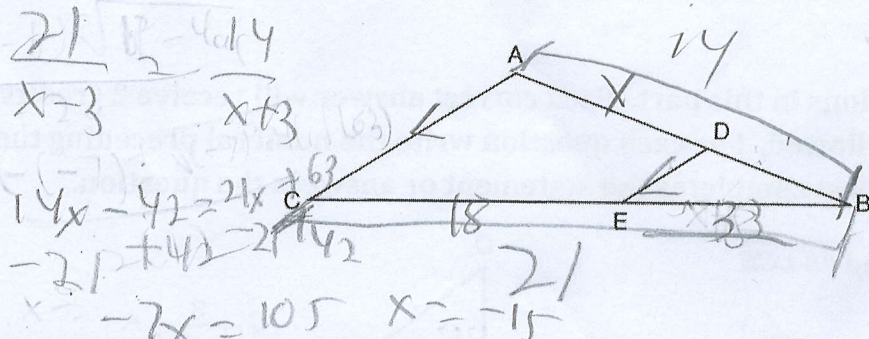


3.) In the diagram of $\triangle ABC$ below, points D and E are on sides $\overline{AB}$ and $\overline{CB}$ respectively, such that $\overline{DE} \parallel \overline{AC}$.



If EB is 3 more than DB , $AB = 14$, and $CB = 21$, what is the length of $\overline{AD}$?

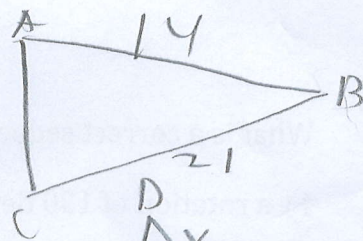
1) 6

2) 8

3) 9

4) 12

$$\frac{21}{14} = \frac{x+3}{x-3}$$



4.) In triangle ABC , points D and E are on sides $\overline{AB}$ and $\overline{BC}$, respectively, such that $\overline{DE} \parallel \overline{AC}$, and $AD:DB = 3:5$.

If $DB = 6.3$ and $AC = 9.4$, what is the length of $\overline{DE}$, to the nearest tenth?

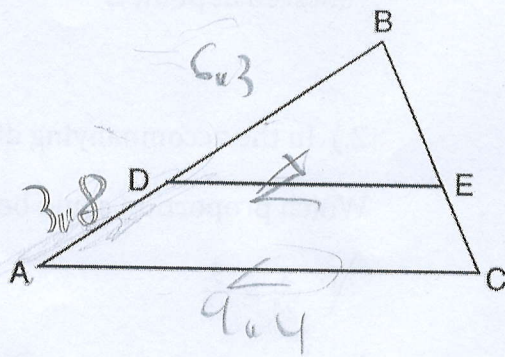
1) 3.8

2) 5.6

3) 5.9

4) 15.7

$$\frac{9.4}{6.3} = \frac{x}{x+6.3}$$



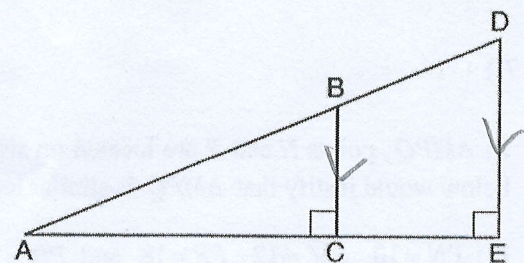
$$6.3x = 9.4x + 59.22$$

$$6.3x + 39.69 = 9.4x - 6.3$$

$$39.69 = 3.1x \quad \frac{39.69}{3.1} = 12.8$$

Triangle
similarity

5.) In the diagram below of right triangle AED , $\overline{BC} \parallel \overline{DE}$.



Which statement is always true?

