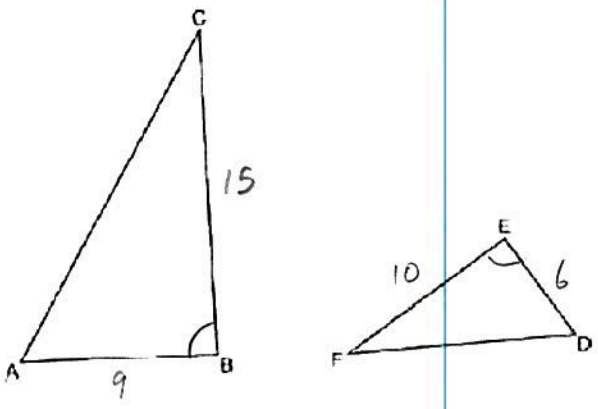
Topic 9: Similarity

1. Triangles ABC and DEF are drawn below.



$\frac{9}{6} = \frac{15}{10}$

$90 = 90$ ✓

If $AB = 9$, $BC = 15$, $DE = 6$, $EF = 10$, and $\angle B \cong \angle E$, which statement is true?

~~X~~ $\angle CAB \cong \angle DEF$

~~2~~ $\frac{AB}{CB} = \frac{FE}{DE}$

(3) $\triangle ABC \sim \triangle DEF$

~~4~~ $\frac{AB}{DE} = \frac{FE}{CB}$

2. The ratio of similarity of $\triangle BOY$ to $\triangle GRL$ is 1:2. If $BO = x + 3$ and $GR = 3x - 1$, then the length of $\overline{GR}$ is

1 5
2 7
3 10
(4) 20

$\frac{1}{2} = \frac{x+3}{3x-1}$

$3x - 1 = 2(x + 3)$

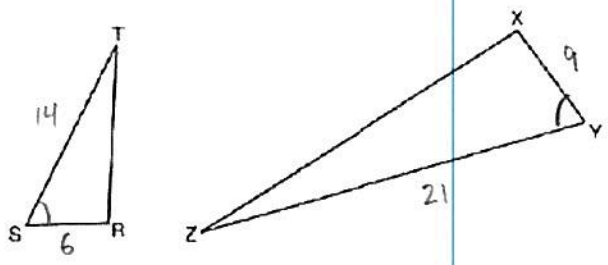
$3x - 1 = 2x + 6$

$x = 7$

$3(7) - 1$

$21 - 1 = 20$

3. Triangles RST and XYZ are drawn below. If $RS = 6$, $ST = 14$, $XY = 9$, $YZ = 21$, and $\angle S \cong \angle Y$, is $\triangle RST$ similar to $\triangle XYZ$? Justify your answer.

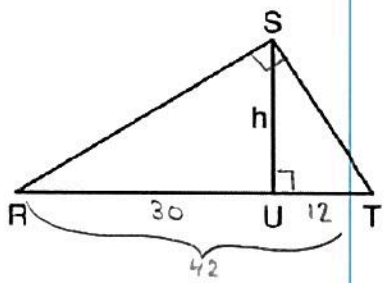


$\frac{6}{9} = \frac{14}{21}$

$\frac{2}{3} = \frac{2}{3}$

Yes, because corresponding sides are in proportion.

4. In $\triangle RST$ shown below, altitude $\overline{SU}$ is drawn to $\overline{RT}$ at U.



If $SU = h$, $UT = 12$, and $RT = 42$, which value of h will make $\triangle RST$ a right triangle with $\angle RST$ as a right angle?

1 $6\sqrt{3}$

(2) $6\sqrt{10}$

3 $6\sqrt{14}$

4 $6\sqrt{35}$

$\frac{h}{12} = \frac{30}{h}$

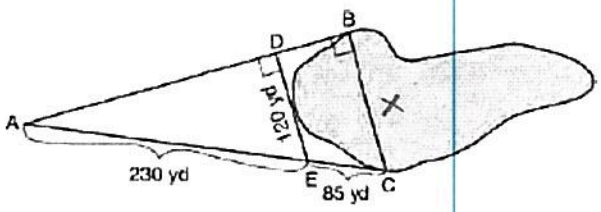
$\sqrt{h^2} = \sqrt{360}$

$h = \sqrt{360}$

$= \sqrt{36}\cdot\sqrt{10}$

$= 6\sqrt{10}$

5. To find the distance across a pond from point B to point C, a surveyor drew the diagram below. The measurements he made are indicated on his diagram.



Use the surveyor's information to determine and state the distance from point B to point C, to the *nearest yard*.

