MAFS.912.G-CO.3.9

1. Complete the following proof.

Given: \( \angle 1 \) and \( \angle 3 \) are vertical angles.
Prove: \( m\angle 1 = m\angle 3 \)

<table>
<thead>
<tr>
<th>Statements</th>
<th>Reasons</th>
</tr>
</thead>
<tbody>
<tr>
<td>( \angle 1 ) and ( \angle 3 ) are vertical angles.</td>
<td></td>
</tr>
<tr>
<td>( \angle 1 ) and ( \angle 2 ) are a linear pair; ( \angle 2 ) and ( \angle 3 ) are a linear pair.</td>
<td>Definition of linear pair</td>
</tr>
<tr>
<td>( \angle 1 ) and ( \angle 2 ) are supplementary; ( \angle 2 ) and ( \angle 3 ) are supplementary.</td>
<td></td>
</tr>
<tr>
<td>( m\angle 1 + m\angle 2 = 180^\circ; ) ( m\angle 2 + m\angle 3 = 180^\circ )</td>
<td></td>
</tr>
<tr>
<td>( m\angle 1 + m\angle 2 = m\angle 2 + m\angle 3 )</td>
<td></td>
</tr>
<tr>
<td>( m\angle 1 = m\angle 3 )</td>
<td></td>
</tr>
</tbody>
</table>

2. Steve drew line segments \( ABCD, EFG, BF, \) and \( CF \) as shown in the diagram below. Scalene \( \triangle BFC \) is formed.

Which statement will allow Steve to prove \( \overline{AD} \parallel \overline{EG} \)?

A. \( \angle CFG \cong \angle FCB \)
B. \( \angle ABF \cong \angle BFC \)
C. \( \angle EFB \cong \angle CFB \)
D. \( \angle CBF \cong \angle GFC \)

3. \( \overline{JK} \) is perpendicular to \( \overline{XY} \) at its midpoint \( M \). Choose the answer that includes the correct response(s).
   I. \( JX = JY \)
   II. \( JK = KY \)
   III. \( KX = KY \)
   IV. \( JX = KX \)
   V. \( XM = YM \)
   VI. \( JM = KM \)

A. \( V \) only
B. II, IV, VI
C. I, III, V
D. \( V \) and VI

4. Alex works as a recruiter. To reduce her travel time, she has created a model of three state universities in Florida, the roads between them, and started a construction.

Using this information, which is an accurate scenario for the work she has begun?

A. She plans to relocate so that she is equidistant to the roads between the three universities. On her model, she has constructed the perpendicular bisectors to locate the point that is the same distance away from each road.
B. She plans to relocate so that she is equidistant to the three universities. On her model, she has constructed the medians to locate the point that is the same distance away from each university.
C. She plans to relocate so that she is equidistant to the three universities. On her model, she has constructed the perpendicular bisectors to locate the point that is the same distance away from each university.
D. She plans to relocate so that she is equidistant to the roads between the three universities. On her model, she has constructed the medians to locate the point that is the same distance away from each road.
MAFS.912.G-CO.3.10

1. In this diagram, $\overline{CD}$ is the perpendicular bisector of $\overline{AB}$. The two-column proof shows that $\overline{AC}$ is congruent to $\overline{BC}$.

   \[
   \begin{array}{|c|c|}
   \hline
   \text{Statements} & \text{Reasons} \\
   \hline
   \overline{CD} \text{ is the perpendicular bisector of } \overline{AB} & \text{Given} \\
   \overline{AD} \cong \overline{BD} & \text{Definition of bisector} \\
   \overline{CD} \cong \overline{CD} & \text{Reflexive Property of Congruence} \\
   \angle ADC \text{ and } \angle BDC \text{ are right triangles} & \text{Definition of perpendicular lines} \\
   \angle ADC \cong \angle BDC & \text{All right angles are congruent.} \\
   \triangle ADC \cong \triangle BDC & \text{CPTC} \\
   \overline{AC} \cong \overline{BC} & \text{CPCTC} \\
   \hline
   \end{array}
   \]

Which of the following is the missing reason?
A. AAS  
B. ASA  
C. SAS  
D. SSS

2. In this diagram, $\overline{STU}$ is an isosceles triangle where $\overline{ST}$ is congruent to $\overline{UT}$. The paragraph proof shows that $\angle S$ is congruent to $\angle U$.

   It is given that $\overline{ST}$ is congruent to $\overline{UT}$. Draw $\overline{TV}$ such that $V$ is on $\overline{SU}$ and $\overline{TV}$ bisects $\angle T$. By the ________, $\angle STV$ is congruent to $\angle UTV$. By the Reflexive Property of Congruence, $\overline{TV}$ is congruent to $\overline{TV}$. Triangle $\triangle STV$ is congruent to triangle $\triangle UTV$ by ________. $\angle S$ is congruent to $\angle U$ by CPCTC.

