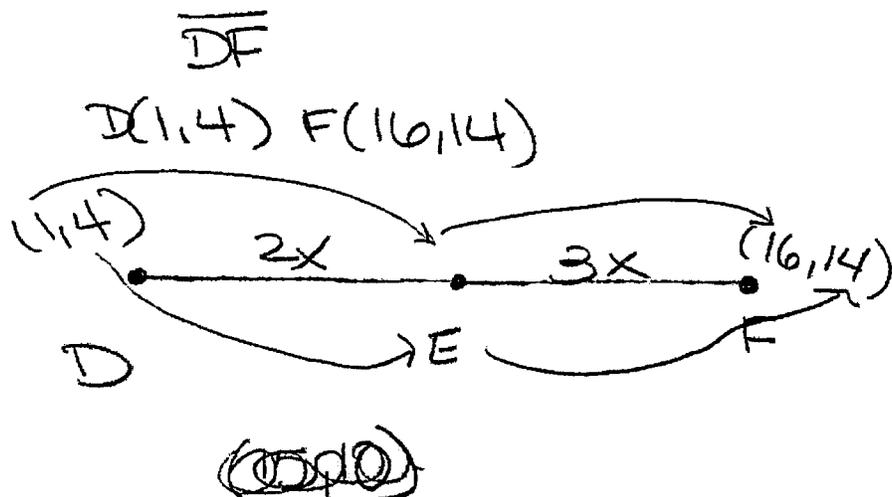
$$\frac{1 + 16}{2}, \frac{4 + 14}{2} \mid \frac{17}{2}, \frac{18}{2} \mid 8.5, 9$$

$$\text{point } E = (8.5, 9)$$

**Score 0:** The student's use of the midpoint formula was irrelevant to the question.

Question 31

31 The endpoints of  $\overline{DF}$  are  $D(1,4)$  and  $F(16,14)$ . Determine and state the coordinates of point  $E$ , if  $DE:EF = 2:3$

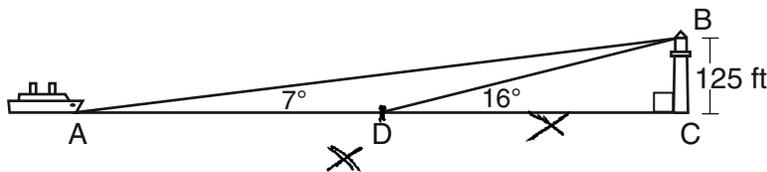


<del>2x</del>	<del>3x</del>
<del>15,10</del>	<del>15,10</del>
<del>7,5,5</del>	<del>2.5,</del>

**Score 0:** The student gave an incomplete and incoherent response.

**Question 32**

**32** As shown in the diagram below, a ship is heading directly toward a lighthouse whose beacon is 125 feet above sea level. At the first sighting, point A, the angle of elevation from the ship to the light was  $7^\circ$ . A short time later, at point D, the angle of elevation was  $16^\circ$ .



To the *nearest foot*, determine and state how far the ship traveled from point A to point D.

$$1) \quad \tan 7^\circ = \frac{125}{X}$$

$$\frac{X \tan 7^\circ}{\tan 7^\circ} = \frac{125}{\tan 7^\circ}$$

$$X = 1018.043303$$

$$2) \quad \tan 16^\circ = \frac{125}{X}$$

$$\frac{X \tan 16^\circ}{\tan 16^\circ} = \frac{125}{\tan 16^\circ}$$

$$X = 435.9268055$$

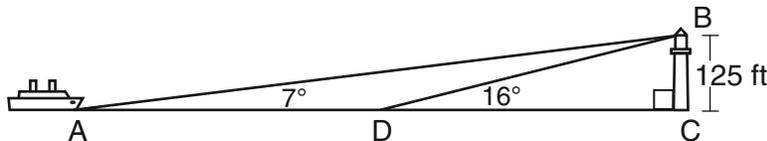
$$3) \quad \begin{array}{r} 1018.043303 \\ - 435.9268055 \\ \hline \end{array}$$

Distance <sup>2</sup> A → D = 582ft

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

**Question 32**

32 As shown in the diagram below, a ship is heading directly toward a lighthouse whose beacon is 125 feet above sea level. At the first sighting, point A, the angle of elevation from the ship to the light was  $7^\circ$ . A short time later, at point D, the angle of elevation was  $16^\circ$ .



To the *nearest foot*, determine and state how far the ship traveled from point A to point D.

$$\tan 7^\circ = \frac{125}{x}$$

$$x = 1018$$

$$\tan 16^\circ = \frac{125}{x}$$

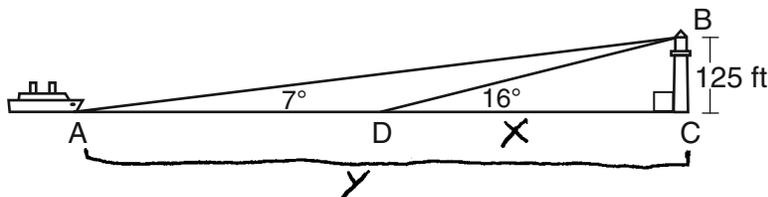
$$x = 435.9$$

$$AD = 582 \text{ ft.}$$

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

**Question 32**

32 As shown in the diagram below, a ship is heading directly toward a lighthouse whose beacon is 125 feet above sea level. At the first sighting, point A, the angle of elevation from the ship to the light was  $7^\circ$ . A short time later, at point D, the angle of elevation was  $16^\circ$ .



To the *nearest foot*, determine and state how far the ship traveled from point A to point D.

$$\tan 74 = \frac{x}{125}$$

$$x = 435.9268055$$

$$\tan 83 = \frac{y}{125}$$

$$y = 1018.043303$$

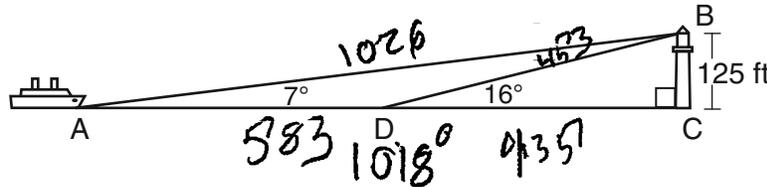
$$y - x = 582.116498$$

$$y - x = 582$$

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

Question 32

32 As shown in the diagram below, a ship is heading directly toward a lighthouse whose beacon is 125 feet above sea level. At the first sighting, point A, the angle of elevation from the ship to the light was  $7^\circ$ . A short time later, at point D, the angle of elevation was  $16^\circ$ .



To the nearest foot, determine and state how far the ship traveled from point A to point D.

$$\sin(7) = \frac{125}{n}$$

$$n = 1026$$

$$125^2 + b^2 = 1026^2$$

$$125^2 + b^2 = 453^2$$

$$1018 - 435 = 583$$

$$\overline{AD} = 583$$

$$\frac{\sin(16)}{1} = \frac{125}{x}$$

$$\frac{125}{\sin(16)} = \frac{\sin(16) \cdot x}{\sin(16)}$$

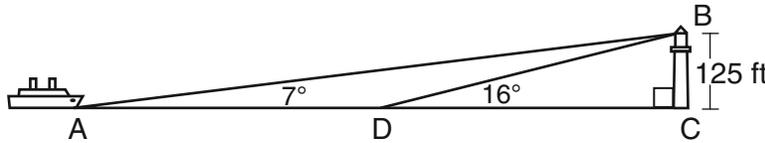
$$453 = x$$

$$1026 - 453 = 573$$

**Score 3:** The student inappropriately rounded the values early when finding the hypotenuses. The student then correctly used the Pythagorean Theorem to get an appropriate answer.

**Question 32**

32 As shown in the diagram below, a ship is heading directly toward a lighthouse whose beacon is 125 feet above sea level. At the first sighting, point A, the angle of elevation from the ship to the light was  $7^\circ$ . A short time later, at point D, the angle of elevation was  $16^\circ$ .



To the *nearest foot*, determine and state how far the ship traveled from point A to point D.

$$\sin 7 = \frac{125}{AC}$$

$$AC = \frac{125}{\sin 7}$$

$$AC = \frac{125}{\sin 7} = 1025.689$$

$$\sin 16 = \frac{125}{DC}$$

$$DC = \frac{125}{\sin 16}$$

$$DC = 453.494$$

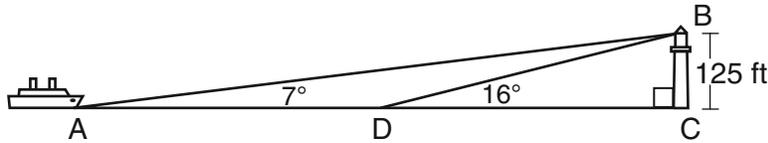
$$1025.689 - 453.494$$

$$AD = 572.195 \approx 572$$

**Score 2:** The student made one conceptual error using the wrong trigonometric function, but found an appropriate distance from point A to point D.

**Question 32**

- 32 As shown in the diagram below, a ship is heading directly toward a lighthouse whose beacon is 125 feet above sea level. At the first sighting, point A, the angle of elevation from the ship to the light was  $7^\circ$ . A short time later, at point D, the angle of elevation was  $16^\circ$ .



To the *nearest foot*, determine and state how far the ship traveled from point A to point D.

$$\frac{\tan 16}{1} = \frac{125}{x}$$

$$\tan 16 x = 125$$

$$\tan x = 16(125)$$

$$\tan x = 2780$$

$$\frac{\tan 7}{1} = \frac{125}{x}$$

$$\tan 7 x = 125$$

$$\tan x = 7(125)$$

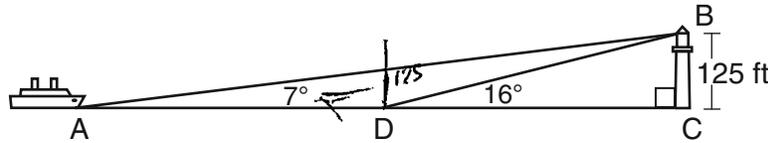
$$\tan x = 8060$$

$$x = 5280 \text{ ft}$$

**Score 1:** The student had both trigonometric functions written correctly, but showed no further correct work.

**Question 32**

**32** As shown in the diagram below, a ship is heading directly toward a lighthouse whose beacon is 125 feet above sea level. At the first sighting, point *A*, the angle of elevation from the ship to the light was  $7^\circ$ . A short time later, at point *D*, the angle of elevation was  $16^\circ$ .



