HIGHER

7.14 Congruent Triangles: Test Pack

EDEXCEL 1MA1 · Calculator allowed · about 60 minutes

Total Marks

Name: _____ Date: ____ / ____ / _____

Answer ALL questions. Show all your working.

1 State one similarity and one difference between a pair of congruent shapes and a pair of similar shapes.

(Total for Question 1 is 2 marks)

2 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 2 is 2 marks)

3 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 3 is 5 marks)

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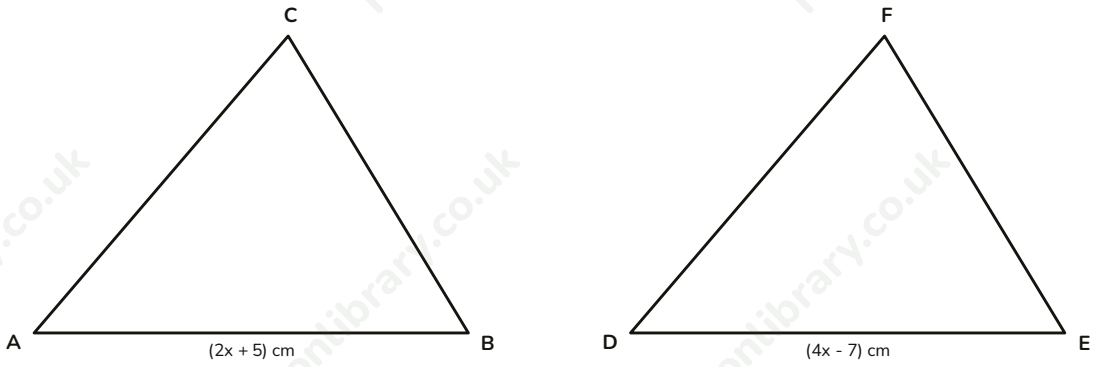
4 Triangles ABC and DEF satisfy angle A = 50 degrees, angle C = 70 degrees and AC = DF. In triangle DEF, angle D = 50 degrees and angle F = 70 degrees. Show that the triangles are congruent and state two pairs of corresponding equal sides.

(Total for Question 4 is 3 marks)

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5 Triangle ABC is congruent to triangle DEF, with vertices corresponding as A to D, B to E and C to F. AB = (2x + 5) cm and DE = (4x - 7) cm are corresponding sides. Form and solve an equation to find x, and hence find the length of AB.

Diagram NOT accurately drawn

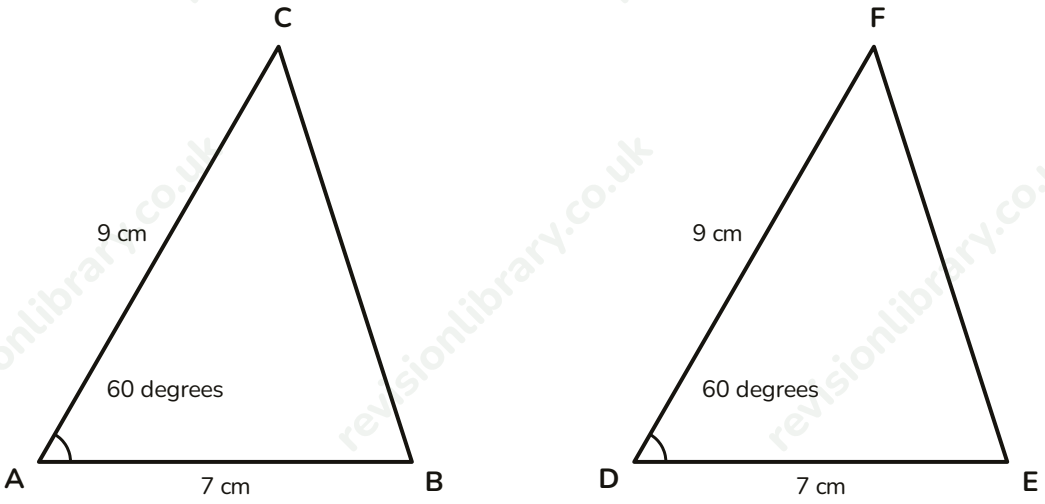


(Total for Question 5 is 4 marks)

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6 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. **(2)**



(b) Work out the length BC, giving your answer to 3 significant figures. **(3)**

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(Total for Question 6 is 5 marks)

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7 Triangles ABC and DEF satisfy AB = DE, angle B = angle E and BC = EF.