Which step are missing in the proof?
A. ASA, Definition of Right Angle  
B. ASA, Definition of Angle Bisector  
C. SAS, Definition of Right Angle  
D. SAS, Definition of Angle Bisector

3. Complete the following proof.

   In $\triangle JKL$ above, $\overline{JK} \cong \overline{LK}$. Prove that $\angle J \cong \angle L$.

   \[
   \begin{array}{|c|c|}
   \hline
   \text{Statements} & \text{Reasons} \\
   \hline
   \overline{JK} \cong \overline{LK} & \text{Given} \\
   \overline{LK} \cong \overline{JK} & \text{Symmetric property} \\
   \angle JKL \cong \angle LKJ & \text{__________} \\
   \angle JKL \cong \angle LKJ & \text{__________} \\
   \angle J \cong \angle L & \text{__________} \\
   \hline
   \end{array}
   \]

4. You want to use a coordinate proof to prove that midsegment $\overline{DE}$ of $\triangle ABC$ is parallel to $\overline{AC}$ and half the length of $\overline{AC}$. Which is the best first step?

   A. Place the triangle on a coordinate grid such that vertex $A$ is at the origin, and $\overline{AC}$ lies on the $x$-axis.  
   B. Place the triangle on a coordinate grid such that $\overline{BC}$ lies on the $x$-axis and $\overline{AB}$ lies on the $y$-axis.  
   C. Place the triangle on a coordinate grid such that vertex $B$ is at the origin.  
   D. Place the triangle on a coordinate grid such that vertex $A$ is on the $y$-axis, and vertex $C$ is on the $x$-axis.
1. In the diagram below, $EF$ intersects $AB$ and $CD$ at $G$ and $H$, respectively, and $GI$ is drawn such that $GH \cong IH$.

If $m\angle EGB = 50^\circ$ and $\angle DIG = 115^\circ$, explain why $AB \parallel CD$.

2. Complete the following proof.

In $\triangle QSU$ above, point $R$ is the midpoint of $QS$ and point $T$ is the midpoint of $SU$. Prove that $RT \cong QU$.

<table>
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<tbody>
<tr>
<td>Point $R$ is the midpoint of $QS$.</td>
<td>Given</td>
</tr>
<tr>
<td>Point $T$ is the midpoint of $SU$.</td>
<td>Given</td>
</tr>
<tr>
<td>$QS = 2RS$</td>
<td></td>
</tr>
<tr>
<td>$US = 2TS$</td>
<td></td>
</tr>
<tr>
<td>$QU$ is the image of $RT$ under a dilation centered at point $S$ with scale factor 2.</td>
<td>Properties of dilations</td>
</tr>
</tbody>
</table>

3. The figure shows $\overline{JN}$ and $\overline{KM}$ intersecting at point $L$.

What value of $x$ proves $\overline{JR} \parallel \overline{MN}$?

$x =$

Use the information provided to answer questions 4 and 5.

In the figure shown, $CF$ intersects $AD$ and $EH$ at points $B$ and $F$, respectively.

4. Given: $m\angle CBD \cong m\angle BFE$

Prove: $m\angle ABF \cong m\angle BFE$

<table>
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<tr>
<td>$\angle CBD \cong \angle BFE$</td>
<td>Given</td>
</tr>
<tr>
<td>$\angle CBD \cong \angle ABF$</td>
<td></td>
</tr>
<tr>
<td>$\angle ABF \cong \angle BFE$</td>
<td></td>
</tr>
</tbody>
</table>

Which two of the given reasons could be used to correctly complete the proof?

- Definition of congruent angles
- Congruence of angles is reflexive
- Congruence of angles is symmetric
- Congruence of angles is transitive
- Vertical angles are congruent
5. \( \text{Given: } \angle ADC = \angle ABFE \)  
\( \text{Prove: } \angle BFE + \angle DBF = 180^\circ \)

<table>
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<tr>
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<tbody>
<tr>
<td>( \angle CBD = \angle BFE )</td>
<td>Given</td>
</tr>
<tr>
<td>( \angle CBD + \angle DBF = 180^\circ )</td>
<td></td>
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<tr>
<td>( \angle BFE + \angle DBF = 180^\circ )</td>
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Which **two** of the given reasons could be used to correctly complete the proof?
- Adjacent angles are congruent
- Adjacent angles are supplementary
- Linear pairs of angles are supplementary
- Reflexive property of equality
- Substitution property of equality
- Transitive property of equality