MCU414

Triangles/Proofs Worksheet

1. In the figure below, M is the midpoint of segments AB and CD.



Which of the following can be used to justify that triangles AMC and BMD are congruent?

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| A) | Two triangles are congruent if they have one congruent angle bounded by two corresponding congruent sides. (SAS) |
| B) | Two triangles are congruent if they have three corresponding congruent sides. (SSS) |
| C) | Two triangles are congruent if they have one congruent side between two corresponding congruent angles. (ASA) |
| D) | Two triangles are congruent if they have two corresponding congruent angles. (AA) |

2. A road map shows four linear routes. Route 1 is parallel to route 2.



The following is part of a procedure used to determine the measure of angle EDB.

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| Step 1 | m ∠ACB = 54°  because the sum of the measures of the interior angles of triangle ACB is equal to 180°. |
| Step 2 | m ∠EDB = m ∠ACB = 54°  because… |

Which one of the following statements correctly completes step 2 of this procedure?

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| A) | Angles EDB and ACB are vertically opposite angles, and are therefore congruent. |
| B) | Angles EDB and ACB are corresponding angles formed when a transversal intersects two parallel lines, and are therefore congruent. |
| C) | Angles EDB and ACB are alternate interior angles formed when a transversal intersects two parallel lines, and are therefore congruent. |
| D) | Angles EDB and ACB are alternate exterior angles formed when a transversal intersects two parallel lines. |

3. In parallelogram ABCD shown below, diagonals AC and BD intersect at point O.

The reasoning below demonstrates that triangles AOB and COD are congruent.



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| Statement | Justification |
| 1. | 1. The opposites sides of a parallelogram are congruent. |
| 2. | 2. The diagonals of a parallelogram bisect each other. |
| 3. | 3. The diagonals of a parallelogram bisect each other. |
| 4. ΔAOB ≅ ΔCOD | 4. ??????? |

Which of the statements below is the reason for step 4?

|  |  |
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| A) | Two triangles are congruent if two sides and the contained angle of one triangle are congruent to two sides and the contained angle of the other triangle. |
| B) | Two triangles are congruent if the three pairs of corresponding sides are congruent. |
| C) | Two triangles are congruent if two angles and the contained side of one triangle are congruent to two angles and the contained side of the other triangle. |
| D) | Two triangles are congruent if two pairs of corresponding angles are congruent. |

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| 4. ABCD is a parallelogram whose diagonals  and  intersect at O. |  |

The following proof shows that triangles AOD and COB are congruent.

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| Statements | Reasons |
| 1. | 1. The diagonals of a parallelogram bisect each other. |
| 2. m ∠AOD = m ∠COB | 2. Vertically opposite angles are congruent. |
| 3. | 3. The diagonals of a parallelogram bisect each other. |
| 4. ΔAOD ≅ ΔCOB | 4. ?????? |

Which of the following reasons completes the proof in step 4?

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| A) | Two triangles with a congruent angle between two congruent corresponding sides are congruent. | |
| B) | Two triangles with all three corresponding sides congruent are congruent. | |
| C) | Two triangles with two corresponding angles and the contained side congruent are congruent. | |
| D) | Two triangles with two corresponding angles congruent are congruent. | |
| 5. Given parallelogram ABCD to the right, prove that triangle ABC and ADC are congruent. | |  | |

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| Statement | Justification |
| m ∠BCA = m ∠CAD | Because |
| m ∠BAC = m ∠ACD | Because |
|  | Because it is a common side for both triangles |
| ΔABC ≅ ΔCDA | Because |

|  |  |
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| 6. Square ABCD is shown on the right. Triangles AEB and DEC are isosceles.  The following is part of a procedure used to shown that triangles AED and BEC are congruent.  In triangles AED and BEC: |  |

Complete steps 3 and 4 of this procedure.

In triangles AED and BEC:

|  |  |  |
| --- | --- | --- |
| Step 1 |  | because Δ AEB is isosceles. |
| Step 2 |  | because Δ DEC is isosceles. |
| Step 3 |  | because |
| Step 4 | Δ AED ≅ Δ BEC | because |

7. Given triangle CDE and parallelogram EFGH below.



To calculate the measure of angle CDE, four statements are given.

Match each statement with its appropriate reason.

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| Statements | | | Reasons | | |
| 1. | m ∠JHK = m ∠HGI = 140° | | A) | The sum of the measures of the interior angles of a triangle is 180°. | |
| 2. | m ∠DEF = m ∠JHK = 140° | | B) | Vertically opposite angles are equal. | |
| 3. | m ∠DEC = 180° − m ∠DEF = 40° | | C) | Adjacent angles whose exterior sides form a straight line are supplementary. | |
| 4. | m ∠D = 180° − (m ∠C + m ∠DEC)  m ∠D = 80° | | D) | If 2 parallel lines are cut by a transversal, then corresponding angles are equal. | |
|  |  | | E) | If 2 parallel lines are cut by a transversal, then alternate exterior angles are equal. | |
| 8. Consider parallelogram ABCD on the right. Diagonals AC and BD intersect at E.  The proof below shows that Δ AEB is congruent to Δ CED. | |  | | |

In the answer booklet, fill in the missing part of each justification.

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| Statement | Justification |
| m ∠ AEB = m ∠ CED | The angles are congruent because they are |
| m  = m | In a parallelogram the diagonals |
| m ∠ BAE = m ∠ DCE | The angles are congruent because they are , as  and  are parallel and are intersected by the transversal . |
| Δ AEB ≅ Δ CED | According to the following theorem: |

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