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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** | |  |  | | --- | --- | | *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* | | |  |
| **b** | |  |  | | --- | --- | | 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 hexagon  Square  Polygon *Q*  *A*  *B*  *E*  *C*  *D*  *F* | | |  |
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| **2** | **Create a geometrical proof** | |  |
| **a** | |  |  | | --- | --- | | Prove that triangle ABC is right-angled | *D*  37°  53°  *A*  72°  *B*  *C* | | |  |
| **b** | |  |  | | --- | --- | | 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.   |  |  |  |  | | --- | --- | --- | --- | | **A** | **B** | **C** | **D** | | 10 cm  85°  40° | 10 cm  55°  40° | 10 cm  85°  55° | 10 cm  55° |   Which two triangles are congruent? Explain how you know. | |  |
| **b** | Freya is given information about two triangles:   |  |  | | --- | --- | | Triangle ABC  AB = 5 cm  AC = 8cm  ∠BAC = 80° | Triangle LMN  LN = 5 cm  LM = 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** | |  |  | | --- | --- | | *ABCD* is a kite.  Prove that the kite has one pair of equal angles. | *D*  *A*  *C*  *B* | | |  |
| **b** | |  |  | | --- | --- | | *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 cm  15 cm  *x* cm  20 cm  10 cm | |  |
| **b** | Pete is told the following facts triangles ABC and QPR:    ∠BAC = ∠QPR  ∠ACB = ∠PRQ  ∠ABC = ∠PQR  AC = 6  PR = 8  He works out that the ratio BC:QR is 4:3  Pete 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.   |  |  | | --- | --- | | 6 cm  8 cm  10 cm  *A* | 5 cm  12 cm  13 cm  *B* | | Area = 24 cm2  Perimeter = 24 cm | Area = 30 cm2  Perimeter = 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 BD  AD = CD  AB = BC  BD is a shared side  Therefore triangles ABD and BCD are congruent  So ∠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** |  |  |