To the *nearest foot*, determine and state how far the ship traveled from point *A* to point *D*.

$$\tan 7 = \frac{125}{x}$$

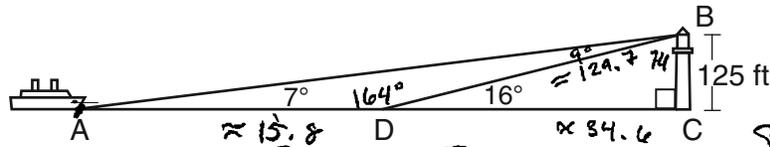
$$\frac{\tan 7}{\tan 7} (x) = \frac{125}{\tan 7}$$

$$x = 143 \text{ feet}$$

**Score 1:** The student had a correct trigonometric function for finding *AC*, but used radians.

Question 32

32 As shown in the diagram below, a ship is heading directly toward a lighthouse whose beacon is 125 feet above sea level. At the first sighting, point A, the angle of elevation from the ship to the light was  $7^\circ$ . A short time later, at point D, the angle of elevation was  $16^\circ$ .



$$\frac{\sin 16}{1} = \frac{x}{125}$$

To the nearest foot, determine and state how far the ship traveled from point A to point D.

$$16 - 7 = 9^\circ$$

$$\overline{AC} = 50.25644059$$

$$x = (\sin 16) 125$$

$$x = 34.45466948$$

$$\frac{\sin 7}{1} = \frac{x}{129.6615758}$$

$$x = (\sin 7) \times 129.6615758$$

$$x = 15.8017711$$

$$\sqrt{125^2 + 34.45466948^2} = \sqrt{16812.12425} = \sqrt{c^2}$$

$$c = 129.6615758$$

$$\overline{BD} \approx 129.7 \text{ ft}$$

$$\overline{CD} \approx 34.6 \text{ ft}$$

$$\overline{AD} \approx 15.8 \text{ ft} \\ = 15.8017711 \text{ ft}$$

Score 0: The student gave a completely incorrect response.

**Question 33**

33 Triangle  $ABC$  has vertices with  $A(x,3)$ ,  $B(-3,-1)$ , and  $C(-1,-4)$ .

Determine and state a value of  $x$  that would make triangle  $ABC$  a right triangle. Justify why  $\triangle ABC$  is a right triangle.

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

$$\text{Distance } \overline{BC} = \sqrt{(-4+1)^2 + (-1+3)^2} = \sqrt{(-3)^2 + (2)^2} = \sqrt{9+4} = \sqrt{13}$$

$$\text{Distance } \overline{AB} = \sqrt{(-3-x)^2 + (-1-3)^2}$$

$$\text{Distance } \overline{AC} = \sqrt{(-1-x)^2 + (-4-3)^2} = \sqrt{(-1-x)^2 + (-7)^2} = \sqrt{(-1-x)^2 + 49}$$

$$(-3-x)(-3-x)$$

$$9 - 3x + 3x + x^2$$

$$9 + 6x + x^2$$

$$(-1-x)(-1-x)$$

$$1 + x + x + x^2$$

$$1 + 2x + x^2$$

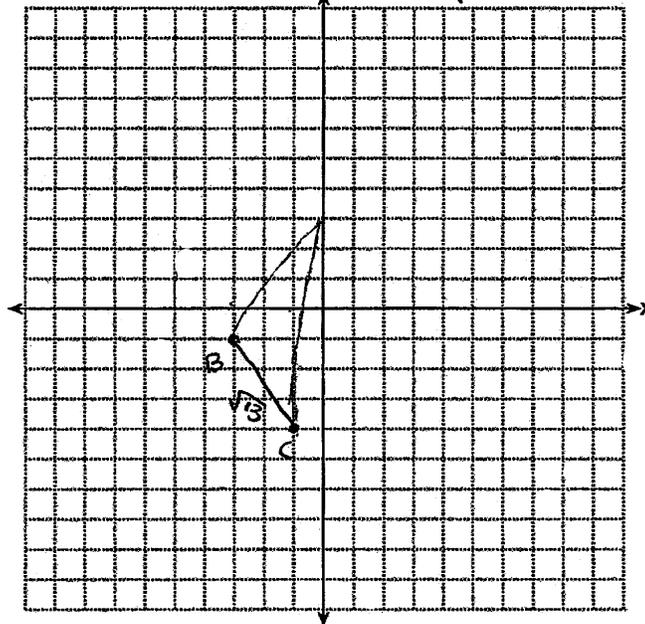
$$\sqrt{13}^2 + \sqrt{(-3-x)^2 + 16}^2 = \sqrt{(-1-x)^2 + 49}^2$$

$$\sqrt{1169 + (-3-x)^2 + 16} = (-1-x)^2 + 49$$

$$13 + x^2 + 6x + 9 + 16 = x^2 + 2x + 50$$

$$38 = -4x + 50$$

$$\frac{12}{12} = \frac{-4x}{-4} \quad \boxed{3=x}$$



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

**Question 33**

33 Triangle  $ABC$  has vertices with  $A(x,3)$ ,  $B(-3,-1)$ , and  $C(-1,-4)$ .

Determine and state a value of  $x$  that would make triangle  $ABC$  a right triangle. Justify why  $\triangle ABC$  is a right triangle.

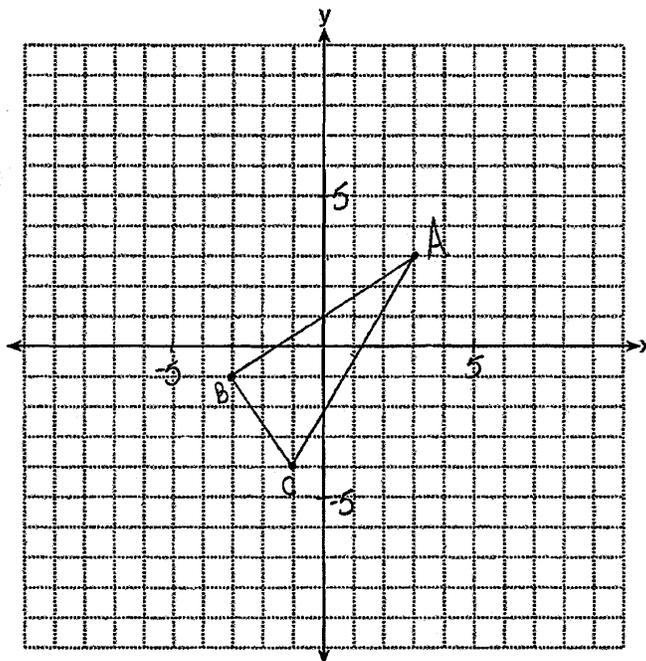
[The use of the set of axes below is optional.]

$$\text{slope of } BC = \frac{\Delta y}{\Delta x}$$

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

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

$$x = 3$$



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

**Question 33**

**33** Triangle  $ABC$  has vertices with  $A(x,3)$ ,  $B(-3,-1)$ , and  $C(-1,-4)$ .

Determine and state a value of  $x$  that would make triangle  $ABC$  a right triangle. Justify why  $\triangle ABC$  is a right triangle.

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

$$C(-1,-4) \quad (5,0)$$

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

$$y+4 = \frac{2}{3}(x+1)$$

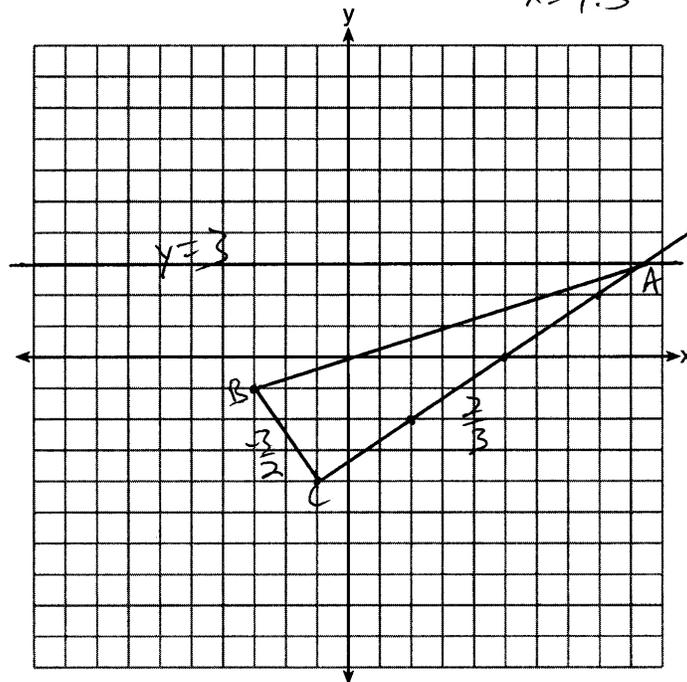
$$3+4 = \frac{2}{3}(x+1)$$

$$3(7 = \frac{2}{3}(x+1))$$

$$21 = 2x + 2$$

$$19 = 2x$$

$$x = 9.5$$



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



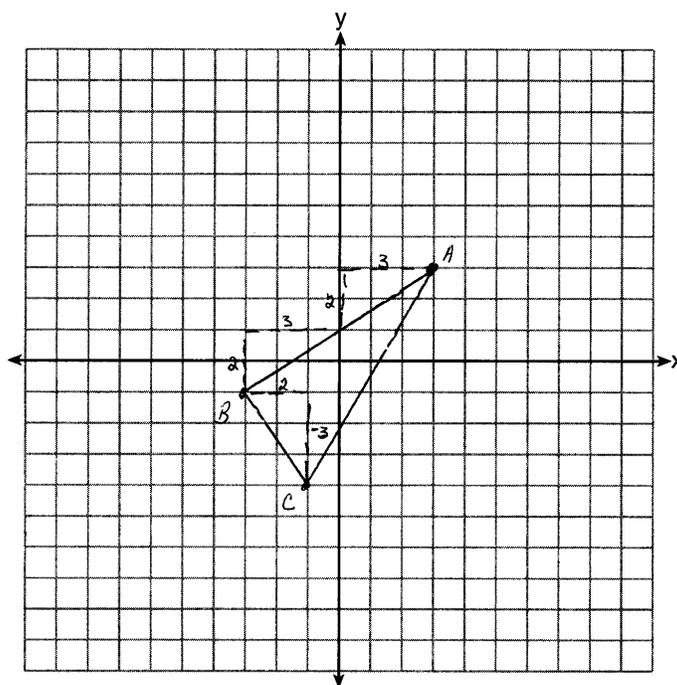
**Question 33**

**33** Triangle  $ABC$  has vertices with  $A(x,3)$ ,  $B(-3,-1)$ , and  $C(-1,-4)$ .

Determine and state a value of  $x$  that would make triangle  $ABC$  a right triangle. Justify why  $\triangle ABC$  is a right triangle.

