HIGHER

7.14 Congruent Triangles: 30-minute Pack

EDEXCEL 1MA1 · Calculator allowed · about 30 minutes

Total Marks

Name: _____ Date: ____ / ____ / _____

Answer ALL questions. Show all your working.

1 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 1 is 1 mark)

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2 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 2 is 4 marks)

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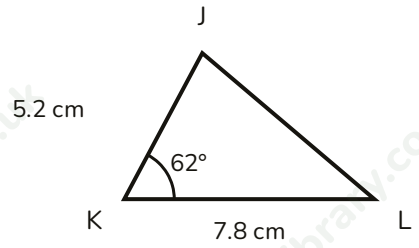
3 Quadrilateral ABCD has AB = CD and BC = DA. The diagonal AC is drawn. Prove that triangles ABC and CDA are congruent, and hence state one pair of equal corresponding angles.

(Total for Question 3 is 4 marks)

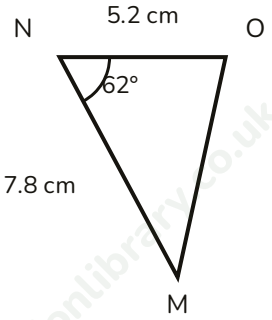
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4 Triangle JKL has JK = 5.2 cm, KL = 7.8 cm and angle JKL = 62 degrees. Triangle MNO has MN = 7.8 cm, NO = 5.2 cm and angle MNO = 62 degrees.

Triangle JKL



Triangle MNO



(a) State whether triangle JKL is congruent to triangle MNO. **(1)**

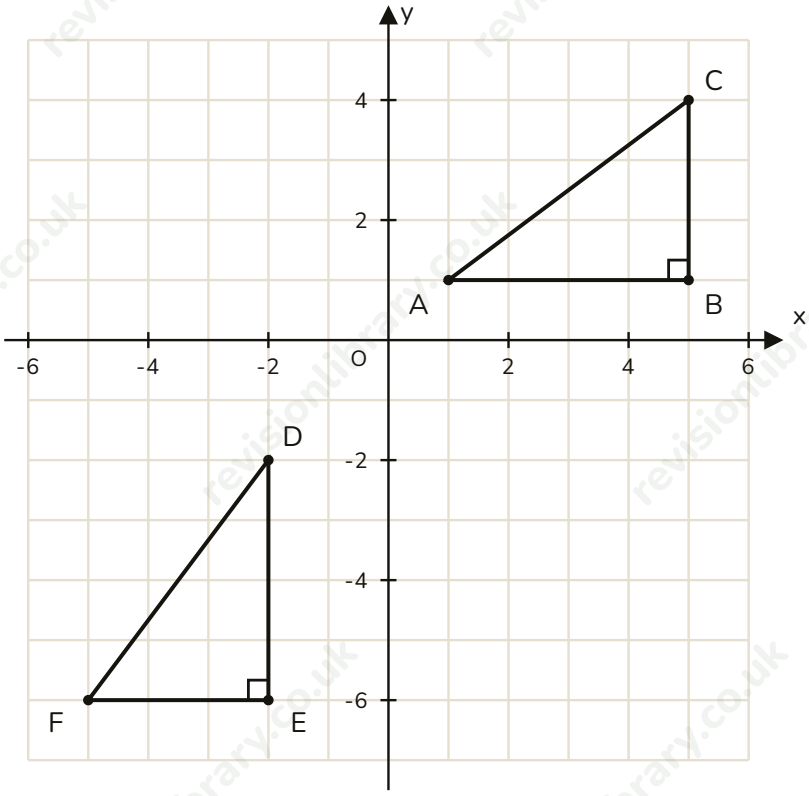
(b) Give a full geometric justification for your answer, stating the congruence condition used and the correct correspondence of vertices. **(2)**

(Total for Question 4 is 3 marks)

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5 Triangle ABC has vertices A(1, 1), B(5, 1) and C(5, 4). Triangle DEF has vertices D(-2, -2), E(-2, -6) and F(-5, -6), all coordinates in cm.

