HIGHER

7.14 Congruent Triangles: 2-hour Pack

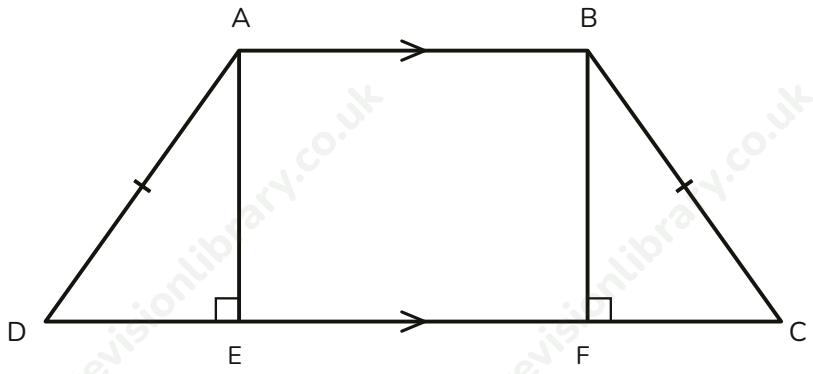
EDEXCEL 1MA1 · Calculator allowed · about 120 minutes

Total Marks

Name: _____ Date: ____ / ____ / _____

Answer ALL questions. Show all your working.

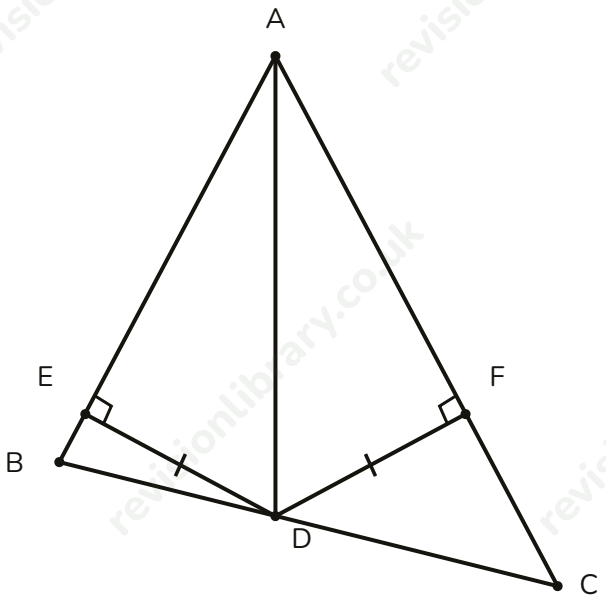
1 ABCD is a trapezium with AB parallel to DC, and AD = BC (an isosceles trapezium). E and F are the points on DC directly below A and B respectively, so that AE is perpendicular to DC and BF is perpendicular to DC. Prove that triangle ADE is congruent to triangle BCF, and hence show that angle ADC = angle BCD.



(Total for Question 1 is 6 marks)

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2 In triangle ABC, D is a point on BC. E is the foot of the perpendicular from D to AB, and F is the foot of the perpendicular from D to AC, with DE = DF. Prove that AD bisects angle BAC.



(Total for Question 2 is 5 marks)

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3 KZHT is a rectangle. Prove that triangle KZT is congruent to triangle THK.

(Total for Question 3 is 3 marks)

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4 RNHC is a rectangle. Prove that triangle RNC is congruent to triangle CHR.

(Total for Question 4 is 3 marks)

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5 Triangle ABC is congruent to triangle PQR, with angle ABC corresponding to angle PQR. Angle ABC = (4y - 12) degrees and angle PQR = (y + 15) degrees. Work out the value of y and the size of angle ABC.

(Total for Question 5 is 4 marks)

