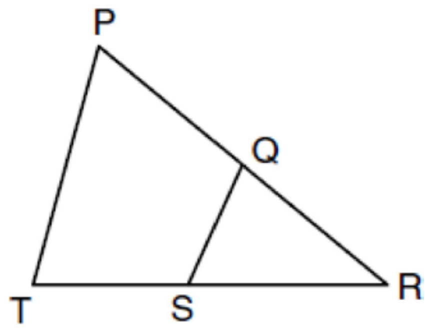
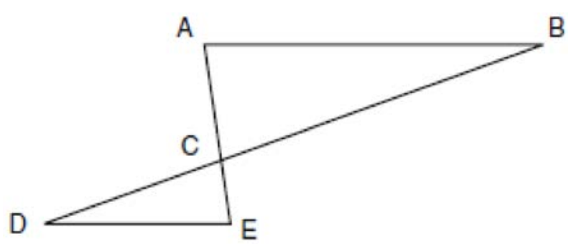
G.G.44: Similarity Proofs: Establish similarity of triangles, using the following theorems: AA, SAS, and SSS

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 $\angle RPT \cong \angle RSQ$.



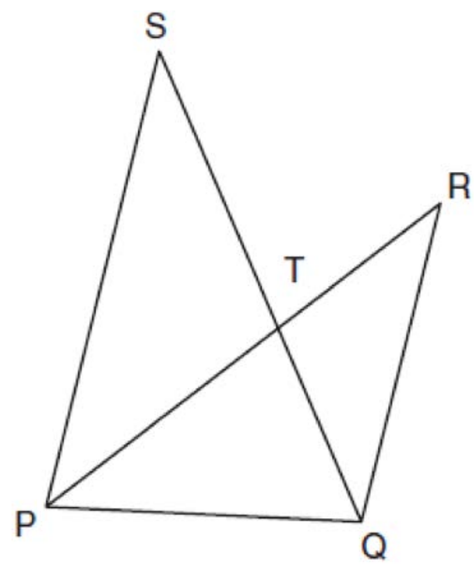
Which reason justifies the conclusion that $\triangle PRT \sim \triangle SRQ$?
1) AA
2) ASA
3) SAS
4) SSS

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

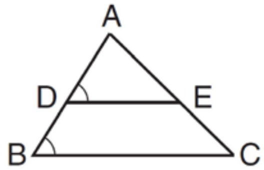
3 In the diagram below, $\overline{SQ}$ and $\overline{PR}$ intersect at T, $\overline{PQ}$ is drawn, and $\overline{PS} \parallel \overline{QR}$.

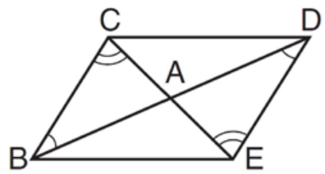


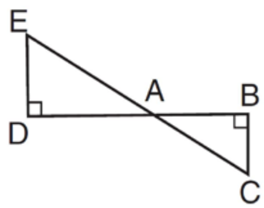
What technique can be used to prove that $\triangle PST \sim \triangle RQT$?
1) SAS
2) SSS
3) ASA
4) AA

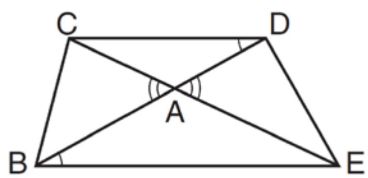
4 In triangles ABC and DEF, $AB = 4$, $AC = 5$, $DE = 8$, $DF = 10$, and $\angle A \cong \angle D$. Which method could be used to prove $\triangle ABC \sim \triangle DEF$?
1) AA
2) SAS
3) SSS
4) ASA

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

1) 

2) 

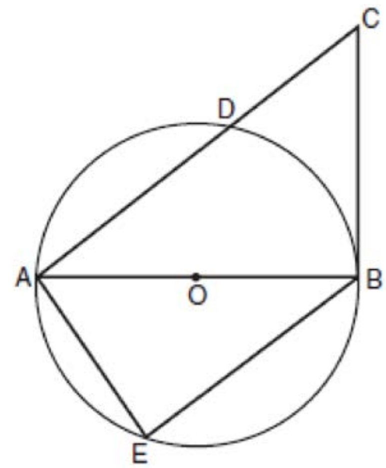
3) 

