Name: _____

Using Scale in Similar Triangles

Scale is a vital part of how similar figures work. You cannot accurately compare the two triangles without it. Scale tells you how much bigger or smaller the new figure became. So, though it is absolutely possible to determine side measures without scale, for this handout, our focus will be on two things: 1. determining the scale, and 2. using the scale to determine side measures.

To use your scale, you must first set up your three scale fractions. There are a few ways to do this, but the two of the easier ways are shown below:

Creating Scale Fractions for $\triangle GHK \sim \triangle NML$

Option A: List the sides in order, and make the fractions using what's next to each other.	Option B: put the first triangle on top of the fraction, then rewrite it two letters at a time.
$\triangle GHK \sim \triangle NML$ 1st two letters: $GH \sim NM$ …turned into a fraction: GH/NM scale fraction: $\frac{GH}{NM}$ last two letters: $HK \sim ML$ …turned into a fraction: HK/ML scale fraction: $\frac{HK}{ML}$ out two letters: $GK \sim NL$ …turned into a fraction: GK/NL scale fraction: $\frac{GK}{NL}$ Set them equal to each other: $\frac{GH}{NM} = \frac{HK}{ML} = \frac{GK}{NL}$	$\triangle GHK \sim \triangle NML$ $\frac{First\ \triangle}{Second\ \triangle} = \frac{\triangle\ GHK}{\triangle\ NML}$ $\frac{1st\ two}{GH\cancel{K}} = \frac{last\ two}{\cancel{G}HK} = \frac{out\ two}{G\cancel{H}K}$ $\frac{GH}{NM\cancel{L}}\ \ \ \frac{\cancel{N}ML}{}\ \ \ \frac{N\cancel{M}L}{}$ $\frac{GH}{NM} = \frac{HK}{ML} = \frac{GK}{NL}$

Create a scale fraction equation for each triangle set.

1. $\triangle SLU \sim \triangle RPS$	2. $\triangle GQA \sim \triangle EHI$	3. $\triangle WXC \sim \triangle ZTD$
4. $\triangle MYK \sim \triangle JBR$	5. $\triangle PVF \sim \triangle NSZ$	6. $\triangle LAU \sim \triangle GHS$

To determine the scale, plug in the given information (to the fraction that goes with that information) and simplify.

Example: $\triangle SLU \sim \triangle RPS$ $LU = 4$ & $PS = 12$. What is the scale? $\frac{SL\cancel{U}}{RP\cancel{S}} = \frac{\cancel{S}LU}{\cancel{R}PS} = \frac{S\cancel{L}U}{R\cancel{P}S}$ $\frac{SL}{RP} = \frac{LU^*}{PS^*} = \frac{SU}{RS}$ $Scale = \frac{LU}{PS} = \frac{4}{12} = \frac{4 \div 4}{12 \div 4} = \boxed{\frac{1}{4}}$	7. $\triangle GQA \sim \triangle EHI$ $GA = 24$ & $EI = 9$. What is the scale?	8. $\triangle WXC \sim \triangle ZTD$ $WX = 17$ & $ZT = 5$. What is the scale?
9. $\triangle MYK \sim \triangle JBR$ $MK = 18$ & $JR = 28$. What is the scale?	10. $\triangle PVF \sim \triangle NSZ$ $PV = 3$ & $NS = 6$. What is the scale?	11. $\triangle LAU \sim \triangle GHS$ $AU = 8$ & $HS = 4$. What is the scale?

Sometimes, you are asked to determine if there is a scale (meaning, if the triangles are similar). To find out, you would substitute into more than one scale fraction.

If the *simplified* **fractions are equal**, then that is your **scale**.

If the *simplified* **fractions are NOT equal**, then that is **NOT** your **scale**, because they are **NOT SIMILAR**.

Determine the scale for each fraction, if there is one. If the scales are not equal, then write "NOT SIMILAR."

Example: On $\triangle PHO$ & $\triangle NED$, $PH = 15, HO = 18, NE = 20, PO = 12, ED = 18$ & $ND = 16$. What is the scale?

$Scale\ Fractions: \frac{PH\cancel{O}}{NE\cancel{D}} = \frac{\cancel{P}HO}{\cancel{N}ED} = \frac{P\cancel{H}O}{N\cancel{E}D}$

$Scale\ Fractions: \frac{PH^*}{NE^*} = \frac{HO^*}{ED^*} = \frac{PO^*}{ND^*}$ $Since\ I\ have\ every\ side, I\ will\ plug\ them\ all\ in: \frac{15}{20} = \frac{18}{18} = \frac{12}{16}$

$Now, I\ need\ to\ simplify\ each\ fraction\ as\ much\ as\ possible: \frac{15 \div 5}{20 \div 5} = \frac{18 \div 18}{18 \div 18} = \frac{12 \div 4}{16 \div 4}$

$\frac{3}{4} \boxed{\neq} \frac{1}{1} \boxed{\neq} \frac{3}{4}$

Because the three fractions are not the same, there is **no scale**, which means that the triangles are $\boxed{NOT\ SIMILAR}$.

12. On $\triangle NMC$ & $\triangle WRK$, $WK = 16, NM = 10, MC = 5, NC = 10, RK = 8$ & $WR = 16$. What is the scale?

13. On $\triangle BXK$ & $\triangle DZP$, $BX = 30, BK = 36, ZP = 28, XK = 24, DZ = 35$ & $DP = 42$. What is the scale?

14. On $\triangle FHS$ & $\triangle LYR$, $FH = 22, FS = 22, YR = 11, LY = 10, HS = 5$ & $LR = 15$. What is the scale?

15. On $\triangle SVD$ & $\triangle ONS$, $NS = 4, OS = 18, ON = 16, SV = 24, VD = 21$ & $SD = 27$. What is the scale?

16. On $\triangle AET$ & $\triangle NMW$, $AE = 5, ET = 5, NM = 4, AT = 5, MW = 4$ & $NW = 4$. What is the scale?

17. On $\triangle BGV$ & $\triangle QCK$, $BG = 40, QK = 5, GV = 20, BV = 50, QC = 4$ & $CK = 2$. What is the scale?

18. On $\triangle HBQ$ & $\triangle ESZ$, $EZ = 13, SZ = 26, ES = 26, HB = 16, BQ = 16, HQ = 8$. What is the scale?

19. On $\triangle FGH$ & $\triangle TVW$, $GH = 5, FH = 1, TW = 5, VW = 15, TV = 3$ & $FG = 1$. What is the scale?

20. On $\triangle YVM$ & $\triangle WRA$, $YV = 10, WR = 120, VM = 7, RA = 84, YM = 9$ & $WA = 108$. What is the scale?