(a) State the congruence test that proves the triangles congruent. **(2)**

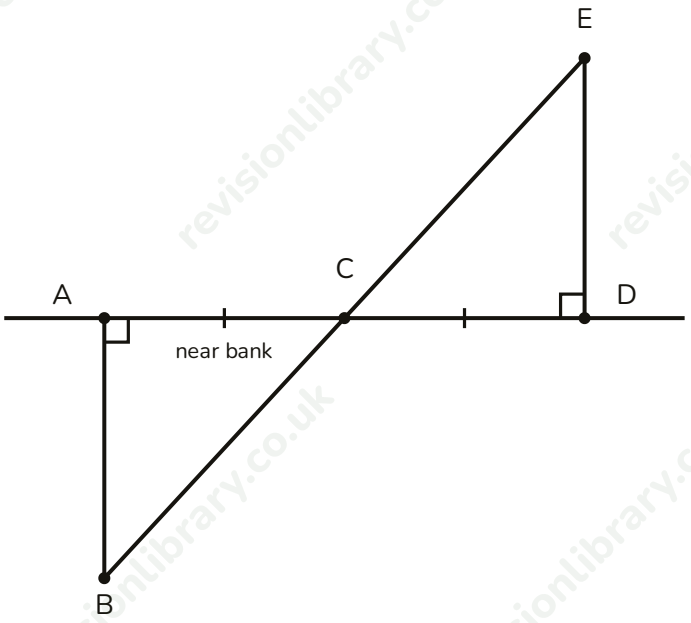
(b) Using the congruence, state two pairs of corresponding equal angles. **(4)**

(Total for Question 7 is 6 marks)

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8 A hiker wants to find the width of a straight river, from a fixed point A on the near bank to a post B on the far bank, without crossing the river. AB is perpendicular to the near bank. She uses the following method: she walks along the near bank from A to a point C, then continues the same distance again in the same direction to a point D, so that C is the midpoint of AD. At D she turns through 90 degrees away from the river and walks until she reaches a point E such that B, C and E lie exactly on a straight line. She then measures the distance DE.

Diagram NOT accurately drawn



(a) Prove that triangle ABC is congruent to triangle DEC. **(3)**

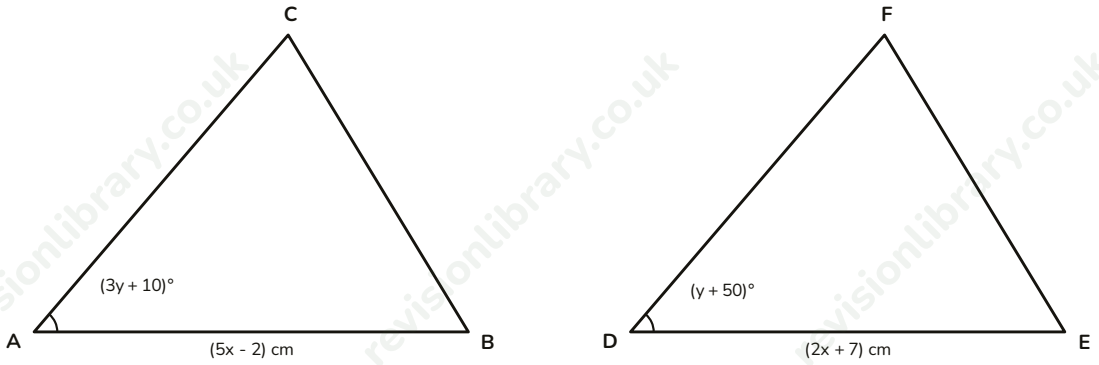
(b) Given that DE = 23.6 m, state the width of the river, AB. **(1)**