4) 

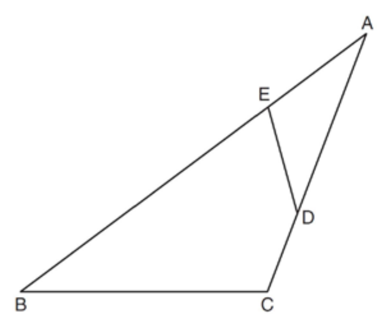
6 In $\triangle ABC$ and $\triangle DEF$, $\frac{AC}{DF} = \frac{CB}{FE}$. Which additional information would prove $\triangle ABC \sim \triangle DEF$?

1) $AC = DF$
2) $CB = FE$
3) $\angle ACB \cong \angle DFE$
4) $\angle BAC \cong \angle EDF$

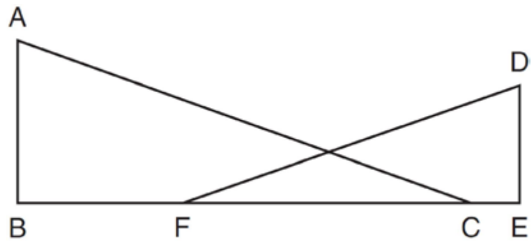
7 In the accompanying diagram of circle O, diameter $\overline{AOB}$ is drawn, tangent $\overline{CB}$ is drawn to the circle at B, E is a point on the circle, and $\overline{BE} \parallel \overline{ADC}$.
Prove: $\triangle ABE \sim \triangle CAB$



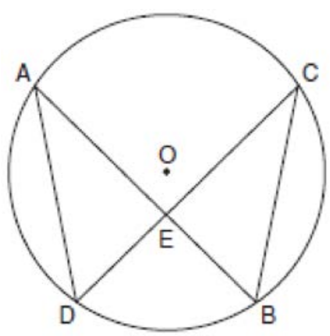
8 The diagram below shows $\triangle ABC$, with $\overline{AEB}$, $\overline{ADC}$, and $\angle ACB \cong \angle AED$. Prove that $\triangle ABC$ is similar to $\triangle ADE$.



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

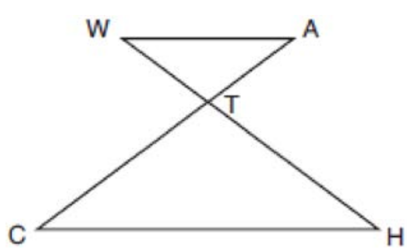


10 Given: chords $\overline{AB}$ and $\overline{CD}$ of circle O intersect at E, an interior point of circle O; chords $\overline{AD}$ and $\overline{CB}$ are drawn.



Prove: $(AE)(EB) = (CE)(ED)$

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



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Answer Section

1 ANS: 1 REF: fall0821ge
2 ANS: 2 REF: 060917ge
3 ANS: 4 REF: 011019ge
4 ANS: 2 REF: 061324ge
5 ANS: 4 REF: 011528ge
6 ANS: 3 REF: 011209ge
7 ANS:

$\angle ABC$, the angle formed by tangent $\overline{CB}$ and diameter $\overline{AOB}$ is a right angle. The measure of an inscribed angle is half that of its intercepted arc. Because $\angle BEA$ intercepts a semicircle, $\angle BEA$ is also a right angle. Since $\overline{BE} \parallel \overline{ADC}$, $\angle CAB$ and $\angle ABE$ are alternate interior angles and congruent. Therefore $\Delta ABE \sim \Delta CAB$ by AA

REF: 080627b

8 ANS:

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

REF: 081133ge

9 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. $\Delta ABC \sim \Delta DEF$ because of AA.

REF: 011136ge

10 ANS:

$\angle AED$ and $\angle CEB$ are congruent vertical angles. Because $\angle D$ and $\angle B$ intercept the same arc, they are congruent. $\Delta ADE \sim \Delta CBE$ by AA. Because corresponding sides of similar triangles are in proportion, $\frac{AE}{CE} = \frac{ED}{EB}$. Cross-multiplying, $(AE)(EB) = (CE)(ED)$.

REF: 060133b

11 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 $\Delta TCH \sim \Delta TAW$ 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