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

$A(3,3)$



**Score 2:** The student gave a correct response for the value of  $x$ . The work for slope was shown graphically but the justification for a right triangle was incomplete.

Question 33

33 Triangle  $ABC$  has vertices with  $A(3,3)$ ,  $B(-3,-1)$ , and  $C(-1,-4)$ .

Determine and state a value of  $x$  that would make triangle  $ABC$  a right triangle. Justify why  $\triangle ABC$  is a right triangle.

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

d

3,3

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

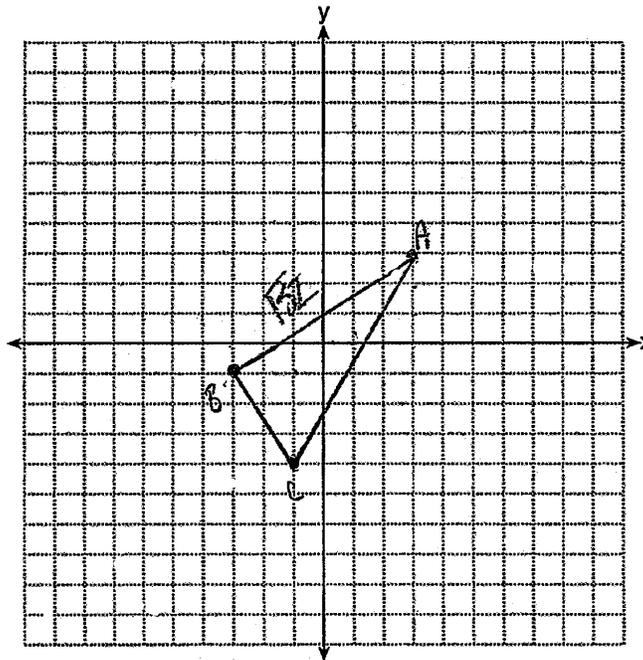
$$d_{BA} = \sqrt{(-3) - (3))^2 + (-1) - (-3))^2}$$

$$d_{BA} = \sqrt{(-6)^2 + (-2)^2}$$

$$d_{BA} = \sqrt{36 + 4}$$

$$d_{BA} = \sqrt{40}$$

$x=3$



**Score 1:** The student gave a correct response with insufficient justification for a right triangle.

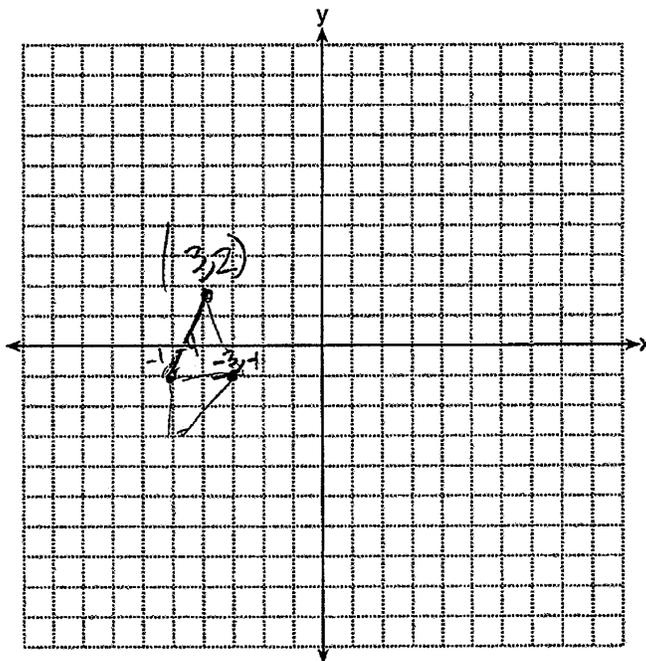
### Question 33

33 Triangle  $ABC$  has vertices with  $A(x,3)$ ,  $B(-3,-1)$ , and  $C(-1,-4)$ .

Determine and state a value of  $x$  that would make triangle  $ABC$  a right triangle. Justify why  $\triangle ABC$  is a right triangle.

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

<sup>reason</sup>  
The  $x$  to this is because the  $x$  would have to  
lie in the II due to  $(x, \frac{4}{3})$



**Score 0:** The student gave a completely incorrect response.

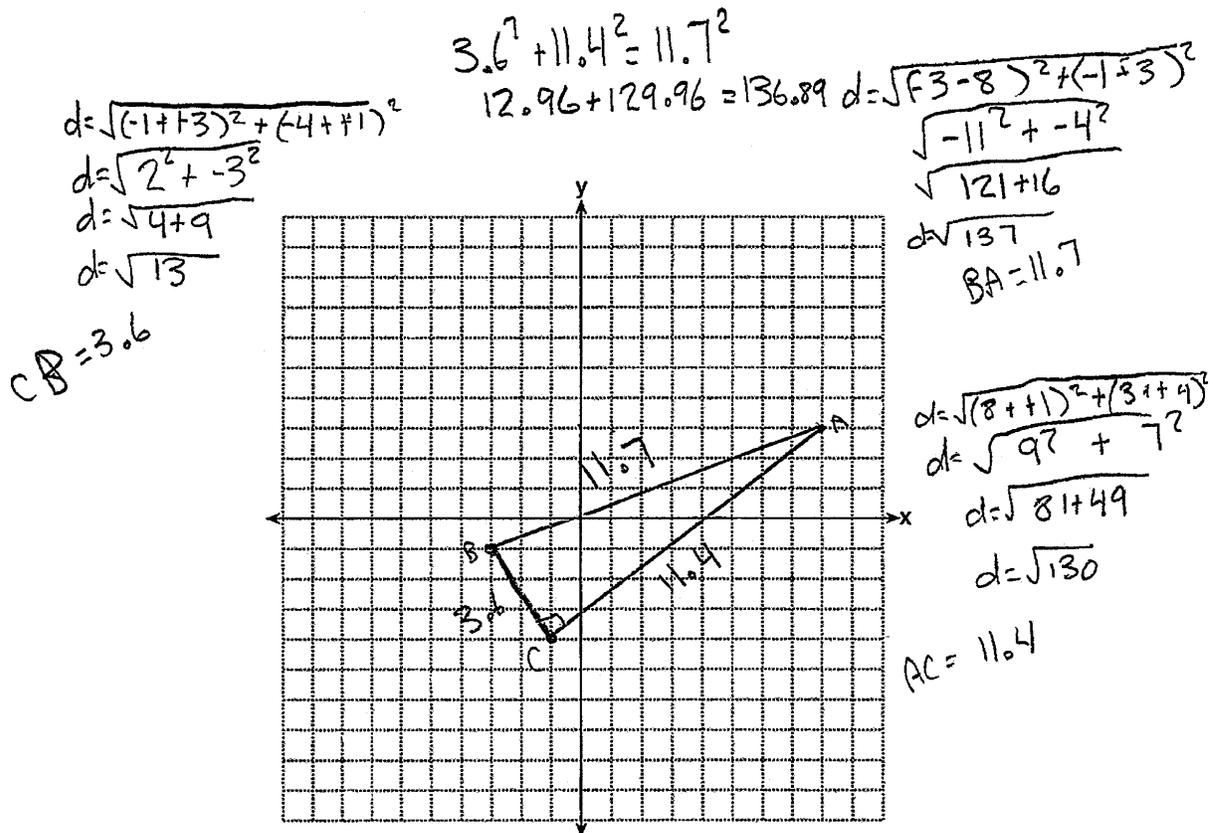
**Question 33**

**33** Triangle  $ABC$  has vertices with  $A(x,3)$ ,  $B(-3,-1)$ , and  $C(-1,-4)$ .

Determine and state a value of  $x$  that would make triangle  $ABC$  a right triangle. Justify why  $\triangle ABC$  is a right triangle.

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

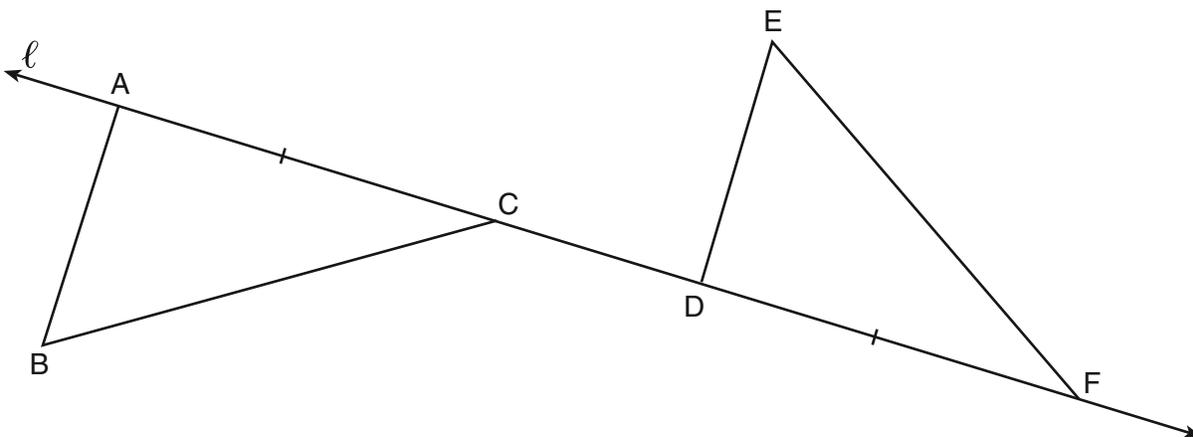
The value of  $x$  is 8. I used the graph to find 8. But with using pathagran therom I could check if I am right which I am the side  $CB$  is 3.6,  $BA$  is 11.7,  $AC$  is 11.4. I used the distance formula to find the distances.



**Score 0:** The student gave an incorrect value of  $x$  followed by an incorrect explanation that the point makes the triangle a right triangle using Pythagorean Theorem.

**Question 34**

34 In the diagram below,  $\overline{AC} \cong \overline{DF}$  and points A, C, D, and F are collinear on line  $\ell$ .



Let  $\triangle D'E'F'$  be the image of  $\triangle DEF$  after a translation along  $\ell$ , such that point D is mapped onto point A. Determine and state the location of  $F'$ . Explain your answer.

Point  $F'$  would be at point C after translation because  $\overline{AC} \cong \overline{DF}$  and if D' meets A then  $F'$  will touch C.