1) $\frac{AC}{BC} = \frac{DE}{AE}$

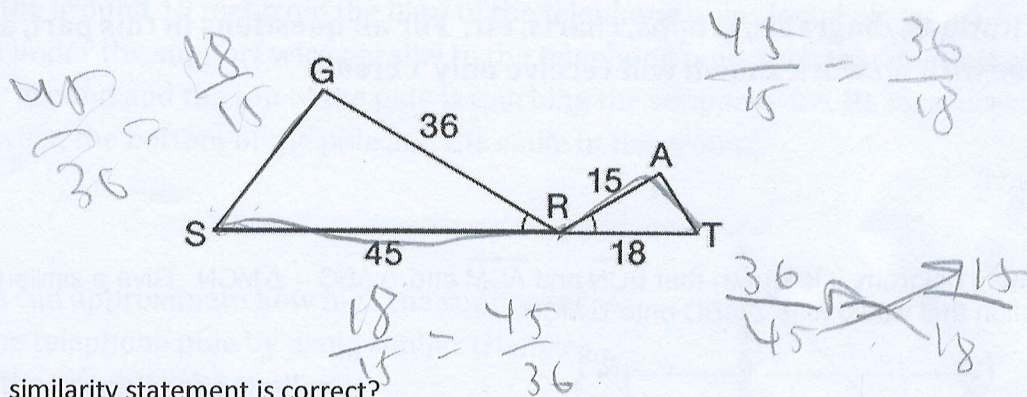
2) $\frac{AB}{AD} = \frac{BC}{DE}$

3) $\frac{AC}{CE} = \frac{BC}{DE}$

4) $\frac{DE}{BC} = \frac{DB}{AB}$

$$\frac{AC}{AE} = \frac{BC}{DE}$$

6.) In the diagram below, $\angle GRS \cong \angle ART$, $GR = 36$, $SR = 45$, $AR = 15$, and $RT = 18$.



Which triangle similarity statement is correct?

1) $\triangle GRS \sim \triangle ART$ by AA.

3) $\triangle GRS \sim \triangle ART$ by SSS.

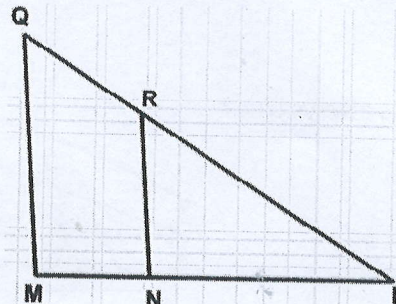
2) $\triangle GRS \sim \triangle ART$ by SAS.

4) $\triangle GRS$ is not similar to $\triangle ART$.

7.)

In $\triangle MPQ$, points N and R are located on sides $\overline{MP}$ and $\overline{QP}$ with $\overline{NR}$ drawn. Which set of measurements below would justify that $\triangle MPQ$ is similar to $\triangle NPR$?

- (1) $PN=10$, $PM=12$, $PR=18$, and $PQ=20$
- (2) $PN=8$, $PM=16$, $PR=10$, and $PQ=15$
- (3) $PN=12$, $PM=16$, $PR=15$, and $PQ=25$
- (4) $PN=6$, $PM=9$, $PR=8$, and $PQ=12$

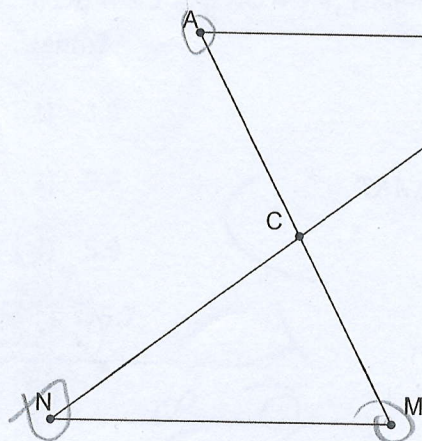


$$\frac{18}{10} = \frac{20}{12}$$

PART II: Answer all questions in this part. Each correct answer will receive 2 credits. Clearly indicate the necessary steps, including appropriate formula substitutions, diagrams, graphs, charts, etc. For all questions in this part, a correct answer with no work shown will receive only 1 credit.

8.)

In the following diagram, it is known that $\overline{BCN}$ and $\overline{ACM}$ and $\triangle ABC \sim \triangle MCN$. Give a similarity transformation that would map $\triangle ABC$ onto $\triangle MCN$.

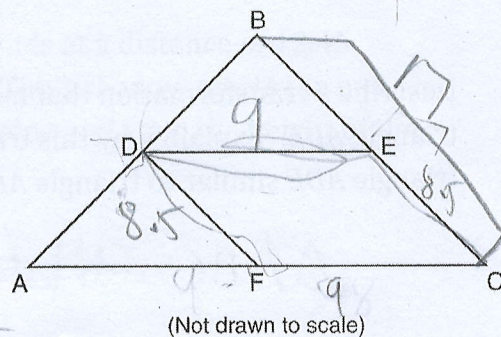


$\triangle ABC \rightarrow \text{Reflection} \rightarrow \triangle MCN$

9.) In the diagram below of $\triangle ABC$, $\overline{DE}$ and $\overline{DF}$ are midsegments.

