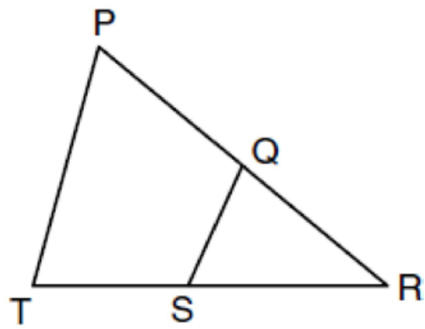
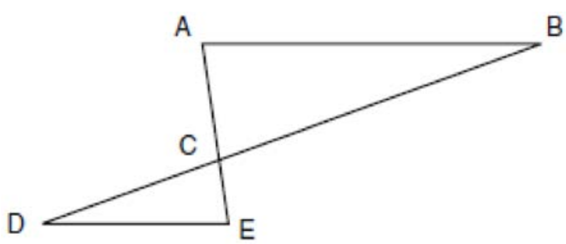
G.SRT.A.3: Similarity Proofs

1 In the diagram below of $\triangle PRT$, Q is a point on $\overline{PR}$, S is a point on $\overline{TR}$, $\overline{QS}$ is drawn, and $\angle RPT \cong \angle RSQ$.



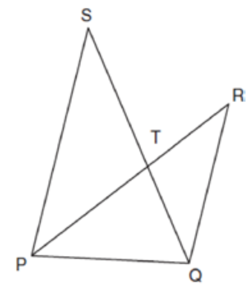
Which reason justifies the conclusion that $\triangle PRT \sim \triangle SRQ$?
1) AA
2) ASA
3) SAS
4) SSS

2 In the diagram of $\triangle ABC$ and $\triangle EDC$ below, $\overline{AE}$ and $\overline{BD}$ intersect at C, and $\angle CAB \cong \angle CED$.



Which method can be used to show that $\triangle ABC$ must be similar to $\triangle EDC$?
1) SAS
2) AA
3) SSS
4) HL

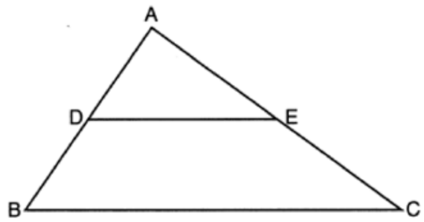
3 In the diagram below, $\overline{SQ}$ and $\overline{PR}$ intersect at T, $\overline{PQ}$ is drawn, and $\overline{PS} \parallel \overline{QR}$.



What technique can be used to prove that $\triangle PST \sim \triangle RQT$?
1) SAS
2) SSS
3) ASA
4) AA

4 In triangles ABC and DEF, $AB = 4$, $AC = 5$, $DE = 8$, $DF = 10$, and $\angle A \cong \angle D$. Which method could be used to prove $\triangle ABC \sim \triangle DEF$?
1) AA
2) SAS
3) SSS
4) ASA

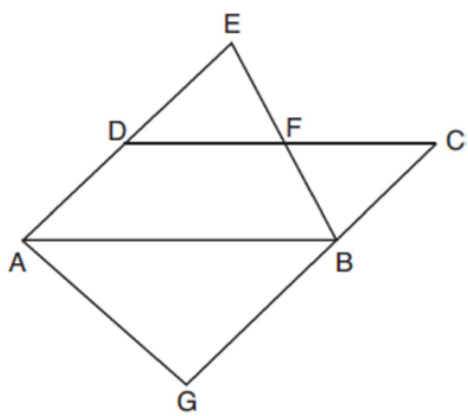
5 In the diagram below of $\triangle ABC$, D and E are the midpoints of $\overline{AB}$ and $\overline{AC}$, respectively, and $\overline{DE}$ is drawn.



I. AA similarity
II. SSS similarity
III. SAS similarity

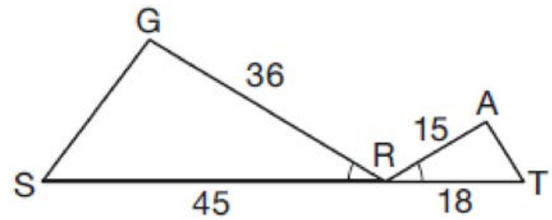
Which methods could be used to prove $\triangle ABC \sim \triangle ADE$?
1) I and II, only
2) II and III, only
3) I and III, only
4) I, II, and III

6 In the diagram below, $\overline{AB} \parallel \overline{DFC}$, $\overline{EDA} \parallel \overline{CBG}$, and $\overline{EFB}$ and $\overline{AG}$ are drawn.