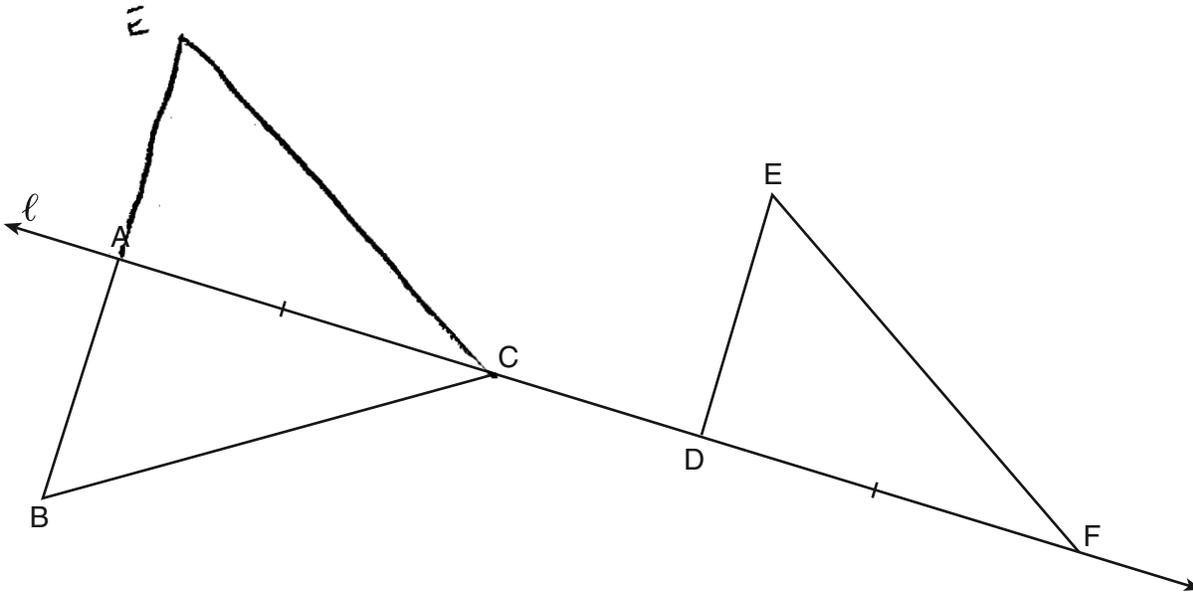
Let  $\triangle D''E''F''$  be the image of  $\triangle D'E'F'$  after a reflection across line  $\ell$ . Suppose that  $E''$  is located at B. Is  $\triangle DEF$  congruent to  $\triangle ABC$ ? Explain your answer.

$\triangle DEF$  is congruent to  $\triangle ABC$  because from the previous answer,  $\overline{DF} \cong \overline{AC}$  so if point  $E''$  lays on point B the triangles are congruent. This is proven by  $\overline{SSS} \cong \overline{SSS}$

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

Question 34

34 In the diagram below,  $\overline{AC} \cong \overline{DF}$  and points A, C, D, and F are collinear on line  $\ell$ .



Let  $\triangle D'E'F'$  be the image of  $\triangle DEF$  after a translation along  $\ell$ , such that point D is mapped onto point A. Determine and state the location of  $F'$ . Explain your answer.

Point F would be located on point C, because lines  $\overline{AC}$  and  $\overline{DF}$  are congruent, and therefore, if points A and D were the same point, and the sides were both collinear, C and F would be located on the same point.

Let  $\triangle D''E''F''$  be the image of  $\triangle D'E'F'$  after a reflection across line  $\ell$ . Suppose that  $E''$  is located at B. Is  $\triangle DEF$  congruent to  $\triangle ABC$ ? Explain your answer.

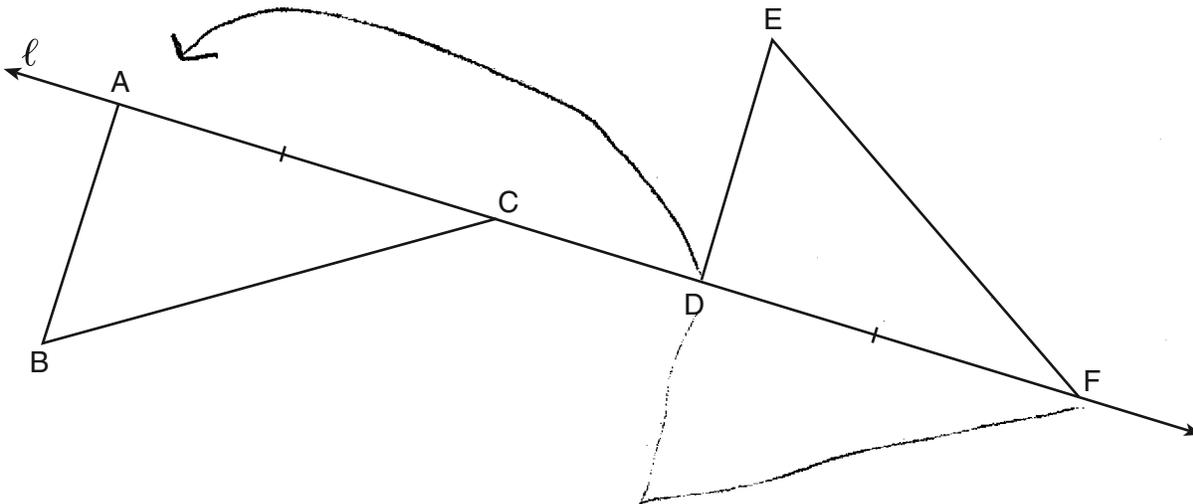
Yes  $\triangle DEF$  is congruent to  $\triangle ABC$ , because all of the points of  $\triangle D''E''F''$  are located at the same points as  $\triangle BAC$ , making them congruent.  $\triangle D''E''F''$  is also congruent to  $\triangle DEF$  because, during the translation, it never underwent dilation. Therefore, through the transitive property,  $\triangle DEF \cong \triangle ABC$ .

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



**Question 34**

34 In the diagram below,  $\overline{AC} \cong \overline{DF}$  and points  $A, C, D,$  and  $F$  are collinear on line  $\ell$ .



Let  $\triangle D'E'F'$  be the image of  $\triangle DEF$  after a translation along  $\ell$ , such that point  $D$  is mapped onto point  $A$ . Determine and state the location of  $F'$ . Explain your answer.

$F \rightarrow F'$  would be at location  $C$  because  $\overline{AC} \cong \overline{DF}$  they have congruent distances apart.

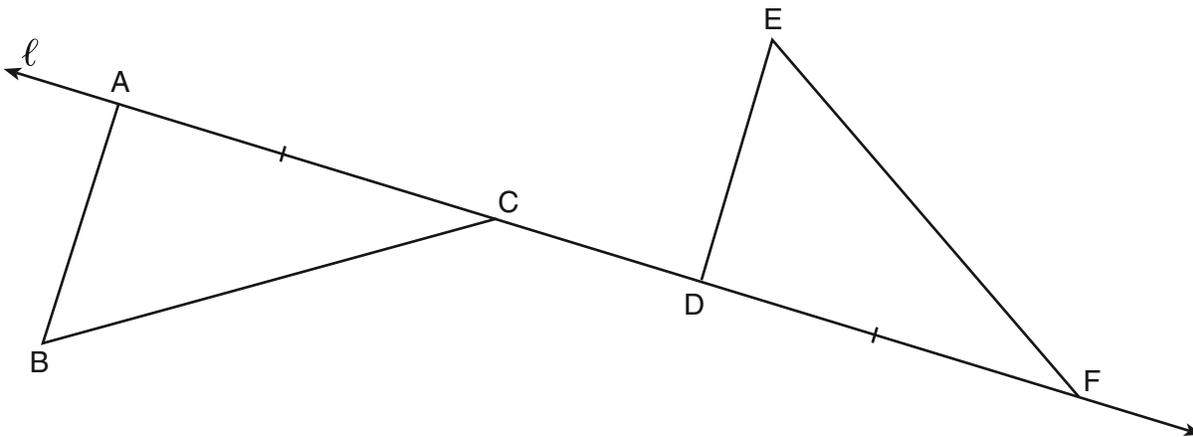
Let  $\triangle D''E''F''$  be the image of  $\triangle D'E'F'$  after a reflection across line  $\ell$ . Suppose that  $E''$  is located at  $B$ . Is  $\triangle DEF$  congruent to  $\triangle ABC$ ? Explain your answer.

Yes because  $\overline{AC} \cong \overline{DF}$  and points are collinear on line  $\ell$ . Also a reflection preserves the size of image to be the same.

**Score 3:** The student gave an incomplete explanation for the first part of the question.

**Question 34**

34 In the diagram below,  $\overline{AC} \cong \overline{DF}$  and points A, C, D, and F are collinear on line  $\ell$ .



Let  $\triangle D'E'F'$  be the image of  $\triangle DEF$  after a translation along  $\ell$ , such that point D is mapped onto point A. Determine and state the location of  $F'$ . Explain your answer.

Point F would then be on point C because point D and F are on the same line and if D is on A, then F must be on C and E on B.

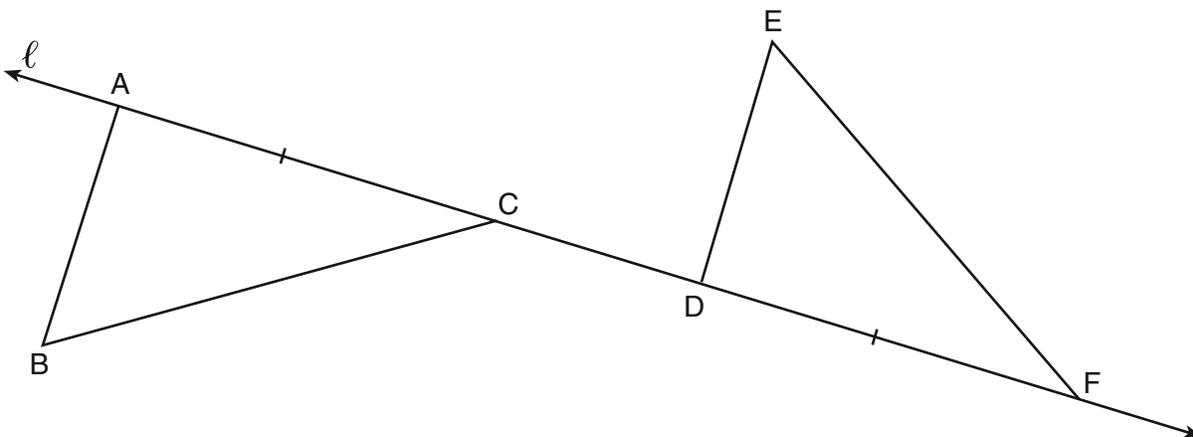
Let  $\triangle D''E''F''$  be the image of  $\triangle D'E'F'$  after a reflection across line  $\ell$ . Suppose that  $E''$  is located at B. Is  $\triangle DEF$  congruent to  $\triangle ABC$ ? Explain your answer.