(Total for Question 8 is 4 marks)

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9 Triangle ABC is congruent to triangle DEF (correspondence A to D, B to E, C to F), proved using the condition SAS: AB corresponds to DE, angle A corresponds to angle D (the included angle), and AC corresponds to DF. AB = (5x - 2) cm, DE = (2x + 7) cm, angle A = (3y + 10) degrees and angle D = (y + 50) degrees. Find the values of x and y, and state the resulting length AB and the size of angle A.

Diagram NOT accurately drawn

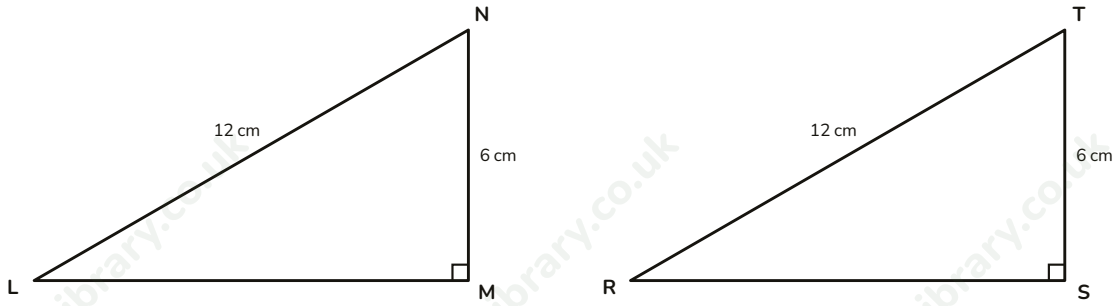


(Total for Question 9 is 5 marks)

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10 Triangle LMN and triangle RST are such that MN = ST = 6 cm; LN = RT = 12 cm; angle LMN = angle RST = 90 degrees. Can you be sure that the two triangles are congruent? Give a reason for your answer.

Diagram NOT accurately drawn

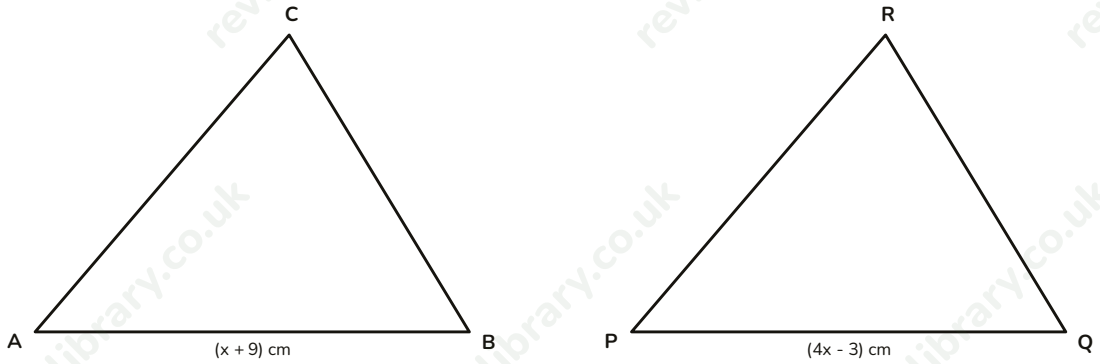


(Total for Question 10 is 2 marks)

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11 Triangle ABC is congruent to triangle PQR, with AB corresponding to PQ. AB = (x + 9) cm and PQ = (4x - 3) cm. Work out the value of x and the length of AB.

Diagram NOT accurately drawn



(Total for Question 11 is 4 marks)

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12 In quadrilateral YSJX, YS is parallel to XJ and YS = XJ. Prove that triangle YSJ is congruent to triangle JXY.