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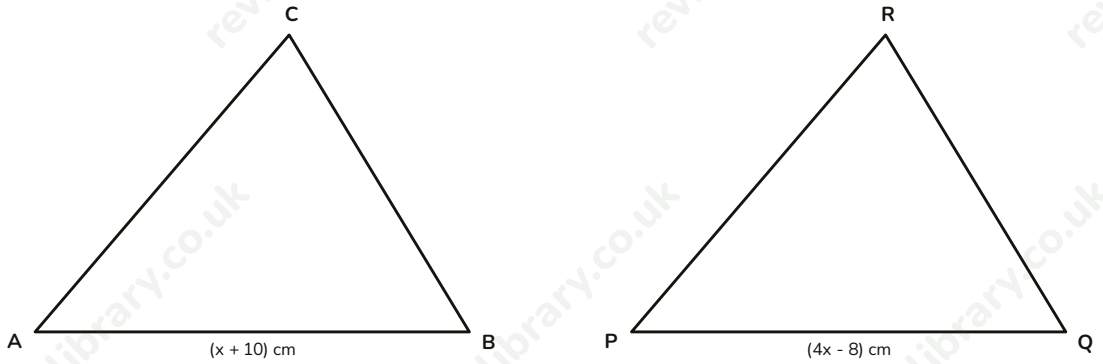
6 CJYG is a rectangle. Prove that triangle CJG is congruent to triangle GYC.

(Total for Question 6 is 3 marks)

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7 Triangle ABC is congruent to triangle PQR, with AB corresponding to PQ. AB = (x + 10) cm and PQ = (4x - 8) cm. Work out the value of x and the length of AB.

Diagram NOT accurately drawn



(Total for Question 7 is 4 marks)

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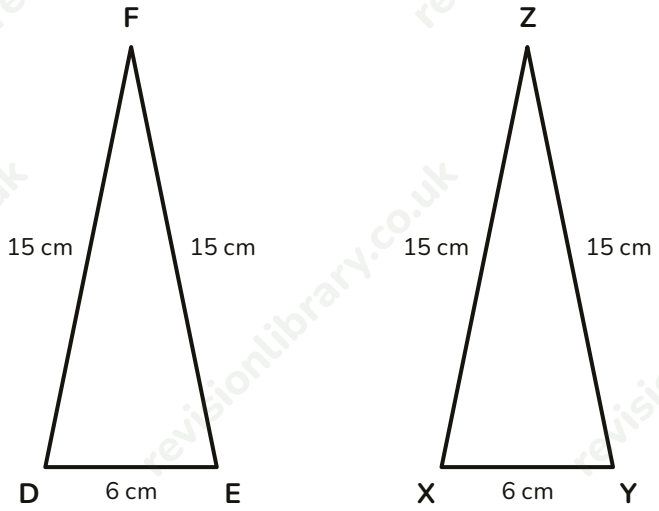
8 RVKB is a square. The diagonals meet at S. Prove that triangle RSV is congruent to triangle KSV.

(Total for Question 8 is 3 marks)

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9 Triangle DEF and triangle XYZ are such that DE = XY = 6 cm; DF = XZ = 15 cm; EF = YZ = 15 cm. Can you be sure that the two triangles are congruent? Give a reason for your answer.

Diagram NOT accurately drawn



(Total for Question 9 is 2 marks)

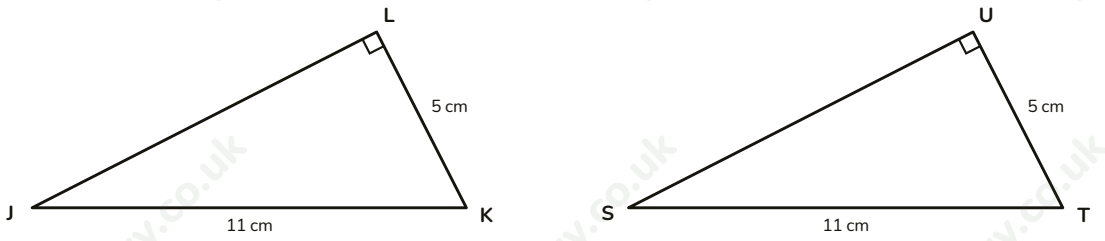
10 BWGR is a square. The diagonals meet at U. Prove that triangle BUW is congruent to triangle GUW.

(Total for Question 10 is 3 marks)

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11 Triangle JKL and triangle STU are such that KL = TU = 5 cm; JK = ST = 11 cm; angle JLK = angle SUT = 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 11 is 2 marks)

12 YKT is an isosceles triangle with YK = YT. N is the midpoint of KT. Prove that triangle YKN is congruent to triangle YTN.

