SINE AND COSINE QUESTIONS

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

1.

18	**(a)**		5000	**4**	**M2** for $2.5 \times \frac{1}{2} \times 80 \times 100 \times \sin 30$ **oe** or **M1** for $\frac{1}{2} \times 80 \times 100 \times \sin 30$ **oe** **B1** for sin 30 = $\frac{1}{2}$ **oe soi**	Area of triangle = 2000 implies M1B1
18	**(b)**		Conditions for growing may have been different in 2019 **oe**	**1**		e.g. extremes in weather oe disease in the carrots oe 2019 may not have been an "average" year oe 2019 may not have harvested the same number as other years Assumes the same amount will grow [in 2019]

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

2.

15	**(a)**		6.0[1…] or 6 nfww	**3**	**M2** for DF² = 10² + 12² – 2 × 10 × 12 cos30 oe and allow one error or **M1** for $cos30 = \frac{10^2+12^2-DF^2}{2 \times 10 \times 12}$, condone one error	nfww i.e. not 12 × sin 30 **M2** implied by DF² = 36.15 to 36.16 if they draw a perpendicular from F to P on DG award **M1** for correct method to find both FP = 5 and PG= 8.6[6…] or 8.67 or 8.7 **M1** for correct use of Pythagoras' on triangle FPD
	(b)		57.3[…] or 57 nfww	**4**	**M2** for [sin B =] $\frac{12.4 \times sin\,63}{12.8}$ or **M1** for $\frac{sin\,B}{12.4} = \frac{sin\,63}{12.8}$ oe and **M1** for 180 – 63 – *their* 59.67	implied by [0].863… or 59.67 to 59.7

OCR GSCE – Thursday 8 June 2017 – Paper 5 (Non - Calculator) Higher Tier

3.

20			397.5 [million]	**7**	**B6** for [area of field =] 39.75 oe **OR** **B2** for [AC =] 13 or $\sqrt{169}$ Or **M1** for 5² + 12² oe **M2** for ½×5×12 + ½×3×*their* 13×sin 30 oe Or **M1** for ½ × 5 × 12 oe or ½ × 3 × *their* 13 × sin 30 oe **B1indep** for sin 30 = 0.5 oe soi	For 7 marks, condone 397 500 000 For B6, accept $\frac{159}{4}$ or better for 39.75 Check diagram for B marks and M marks *their* 13 must be *their* AC written or indicated and is not 3, 5 or 12 M2 can be given for adding costs if correct total area method is implied [30] or [9.75 oe] 9.75 implies M1B1

AQA GSCE – Thursday 6 June 2019 – Paper 2 (Calculator) Higher Tier

4.

	$\frac{1}{2} \times 14 \times AC = 80.5$	M1	oe eg $7AC = 80.5$ any letter for AC
	$\frac{80.5 \times 2}{14}$ or $\frac{161}{14}$ or 11.5	M1dep	oe eg $\frac{80.5}{7}$ implies M2 may be seen on diagram
	$\frac{1}{2} \times 19 \times$ their 11.5 $\times \sin 36$ or 64.21... or 64.22 or 64	M1	oe 64.21... or 64.22 or 64 scores M3 if no incorrect formula used
	64.2 with no incorrect formula used	A1	
	Additional Guidance		
	Answer 64.2 with no incorrect working		M3A1
	11.5 scores M2 even if not subsequently used		
16	Answer 64.2 from using 'bh' and '$ab\sin C$' (unless clear explanation that $\frac{1}{2}$ has been cancelled in both area formulae) $14 \times AC = 80.5$ $\frac{80.5}{14} = 5.75$ $19 \times 5.75 \times \sin 36$ 64.2		 M0 M0 M0 A0
	3rd M1 can be scored if they have a value for AC eg $AC = 6$ (may be seen on diagram) $\frac{1}{2} \times 19 \times 6 \times \sin 36 = 33.5$		 M0M0 M1A0
	3rd M1 may be seen in stages eg1 11.5 $\times \sin 36$ or [6.7, 6.8] $\frac{1}{2} \times 19 \times$ [6.7, 6.8] eg2 19 sin 36 or [11.1, 11.2] $\frac{11.5 \times [11.1, 11.2]}{2}$		

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

5.

26	**Alternative method 1**		
	$0.5 \times 20 \times x \times \sin 60$ or $10x \sin 60$ or $5\sqrt{3}\,x$	M1	oe
	$0.5 \times 20 \times x \times \sin 60 = 25\sqrt{3}$ or $x = 5$	M1dep	oe equation
	$(\text{their } 5)^2 + 20^2$ $- 2 \times \text{their } 5 \times 20 \times \cos 60$ or $25 + 400 - 200 \cos 60$ or 325	M1	oe their 5 must be their value of x
	$\sqrt{\text{their } 325}$	M1dep	dep on 3rd M1 their 325 can be unsimplified
	$5\sqrt{13}$	A1	
	Alternative method 2		
	$0.5 \times 20 \times h = 25\sqrt{3}$ or $h = \frac{5\sqrt{3}}{2}$	M1	oe any letter h is perpendicular height for 20 cm base
	$\sin 60 = \frac{\text{their } \frac{5\sqrt{3}}{2}}{x}$ or $x = 5$	M1dep	oe
	$(\text{their } 5)^2 + 20^2$ $- 2 \times \text{their } 5 \times 20 \times \cos 60$ or $25 + 400 - 200 \cos 60$ or 325	M1	oe their 5 must be their value of x
	$\sqrt{\text{their } 325}$	M1dep	dep on 3rd M1 their 325 can be unsimplified
	$5\sqrt{13}$	A1	