(Total for Question 12 is 3 marks)

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Mark scheme · 7.14 Congruent Triangles: Test Pack

Question 1

similarity: both have equal corresponding angles / both are the same shape oe **B1**

difference: congruent shapes are also the same size (all corresponding sides equal, scale factor 1), whereas similar shapes can be different sizes (scale factor not equal to 1) oe **B1**

Answer: Similar: same shape (equal angles). Different: congruent shapes must also be the same size; similar shapes need not be.

Question 2

identify correspondence BC corresponds to QR or state QR = BC oe **M1**

12 cao **A1**

Answer: 12

Question 3

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 **M1**

give one angle equality, e.g. angle ABC = angle CDA cao **A1**

Answer: Triangles ABC and CDA are congruent by SSS. Therefore angle ABC = angle CDA.

Question 4

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 **M1**

conclude triangles are congruent and so AB = DE and BC = EF (state two corresponding sides) **A1**

Answer: Triangles are congruent by ASA. Corresponding equal sides: AB = DE and BC = EF.

Question 5

forms the equation 2x + 5 = 4x - 7 (or equivalent), using that corresponding sides of congruent triangles are equal **M1**

x = 6 cao **A1**

substitutes x = 6 back into the expression for AB (or DE) **M1**

AB = 17 cm cao **A1**

Answer: x = 6, AB = 17 cm

Question 6

(a) identify two sides and included angle equal (AB = DE, AC = DF, angle BAC = angle EDF) **M1**

(a) conclude triangles are congruent by SAS cao **A1**

(a) Answer: Triangles ABC and EDF are congruent by SAS.

(b) apply cosine rule: $BC^2 = AB^2 + AC^2 - 2*AB*AC*\cos(60 \text{ degrees})$ **M1**

(b) substitute values: $BC^2 = 7^2 + 9^2 - 2*7*9*(1/2) = 49 + 81 - 63 = 67$ **M1**

(b) $BC = \sqrt{67} = 8.185...$ so 8.19 cm to 3 s.f. cao **A1**

(b) Answer: 8.19 cm

Question 7

(a) identify side-angle-side with the angle between the given sides **M1**

(a) SAS cao **A1**

(a) Answer: SAS (side-angle-side)

(b) use congruence to state corresponding angles are equal (one pair) **M1**

(b) state first corresponding pair, e.g. angle A = angle D **M1**

(b) state second corresponding pair, e.g. angle C = angle F **M1**

(b) both angle equalities correct cao **A1**

(b) Answer: angle A = angle D and angle C = angle F

Question 8

(a) AC = CD (by construction, C is the midpoint of AD) **B1**

(a) angle BAC = angle EDC = 90 degrees (both perpendicular to the bank, by construction) **B1**

(a) angle ACB = angle DCE (vertically opposite angles, since A, C, D and B, C, E are each straight lines); hence ASA, triangle ABC = triangle DEC (cso) **B1**

(a) Answer: Triangle ABC = Triangle DEC (ASA)

(b) AB = 23.6 m (corresponding sides of congruent triangles, cao) **B1**

(b) Answer: 23.6 m

Question 9

forms the equation 5x - 2 = 2x + 7 (using AB = DE) **M1**

x = 3 cao **A1**

forms the equation 3y + 10 = y + 50 (using angle A = angle D) **M1**

y = 20 cao **A1**

AB = 13 cm and angle A = 70 degrees (both correct, ft their x and y) **B1**

Answer: x = 3, y = 20, AB = 13 cm, angle A = 70 degrees

Question 10

Yes **B1**

RHS given as the reason **B1**

Answer: Yes, RHS

Question 11

x + 9 = 4x - 3 **M1**

rearranges to make x the subject **M1**

x = 4 **A1**

AB = 13 cm **B1**

Answer: x = 4, AB = 13 cm

Question 12

first correct statement: YS = JX (given) **B1**

second correct statement: angle SYJ = angle XJY (alternate angles) **B1**

third statement and conclusion of congruence (SAS) **B1**

Answer: SAS: YS = JX (given); angle SYJ = angle XJY (alternate angles); YJ is common

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