(Total for Question 12 is 3 marks)

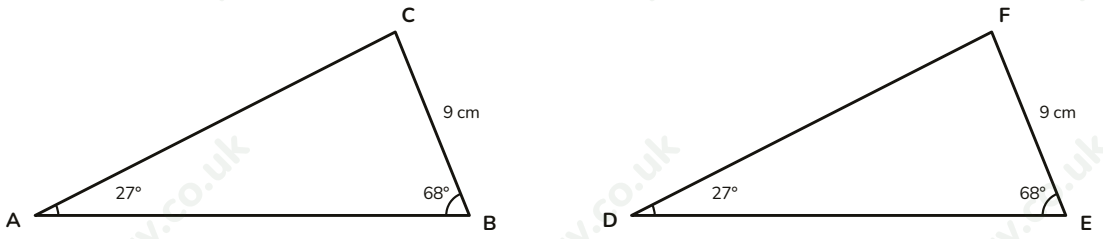
13 Triangle ABC is congruent to triangle PQR, with angle ABC corresponding to angle PQR. Angle ABC = (4y - 18) degrees and angle PQR = (y + 18) degrees. Work out the value of y and the size of angle ABC.

(Total for Question 13 is 4 marks)

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14 Triangle ABC and triangle DEF are such that angle ABC = angle DEF = 68 degrees; angle BAC = angle EDF = 27 degrees; BC = EF = 9 cm. Can you be sure that the two triangles are congruent? Give a reason for your answer.

Diagram NOT accurately drawn



(Total for Question 14 is 2 marks)

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15 RTYJ is a parallelogram. The diagonal RY splits it into triangles RTY and YJR. Prove that triangle RTY is congruent to triangle YJR.

(Total for Question 15 is 3 marks)

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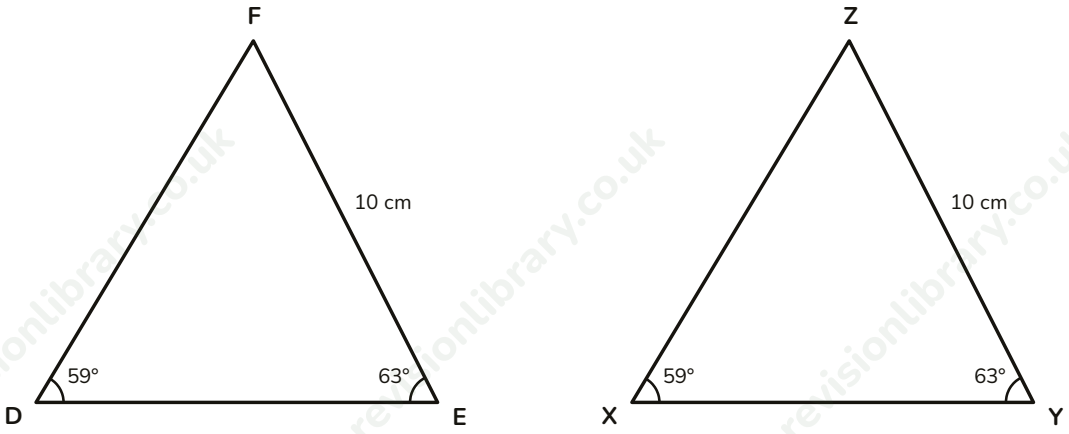
16 Triangle ABC is congruent to triangle PQR, with angle ABC corresponding to angle PQR. Angle ABC = (4y - 30) degrees and angle PQR = (y + 3) degrees. Work out the value of y and the size of angle ABC.

(Total for Question 16 is 4 marks)

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17 Triangle DEF and triangle XYZ are such that angle EDF = angle YXZ = 59 degrees; angle DEF = angle XYZ = 63 degrees; EF = YZ = 10 cm. Can you be sure that the two triangles are congruent? Give a reason for your answer.

Diagram NOT accurately drawn



(Total for Question 17 is 2 marks)

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18 Triangle ABC is congruent to triangle PQR, with angle ABC corresponding to angle PQR. Angle ABC = (4y - 2) degrees and angle PQR = (y + 19) degrees. Work out the value of y and the size of angle ABC.

