4CONGRUENT TRIANGLES

Pearson Edexcel - Tuesday 19 May 2020 - Paper 1 (Non-Calculator) Higher Tier

1.

			i e e e e e e e e e e e e e e e e e e e	
4	A & D	B1	cao	
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Pearson Edexcel - Tuesday 11 June 2019 - Paper 3 (Calculator) Higher Tier

2.

14	36	P1	for process to find an expression for the area of triangle eg $\frac{1}{2} \times 24 \times AE \times \sin 30 (= 6AE)$	Accept any correct expression, $eg \frac{1}{2} \times 24 \times y \times \sin 30$
		P1	(dep P1) for process to link the area of rectangle with the area of the triangle eg $2 \times \frac{1}{2} \times 24 \times AE \times \sin 30$ (= 12AE) or for $AB = 12$	
		P1	(indep) for use of given ratio eg $AE = 3AB$ oe, eg area of rectangle = $AE \times AB = 3x \times x$	May be shown on the diagram by labelling AE and AB with, for example, $3x$, x or x , $\frac{1}{3}x$ or $\frac{3}{4}x$, $\frac{1}{4}x$ Do not accept 3, 1 or 1, $\frac{1}{3}$ or $\frac{3}{4}$, $\frac{1}{4}$ for this mark.
		A1	cao	3 44

Pearson Edexcel - Tuesday 12 June 2018 - Paper 3 (Calculator) Higher Tier

3.

21	(a)	Proof	C1	for starting the proof, identifying a pair of relevant equal sides or angles with reasons from $AD = BC$ (opposite sides of a parallelogram are equal) angle $PAD = \text{angle } QCB$ (opposite angles of a parallelogram are equal) angle $ADP = \text{angle } CBQ$ (given or both 90°)	
			C1	(dep C1) for complete identification of all three equal aspects with reasons	
			C1	(dep C2) for conclusion of congruency proof	Congruency conclusion must include a reference to ASA
	(b)	Explanation	C1	for identifying a pair of equal sides or angles in $APCQ$, with reason, eg $AP = QC$ since triangle ADP is congruent to triangle CBQ	100000000000000000000000000000000000000
			C1	(dep C1) for reasoning that $APCQ$ is a parallelogram so opposite sides of a parallelogram are parallel	

Pearson Edexcel - Specimen Papers Set 2 - Paper 1 (Non-Calculator) Higher Tier

4.

12 Complete proof	 M1 Begins proof BAE=ACD and ABE=EDC M1 AB = DC because opposite sides of a parallelogram are equal C1 Completes proof with all reasons eg alternate angles are equal and reference to ASA
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Pearson Edexcel - Specimen Papers Set 1 - Paper 1 (Non-Calculator) Higher Tier

17	SAS	M1 links angles PQR and PRQ (eg isosceles triangle) with full reasons
		M1 links TR and SQ with full reasons
		C1 gives full conclusion for congruency eg SAS

Pearson Edexcel - Sample Paper 3 - (Calculator) Higher Tier

6.

ſ	13	DN = MB (given)	Proof	C1	One correct relevant statement
-		$\angle NDC = \angle MBC$ (base angles of		C1	All correct relevant statements
-		isosceles triangle)		C1	Correct conclusion with reasons
-		DC = BC (sides of a rhombus are			
-		equal)			
-		$\triangle DNC \equiv \Delta BMC \text{ (SAS)}$			
L					

Pearson Edexcel - Friday 8 November 2013 - Paper 2 (Calculator) Higher Tier

7.

*28	Proof		All for one pair of equal angles or sides with reason All for second pair of equal angles or sides with reason Completed correctly with full reasons and reason for congruence Acceptable reasons: All common (oe eg both same) Angle BAD = angle CDA (angles in a semicircle are 90°) Angle ABO = angle DCA (angles in the same segment are equal) Friangle ABD and triangle DCA are congruent - ASA OR BD = CA (diameters of the circle) Angle BAD = angle CDA (angles in a semicircle are 90°) All common Friangle ABD and triangle DCA are congruent - RHS OR BD = CA (diameters of the circle) AD = CA (diameters of the circle)
		1	riangle ABD and triangle DCA are congruent - SAS

