“Side Splitter Theorem”
Day 1 and 2 Notes
Triangle Proportionality Theorem (Side - Splitter Theorem)

- If a line is parallel to one side of a triangle & intersects the other two sides, it divides the two sides proportionally.

If $\overline{TU} \parallel \overline{QS}$, then $\frac{RT}{TQ} = \frac{RU}{US}$
Triangle Proportionality Theorem

Converse

- If a line divides two sides of a triangle proportionally, then the line is parallel to the third side.

\[ \frac{RT}{TQ} = \frac{RU}{US} \]

If \( \frac{RT}{TQ} = \frac{RU}{US} \), then \( TU \parallel QS \)
Ex 1) Determine whether the statement is true or false. Explain your reasoning.

a) \( \frac{AB}{BC} = \frac{AD}{DE} \)
   
   Yes, side splitter thm

b) \( \frac{AB}{AC} = \frac{AD}{AE} \)
   
   Yes, \( \Delta \)s similar by AA
   
   So sides proportional

c) \( \frac{AB}{BC} = \frac{DB}{EC} \)
   
   No, mixed side splitter and sides proportional
Ex 2) Use the diagram to fill in the proportions below. \( \overrightarrow{NO} \parallel \overrightarrow{LM} \parallel \overrightarrow{JK} \)

a) \( \frac{JL}{LN} = \frac{KM}{?} \)  \( \text{MO} \)

b) \( \frac{HJ}{HN} = \frac{?}{HO} \)  \( \text{HK} \)

c) \( \frac{OM}{MH} = \frac{NL}{?} \)  \( \text{LH} \)
Determine whether the information implies that MN || GH

No, MN is not parallel to GH because side splitter converse fails
Decide if enough information is given to conclude that $PS \parallel QT$. Explain

**Ex 4)**

\[
\frac{PS}{QT} = \frac{PQ}{QL}
\]

NO, side splitter and sides prop mixed

**Ex 5)**

\[
\frac{QL}{PQ} = \frac{TL}{ST}
\]

Yes, side splitter thm converse

**Ex 6)**

$\angle SPQ \cong \angle TQL$

Yes, corr $< s \cong \rightarrow \parallel$
Find the unknown value.

Ex 7)

\[ \frac{4}{8} = \frac{x}{12} \]

\[ 8x = 48 \]

\[ x = 6 \]
Find the unknown value.

Ex 8)

\[
\frac{3}{15} = \frac{x}{16}
\]

\[15x = 48\]

\[x = \frac{48}{15}\]

\[x = \frac{16}{5}\]
Parallel Lines & Proportions

If three or more parallel lines are intersected by two transversals, the parallel lines divide the transversals proportionally.

If \( r \parallel s \) and \( s \parallel t \), and \( l \) and \( m \) intersect at \( r \), \( s \), and \( t \), then

\[
\frac{UW}{WK} = \frac{VX}{XZ}
\]
Ex 9: What is the length of TU?

Lines parallel because corresponding angles congruent

\[
\frac{9}{15} = \frac{11}{x}
\]

\[9x = 165\]

\[x = \frac{165}{9}\]

\[x = \frac{55}{3}\]