(Total for Question 18 is 4 marks)

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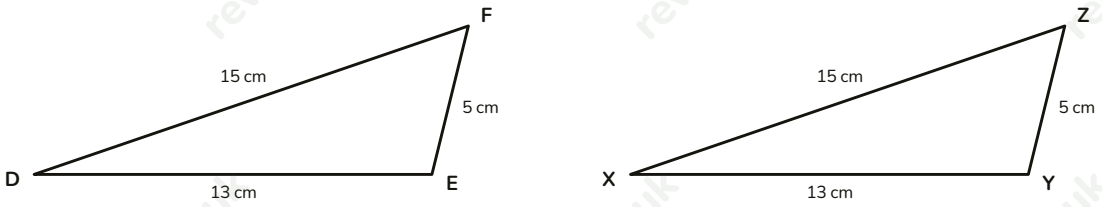
19 FGYT is a rectangle. Prove that triangle FGT is congruent to triangle TYF.

(Total for Question 19 is 3 marks)

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20 Triangle DEF and triangle XYZ are such that DF = XZ = 15 cm; EF = YZ = 5 cm; DE = XY = 13 cm. Can you be sure that the two triangles are congruent? Give a reason for your answer.

Diagram NOT accurately drawn



(Total for Question 20 is 2 marks)

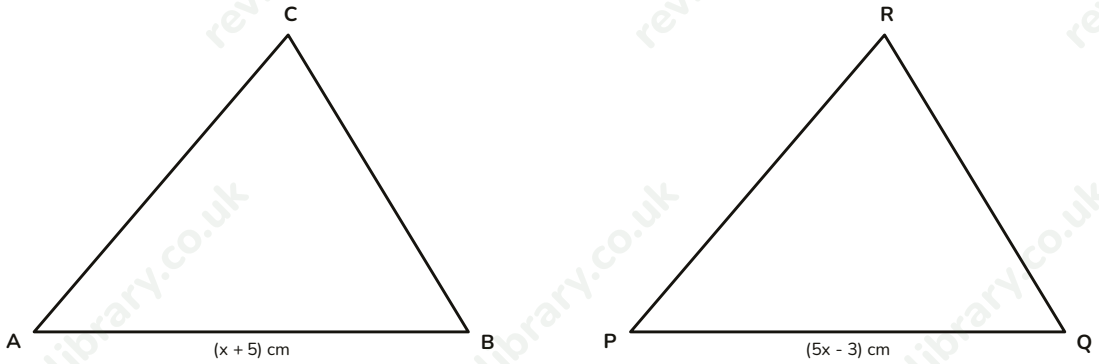
21 ARG is an isosceles triangle with AR = AG. D is the midpoint of RG. Prove that triangle ARD is congruent to triangle AGD.

(Total for Question 21 is 3 marks)

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22 Triangle ABC is congruent to triangle PQR, with AB corresponding to PQ. AB = (x + 5) cm and PQ = (5x - 3) cm. Work out the value of x and the length of AB.

Diagram NOT accurately drawn

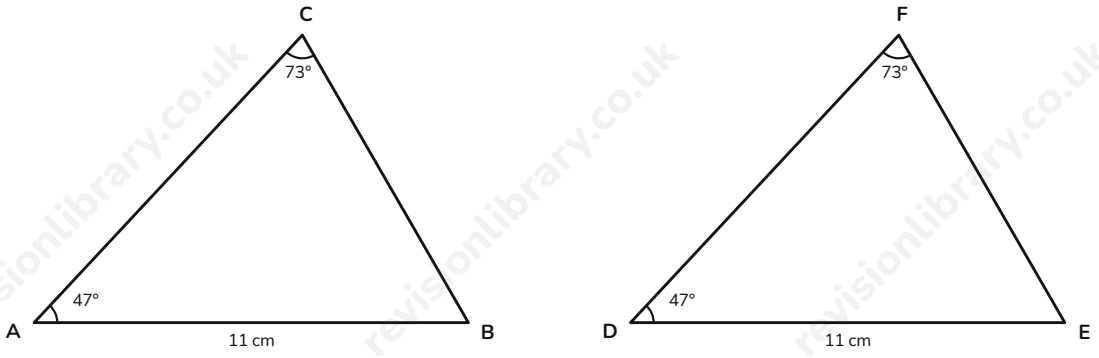


(Total for Question 22 is 4 marks)

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23 Triangle ABC and triangle DEF are such that AB = DE = 11 cm; angle ACB = angle DFE = 73 degrees; angle BAC = angle EDF = 47 degrees. Can you be sure that the two triangles are congruent? Give a reason for your answer.