Pearson Edexcel - Monday 14 November 2011 - Paper 4 (Calculator) Higher Tier

22	AM = MC (given M is midpoint) AL = LB (given L is midpoint) LB = MN (opp sides of a parallogram) So $AL = MN$ BN = NC (given N is midpoint) BN = LM (opp sides of a parallogram) So $LM = NC$ triangles are congruent SSS OR AM = MC (given M is midpoint) Angle $ALM = \text{angle } ABN = \text{angle } MNC$	Proof	3	M1 for either $AM = MC$ or $AL = LB$ or $BN = NC$ M1 for either $LB = MN$ or $BN = LM$ A1 for conclusion of congruency (eg SSS) with all three sides shown as equal OR M1 for $AM = MC$ M1 for either $AM = ALM $
	(corresponding angles) Angle AML = angle MCN (corresponding angles) triangles are congruent ASA OR Angles CNM = Angles NML (alternate angles)			Angle AML = angle MCN or Angle MAL = angle CMN A1 for conclusion of congruency (eg ASA) with two angles and one side shown to be equal OR
	Angle NML = Angle MLA (alternate angles) Therefore Angle MLA = Angle CNM [Then lines 2 to 7 of the first method] triangles are congruent SAS			M1 for either Angle MLA = Angle CNM or AL = LB or BN = NC M1 for either LB = MN or BN = LM A1 for conclusion of congruency (e.g. SAS) with two sides and one angle shown to be equal SC: Include appropriate pair of sides (eg. LM = NC) with justification of mid-point rule in any of above

OCR GSCE – Thursday 5 November 2020 – Paper 5 (Non-Calculator) Higher Tier

9.

9	Angle ABD = Angle CDB (alternate) BD is common oe AB = CD given oe	М3	M2 for 2 correct statements with reason[s] or 3 correct but no/incorrect reason[s] M1 for 1 correct statement with reason or 2 correct but no/incorrect reasons	Not alternative angles Accept BD = BD, BD is shared Accept same length oe for 'given'
	SAS so triangles are congruent and Angle DAB = angle BCD	A1	If 0 scored, SC1 for any attempt to prove congruency	eg attempt to list pairs of equal sides or equal angles (2 or more even if incorrect)

OCR GSCE – Tuesday 5 November 2019 – Paper 6 (Calculator) Higher Tier

11	(a)	Accept any correct reason e.g. No as lengths are unknown or lengths may be double each one or triangles are similar	1		See exemplars in appendix
	(b)	First correct reason Second correct reason Third correct reason and SAS	1 1 1	Reasons are Angle [I]G[H] = angle [L]J[K] GH = JK GI = JL	Reasons can be given in any order Allow same angle, (36), but lines must be identified

OCR GSCE – Tuesday 12 June 2018 – Paper 6 (Calculator) Higher Tier

11.

11	angle BCA = 44° and angles [in a] triangle [= 180°] or angle DCA = 56° and angles [in a] triangle [= 180°] Best two statements from: (i) [side] AC is common (ii) [angle] ACB = [angle] CAD (iii) [angle] BAC = [angle] ACD (iv) angle B = angle D or [angle] ABC = [angle] CDA	2	B1 for each to a max of 2	C = 44 (or 56) is not sufficient. Accept angles shown on diagram. 0 if alternate angles is given as the reason unless the parallelogram has been justified Notation needed for these marks. 44 = 44 is not sufficient. 56 = 56 is not sufficient "angle" required if using just B or D
	Conclusion and third statement [congruent because] ASA after stating (i), (ii), (iii) AAS after stating (i), (ii), (iv) or (i), (iii),	1		Final mark needs a third statement (ignore superfluous ones) and the appropriate congruence conclusion.
	(iv)		If 0 (or 1 for statements) scored then, to a maximum total of 2 marks, allow: SC1 for angle <i>BCA</i> = 44° and angle <i>DCA</i> = 56° stated or on diagram and SC1 for a correct statement lacking precision eg "both triangles have a common side", "both triangles have an angle of 80", "all the angles are the same"	Possible marks (without SC): 1+2+1, 1+2+0, 1+1+0, 0+2+1, 0+2+0, 0+1+0, 0+0+0.

OCR GSCE – Tuesday 6 November 2017 – Paper 5 (Non - Calculator) Higher Tier

10	AD = AB [given] oe CD = CB [given] oe AC = AC (common) oe Congruent SSS	М3	M2 for 2 correct statements with reason[s] or 3 correct but no/incorrect reason[s] M1 for 1 correct statement with reason or 2 correct but no/incorrect reasons	
	Angle ADC = angle ABC	A1	If 0 scored, SC1 for AC is a line of symmetry oe or for triangle ADC is congruent to triangle ABC oe	Accept vertical line of symmetry or reflection see diagram as well if unsure

OCR GSCE – Tuesday 13 June 2017 – Paper 6 (Calculator) Higher Tier

13.