Which statement is always true?
1) $\triangle DEF \cong \triangle CBF$
2) $\triangle BAG \cong \triangle BAE$
3) $\triangle BAG \sim \triangle AEB$
4) $\triangle DEF \sim \triangle AEB$

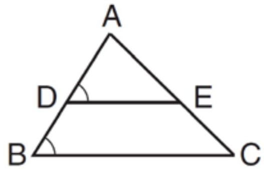
7 In the diagram below, $\angle GRS \cong \angle ART$, $GR = 36$, $SR = 45$, $AR = 15$, and $RT = 18$.

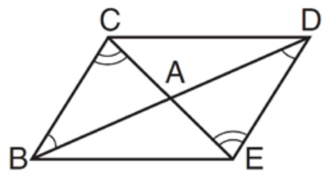


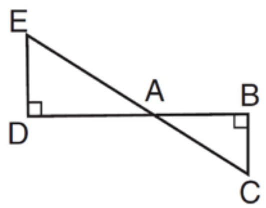
Which triangle similarity statement is correct?
1) $\triangle GRS \sim \triangle ART$ by AA.
2) $\triangle GRS \sim \triangle ART$ by SAS.
3) $\triangle GRS \sim \triangle ART$ by SSS.
4) $\triangle GRS$ is not similar to $\triangle ART$.

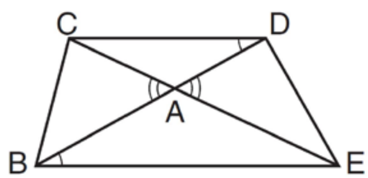
8 In $\triangle ABC$ and $\triangle DEF$, $\frac{AC}{DF} = \frac{CB}{FE}$. Which additional information would prove $\triangle ABC \sim \triangle DEF$?
1) $AC = DF$
2) $CB = FE$
3) $\angle ACB \cong \angle DFE$
4) $\angle BAC \cong \angle EDF$

9 For which diagram is the statement $\triangle ABC \sim \triangle ADE$ *not* always true??

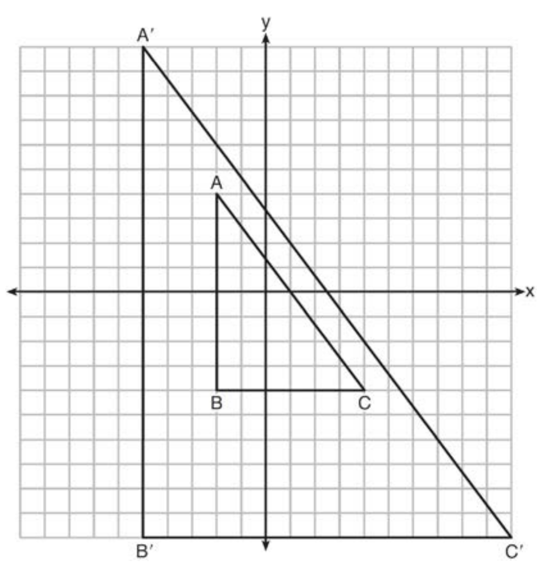
1) 

2) 

3) 

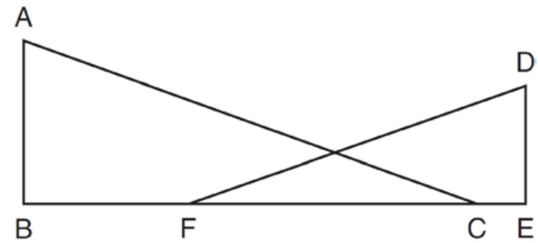
4) 

10 In the diagram below, $\triangle A'B'C'$ is the image of $\triangle ABC$ after a transformation.

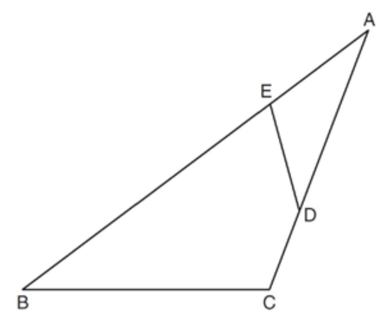


Describe the transformation that was performed. Explain why $\triangle A'B'C' \sim \triangle ABC$.

