



7.14D Congruent Triangles: Fluency and Exam Drill

EDEXCEL Edexcel 1MA1 · Calculator allowed · about 60 minutes

Total Marks

Name: _____ Date: ____ / ____ / ____

Answer ALL questions. Show all your working.

- 1** Triangles ABC and DEF have $AB = DE$, $BC = EF$ and $AC = DF$. Which congruence test proves the triangles are congruent?

(Total for Question 1 is 1 mark)

- 2** Triangles PQR and STU satisfy $PQ = ST$, $PR = SU$ and $\angle QPR = \angle TSU$ where the equal angle is between the equal sides. Which congruence test applies?

(Total for Question 2 is 1 mark)

- 3** Two right-angled triangles have equal hypotenuses and one pair of equal legs. Which congruence test proves they are congruent?

(Total for Question 3 is 1 mark)

- 4** Triangles XYZ and LMN have $\angle X = \angle L$, $\angle Z = \angle N$ and the side $XZ = LN$ between those angles. Which congruence test applies?

(Total for Question 4 is 1 mark)

- 5** Triangles ABC and PQR are congruent with the correspondence A-P, B-Q, C-R. $AB = 8$, $BC = 12$ and $CA = 10$. Work out QR.

(Total for Question 5 is 2 marks)

- 6** Triangle ABC is right-angled at B with $AB = 5$, $BC = 12$ and $AC = 13$. Triangle DEF is right-angled at F with $EF = 5$ and $DE = 13$. Use congruence to find DF (labelled x in the second triangle).

(Total for Question 6 is 3 marks)

- 7** Triangles ABC and DEF satisfy angle A = 50 degrees, angle C = 70 degrees and $AC = DF$. In triangle DEF, angle D = 50 degrees and angle F = 70 degrees. Show that the triangles are congruent and state two pairs of corresponding equal sides.

(Total for Question 7 is 3 marks)

- 8** In triangle ABC, $AB = AC$ and D is the midpoint of BC so $BD = DC$. Show that triangles ABD and ACD are congruent. Hence state angle ABD = angle DCA.

(Total for Question 8 is 4 marks)

- 9** Quadrilateral ABCD has $AB = CD$ and $BC = DA$. The diagonal AC is drawn. Prove that triangles ABC and CDA are congruent, and hence state one pair of equal corresponding angles.

(Total for Question 9 is 4 marks)

- 10** In triangle ABC, $AB = 7$ cm, $AC = 9$ cm and angle $BAC = 60$ degrees. Triangle DEF has $DE = 7$ cm, $DF = 9$ cm and angle $EDF = 60$ degrees. (a) Show that triangles ABC and EDF are congruent. (b) Work out the length BC, giving your answer to 3 significant figures.

(a) Show that triangles ABC and EDF are congruent. (2)

(b) Work out BC to 3 significant figures. (3)

(Total for Question 10 is 5 marks)

- 11** Triangles ABC and DEF satisfy $AB = DE$, angle $B =$ angle E and $BC = EF$. (a) State the congruence test that proves the triangles congruent. (b) Using the congruence, state two pairs of corresponding equal angles.

(a) State the congruence test. (2)

(b) State two pairs of corresponding equal angles. (4)

(Total for Question 11 is 6 marks)

- 12** In quadrilateral ABCD, $AB = CD$ and $BC = DA$. The diagonal AC is drawn. Prove that triangles ABC and CDA are congruent by SSS and state which pair of corresponding angles are equal as a result.

(Total for Question 12 is 5 marks)

Mark scheme · 7.14D Congruent Triangles: Fluency and Exam Drill

Question 1

- **B1** SSS cao
- **Answer:** SSS (side-side-side) congruence test is sufficient to prove the triangles congruent.

Question 2

- **B1** SAS cao
- **Answer:** SAS (side-angle-side)

Question 3

- **B1** RHS cao
- **Answer:** RHS (right angle, hypotenuse, side)

Question 4

- **B1** ASA cao
- **Answer:** ASA (angle-side-angle)

Question 5

- **M1** identify correspondence BC corresponds to QR or state $QR = BC$ oe
- **A1** 12 cao
- **Answer:** 12

Question 6

- **M1** identify hypotenuse and one leg equal so triangles are congruent by RHS
- **M1** use correspondence to state DF corresponds to BC or compute DF using Pythagoras ($DF^2 = DE^2 - EF^2$)
- **A1** 12 cao
- **Answer:** 12 cm (DF = 12). The Pythagorean check: $DF = \sqrt{13^2 - 5^2} = \sqrt{169 - 25} = \sqrt{144} = 12$, corresponding to BC.

Question 7

- **M1** find the remaining angle B = 60 degrees and E = 60 degrees or state two angles equal in both triangles
- **M1** identify two angles and included side AC = DF so ASA applies
- **A1** conclude triangles are congruent and so AB = DE and BC = EF (state two corresponding sides)
- **Answer:** Triangles are congruent by ASA. Corresponding equal sides: AB = DE and BC = EF.

Question 8

- **M1** state AB = AC (given), BD = DC (D midpoint), AD = AD (common)
- **M1** use three pairs of equal sides so SSS applies
- **M1** conclude triangles ABD and ACD are congruent
- **A1** angle ABD = angle DCA cao (corresponding angles in congruent triangles are equal)
- **Answer:** Triangles ABD and ACD are congruent by SSS. Therefore angle ABD = angle DCA.

Question 9

- **M1** identify AB = CD and BC = DA and AC = AC (common)
- **M1** use SSS to conclude triangles ABC and CDA are congruent
- **M1** state corresponding parts are equal
- **A1** give one angle equality, e.g. angle ABC = angle DCA cao
- **Answer:** Triangles ABC and CDA are congruent by SSS. Hence angle ABC = angle DCA.

Question 10

- (a) **M1** identify two sides and included angle equal ($AB = DE$, $AC = DF$, angle $BAC =$ angle EDF)
- (a) **A1** conclude triangles are congruent by SAS cao
- (a) **Answer: Triangles ABC and EDF are congruent by SAS.**
- (b) **M1** apply cosine rule: $BC^2 = AB^2 + AC^2 - 2 \cdot AB \cdot AC \cdot \cos(60 \text{ degrees})$
- (b) **M1** substitute values: $BC^2 = 7^2 + 9^2 - 2 \cdot 7 \cdot 9 \cdot (1/2) = 49 + 81 - 63 = 67$
- (b) **A1** $BC = \sqrt{67} = 8.185\dots$ so 8.19 cm to 3 s.f. cao
- (b) **Answer: 8.19 cm**

Question 11

- (a) **M1** identify side-angle-side with the angle between the given sides
- (a) **A1** SAS cao
- (a) **Answer: SAS (side-angle-side)**
- (b) **M1** use congruence to state corresponding angles are equal (one pair)
- (b) **M1** state first corresponding pair, e.g. angle $A =$ angle D
- (b) **M1** state second corresponding pair, e.g. angle $C =$ angle F
- (b) **A1** both angle equalities correct cao
- (b) **Answer: angle $A =$ angle D and angle $C =$ angle F**

Question 12

- **M1** identify $AB = CD$ and $BC = DA$ and $AC = AC$ (common side)
- **M1** state three pairs of equal sides so SSS applies
- **M1** conclude triangles ABC and CDA are congruent
- **M1** state corresponding parts are equal
- **A1** give one angle equality, e.g. angle $ABC =$ angle DCA cao
- **Answer: Triangles ABC and CDA are congruent by SSS. Therefore angle $ABC =$ angle DCA .**