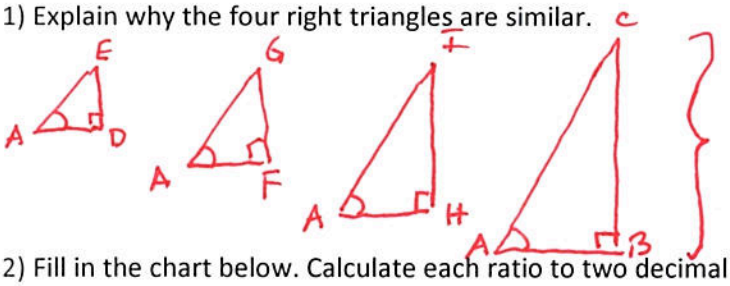
Name: Key Period: _____

Checkpoint 7C *Integrated Math 2*

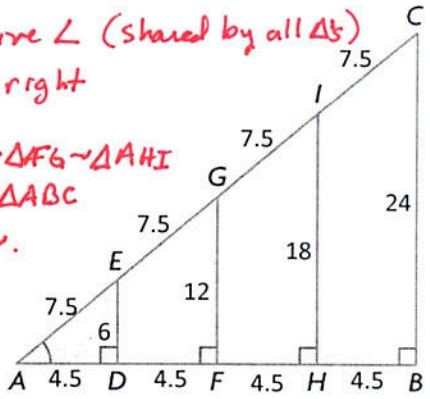
Use the diagram to answer questions 1 through 4.

1) Explain why the four right triangles are similar.



4 Δ's

* ∠A is reflexive ∠ (shared by all Δs)
Four ∠s are right
∴ ΔADE ~ ΔAFG ~ ΔAHI ~ ΔABC
by AA~.



2) Fill in the chart below. Calculate each ratio to two decimal places.

Triangle	Side Opposite to ∠A	Side Adjacent to ∠A	Hypotenuse	Trigonometric Ratios: opposite / hypotenuse	Trigonometric Ratios: adjacent / hypotenuse	Trigonometric Ratios: opposite / adjacent
△ABC	BC = 24	AB = 18	AC = 30	$\frac{BC}{AC} = \frac{24}{30} = 0.8$	$\frac{AB}{AC} = \frac{18}{30} = 0.6$	$\frac{BC}{AB} = \frac{24}{18} = 1.\overline{3}$
△ADE	ED = 6	AD = 4.5	AE = 7.5	$\frac{6}{7.5} = 0.8$	$\frac{4.5}{7.5} = 0.6$	$\frac{6}{4.5} = 1.\overline{3}$
△AFG	FG = 12	AF = 9	AG = 15	$\frac{12}{15} = 0.8$	$\frac{9}{15} = 0.6$	$\frac{12}{9} = 1.\overline{3}$
△AHI	HI = 18	AH = 13.5	AG = 22.5	$\frac{18}{22.5} = 0.8$	$\frac{13.5}{22.5} = 0.6$	$\frac{18}{13.5} = 1.\overline{3}$

3) Describe the relationships of the trigonometric ratios in the table. Hint: Convert them to a decimal value.

The ratios of $\frac{opp}{hyp}$ are equal.

The ratios of $\frac{adj}{hyp}$ are equal.

The ratios of $\frac{opp}{adj}$ are equal

4) Do you think the relationships you described in question 3 would change if angle A changed to a different measure?

No. The ratios will still be equal because the Δs are similar.

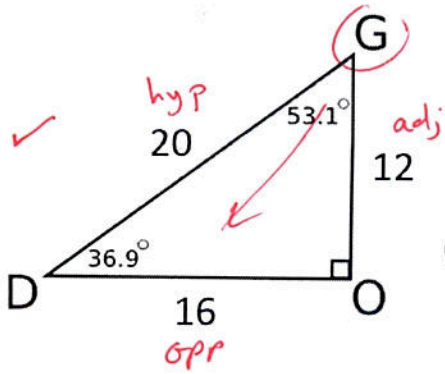
5) Prove that $\sin(G)$ and $\sin(T)$ are equivalent.

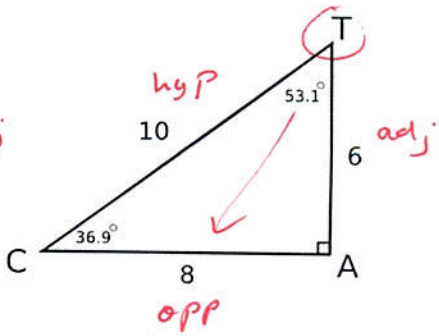
$\sin G = \frac{opp}{hyp} = \frac{16}{20} = \frac{4}{5}$

$\sin T = \frac{opp}{hyp} = \frac{8}{10} = \frac{4}{5}$

$> = \checkmark$

∴ Sin G and Sin T are equal.

