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| **Stage 9: Conjecturing** | **Quick Quiz** |
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| **1** | **Apply angle facts to derive results about angles and sides** |  |
| **a** |

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| *ABCD* is a square.Show that *x* = 43°.You must give a reason for each stage of your working. | 105°28°*x*°*A**D**C**B* |

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| **b** |

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| The diagram shows part of an arrangement of regular polygons. Carol is asked to show that polygon *Q* has 12 sides. Here is her work.* Angle sum of the hexagon = 4 × 180° = 720°
* One interior angle = 720° ÷ 6 = 120°
* Interior angle of square = 90°
* Interior angle of *Q* = 360° – 120° – 90° = 150°
* Exterior angle of *Q* = 180° – 150° = 30°
* Number of sides = 360° ÷ 30° = 12

Evaluate Carol’s work. | Regular hexagonSquarePolygon *Q**A**B**E**C**D**F* |

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| **2** | **Create a geometrical proof** |  |
| **a** |

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| Prove that triangle ABC is right-angled | *D*37°53°*A*72°*B**C* |

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| **b** |

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| Max is asked to prove that LM = MN. Here is his proof:* ∠LNM = 58° because angles on a straight line sum to 180°
* Triangle LMN is isosceles so ∠MLN = 58°
* Therefore LM = MN

This is not a correct proof. Explain why. | *N*58°122°*M**L* |

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| **3** | **Know the conditions for triangles to be congruent** |  |
| **a** | Which of the following is **not** a condition for triangles to be congruent?RHS SSA SAS ASA |  |
| **b** | Angela says‘*If the angles in triangle ABC are the same as the angles in triangle XYZ, then the triangles are congruent*’Do you agree with Angela? Give a reason for your answer. |  |
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| **4** | **Use the conditions for congruent triangles** |  |
| **a** | Here are four triangles.

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| **A** | **B** | **C** | **D** |
| 10 cm85°40° | 10 cm55°40° | 10 cm85°55° | 10 cm55° |

Which two triangles are congruent? Explain how you know. |  |
| **b** | Freya is given information about two triangles:

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| Triangle ABCAB = 5 cmAC = 8cm∠BAC = 80° | Triangle LMNLN = 5 cmLM = 8cm∠MNL = 80° |

She thinks that the two triangles are congruent.Freya is wrong. Explain why. |  |
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| **5** | **Use congruence in geometrical proofs** |  |
| **a** |

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| *ABCD* is a kite.Prove that the kite has one pair of equal angles.  | *D**A**C**B* |

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| **b** |

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| *Ray is asked to prove that triangle ACD is isosceles.* Here is his proof:* Triangle ADE is congruent to triangle ABC (ASA)
* Therefore AC = AD
* Therefore triangle ACD is isosceles

Do you agree with Ray? Explain why. | *D**E**B**A**C* |

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| **6** | **Solve geometrical problems involving similarity** |  |
| **a** | Find the value of *x*.25 cm15 cm*x* cm20 cm10 cm |  |
| **b** | Pete is told the following facts triangles ABC and QPR: ∠BAC = ∠QPR∠ACB = ∠PRQ∠ABC = ∠PQRAC = 6PR = 8He works out that the ratio BC:QR is 4:3Pete is wrong. Explain why. |  |
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| **7** | **Know the meaning of a Pythagorean triple** |  |
| **a** | Which of the following is **not** a Pythagorean triple?7, 21, 25 9, 40, 41 8, 15, 17 11, 59, 61 |  |
| **b** | Zak is investigating some right-angled triangles made using Pythagorean triples.

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| 6 cm 8 cm10 cm*A*  | 5 cm 12 cm13 cm*B*  |
| Area = 24 cm2Perimeter = 24 cm | Area = 30 cm2Perimeter = 30 cm |

Zak makes a conjecture:‘*When a triangle is made from a Pythagorean triple, the area and the perimeter have the same value*’Find a counterexample to show that Zak’s conjecture is not correct. |  |

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| **Stage 9: Conjecturing** | **Review** |
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|  | **Key learning point** | ☹ | 😐 | 😐 | ☺ |
| **1** | Apply angle facts to derive results about angles and sides |  |  |  |  |
| **2** | Create a geometrical proof |  |  |  |  |
| **3** | Know the conditions for triangles to be congruent |  |  |  |  |
| **4** | Use the conditions for congruent triangles |  |  |  |  |
| **5** | Use congruence in geometrical proofs |  |  |  |  |
| **6** | Solve geometrical problems involving similarity |  |  |  |  |
| **7** | Know the meaning of a Pythagorean triple |  |  |  |  |
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| **Top three improvements for me to make** |

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| **Stage 9: Conjecturing** | **Quick Quiz: the answers** |

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| **1a** | Correct derivation supported by reasons |  |
| **1b** | Carol’s work is correct |  |
| **2a** | Proof; e.g.* ∠ABC = 53° (vertically opposite angles are equal)
* Therefore ∠BAC = 180° – 53° – 37° – 90°

So triangle ABC is right-angled  |  |
| **2b** | Max has assumed that triangle LMN is isosceles rather than proved it |  |
| **3a** | SSA |  |
| **3b** | Angela is wrong |  |
| **4a** | B and C |  |
| **4b** | Students should draw the diagrams and show that the labelling does not fit the SAS condition |  |
| **5a** | Draws in line BDAD = CDAB = BCBD is a shared sideTherefore triangles ABD and BCD are congruentSo ∠BAD = ∠BCD |  |
| **5b** | The ASA condition is wrong. It should be SAS. |  |
| **6a** | 8 |  |
| **6b** | It should be 3:4 |  |
| **7a** | 11, 59, 61 |  |
| **7b** | Finds a counterexample |  |
| **8a** |  |  |
| **8b** |  |  |