13	Three of these	М3	M1 for each	Ignore extra facts and reasons
	 OC is common or shared OA = OB (equal) radii ∠OAC = ∠OBC tangent perpendicular to radius CA = CB tangents from a point [to a circle] RHS, SSS or SAS as appropriate 	A1 4 A02.4b	After M0, B2 three pairs of these equal sides/angles with insufficient or no reasons or B1 for two pairs of these equal sides/angles identified with insufficient or no reasons OR After M1, B1 for two further pairs of these equal sides/angles identified with insufficient or no reasons	For B marks accept if indicated on diagram

OCR GSCE – Sample Papers – Paper 4 (Calculator) Higher Tier

14.

10		e.g.	3	B2 for two facts with conclusion	Each fact must be backed up
		BD is common	1 AO1.1	or	with a reason
		ABD = BDC (alternate angles)	2 AO2.4b	B2 for three facts with conclusion	
		AB = CD (parallelogram)		missing or unclear	
		So triangles ABD and CBD are congruent by		or	
		SAS		B1 for one correct fact	

AQA GSCE – Thursday 4 June 2020 – Paper 2 (Calculator) Higher Tier

	SAS	B1			
2	Additional Guidance				

AQA GSCE – Tuesday 21 May 2019 – Paper 1 (Non - Calculator) Higher Tier 16.

	Alternative method 1: shows that BAC = ACD and alternate angles					
	ACD = ABC	M1	accept both with same letter on diagram			
	ABC = BAC	M1	accept both with same letter on diagram			
	BAC = ACD and alternate segment (theorem) with M2 awarded	M1dep	dep on M2			
	Other two correct reasons given with M3 awarded	A1	eg (base angles of) isosceles triangle and alternate angles			
20(a)	Alternative method 2: shows that ABC + BCD = 180 and co-interior angles					
20(0)	ACD = ABC	M1	accept both with same letter on diagram			
	ABC = BAC	M1	accept both with same letter on diagram			
	BCD = 180 – (BAC + ABC) + ACD and ABC + BCD = 180 and alternate segment (theorem) with M2 awarded	M1dep	oe dep on M2			
	Other two correct reasons given with M3 awarded	A1	eg (base angles of) isosceles triangle and (co-)interior angles or allied angles			
	The mark scheme for question 20(a) continues on the next page					

	Alternative method 3: line from midpoint of AB to C is perpendicular to AB and CD						
	Let M be the midpoint of AB and MC is perpendicular to AB	M1	any letter				
	MC is perpendicular to CD	M1					
	AB and CD are both perpendicular to MC with M2 awarded	M1dep	oe dep on M2				
	Three correct reasons given with M3 awarded	A1	eg (perpendicular bisector of) isosceles triangle and MC goes through the centre of the circle and tangent is perpendicular to radius				
	Additional Guidance						
20(a) (cont)	Other correct methods can be found lines. For example, by extending BC angles as a proof instead of alternation in the reasons required for the last m						
	In the scheme, ACD (for example) macD						
	Accept equality of angles indicated by not by arcs						
	Accept (angle) B for angle ABC						
	Do not accept (angle) A for angle BAC or (angle) C for angle ACB unless intention is clear from annotation of the diagram						
	For the third mark in alternative method 2, accept algebraic expressions for angles if clearly marked on the diagram						
	Do not award marks for an argument based only on assumed values of angles, but ignore 60° marked on diagram, which is for (b)						
	Ignore an angle marked at ADC						
	Ignore incorrect statements that do n eg ACD is an isosceles triangle (but						

20(b)	✓ AB is parallel to DC ✓ AC bisects angle BCD AC bisects angle BAD	B1					
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	Ad	iditional	Guidano	e	<u> </u>		
AQA GSCE	E – Tuesday 6 November 2018 – Pa	aper 1 (Non - Ca	lculator) Higher	Tier		
17.							
11	A and D	B1					
	A dia B						
AQA GSCE 18.	E – Wednesday 25 May 2017 – Pap	er 1 (N	on - Cald	culator) Higher 1	Γier		
	T						
2	ASA		B1				
AQA GSCE 19.	E – Tuesday 13 June 2017 – Paper 3	3 (Calcu	ılator) H	igher Tier			
	Could be true		B1				
8(a)		Add	litional (Guidance			
	Must be true		B1				
8(b)	Additional Guidance						
AQA GSCE	AQA GSCE – Sample Paper 2 (Calculator) Higher Tier						
20.							
2	AAA		B1				