Unit 7 Key Concepts

- Ratio – a relationship between two numbers represented by division or a colon, ex: $\frac{2}{3}$ or 2:3
- Extended Ratio – a relationship between three or more numbers such as 4:5:6, which can be represented as 4x:5x:6x
- Proportion – a statement of equality between two ratios, ex: $\frac{a}{b}=\frac{c}{d}$
- Equivalent Proportions – rewritten proportions that remain true (check with cross-products property $a \bullet d = b \bullet c$)

<u>Solving Quadratics</u>

1. Set the quadratic equation = 0
2. Factor
3. Write linear equations & set = 0
4. Solve linear equations
5. Check your solution(s)

<u>Simplifying Square Root Radicals</u>

1. Rewrite radicals as products of perfect squares and other factors, ex: $\sqrt{72} = \sqrt{36}\sqrt{2}$
2. Remove the square root of perfect squares and write in front of the radical $\sqrt{36}\sqrt{2} = 6\sqrt{2}$

<u>Similar Polygons</u>

- Similar Polygons – Polygons in which all corresponding ∡'s are ≅ & all corresponding sides are proportional
- Similarity Statement – Figure I ~ Figure II, ex: ΔEFG~ΔMNO
- Similarity Ratio – The ratio between the corresponding side lengths of similar figures, Ex: $\frac{SideI}{SideII}$: $\frac{EF}{MN} = \frac{2}{3}$
    - Perimeter Ratio = Similarity Ratio Ex: $\frac{PerimeterI}{PerimeterII} = \frac{EF}{MN}$
    - Area Ratio = (Similarity Ratio)^2 Ex: $\frac{AreaI}{AreaII} = \left[\frac{EF}{MN}\right]^2$

<u>Triangle Similarity Theorems:</u>

- AA~ (2 pairs ≅ ∡'s)
- SAS~ (included ≅ ∡ ; 2 pairs proportional sides) $\frac{SideI}{SideII} = \frac{SideI}{SideII}$
- SSS~ (3 pairs proportional sides) $\frac{SideI}{SideII} = \frac{SideI}{SideII} = \frac{SideI}{SideII}$

<u>Commonly Used Reasons in Similarity Proofs</u>

- Cross-Products Property
- Division Property of Equality
- Substitution (after getting sides to equal the same similarity ratio)
- ~ triangles → proportional sides
- ~ triangles → congruent angles

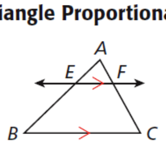
} (These replace CPCTC since the Δ's are ~ not ≅)

<u>Proportional Splitters:</u>

"Δ Side Splitter"

Triangle Proportionality Theorem

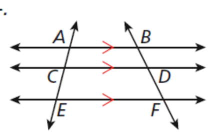
If $\overleftrightarrow{EF} \parallel \overleftrightarrow{BC}$, then $\frac{AE}{EB} = \frac{AF}{FC}$.



Converse: If $\frac{AE}{EB} = \frac{AF}{FC}$, then $\overleftrightarrow{EF} \parallel \overleftrightarrow{BC}$.

Two-Transversal Proportionality

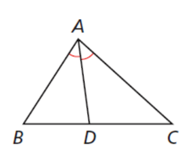
If $\overleftrightarrow{AB} \parallel \overleftrightarrow{CD} \parallel \overleftrightarrow{EF}$, then $\frac{AC}{CE} = \frac{BD}{DF}$.



"Transversal Splitter"

Triangle Angle Bisector Theorem

If ∠BAD ≅ ∠CAD, then $\frac{BD}{DC} = \frac{AB}{AC}$.



<u>Dilations:</u> Pre-Image $\xrightarrow[\text{Maps to}]{D_k}$ Image
A(x,y) A'(kx,ky)

A **dilation** enlarges or reduces a figure proportionally by a **scale factor**.