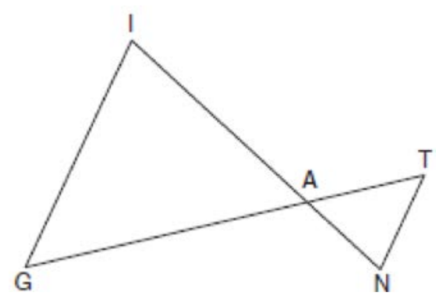
11 In the diagram below, $\overline{BFCE}$, $\overline{AB} \perp \overline{BE}$, $\overline{DE} \perp \overline{BE}$, and $\angle BFD \cong \angle ECA$. Prove that $\triangle ABC \sim \triangle DEF$.



12 The diagram below shows $\triangle ABC$, with $\overline{AEB}$, $\overline{ADC}$, and $\angle ACB \cong \angle AED$. Prove that $\triangle ABC$ is similar to $\triangle ADE$.

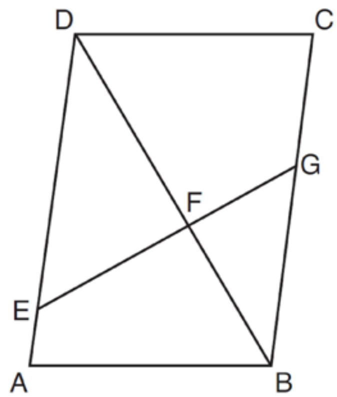


13 In the diagram below, $\overline{GI}$ is parallel to $\overline{NT}$, and $\overline{IN}$ intersects $\overline{GT}$ at A.



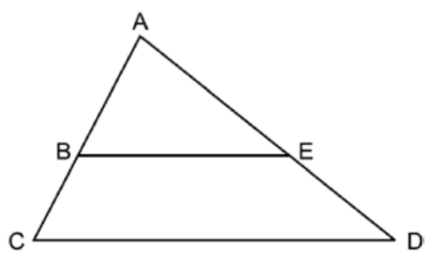
Prove: $\triangle GIA \sim \triangle TNA$

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



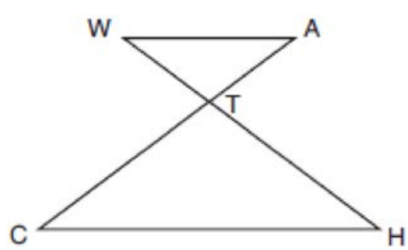
Prove: $\triangle DEF \sim \triangle BGF$

15 Given: $\triangle ACD$ with $\overline{ABC}$, $\overline{AED}$, and $\overline{BE} \parallel \overline{CD}$

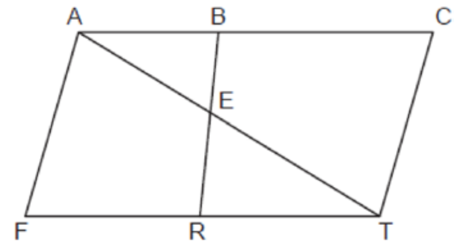


Prove: $AB \bullet AD = AE \bullet AC$

16 In the accompanying diagram, $\overline{WA} \parallel \overline{CH}$ and $\overline{WH}$ and $\overline{AC}$ intersect at point T. Prove that $(WT)(CT) = (HT)(AT)$.



17 In the diagram below of quadrilateral $FACT$, $\overline{BR}$ intersects diagonal $\overline{AT}$ at E, $\overline{AF} \parallel \overline{CT}$, and $\overline{AF} \cong \overline{CT}$.



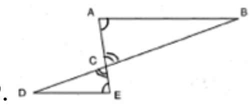
Prove: $(AB)(TE) = (AE)(TR)$

G.SRT.A.3: Similarity Proofs
Answer Section

1 ANS: 1
$\triangle PRT$ and $\triangle SRQ$ share $\angle R$ and it is given that $\angle RPT \cong \angle RSQ$.

REF: fall0821ge

2 ANS: 2

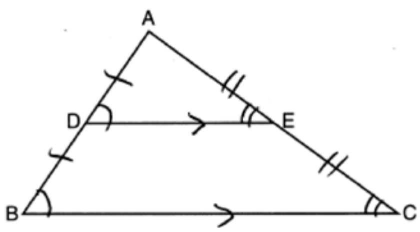
$\angle ACB$ and $\angle ECD$ are congruent vertical angles and $\angle CAB \cong \angle CED$. 

REF: 060917ge

3 ANS: 4 REF: 011019ge

4 ANS: 2 REF: 061324ge

5 ANS: 4



AA from diagram; SSS as the three corresponding sides are proportional; SAS as two corresponding sides are proportional and an angle is equal.

