7.1

~~6.1~~ **Proportions**

- **Ratio** – Comparison of 2 quantities 3/4
- **Proportion** – when two ratios are equal

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

Example

The total number of students who participate in sports programs at Central High School is 520. The total number of students in the school is 1850. Find the athlete-to-student ratio to the nearest tenth.

$\frac{520}{1850} = .28 \approx .3$

Example

Solve each proportion

$\frac{6}{18.2} \times \frac{9}{y}$

$6y = 18.2 \times 9$

$\frac{6y}{6} = \frac{163.8}{6}$

$y = 27.3$

$\frac{(4x-5)}{3} = \frac{-26}{6}$ (x3)

$6(4x-5) = 3 \cdot -26$

$24x - 30 = -78$

$+30 \quad +30$

$24x = -48$

$x = -2$

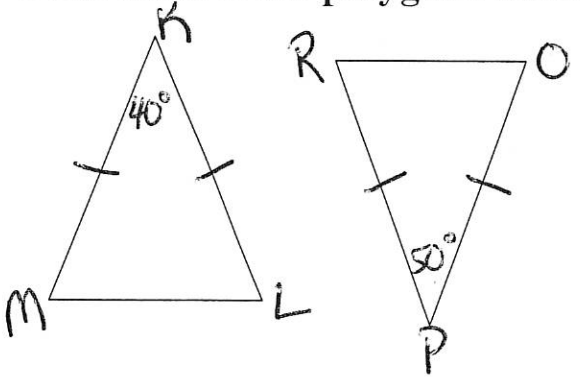
7.2

~~6.2~~ Similar Polygons

Similar Polygons – 1) Angles are Congruent (Coorresponding)
Symbol ~ 2) All sides have consistent ratio

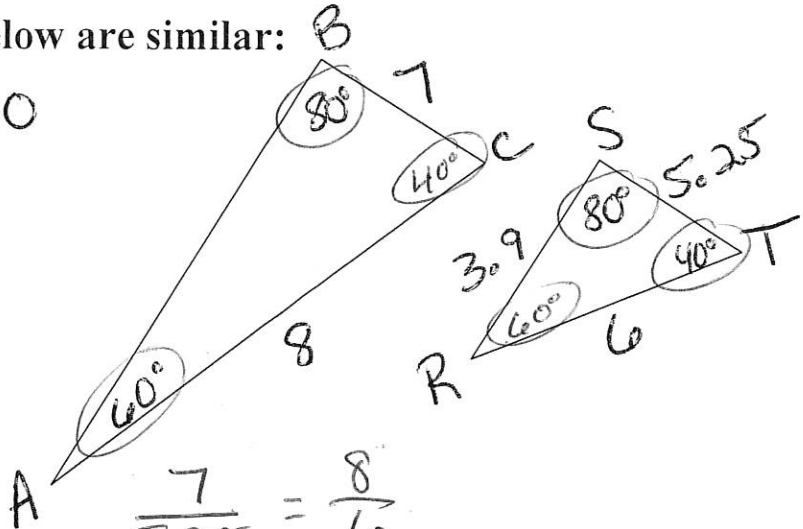
Example

Determine if the polygons below are similar:



Not similar
$\angle K \neq \angle P$

Is KLM ~ PRQ?



$\frac{7}{5.25} = \frac{8}{6}$

1.3 1.3

Is ABC ~ RST? Yes

Example

An architect prepared a 12-inch model of a skyscraper to look like a real 1100-foot building. What is the scale factor of the model compared to the real building? (1ft.)

$1100 \times 12 = 13{,}200$

model / real thing

$12 / 13{,}200$

$= 1 / 1100$

Example

Rectangle WXYZ is similar to rectangle PQRS with a scale factor of 1.5. If the length and width of PQRS are ~~10~~ 12 and ~~4~~ 7 meters respectively, what are the length and width of rectangle WXYZ?

$12 \times 1.5 = 18$ length

$7 \times 1.5 = 10.5$ width

Example

The scale on the map of a city is ¼ inch equals 2miles. On the map, the width of the city at its widest point is 3.75 inches. The city hosts a bicycle race across town at its widest point. Tashawn bikes at 10 miles per hour. How long will it take her to complete the race?