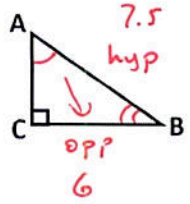


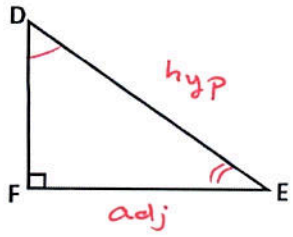


6) Use $\Delta ABC \sim \Delta DEF$ to answer the following questions.

If $\sin(A) = \frac{6}{7.5}$, choose the expression that is equivalent to $\sin(A)$:

Is it $\cos(D)$ or $\cos(E)$? Explain.





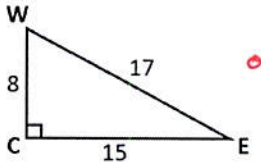
~~cos D~~ $\cos E = \frac{FE}{DE} = \sin A = \frac{6}{7.5}$

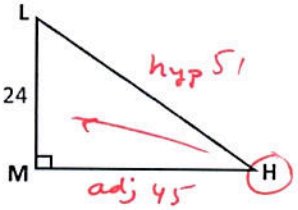
$\therefore \frac{FE}{DE} = \frac{6}{7.5}$

Notice $\Delta ABC \sim \Delta DEF \Rightarrow$ Sides are proportional. Cos E uses same sides as sin A, so ratios will be equal when reduced.

7) Use $\Delta WCE \sim \Delta LMN$ to determine the value of the trigonometric expressions.

a) $\sin(H)$ b) $\tan(H)$





$8 \times 3 = 24$

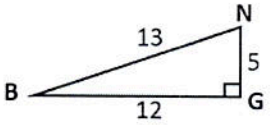
$15 \times 3 = 45$

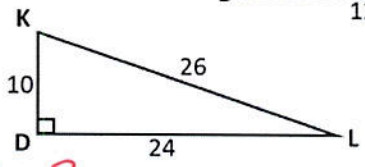
$17 \times 3 = 51$

$\sin H = \frac{opp}{hyp} = \frac{24}{51} = \frac{8}{17}$

$\tan H = \frac{opp}{adj} = \frac{24}{45} = \frac{8}{15}$

8) Find the cosine ratios of the corresponding non-right angles for ΔKDL and ΔNGB. Compare the ratios.





ΔKDL

$\cos K = \frac{10}{26} = \frac{5}{13}$

$\cos L = \frac{24}{26} = \frac{12}{13}$

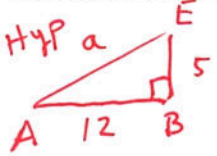
ΔNGB

$\cos B = \frac{12}{13}$

$\cos N = \frac{5}{13}$

$\therefore \cos K = \cos N$ and $\cos L = \cos B$

9) Solve for the missing variable and determine if $\cos(\angle EAB) = \cos(\angle DAC)$.



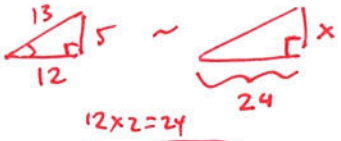
$a^2 + b^2 = c^2$

$5^2 + 12^2 = a^2$

$169 = a^2$

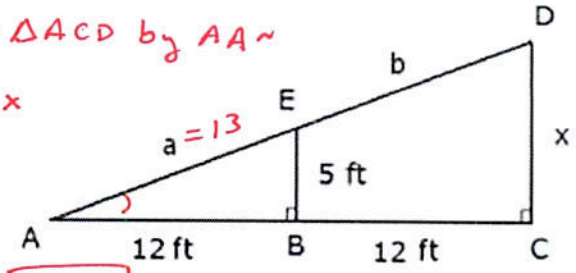
$13 = a$

Note $\Delta ABE \sim \Delta ACD$ by AA~



$12 \times 2 = 24$

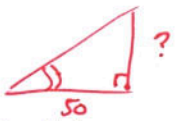
$5 \times 2 = 10 = x$



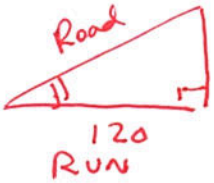
$13 \times 2 = 26$, so $b = 13$

$\cos \angle EAB = \frac{12}{13} = \cos \angle DAC = \frac{24}{26} = \frac{12}{13}$ ✓

10) Image a road where part of it rises 8 miles over a horizontal run of 120 miles.



a) Draw a diagram of this situation. Hint: It resembles a right triangle where the hypotenuse is the actual road.



$\frac{8}{120} = \frac{1}{15}$

b) What is the rise over a run of 50 miles if the slope remains constant?

$\frac{1}{15} = \frac{RISE}{RUN} = \frac{x}{50} \Rightarrow \frac{1}{15} = \frac{x}{50}$

$\frac{15x}{15} = \frac{50}{15}$

$x = 3.33$ miles

c) Compare the slopes. Explain why these slopes are the same.

The slopes are 0.067. The two Δ's are ~ and corresponding $\angle$s of ~ Δs are congruent. $\angle$'s creating slope are equal.