Diagram NOT accurately drawn



(Total for Question 23 is 2 marks)

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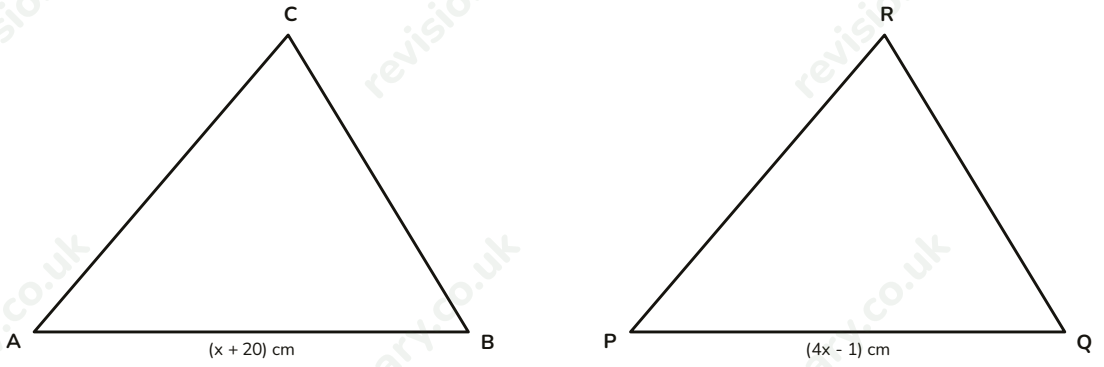
24 In quadrilateral LFMK, LF is parallel to KM and LF = KM. Prove that triangle LFM is congruent to triangle MKL.

(Total for Question 24 is 3 marks)

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25 Triangle ABC is congruent to triangle PQR, with AB corresponding to PQ. AB = (x + 20) cm and PQ = (4x - 1) cm. Work out the value of x and the length of AB.

Diagram NOT accurately drawn

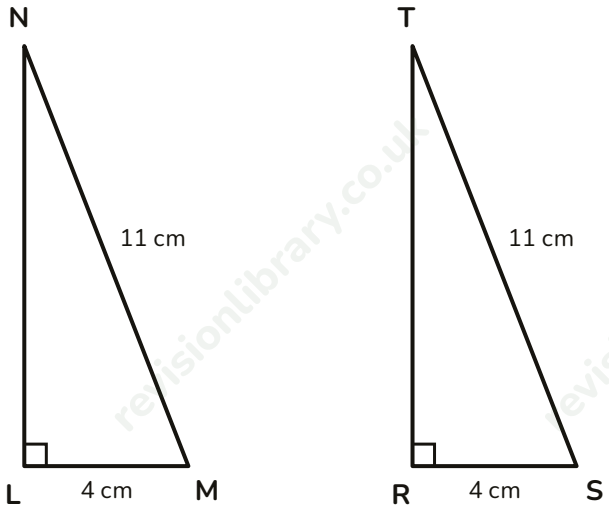


(Total for Question 25 is 4 marks)

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26 Triangle LMN and triangle RST are such that LM = RS = 4 cm; angle MLN = angle SRT = 90 degrees; MN = ST = 11 cm. Can you be sure that the two triangles are congruent? Give a reason for your answer.

Diagram NOT accurately drawn

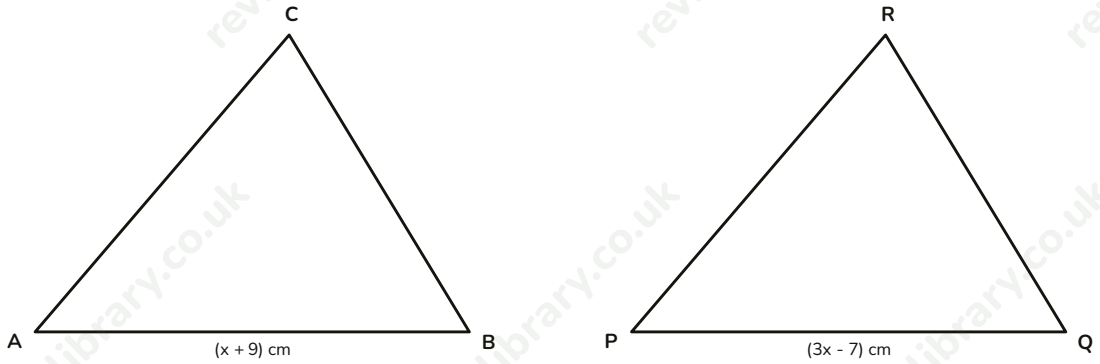


(Total for Question 26 is 2 marks)

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27 Triangle ABC is congruent to triangle PQR, with AB corresponding to PQ. AB = (x + 9) cm and PQ = (3x - 7) cm. Work out the value of x and the length of AB.