$\triangle DEF \cong \triangle ABC$  because all the angles and sides match up and are perfectly fit together. In order to have 2 congruent triangles you need equalsides.

**Score 2:** The student correctly answered Point C and Yes, but both explanations were incomplete.

**Question 34**

34 In the diagram below,  $\overline{AC} \cong \overline{DF}$  and points  $A$ ,  $C$ ,  $D$ , and  $F$  are collinear on line  $\ell$ .



Let  $\triangle D'E'F'$  be the image of  $\triangle DEF$  after a translation along  $\ell$ , such that point  $D$  is mapped onto point  $A$ . Determine and state the location of  $F'$ . Explain your answer.

The location of  $F'$  will be on point  $C$  because after the translation the orientation of the triangle must stay the same.

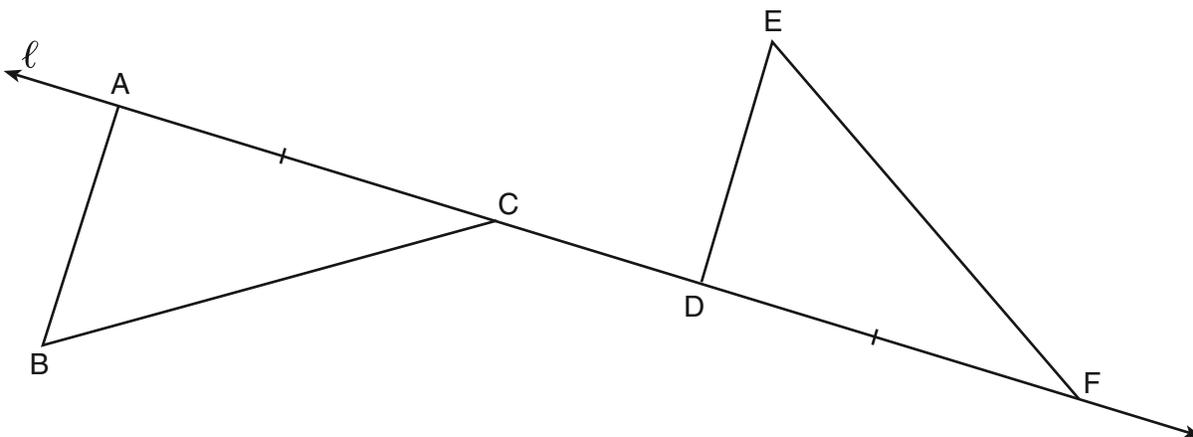
Let  $\triangle D''E''F''$  be the image of  $\triangle D'E'F'$  after a reflection across line  $\ell$ . Suppose that  $E''$  is located at  $B$ . Is  $\triangle DEF$  congruent to  $\triangle ABC$ ? Explain your answer.

$\triangle DEF$  is congruent to  $\triangle ABC$  because they both share line  $\ell$  and have a congruent side.

**Score 1:** The student correctly answered Point  $C$ , but showed no further correct work.

**Question 34**

34 In the diagram below,  $\overline{AC} \cong \overline{DF}$  and points  $A$ ,  $C$ ,  $D$ , and  $F$  are collinear on line  $\ell$ .



Let  $\triangle D'E'F'$  be the image of  $\triangle DEF$  after a translation along  $\ell$ , such that point  $D$  is mapped onto point  $A$ . Determine and state the location of  $F'$ . Explain your answer.

F would be on  $\ell$  after  
you slide it over.

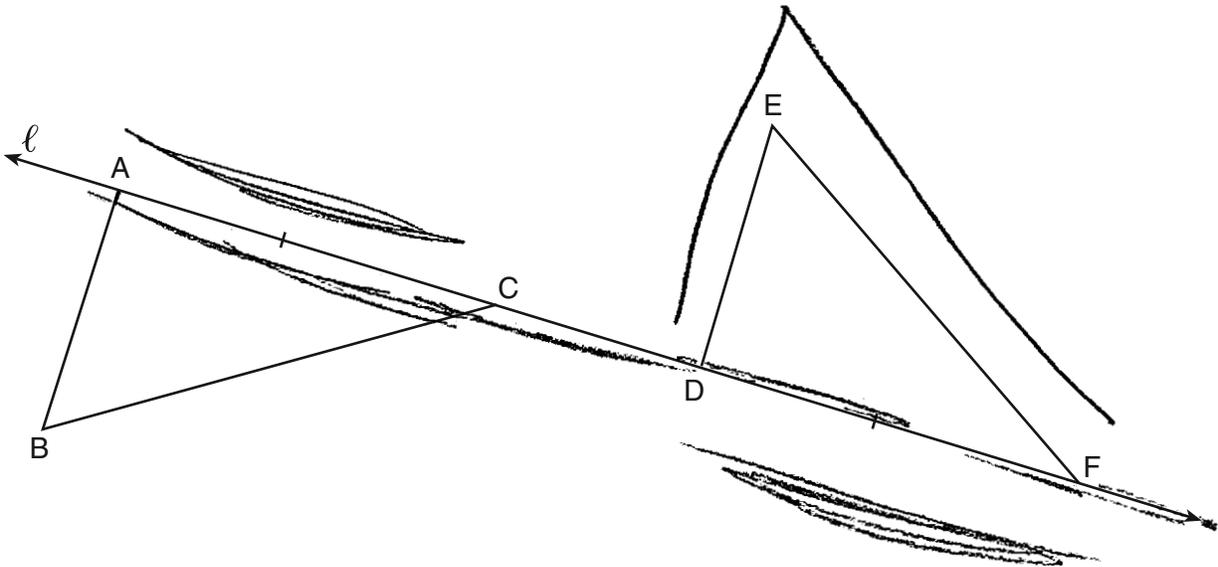
Let  $\triangle D''E''F''$  be the image of  $\triangle D'E'F'$  after a reflection across line  $\ell$ . Suppose that  $E''$  is located at  $B$ . Is  $\triangle DEF$  congruent to  $\triangle ABC$ ? Explain your answer.

Yes because their's Isometry.

**Score 1:** The student correctly answered Point  $C$ , but showed no further correct work.

**Question 34**

34 In the diagram below,  $\overline{AC} \cong \overline{DF}$  and points  $A, C, D,$  and  $F$  are collinear on line  $\ell$ .



Let  $\triangle D'E'F'$  be the image of  $\triangle DEF$  after a translation along  $\ell$ , such that point  $D$  is mapped onto point  $A$ . Determine and state the location of  $F'$ . Explain your answer.

*F' would be C' because D and F are close to each other and A and C are close to each other. They are the same distance.*

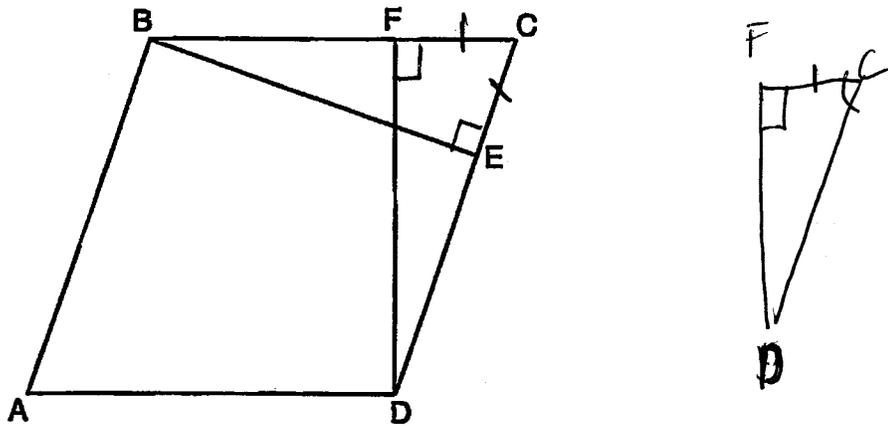
Let  $\triangle D''E''F''$  be the image of  $\triangle D'E'F'$  after a reflection across line  $\ell$ . Suppose that  $E''$  is located at  $B$ . Is  $\triangle DEF$  congruent to  $\triangle ABC$ ? Explain your answer.

*yes because its on the same side and B and E are the same.*

**Score 0:** The student's response was completely incorrect.

Question 35

35 In the diagram of parallelogram  $ABCD$  below,  $\overline{BE} \perp \overline{CD}$ ,  $\overline{DF} \perp \overline{BC}$ , and  $\overline{CE} \cong \overline{CF}$ .



Prove  $ABCD$  is a rhombus.

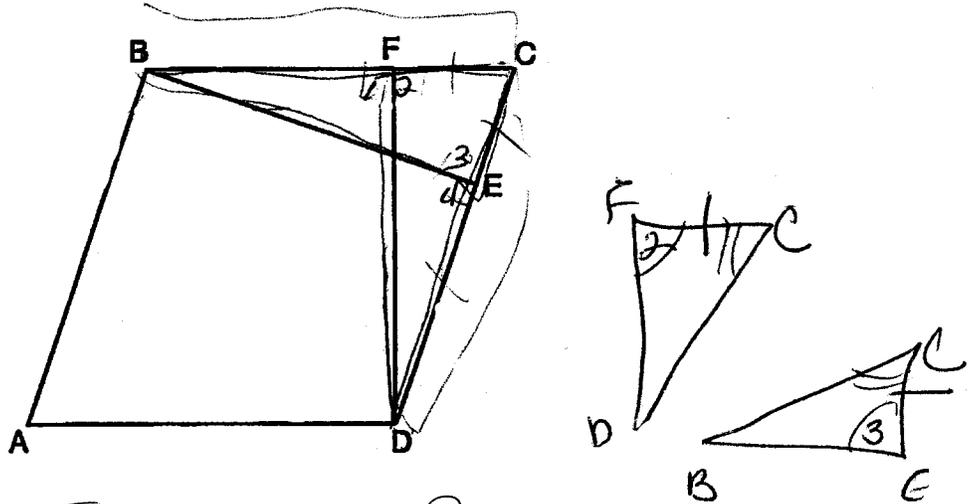
Given  $\overline{BE} \perp \overline{CD}$  &  $\overline{DF} \perp \overline{BC}$ , the  $\perp$  segments form right angles  $\angle BEC$  &  $\angle DFC$ , which are congruent.  $\angle BCD = \angle BCE$  by reflexive property. Given  $\overline{CE} = \overline{CF}$ , this makes  $\triangle BEC \cong \triangle DFC$  by ASA.