$\frac{1}{4}$ in = 2 miles

3.75 in = ~~3~~

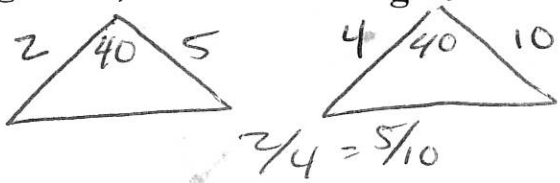
$\frac{.25}{2} = \frac{3.75}{x}$

$.25x = 7.5$

$x = 30$ miles

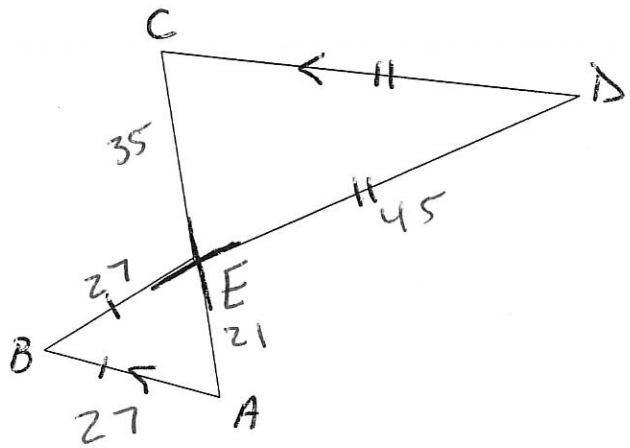
3 hrs

- AA Similarity – If two angles of one triangle are congruent to two angles of another, then the triangles are similar.
- SSS Similarity – If the measures of corresponding sides of two triangles are PROPORTIONAL, then the triangles are similar.
- SAS Similarity – If the measures of two sides are proportional to the corresponding sides of another and the included angles are congruent, then the triangles are similar.



Example

In the figure $\overline{AB}$ is parallel to $\overline{DC}$, BE = 27, DE = 45, AE = 21, and CE = 35. Determine which triangles in the figure are similar.

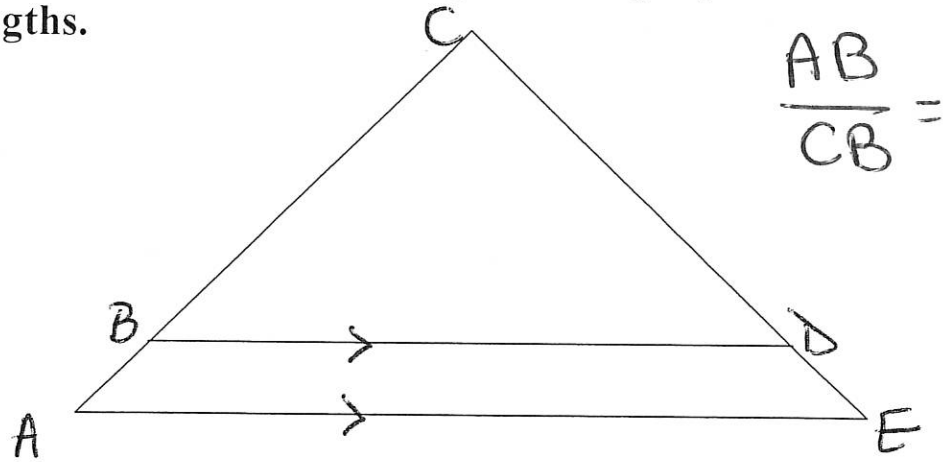


△ABE ~ △CDE

7.4

6.4 Parallel and Proportional Parts

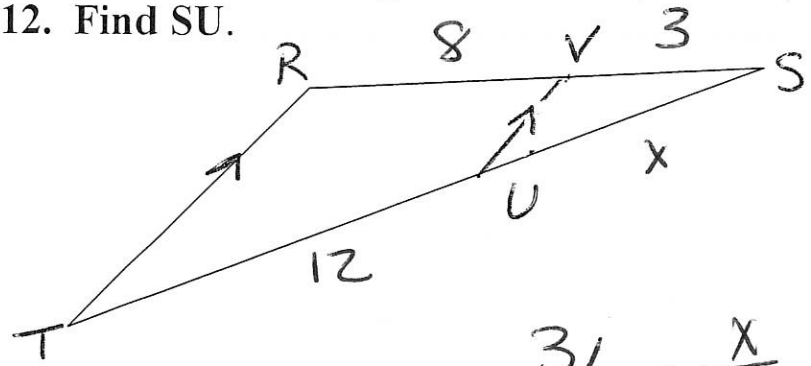
- **A line is parallel to one side of a triangle if and only if it intersects the other two sides in two distinct points and it separates these sides into segments of proportional lengths.**



$$\frac{AB}{CB} = \frac{DE}{CD}$$

Example

In triangle RST, RT is parallel to VU, SV = 3, VR = 8, and UT = 12. Find SU.

