

4 CONGRUENT TRIANGLES

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

1.

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 $\frac{1}{2} \times 24 \times y \times \sin 30$ 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.
		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 = $AE \times AB = 3x \times x$	
		A1	cao	

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 $PAD =$ angle QCB (opposite angles of a parallelogram are equal) angle $ADP =$ angle CBQ (given or both 90°)	Congruency conclusion must include a reference to ASA
			C1	(dep C1) for complete identification of all three equal aspects with reasons	
			C1	(dep C2) for conclusion of congruency proof	
	(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	
			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

5.

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

6.

13	$DN = MB$ (given) $\angle NDC = \angle MBC$ (base angles of isosceles triangle) $DC = BC$ (sides of a rhombus are equal) $\therefore \triangle DNC \cong \triangle BMC$ (SAS)	Proof	C1 One correct relevant statement C1 All correct relevant statements C1 Correct conclusion with reasons
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Pearson Edexcel - Friday 8 November 2013 - Paper 2 (Calculator) Higher Tier

7.

*28		Proof	3	M1 for one pair of equal angles or sides with reason M1 for second pair of equal angles or sides with reason C1 for proof completed correctly with full reasons and reason for congruence Acceptable reasons: AD 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) Triangle ABD and triangle DCA are congruent - ASA OR $BD = CA$ (diameters of the circle) Angle $BAD =$ angle CDA (angles in a semicircle are 90°) AD common Triangle ABD and triangle DCA are congruent - RHS OR $BD = CA$ (diameters of the circle) AD is common Angle $ADB =$ angle CAD (base angles of an isosceles triangle are equal.) Triangle ABD and triangle DCA are congruent - SAS
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Pearson Edexcel - Monday 14 November 2011 - Paper 4 (Calculator) Higher Tier

8.

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

11.

11		<p>angle $BCA = 44^\circ$ and angles [in a] triangle [= 180°] or angle $DCA = 56^\circ$ and angles [in a] triangle [= 180°]</p> <p>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</p> <p>Conclusion and third statement [congruent because] ASA after stating (i), (ii), (iii) AAS after stating (i), (ii), (iv) or (i), (iii), (iv)</p>	1		<p>$C = 44$ (or 56) is not sufficient. Accept angles shown on diagram.</p> <p>0 if alternate angles is given as the reason unless the parallelogram has been justified</p> <p>Notation needed for these marks.</p> <p>$44 = 44$ is not sufficient. $56 = 56$ is not sufficient "angle" required if using just B or D</p> <p>Final mark needs a third statement (ignore superfluous ones) and the appropriate congruence conclusion.</p> <p>Possible marks (without SC): $1 + 2 + 1$, $1 + 2 + 0$, $1 + 1 + 0$, $0 + 2 + 1$, $0 + 2 + 0$, $0 + 1 + 0$, $0 + 0 + 0$.</p>
			2	B1 for each to a max of 2	
			1	<p>If 0 (or 1 for statements) scored then, to a maximum total of 2 marks, allow: SC1 for angle $BCA = 44^\circ$ and angle $DCA = 56^\circ$ 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"</p>	

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

12.

10		<p>$AD = AB$ [given] oe $CD = CB$ [given] oe $AC = AC$ (common) oe Congruent SSS</p> <p>Angle $ADC =$ angle ABC</p>	M3	<p>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</p>	<p>Accept vertical line of symmetry or reflection see diagram as well if unsure</p>
			A1	<p>If 0 scored, SC1 for AC is a line of symmetry oe or for triangle ADC is congruent to triangle ABC oe</p>	

16.

20(a)	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
	Alternative method 2: shows that $ABC + BCD = 180$ and co-interior angles		
	$ACD = ABC$	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		

20(a) (cont)	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		
	Other correct methods can be found by extending one or more of the lines. For example, by extending BC it is possible to use corresponding angles as a proof instead of alternating angles. This should be reflected in the reasons required for the last mark		
	In the scheme, ACD (for example) means angle ACD and not triangle ACD		
	Accept equality of angles indicated by labelling with the same letter, but 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 not affect the proof eg ACD is an isosceles triangle (but not used in proof)			

20(b)	<input checked="" type="checkbox"/> AB is parallel to DC	B1	
	<input checked="" type="checkbox"/> AC bisects angle BCD		
	<input type="checkbox"/> AC bisects angle BAD		
Additional Guidance			

AQA GCSE – Tuesday 6 November 2018 – Paper 1 (Non - Calculator) Higher Tier

17.

11	A and D	B1	
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AQA GCSE – Wednesday 25 May 2017 – Paper 1 (Non - Calculator) Higher Tier

18.

2	ASA	B1	
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AQA GCSE – Tuesday 13 June 2017 – Paper 3 (Calculator) Higher Tier

19.

8(a)	Could be true	B1	
	Additional Guidance		

8(b)	Must be true	B1	
	Additional Guidance		

AQA GCSE – Sample Paper 2 (Calculator) Higher Tier

20.

2	AAA	B1	
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