26 cont	**Alternative method 3**		
	$0.5 \times 20 \times h = 25\sqrt{3}$ or $h = \frac{5\sqrt{3}}{2}$	M1	oe any letter h is perpendicular height for 20 cm base
	$\tan 60 = \frac{\text{their } h}{c}$ or $c = \frac{5}{2}$	M1dep	oe any letter c is part of 20 cm base
	$\left(\text{their } \frac{5\sqrt{3}}{2}\right)^2 + \left(20 - \text{their } \frac{5}{2}\right)^2$ or $\left(\text{their } \frac{5\sqrt{3}}{2}\right)^2 + \left(\frac{35}{2}\right)^2$ or 325	M1dep	
	$\sqrt{(\text{their } \frac{5\sqrt{3}}{2})^2 + (20 - \text{their } \frac{5}{2})^2}$ or $\sqrt{\text{their } 325}$	M1dep	
	$5\sqrt{13}$	A1	
	Additional Guidance		
	Omitting 0.5 in area formula can score a maximum of M0M0M1M1A0		
	$\sqrt{(\text{their } 5)^2 + 20^2 - 2 \times \text{their } 5 \times 20 \times \cos 60}$		M0M0M1M1A0

AQA GSCE – Monday 24 May 2018 – Paper 1 (Non - Calculator) Higher Tier

6.

17	$\frac{x}{\sin 42°} = \frac{15}{\sin 104°}$	B1	

AQA GSCE – Thursday 6 November 2017 – Paper 2 (Calculator) Higher Tier

7.

17	**Alternative method 1**		
	$\sin 72 = \frac{h}{12}$ or $12 \sin 72$ or $\cos (90 - 72) = \frac{h}{12}$ or $12 \cos (90 - 72)$ or $\frac{h}{\sin 72} = \frac{12}{\sin 90}$ or 11.4...	M1	oe Any letter
	16 × their 11.4...	M1dep	
	[182.4, 182.603] or 183	A1	
	Alternative method 2		
	$h^2 + (12 \cos 72)^2 = 12^2$ or $h^2 + (12 \sin (90 - 72))^2 = 12^2$ or $\sqrt{12^2 - (12 \cos 72)^2}$ or $\sqrt{12^2 - (12 \sin (90 - 72))^2}$ or 11.4...	M1	oe Any letter
	16 × their 11.4...	M1dep	
	[182.4, 182.603] or 183	A1	
	Alternative method 3		
	0.5 × 16 × 12 × sin 72 or 91.3...	M1	oe eg 0.5 × 16 × 12 × sin 108
	2 × their 91.3...	M1dep	
	[182.4, 182.603] or 183	A1	
	Additional Guidance		
	2 × 16 × 12 × sin 72		M1M0A0
	$\sin = \frac{h}{12}$ or $\sin\theta = \frac{h}{12}$ (unless recovered)		M0

AQA GSCE – Wednesday 8 November 2017 – Paper 3 (Calculator) Higher Tier

8.

22	$6^2 + 9^2 - 2 \times 6 \times 9 \times \cos 120$ or $36 + 81 - 108 \cos 120$ or $36 + 81 + 54$ or 171	M1	oe
	$\sqrt{6^2 + 9^2 - 2 \times 6 \times 9 \times \cos 120}$ or $\sqrt{36 + 81 - 108 \cos 120}$ or $\sqrt{36 + 81 + 54}$	M1dep	oe
	[13, 13.1] or $\sqrt{171}$ or $3\sqrt{19}$	A1	
	Additional Guidance		
	$6^2 + 9^2 = 36 + 81$ $= 117$ Answer $\sqrt{117}$		M0

AQA GSCE – Thursday 8 June 2017 – Paper 2 (Calculator) Higher Tier

9.

20	$\frac{\sin x}{6} = \frac{\sin 125}{14}$ or $\frac{6}{\sin x} = \frac{14}{\sin 125}$	M1	oe eg $\frac{\sin x}{6} = 0.058(\ldots)$ or 0.059 or 0.06 or $\frac{6}{\sin x} = 17.(0\ldots)$ or 17.1
	$(\sin x =) \frac{\sin 125}{14} \times 6$ or 0.35(1...)	M1dep	oe eg $\sin^{-1}\left(\frac{\sin 125}{14} \times 6\right)$
	[20.5, 20.6] or 21	A1	
	Additional Guidance		
	Condone incorrect notation if recovered eg $x = \frac{\sin 125}{14} \times 6$ Answer 20.6		M2 A1
	$\frac{\sin}{6} = \frac{\sin 125}{14}$ not recovered		Zero
	Answer [20.5, 20.6] from scale drawing		M1M1A1
	Answer 21 from scale drawing		Zero
	Answer only [20.5, 20.6] or 21		M1M1A1

AQA GSCE – Sample Paper 2 (Calculator) Higher Tier

10.

24(a)	$\cos x = \frac{OA}{15}$ or $OA = 15 \cos x$	M1	
	$OA = 15 \cos x$ and $OB = 15 + 2$ and $h = OB - OA = 17 - 15 \cos x$	A1	
24(b)	$17 - 15 \cos 120$ or $15 \sin 30$ or 7.5	M1	
	24.5	A1	oe
24(c)	(180, 32)	B2	B1 one correct coordinate SC1 (32, 180)