The corresponding segments  $\overline{BE}$  &  $\overline{DF}$  are congruent by CPCTC. Given that  $ABCD$  is a parallelogram & 2 consecutive sides are  $\cong$   $ABCD$  must be a rhombus.

**Score 6:** The student has a complete and correct proof.

Question 35

35 In the diagram of parallelogram  $ABCD$  below,  $\overline{BE} \perp \overline{CED}$ ,  $\overline{DF} \perp \overline{BFC}$ , and  $\overline{CE} \cong \overline{CF}$ .



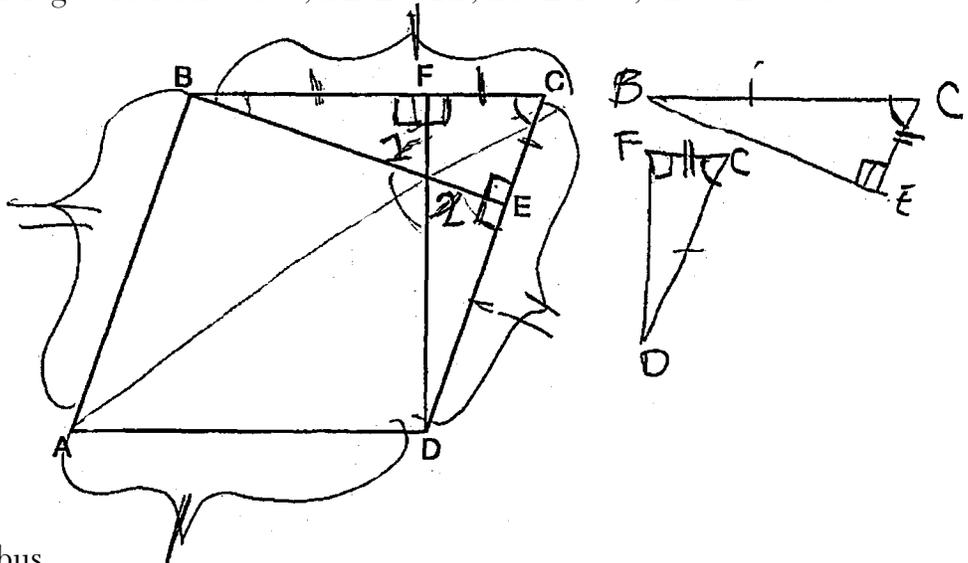
Prove  $ABCD$  is a rhombus.

<p style="text-align: center; font-size: 2em; margin: 0;">S</p> <p>(1) <math>ABCD</math> is a <math>\square</math>, <math>\overline{BE} \perp \overline{CD}</math>, <math>\overline{DF} \perp \overline{BC}</math>, <math>\overline{CE} \cong \overline{CF}</math></p> <p>(2) <math>\angle 1, \angle 2, \angle 3, \angle 4</math> are right angles</p> <p>(3) <math>\angle 2 \cong \angle 3</math></p> <p>(4) <math>\angle C \cong \angle C</math></p> <p>(5) <math>\triangle DFC \cong \triangle BEC</math></p> <p>(6) <math>\overline{DC} \cong \overline{BC}</math></p> <p>(7) <math>ABCD</math> is a rhombus</p>	<p style="text-align: center; font-size: 2em; margin: 0;">R</p> <p>(1) given</p> <p>(2) <math>\perp</math> lines intersect to (i) form right angles</p> <p>(3) if 2 angles are right, then they are <math>\cong</math> (2)</p> <p>(4) reflexive</p> <p>(5) ASA <math>\cong</math> ASA (1, 3, 4)</p> <p>(6) if 2 <math>\triangle</math>'s are <math>\cong</math> corresp parts are <math>\cong</math> (5)</p> <p>(7) a rhombus is a <math>\square</math> w/ 2 consec. sides <math>\cong</math> (1, 7)</p>
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**Score 6:** The student has a complete and correct proof.

Question 35

35 In the diagram of parallelogram  $ABCD$  below,  $\overline{BE} \perp \overline{CED}$ ,  $\overline{DF} \perp \overline{BFC}$ , and  $\overline{CE} \cong \overline{CF}$ .



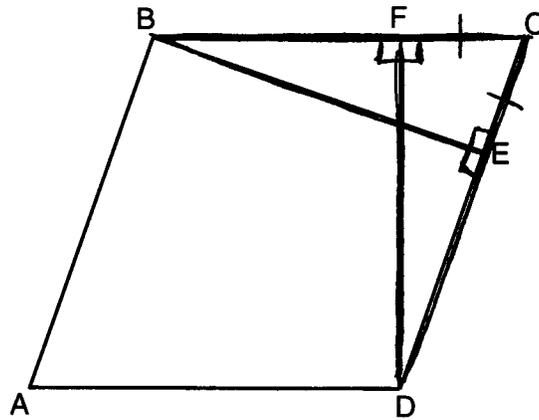
Prove  $ABCD$  is a rhombus.

Statements	Reasons
① $\overline{BE} \perp \overline{CED}$ , $\overline{DF} \perp \overline{BFC}$ , $\overline{CE} \cong \overline{CF}$	① given
② $\angle DFC \cong \angle BFD \cong \angle FEC$ , $\angle B \cong \angle D$	② perpendicular lines form congruent right angles
③ $\angle 1 \cong \angle 2$	③ vertical angles are congruent
④ $\angle C = \angle C$	④ reflexive property
⑤ $\triangle BCE \cong \triangle DCF$	⑤ ASA
⑥ $\overline{BC} \cong \overline{CD}$	⑥ CPCTC
⑦ $ABCD$ is a rhombus	⑦ in a parallelogram, if two consecutive sides are congruent, said parallelogram is a rhombus

Score 5: The student had an incomplete given.

Question 35

35 In the diagram of parallelogram  $ABCD$  below,  $\overline{BE} \perp \overline{CD}$ ,  $\overline{DF} \perp \overline{BC}$ , and  $\overline{CE} \cong \overline{CF}$ .



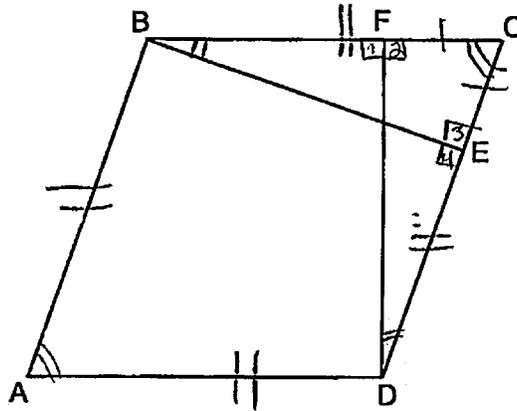
Prove  $ABCD$  is a rhombus.

- |  |  |
|--|--|
| <p>① <math>\overline{BE} \perp \overline{CD}</math>, <math>\overline{DF} \perp \overline{BC}</math><br/> <math>\overline{CE} \cong \overline{CF}</math>, <math>\square ABCD</math></p> <p>② <math>\angle BEC</math> is a right angle<br/> and <math>\angle DFC</math> is a right angle</p> <p>③ <math>\angle BEC \cong \angle DFC</math></p> <p>④ <math>\overline{BC} \cong \overline{DC}</math></p> <p>⑤ <math>\triangle BCE \cong \triangle DCF</math></p> <p>⑥ <math>\overline{BC} \cong \overline{DC}</math></p> <p>⑦ <math>\square ABCD</math> is a rhombus</p> | <p>① Given</p> <p>② Definition of perpendicular</p> <p>③ All right angles are congruent</p> <p>④ Reflexive</p> <p>⑤ ASA <math>\cong</math> ASA</p> <p>⑥ sides are congruent</p> <p>⑦ Two consecutive sides are congruent</p> |
|--|--|

**Score 5:** The student gave one incorrect reason.

Question 35

35 In the diagram of parallelogram  $ABCD$  below,  $\overline{BE} \perp \overline{CED}$ ,  $\overline{DF} \perp \overline{BFC}$ , and  $\overline{CE} \cong \overline{CF}$ .



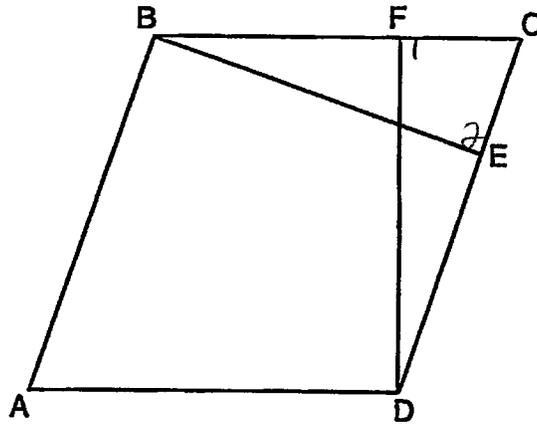
Prove  $ABCD$  is a rhombus.

S	R
① $\overline{BE} \perp \overline{CED}$ , $\overline{DF} \perp \overline{BFC}$ , $\overline{CE} \cong \overline{CF}$	① Given
Parallelogram $ABCD$	
② $\angle 1, \angle 2, \angle 3, \angle 4$ are rt. $\angle$ s	② $\perp$ lines form rt. $\angle$ s
③ $\angle 1 \cong \angle 2 \cong \angle 3 \cong \angle 4$	③ All rt. $\angle$ s are $\cong$
④ $\angle C \cong \angle C$	④ Reflexive
⑤ $\triangle BEC \cong \triangle DFC$	⑤ ASA
⑥ $\overline{CD} \cong \overline{BA}$	⑥ In a parallelogram, opposite sides are $\cong$
⑦ $\angle B \cong \angle D$	⑦ CPCTC
⑧ $\angle A \cong \angle C$	⑧ In a parallelogram, opposite $\angle$ s are $\cong$
⑨ $ABCD$ is a rhombus	⑨ All sides are $\cong$ ,

**Score 4:** The student proved congruent triangles, but showed no further correct work to prove  $ABCD$  is a rhombus.

Question 35

35 In the diagram of parallelogram  $ABCD$  below,  $\overline{BE} \perp \overline{CED}$ ,  $\overline{DF} \perp \overline{BFC}$ , and  $\overline{CE} \cong \overline{CF}$ .