Diagram NOT accurately drawn

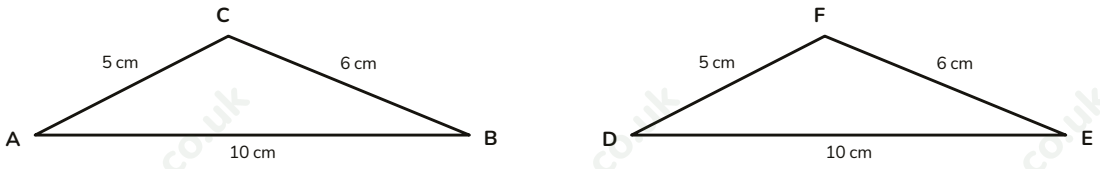


(Total for Question 27 is 4 marks)

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28 Triangle ABC and triangle DEF are such that BC = EF = 6 cm; AC = DF = 5 cm; AB = DE = 10 cm. Can you be sure that the two triangles are congruent? Give a reason for your answer.

Diagram NOT accurately drawn



(Total for Question 28 is 2 marks)

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Mark scheme · 7.14 Congruent Triangles: 2-hour Pack

Question 1

AD = BC (given, hypotenuse of each right-angled triangle)	**B1**
angle AED = angle BFC = 90 degrees (given, by construction)	**B1**
AE = BF (A and B are the same perpendicular distance from line DC)	**B1**
reason: since AB is parallel to DC, the perpendicular distance between the two parallel lines is constant	**B1**
hence RHS, triangle ADE = triangle BCF	**B1**
hence angle ADE = angle BCF, i.e. angle ADC = angle BCD (corresponding angles in congruent triangles, cso)	**B1**

Answer: Triangle ADE = Triangle BCF (RHS); angle ADC = angle BCD

Question 2

angle AED = angle AFD = 90 degrees (given)	**B1**
DE = DF (given)	**B1**
AD = AD (common side, the hypotenuse of each triangle); hence RHS, triangle ADE = triangle ADF	**B1**
hence angle DAE = angle DAF (corresponding angles in congruent triangles)	**B1**
therefore AD bisects angle BAC (cso)	**B1**

Answer: Triangle ADE = Triangle ADF (RHS); AD bisects angle BAC

Question 3

first correct statement: KZ = TH (opposite sides of a rectangle)	**B1**
second correct statement: angle ZKT = angle HTK = 90 degrees	**B1**
third statement and conclusion of congruence (SAS)	**B1**

Answer: SAS: KZ = TH (opposite sides of a rectangle); angle ZKT = angle HTK = 90 degrees; KT is common

Question 4

first correct statement: RN = CH (opposite sides of a rectangle)	**B1**
second correct statement: angle NRC = angle HCR = 90 degrees	**B1**
third statement and conclusion of congruence (SAS)	**B1**

Answer: SAS: RN = CH (opposite sides of a rectangle); angle NRC = angle HCR = 90 degrees; RC is common

Question 5

4y - 12 = y + 15	**M1**
rearranges to make y the subject	**M1**
y = 9	**A1**
angle ABC = 24 degrees	**B1**

Answer: y = 9, angle ABC = 24 degrees

Question 6

first correct statement: CJ = GY (opposite sides of a rectangle)	**B1**
second correct statement: angle JCG = angle YGC = 90 degrees	**B1**
third statement and conclusion of congruence (SAS)	**B1**

Answer: SAS: CJ = GY (opposite sides of a rectangle); angle JCG = angle YGC = 90 degrees; CG is common

Question 7

x + 10 = 4x - 8	**M1**
rearranges to make x the subject	**M1**
x = 6	**A1**
AB = 16 cm	**B1**