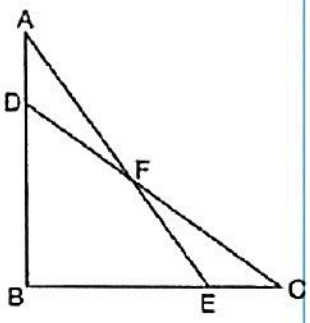
$\frac{230}{120} = \frac{230+85}{x}$

$230x = 37800$

$x = 164.3478$

164 yards

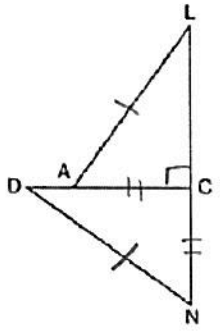
1. Given: $\triangle ABE$ and $\triangle CBD$ shown in the diagram below with $\overline{DB} \cong \overline{BE}$



Which statement is needed to prove $\triangle ABE \cong \triangle CBD$ using only SAS ≅ SAS?

1 $\angle CDB \cong \angle AEB$
2 $\angle AFD \cong \angle EFC$
(3) $\overline{AD} \cong \overline{CE}$
4 $\overline{AE} \cong \overline{CD}$

2. In the diagram of $\triangle LAC$ and $\triangle DNC$ below, $\overline{LA} \cong \overline{DN}$, $\overline{CA} \cong \overline{CN}$, and $\overline{DAC} \perp \overline{LCN}$.

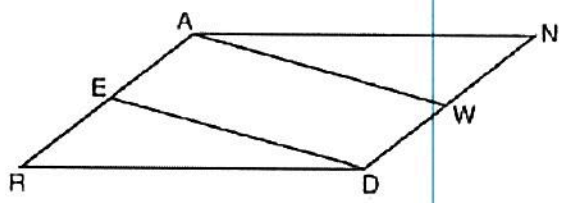


a) Prove that $\triangle LAC \cong \triangle DNC$.
b) Describe a sequence of rigid motions that will map $\triangle LAC$ onto $\triangle DNC$.

S	R
① ~~~~	① Given
② ∡LCA and ∡DCN are right ∡'s	② Definition of perpendicular lines
③ $\triangle LAC$ and $\triangle DNC$ are right $\triangle$'s	③ Definition of a right triangle
④ $\triangle LAC \cong \triangle DNC$	④ HL ≅ HL

$\triangle LAC$ will map onto $\triangle DNC$ after rotating $\triangle LAC$ counterclockwise 90° about point C such that L maps onto D.

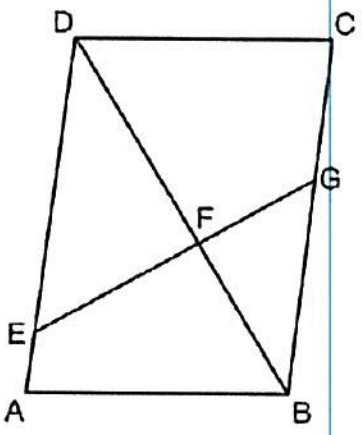
3. Given: Parallelogram $ANDR$ with $\overline{AW}$ and $\overline{DE}$ bisecting $\overline{NWD}$ and $\overline{REA}$ at points W and E, respectively



Prove that $\triangle ANW \cong \triangle DRE$. Prove that quadrilateral $AWDE$ is a parallelogram.

S	R
(1) ~~~	(1) Given
(2) $\overline{AN} \cong \overline{RD}$, $\overline{AR} \cong \overline{DN}$	(2) Opp sides of ▱ are $\cong$
(3) $\overline{AE} \cong \overline{WD}$	(3) Definition of a bisector
(4) $\overline{AR} \parallel \overline{DN}$	(4) Opp sides of a ▱ are $\parallel$
(5) AWDE is a ▱	(5) Def. of a ▱
(6) $\overline{RE} \cong \overline{NW}$	(6) Def. of a bisector
(7) $\overline{ED} \cong \overline{AW}$	(7) opp. sides of a ▱ are $\cong$
(8) $\triangle ANW \cong \triangle DRE$	(8) SSS $\cong$ SSS

4. Given: Parallelogram $ABCD$, $\overline{EFG}$, and diagonal $\overline{DFB}$



Prove: $\triangle DEF \sim \triangle BGF$

S	R
(1) ▱ ABCD, $\overline{EFG}$, diagonal $\overline{DFB}$	(1) Given
(2) $\angle DFE \cong \angle BFG$	(2) Vert. $\angle$'s are $\cong$
(3) $\overline{AD} \parallel \overline{CB}$	(3) Opp sides of ▱ are parallel
(4) $\angle EDF \cong \angle GBF$	(4) Alt. int. $\angle$'s are $\cong$
(5) $\triangle DEF \sim \triangle BGF$	(5) AA $\cong$ AA

5. Two right triangles must be congruent if
   1. an acute angle in each triangle is congruent - only proves AA
   2. the lengths of the hypotenuses are equal - need $\cong$ legs for HL
   3. the corresponding legs are congruent
   4. the areas are equal