If $DE = 9$, and $BC = 17$, determine and state the perimeter of quadrilateral $FDEC$

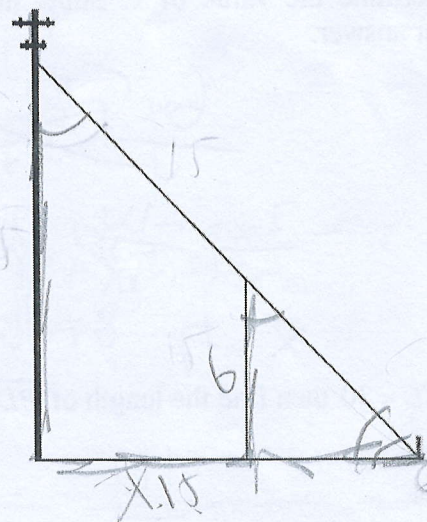
The perimeter
of $FDEC$ is 35



10.) In the model below, a support wire for a telephone pole is attached to the pole and anchored to a stake in the ground 15 feet from the base of the telephone pole. Jamal places a 6-foot wooden pole under the support wire parallel to the telephone pole, such that one end of the pole is on the ground and the top of the pole is touching the support wire. He measures the distance between the bottom of the pole and the stake in the ground.

Jamal says he can approximate how high the support wire attaches to the telephone pole by using similar triangles. Explain why the triangles are similar.

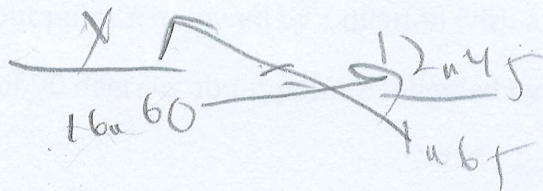
The ~~triangles~~ $\triangle$'s are similar
because of AA ~.



PART III: Answer all questions in this part. Each correct answer will receive 4 credits. Clearly indicate the necessary steps, including appropriate formula substitutions, diagrams, graphs, charts, etc. For all questions in this part, a correct answer with no work shown will receive only 1 credit.

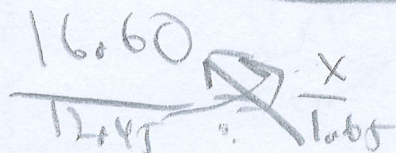
13.) A flagpole casts a shadow 16.60 meters long. Tim stands at a distance of 12.45 meters from the base of the flagpole, such that the end of Tim's shadow **meets** the end of the flagpole's shadow. If Tim is 1.65 meters tall, determine and state the height of the flagpole to the *nearest tenth of a meter*.

$$\frac{\text{FP height}}{\text{Shadow long}} = \frac{\text{Tim distance}}{\text{Tim height}}$$



$$\frac{1.65}{1.65} = \frac{206.06}{1.65}$$

$$x = 125.3 \text{ meters}$$

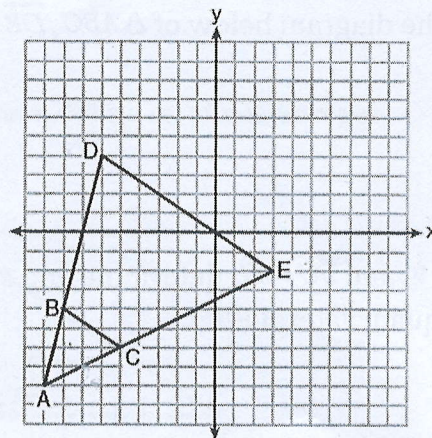


$$\frac{27.39}{12.45} = \frac{12.45}{12.45}$$

$$2.2 = x$$

$$2.2 \text{ meters}$$

- 11.) Triangle ABC and triangle ADE are graphed on the set of axes below.



Describe a transformation that maps triangle ABC onto triangle ADE . Explain why this transformation makes triangle ADE similar to triangle ABC .

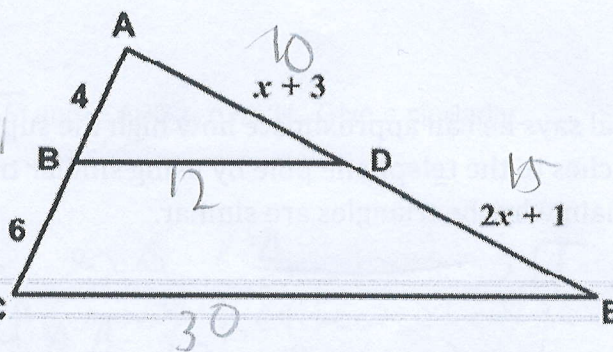
ΔABC dilation $r > 1$ and they're similar to ΔABC because $AA \sim$

12.)

In the diagram shown, $\overline{BD}$ is parallel to $\overline{CE}$ with $AB=4$, $BC=6$, $AC=x+3$, and $DE=2x+1$.

- (a) Determine the value of x . Show how you found your answer.

$$\begin{aligned} \frac{6}{4} &= \frac{2x+1}{x+3} \\ -2x &= -14 \\ -2 & \quad -2 \\ \hline x &= 7 \end{aligned}$$



- (b) If $CE = 30$ then find the length of $\overline{BD}$.

$$\frac{10}{4}$$

$$30 = x(2+5)$$

$$12 = x$$