REF: 012324geo

6 ANS: 4
AA

REF: 061809geo

7 ANS: 4

$$\frac{36}{45} \neq \frac{15}{18}$$

$$\frac{4}{5} \neq \frac{5}{6}$$

REF: 081709geo

8 ANS: 3 REF: 011209ge

9 ANS: 4 REF: 011528ge

10 ANS:
A dilation of $\frac{5}{2}$ about the origin. Dilations preserve angle measure, so the triangles are similar by AA.

REF: 061634geo

11 ANS:
$\angle B$ and $\angle E$ are right angles because of the definition of perpendicular lines. $\angle B \cong \angle E$ because all right angles are congruent. $\angle BFD$ and $\angle DFE$ are supplementary and $\angle ECA$ and $\angle ACB$ are supplementary because of the definition of supplementary angles. $\angle DFE \cong \angle ACB$ because angles supplementary to congruent angles are congruent. $\triangle ABC \sim \triangle DEF$ because of AA.

REF: 011136ge

12 ANS:
$\angle ACB \cong \angle AED$ is given. $\angle A \cong \angle A$ because of the reflexive property. Therefore $\triangle ABC \sim \triangle ADE$ because of AA.

REF: 081133ge

13 ANS:
$\overline{GI}$ is parallel to $\overline{NT}$, and $\overline{IN}$ intersects at A (given); $\angle I \cong \angle N$, $\angle G \cong \angle T$ (paralleling lines cut by a transversal form congruent alternate interior angles); $\triangle GIA \sim \triangle TNA$ (AA).

REF: 011729geo

14 ANS:
Parallelogram $ABCD$, $\overline{EFG}$, and diagonal $\overline{DFB}$ (given); $\angle DFE \cong \angle BFG$ (vertical angles); $\overline{AD} \parallel \overline{CB}$ (opposite sides of a parallelogram are parallel); $\angle EDF \cong \angle GBF$ (alternate interior angles are congruent); $\triangle DEF \sim \triangle BGF$ (AA).

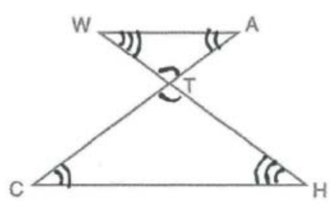
REF: 061633geo

15 ANS:
1) $\triangle ACD$ with $\overline{ABC}$, $\overline{AED}$, and $\overline{BE} \parallel \overline{CD}$ (Given); 2) $\angle ABE \cong \angle ACD$ and $\angle AEB \cong \angle ADC$ (A transversal crossing parallel lines creates congruent corresponding angles; 3) $\triangle ABE \cong \triangle ACD$ (AA); 4) $\frac{AB}{AC} = \frac{AE}{AD}$ (Corresponding sides of similar triangles are proportional); 5) $AB \bullet AD = AE \bullet AC$ (Product of the means equals the product of the extremes)

REF: 012534geo

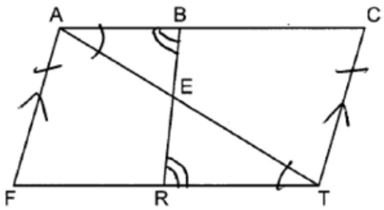
16 ANS:
$\angle WTA$ and $\angle HTC$ are congruent vertical angles. Since $\overline{WA} \parallel \overline{CH}$, $\angle WHC$ and $\angle AWH$ are alternate interior angles and congruent and $\angle ACH$ and $\angle WAC$ are alternate interior angles and congruent. Therefore $\triangle TCH \sim \triangle TAW$ by AA. Because corresponding sides of similar triangles are in proportion, $\frac{WH}{AT} = \frac{HT}{CT}$.

Cross-multiplying, $(WT)(CT) = (HT)(AT)$.



REF: 010833b

17 ANS:



Quadrilateral $FACT$, $\overline{BR}$ intersects diagonal $\overline{AT}$ at E, $\overline{AF} \parallel \overline{CT}$, and $\overline{AF} \cong \overline{CT}$ (Given); $FACT$ is a parallelogram (A quadrilateral with one pair of opposite sides parallel and congruent is a parallelogram); $\overline{AC} \cong \overline{FT}$ (Opposite sides of a parallelogram are parallel); $\angle BAE \cong \angle RTE$, $\angle ABE \cong \angle TRE$ (Parallel lines cut by a transversal form alternate interior angles that are congruent); $\triangle ABE \sim \triangle TRE$ (AA); $\frac{AB}{AE} = \frac{TR}{TE}$ (Corresponding sides of similar triangles are proportional); $(AB)(TE) = (AE)(TR)$ (Product of the means equals the product of the extremes).

REF: 082335geo