Answer: x = 6, AB = 16 cm

Question 8

first correct statement: RS = KS (diagonals of a square bisect each other)	**B1**
second correct statement: SV is common	**B1**
third statement and conclusion of congruence (SAS)	**B1**

Answer: SAS: RS = KS (diagonals of a square bisect each other); SV is common; angle RSV = angle KSV = 90 degrees (diagonals of a square are perpendicular)

Question 9

Yes	**B1**
SSS given as the reason	**B1**

Answer: Yes, SSS

Question 10

first correct statement: BU = GU (diagonals of a square bisect each other)	**B1**
second correct statement: UW is common	**B1**
third statement and conclusion of congruence (SAS)	**B1**

Answer: SAS: BU = GU (diagonals of a square bisect each other); UW is common; angle BUW = angle GUW = 90 degrees (diagonals of a square are perpendicular)

Question 11

Yes	**B1**
RHS given as the reason	**B1**

Answer: Yes, RHS

Question 12

first correct statement: YK = YT (given)	**B1**
second correct statement: KN = TN (N is the midpoint)	**B1**
third statement and conclusion of congruence (SSS)	**B1**

Answer: SSS: YK = YT (given); KN = TN (N is the midpoint); YN is common

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Question 13

4y - 18 = y + 18	**M1**
rearranges to make y the subject	**M1**
y = 12	**A1**
angle ABC = 30 degrees	**B1**

Answer: y = 12, angle ABC = 30 degrees

Question 14

Yes	**B1**
AAS given as the reason	**B1**

Answer: Yes, AAS

Question 15

first correct statement: RT = YJ (opposite sides of a parallelogram)	**B1**
second correct statement: TY = JR (opposite sides of a parallelogram)	**B1**
third statement and conclusion of congruence (SSS)	**B1**

Answer: SSS: RT = YJ (opposite sides of a parallelogram); TY = JR (opposite sides of a parallelogram); RY is common

Question 16

4y - 30 = y + 3	**M1**
rearranges to make y the subject	**M1**
y = 11	**A1**
angle ABC = 14 degrees	**B1**

Answer: y = 11, angle ABC = 14 degrees

Question 17

Yes	**B1**
AAS given as the reason	**B1**

Answer: Yes, AAS

Question 18

4y - 2 = y + 19	**M1**
rearranges to make y the subject	**M1**
y = 7	**A1**
angle ABC = 26 degrees	**B1**

Answer: y = 7, angle ABC = 26 degrees

Question 19

first correct statement: FG = TY (opposite sides of a rectangle)	**B1**
second correct statement: angle GFT = angle YTF = 90 degrees	**B1**
third statement and conclusion of congruence (SAS)	**B1**

Answer: SAS: FG = TY (opposite sides of a rectangle); angle GFT = angle YTF = 90 degrees; FT is common

Question 20

Yes	**B1**
SSS given as the reason	**B1**

Answer: Yes, SSS

Question 21

first correct statement: AR = AG (given)	**B1**
second correct statement: RD = GD (D is the midpoint)	**B1**
third statement and conclusion of congruence (SSS)	**B1**

Answer: SSS: AR = AG (given); RD = GD (D is the midpoint); AD is common

Question 22

x + 5 = 5x - 3	**M1**
rearranges to make x the subject	**M1**
x = 2	**A1**
AB = 7 cm	**B1**

Answer: x = 2, AB = 7 cm

Question 23

Yes	**B1**
AAS given as the reason	**B1**

Answer: Yes, AAS

Question 24

first correct statement: LF = MK (given)	**B1**
second correct statement: angle FLM = angle KML (alternate angles)	**B1**
third statement and conclusion of congruence (SAS)	**B1**

Answer: SAS: LF = MK (given); angle FLM = angle KML (alternate angles); LM is common

Question 25

x + 20 = 4x - 1	**M1**
rearranges to make x the subject	**M1**
x = 7	**A1**
AB = 27 cm	**B1**

Answer: x = 7, AB = 27 cm

Question 26

Yes	**B1**
RHS given as the reason	**B1**

Answer: Yes, RHS

Question 27

x + 9 = 3x - 7	**M1**
rearranges to make x the subject	**M1**
x = 8	**A1**
AB = 17 cm	**B1**

Answer: x = 8, AB = 17 cm

Question 28

Yes	**B1**
SSS given as the reason	**B1**

Answer: Yes, SSS

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