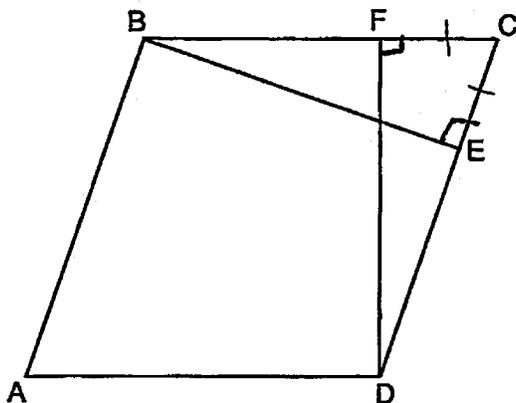
Prove  $ABCD$  is a rhombus.

S	R
1) $\square ABCD$ , $\overline{BE} \perp \overline{CED}$ $\overline{DF} \perp \overline{BFC}$ , $\overline{CE} \cong \overline{CF}$	1) given
2) $\angle 1, \angle 2$ are rt $\angle s$	2) $\perp$ lines intersect to form rt $\angle s$
3) $\angle 1 \cong \angle 2$	3) if 2 $\angle s$ are rt, then they are $\cong$
4) $\angle C \cong \angle C$	4) Reflexive property

**Score 3:** The student proved  $\angle BEC \cong \angle DFC$  and  $\angle C \cong \angle C$ , but showed no further work.

Question 35

35 In the diagram of parallelogram  $ABCD$  below,  $\overline{BE} \perp \overline{CED}$ ,  $\overline{DF} \perp \overline{BFC}$ , and  $\overline{CE} \cong \overline{CF}$ .



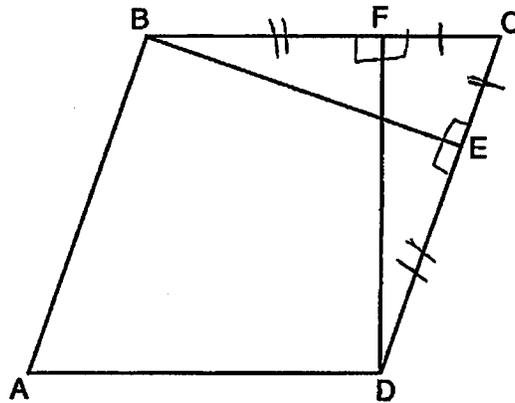
Prove  $ABCD$  is a rhombus.

<p>① <math>\overline{BE} \perp \overline{CED}, \overline{DF} \perp \overline{BFC}</math>, or <math>\overline{CE} \cong \overline{CF}</math></p> <p>② <math>\angle DFC</math> and <math>\angle BEC</math> are right angles</p> <p>③ <math>\triangle DFC \cong \triangle BEC</math></p>	<p>① Given</p> <p>② perpendicular lines create rt <math>\angle</math>'s</p> <p>③ rt <math>\angle</math>'s are <math>\cong</math></p>
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**Score 2:** The student proved  $\angle BEC \cong \angle DFC$ , but showed no further work.

Question 35

35 In the diagram of parallelogram  $ABCD$  below,  $\overline{BE} \perp \overline{CED}$ ,  $\overline{DF} \perp \overline{BFC}$ , and  $\overline{CE} \cong \overline{CF}$ .



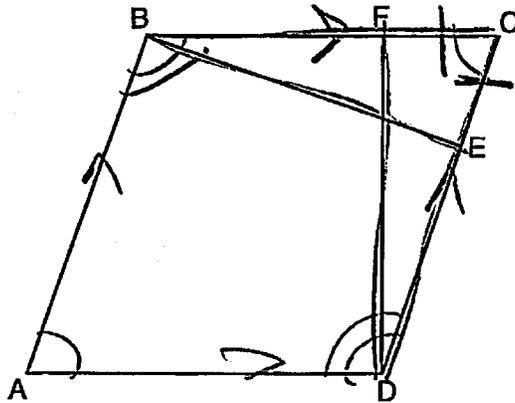
Prove  $ABCD$  is a rhombus.

Statement	Reason
① $\overline{BE} \perp \overline{CED}$ $\overline{DF} \perp \overline{BFC}$ $\overline{CE} \cong \overline{CF}$	① Given
② $\angle BED \neq \angle BEC$ $\angle BFD \neq \angle DFC$ are right angles	② perpendicular lines form right angles
③ $\angle BED \cong \angle BEC$ $\angle BFD \cong \angle DFC$	③ right angles are congruent
④ $BC - FC \cong CD - CE$	④ subtraction postulate
⑤ $BF \cong DE$	⑤ substitute postulate
⑥ $ABCD$ is a rhombus	⑥ all sides are congruent

**Score 1:** The student used perpendicularity to prove right angles, but did not prove  $\angle BEC \cong \angle DFC$ .

Question 35

35 In the diagram of parallelogram  $ABCD$  below,  $\overline{BE} \perp \overline{CED}$ ,  $\overline{DF} \perp \overline{BFC}$ , and  $\overline{CE} \cong \overline{CF}$ .



$\overline{BE} \perp \overline{CED}, \overline{DF} \perp \overline{BFC} \overline{CE} \cong \overline{CF}$  / Given

Prove  $ABCD$  is a rhombus.

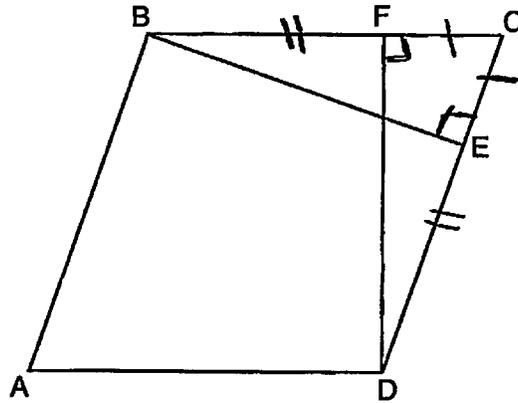
1.  $\overline{CD} \parallel \overline{BA}, \overline{BC} \parallel \overline{AD}$
2.  $\angle A + \angle D = 180^\circ$   
 $\angle B + \angle C = 180^\circ$
3.  $\angle B \cong \angle D$   
 $\angle A \cong \angle C$
4.  $\overline{AD} \cong \overline{BC}$
5.  $ABCD$  is a rhombus

1. opposite sides  $\parallel$ .
2. properties of suppl.
3. opposite angles congruent.
4. supplementary lines parallel.
5. ASA

**Score 0:** The student repeated the given but wrote no relevant statements.

Question 35

35 In the diagram of parallelogram  $ABCD$  below,  $\overline{BE} \perp \overline{CD}$ ,  $\overline{DF} \perp \overline{BC}$ , and  $\overline{CE} \cong \overline{CF}$ .



Prove  $ABCD$  is a rhombus.

S	R
<ol style="list-style-type: none"> <li>1. <math>\overline{CE} \cong \overline{CF}</math></li> <li>2. <math>\overline{CE} + \overline{ED} \cong \overline{CD}</math></li> <li>3. <math>\overline{CF} + \overline{BF} = \overline{CB}</math></li> <li>4. <math>\overline{CD} \cong \overline{CB}</math></li> <li>5. Parallelogram <math>ABCD</math></li> <li>6. <math>\overline{CB} \cong \overline{DA}</math></li> <li>7. <math>\overline{CD} \cong \overline{BA}</math></li> <li>8. All sides are <math>\cong</math></li> <li>9. <math>ABCD</math> is a rhombus</li> </ol>	<ol style="list-style-type: none"> <li>1. Given</li> <li>2. Parts are equal to the total (1)</li> <li>3. Partition (2)</li> <li>4. Given</li> <li>5. Opposite sides of a parallelogram are <math>\cong</math>.</li> <li>6. Partition (3, 5)</li> <li>7. All sides are <math>\cong</math></li> </ol>

Score 0: The student wrote no relevant statements.

Question 36

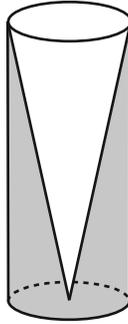
36 Walter wants to make 100 candles in the shape of a cone for his new candle business. The mold shown below will be used to make the candles. Each mold will have a height of 8 inches and a diameter of 3 inches. To the *nearest cubic inch*, what will be the total volume of 100 candles?

$$V = \frac{1}{3}\pi(1.5)^2 \cdot 8$$

$$V_{100} = \frac{800}{3}\pi(2.25)$$

$$= 1885 \text{ in}^3$$

↑  
Volume for 100 candles



Walter goes to a hobby store to buy the wax for his candles. The wax costs \$0.10 per ounce. If the weight of the wax is 0.52 ounce per cubic inch, how much will it cost Walter to buy the wax for 100 candles?

$$(1885 \text{ in}^3)(0.52) \left(\frac{0.9}{\text{in}^3}\right) (0.10) \left(\frac{\$}{0.9}\right) = \$98.02$$

If Walter spent a total of \$37.83 for the molds and charges \$1.95 for each candle, what is Walter's profit after selling 100 candles?

$$\text{Revenue} = \$195$$

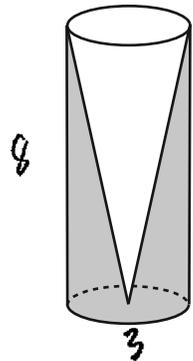
$$\text{Cost} = \cancel{\$}37.83 + \cancel{\$}98.02 = \$135.85$$

$$\text{Profit} = \$195 - \cancel{\$}135.85 = \$59.15$$

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

**Question 36**

36 Walter wants to make 100 candles in the shape of a cone for his new candle business. The mold shown below will be used to make the candles. Each mold will have a height of 8 inches and a diameter of 3 inches. To the *nearest cubic inch*, what will be the total volume of 100 candles?



Cone  
 $V = \frac{1}{3}\pi r^2 h$   
 $V = \frac{1}{3}\pi (1.5)^2 (8)$   
 $V = 6\pi = 18.84955592$   
 $\times 100$   
 $1884.96 \text{ in}^3$

Walter goes to a hobby store to buy the wax for his candles. The wax costs \$0.10 per ounce. If the weight of the wax is 0.52 ounce per cubic inch, how much will it cost Walter to buy the wax for 100 candles?

$$0.52 \times 1884.96 = 980.179202$$

$$\times .10^{\text{F}}$$

\$ 98.02

If Walter spent a total of \$37.83 for the molds and charges \$1.95 for each candle, what is Walter's profit after selling 100 candles?