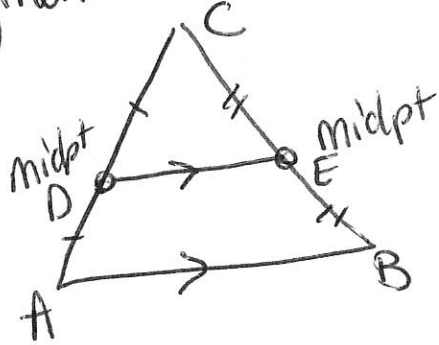


$$\frac{3}{8} = \frac{x}{12}$$

$$36 = 8x$$

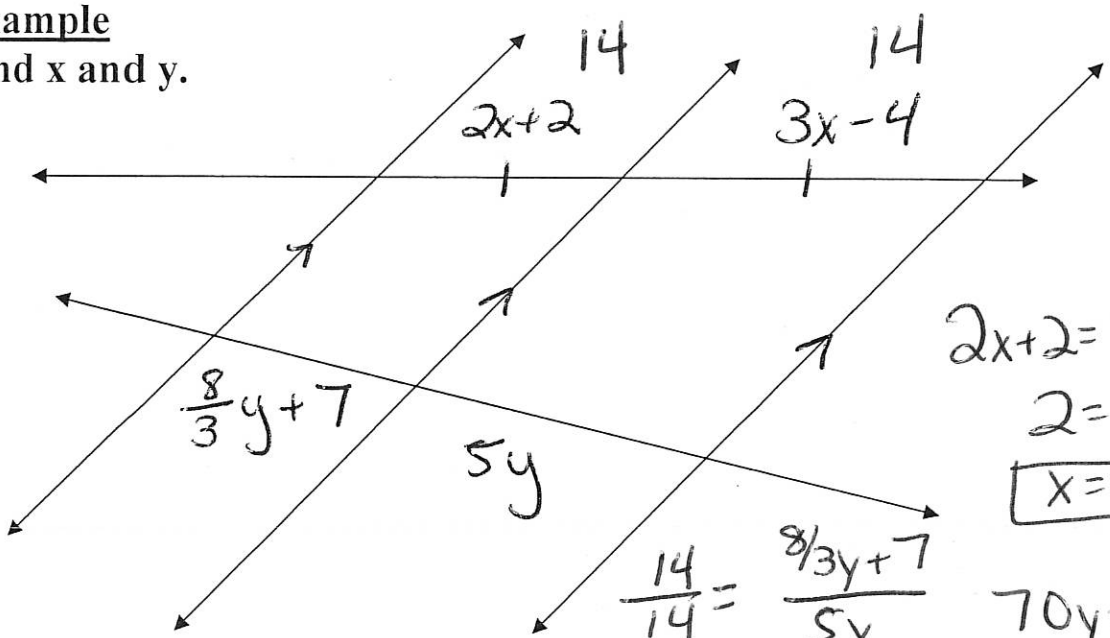
$$x = 4.5$$

• Midsegment Theorem -



$DE = \frac{1}{2}AB$

Example
Find x and y.



$2x+2 = 3x-4$

$2 = x-4$

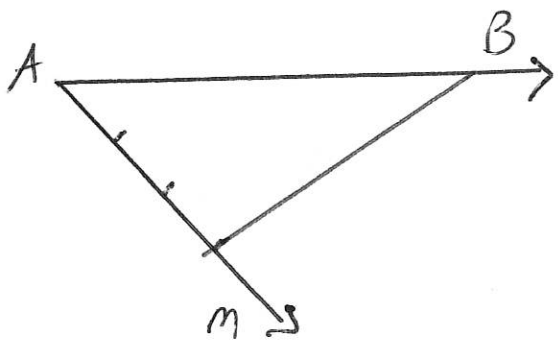
$\boxed{x=6}$

$\frac{14}{14} = \frac{8/3y+7}{5y}$

$70y = 112/3y + 98$

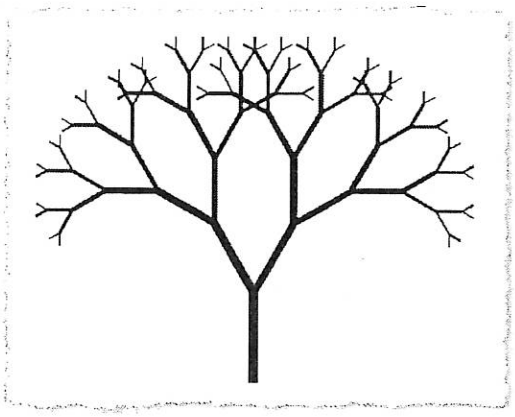
$y = 3$

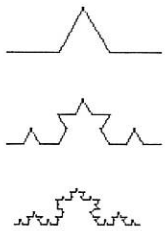
Construction - Trisect a segment



6.6 Fractals and Self-Similarity

- **Fractals -** geo figure created by iteration (repeating)





- **Self-Similar -** smaller details of shape same as original form.

Example

Find the values of $3x^2-1$ where x initially equals 1. Then use that value as the next x in the expression. Repeat the process three more times and describe your observations.

2
11
362
increasing to ∞

Example

Joanna has $1500 in a savings account that earns 4.1% interest. If the interest is compounded annually find the balance of her account after 4 years.

1761.55

1500 + (1500 • .041) = ⬭

⬭ + ⬭ • .041