Diagram NOT accurately drawn



(a) Calculate the lengths of all three sides of each triangle. **(3)**

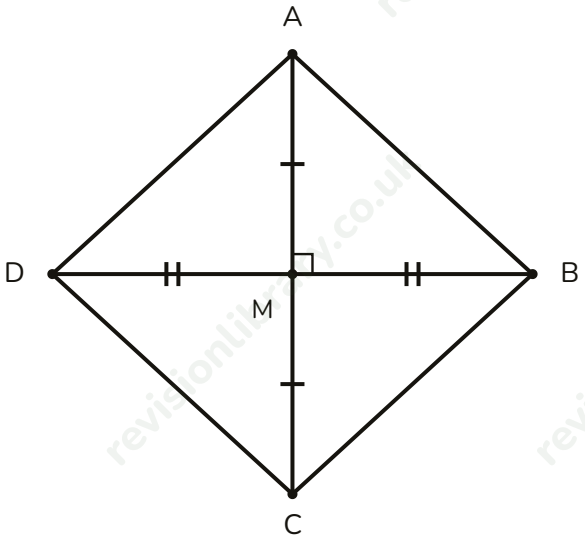
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(b) State the condition that proves triangle ABC is congruent to triangle DEF, and write down the correspondence of vertices. **(2)**

(Total for Question 5 is 5 marks)

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6 Quadrilateral ABCD has diagonals AC and BD which intersect at M, such that AM = MC, BM = MD, and AC is perpendicular to BD. Prove that triangle AMB is congruent to triangle CMB, to triangle CMD, and to triangle AMD, and hence prove that ABCD is a rhombus (all four sides equal in length).



(Total for Question 6 is 6 marks)

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Mark scheme · 7.14 Congruent Triangles: 30-minute Pack

Question 1

SAS cao	**B1**

Answer: SAS (side-angle-side)

Question 2

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	**M1**
angle ABD = angle DCA cao (corresponding angles in congruent triangles are equal)	**A1**

Answer: Triangles ABD and ACD are congruent by SSS. Therefore angle ABD = angle DCA.

Question 3

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	**M1**
give one angle equality, e.g. angle ABC = angle CDA cao	**A1**

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

Question 4

(a) yes cao	**B1**

(a) Answer: Yes

(b) SAS identified with correctly matched pairs: JK = NO (5.2 cm), KL = MN (7.8 cm), angle K = angle N = 62 degrees (the included angle)	**B1**
(b) correct correspondence stated, e.g. triangle JKL = triangle ONM (oe, any correct equivalent vertex order)	**B1**

(b) Answer: Triangle JKL = Triangle ONM (SAS)

Question 5

(a) valid method, e.g. counting squares or distance = $\sqrt{(x2-x1)^2 + (y2-y1)^2}$, used for at least one side of each triangle	**M1**
(a) AB = DE = 4 cm and BC = EF = 3 cm	**A1**
(a) AC = DF = 5 cm (oe using Pythagoras: $\sqrt{4^2 + 3^2}$)	**A1**

(a) Answer: AB = 4 cm, BC = 3 cm, AC = 5 cm; DE = 4 cm, EF = 3 cm, DF = 5 cm

(b) RHS oe - right angle (at B and at E), hypotenuse (AC = DF = 5 cm) and one other side (AB = DE = 4 cm, or BC = EF = 3 cm) all equal	**B1**
(b) correct correspondence, e.g. triangle ABC = triangle DEF (A to D, B to E, C to F)	**B1**

(b) Answer: RHS; triangle ABC = triangle DEF

Question 6

AM = CM and BM = DM (given, diagonals bisect each other), and all four angles at M are 90 degrees (diagonals perpendicular)	**B1**
triangle AMB = triangle CMB (SAS: AM = CM, angle AMB = angle CMB = 90, MB common); hence AB = CB	**B1**
triangle CMB = triangle CMD (SAS: CM common, angle CMB = angle CMD = 90, MB = MD); hence CB = CD	**B1**
triangle CMD = triangle AMD (SAS: CM = AM, angle CMD = angle AMD = 90, MD common); hence CD = AD	**B1**
combines results: AB = CB = CD = AD	**B1**
therefore all four sides of ABCD are equal, so ABCD is a rhombus (cso)	**B1**

Answer: AB = BC = CD = DA; ABCD is a rhombus

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