$\begin{array}{r} \$ 98.02 \\ + 37.83 \\ \hline \$ 135.85 \end{array}$	$\begin{array}{r} 100 \\ \times 1.95 \\ \hline 195 \end{array}$	$\begin{array}{r} 195 \\ - 135.85 \\ \hline \end{array}$ <div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 0 auto;">\$ 59.15</div>
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**Score 5:** The student did not give the total volume to the *nearest cubic inch*.

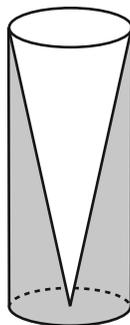
Question 36

36 Walter wants to make 100 candles in the shape of a cone for his new candle business. The mold shown below will be used to make the candles. Each mold will have a height of 8 inches and a diameter of 3 inches. To the *nearest cubic inch*, what will be the total volume of 100 candles?

$$V = \frac{1}{3} \pi r^2 h = 18.849$$

$$18.849 \times 100 = 1884.9 \text{ in}^3$$

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



$$h = 8 \text{ inches}$$

$$d = 3 \text{ inches}$$

$$V = 100 \text{ candles}$$

Walter goes to a hobby store to buy the wax for his candles. The wax costs \$0.10 per ounce. If the weight of the wax is 0.52 ounce per cubic inch, how much will it cost Walter to buy the wax for 100 candles?

$$1884.9 \times 0.52 \text{ oz} = 979.6807 \times \$0.10 = \$97.96$$

If Walter spent a total of \$37.83 for the molds and charges \$1.95 for each candle, what is Walter's profit after selling 100 candles?

$$\begin{array}{r} 97.96 \\ + 37.83 \\ \hline \$135.79 \text{ spent} \end{array}$$

$$1.95 \times 100 = \$195.00$$

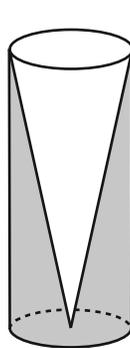
$$\begin{array}{r} 195.00 \\ - 135.79 \\ \hline \end{array}$$

$$\$59.21 \text{ profit}$$

**Score 5:** The student truncated instead of rounding early when finding the volume and the cost of the wax.

**Question 36**

**36** Walter wants to make 100 candles in the shape of a cone for his new candle business. The mold shown below will be used to make the candles. Each mold will have a height of 8 inches and a diameter of 3 inches. To the *nearest cubic inch*, what will be the total volume of 100 candles?



$V = \pi r^2 h$   
 $V = \pi \left(\frac{3}{2}\right)^2 (8) = 56,548$   
 for 100 candles  
 $\boxed{5654.87}$

Walter goes to a hobby store to buy the wax for his candles. The wax costs \$0.10 per ounce. If the weight of the wax is 0.52 ounce per cubic inch, how much will it cost Walter to buy the wax for 100 candles?

$(.52)(.10)(5654.87) = \$294.053$

If Walter spent a total of \$37.83 for the molds and charges \$1.95 for each candle, what is Walter's profit after selling 100 candles?

$$\begin{array}{r} 195.00 \\ - 37.83 \\ \hline 157.17 \\ - 294.05 \\ \hline -136.88 \\ \text{Walter lost money} \end{array}$$

**Score 4:** The student made an error in finding the volume as well as a rounding error.

Question 36

36 Walter wants to make 100 candles in the shape of a cone for his new candle business. The mold shown below will be used to make the candles. Each mold will have a height of 8 inches and a diameter of 3 inches. To the *nearest cubic inch*, what will be the total volume of 100 candles?

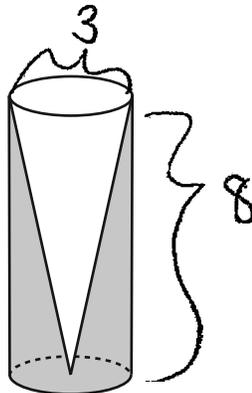
$$V = \pi r^2 h$$

$$V = \pi (1.5)^2 (8)$$

$$\pi (2.25)(8)$$

$$\pi 18$$

$$56.55$$



$$56.55 \times 100 =$$

$$5654.866776$$

$$\boxed{5654.87}$$

Walter goes to a hobby store to buy the wax for his candles. The wax costs \$0.10 per ounce. If the weight of the wax is 0.52 ounce per cubic inch, how much will it cost Walter to buy the wax for 100 candles?

$$\boxed{294.053}$$

$$d = \frac{W}{V}$$

$$.52 = \frac{x}{5654.87}$$

$$x = 2940.534$$

If Walter spent a total of \$37.83 for the molds and charges \$1.95 for each candle, what is Walter's profit after selling 100 candles?

$$\begin{array}{r} 37.83 \\ + 294.053 \\ \hline 331.883 \end{array}$$

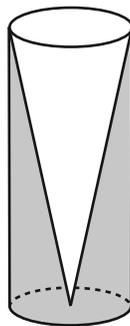
$$\begin{array}{r} 1.95 \\ \times 100 = 195 \\ \hline \text{Walter 10¢ } \$136.883 \end{array}$$

**Score 3:** The student made an error by finding the volume of a cylinder, and two rounding errors.

Question 36

36 Walter wants to make 100 candles in the shape of a cone for his new candle business. The mold shown below will be used to make the candles. Each mold will have a height of 8 inches and a diameter of 3 inches. To the *nearest cubic inch*, what will be the total volume of 100 candles?

$$V = 1884.96$$



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

$$V = \frac{1}{3} \pi 1.5^2 (8)$$

$$V = \frac{1}{3} \pi 2.25 (8)$$

$$V = \frac{1}{3} \pi 2.25 (8)$$

$$V = 1884.96$$

$$\cdot 100$$

Walter goes to a hobby store to buy the wax for his candles. The wax costs \$0.10 per ounce. If the weight of the wax is 0.52 ounce per cubic inch, how much will it cost Walter to buy the wax for 100 candles?

$$A = \pi r^2$$

$$A = \pi 1.5^2$$

$$A = 7.07$$

$$\$ .10$$

~~$$1884.96 \cdot 0.52 \cdot 0.10$$~~

~~$$1884.96 \cdot 0.52 \cdot 0.10$$~~

If Walter spent a total of \$37.83 for the molds and charges \$1.95 for each candle, what is Walter's profit after selling 100 candles?

$$\$ 157.17$$

$$1.95 \cdot 100$$

$$195$$

$$- 37.83$$

$$\$ 157.17$$

**Score 2:** The student made a rounding error when finding the volume, did not find the cost of the wax, and made an error in finding the profit.

Question 36

36 Walter wants to make 100 candles in the shape of a cone for his new candle business. The mold shown below will be used to make the candles. Each mold will have a height of 8 inches and a diameter of 3 inches. To the *nearest cubic inch*, what will be the total volume of 100 candles?

Handwritten work for finding the volume of a cone:

$$\frac{1}{3} \pi \cdot 1.5^2 \cdot 8$$

$$2.25 \cdot 8$$

$$18\pi$$

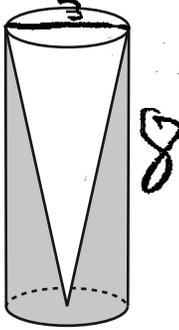
$$\frac{56.54866776}{3} \times 100 =$$


Diagram description: A cylinder with a cone inside it. The cone's height is labeled as 8. The diameter of the cone's base is labeled as 3.

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

$$1884.96 \text{ in}^3$$

Walter goes to a hobby store to buy the wax for his candles. The wax costs \$0.10 per ounce. If the weight of the wax is 0.52 ounce per cubic inch, how much will it cost Walter to buy the wax for 100 candles?

$$1884.96 \times 0.52$$

$$980.1792$$

If Walter spent a total of \$37.83 for the molds and charges \$1.95 for each candle, what is Walter's profit after selling 100 candles?

**Score 2:** The student made a rounding error in finding the volume, and calculated the ounces of wax, but not the cost.

**Question 36**

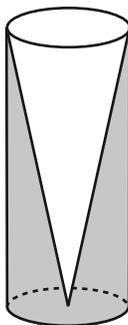
- 36 Walter wants to make 100 candles in the shape of a cone for his new candle business. The mold shown below will be used to make the candles. Each mold will have a height of 8 inches and a diameter of 3 inches. To the *nearest cubic inch*, what will be the total volume of 100 candles?

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

$$V = \frac{1}{3} \pi (1.5)^2 (8)$$

$$V = 18.849$$

$$19$$



Walter goes to a hobby store to buy the wax for his candles. The wax costs \$0.10 per ounce. If the weight of the wax is 0.52 ounce per cubic inch, how much will it cost Walter to buy the wax for 100 candles?

$$\frac{19}{.52} = 36.538 \times 10 = 365$$

If Walter spent a total of \$37.83 for the molds and charges \$1.95 for each candle, what is Walter's profit after selling 100 candles?

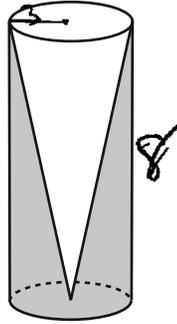
$$365 - 1.95 - 37.83 = 325.22$$

**Score 1:** The student found the volume of one candle, but no further correct work was shown.

**Question 36**

**36** Walter wants to make 100 candles in the shape of a cone for his new candle business. The mold shown below will be used to make the candles. Each mold will have a height of 8 inches and a diameter of 3 inches. To the *nearest cubic inch*, what will be the total volume of 100 candles?

$$\boxed{\approx 75.36 \text{ in}^3}$$



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

$$\frac{1}{3} \pi (1.5)^2 (8)$$

$$3 \pi (8)$$

$$24 \pi$$

$$\begin{array}{r} 3.14 \\ \underline{24} \\ 1256 \\ \underline{628} \\ 753.6 \end{array}$$

Walter goes to a hobby store to buy the wax for his candles. The wax costs \$0.10 per ounce. If the weight of the wax is 0.52 ounce per cubic inch, how much will it cost Walter to buy the wax for 100 candles?

$$\boxed{1000.56}$$

If Walter spent a total of \$37.83 for the molds and charges \$1.95 for each candle, what is Walter's profit after selling 100 candles?

$$\begin{array}{r} 100 \\ \times 1.95 \\ \hline 500 \\ 900 \\ 190 \\ \hline 195.00 \end{array}$$

$$\begin{array}{r} 37.83 \\ \times 1.95 \\ \hline 179.1675 \end{array}$$

$$\boxed{\$ 195.00}$$

**Score 0:** The student gave a completely incorrect response.