Question	Answer	Marks	AO Element	Notes	Guidance
1(a)(i)	**M2** for $\frac{(8-2)\times 180}{8\times 2}$ oe	**2**		**M1** for $\frac{(8-2)\times 180}{8}$ or $\frac{360}{8}$ or $\frac{(2\times 8-4)\times 90}{8}$	

Question	Answer	Marks	AO Element	Notes	Guidance
1(a)(ii)	174 or 173.8....	**4**		**M3** for $\frac{1}{2} \times 6 \times OM$ oe or $\frac{1}{2} \times (OA)^2 \times \sin 45$ oe or $\frac{1}{2} \times 6 \times OA \times \sin 67.5$ oe where OA and OM are as in the **M2** or **M2** for $OM = 3 \times \tan 67.5$ oe or for $OA = \left(\frac{3}{\cos 67.5}\right)$ or $\frac{6 \times \sin 67.5}{\sin 45}$ oe or **M1** for $\frac{OM}{3} = \tan 67.5$ oe or for $\frac{3}{OA} = \cos 67.5$ oe or for $\frac{\sin 45}{6} = \frac{\sin 67.5}{OA}$ oe	

Question	Answer	Marks	AO Element	Notes	Guidance
1(b)	193 or 193.0 to 193.1	**3**		**M2** for $\pi \times \left(\frac{3}{\cos 67.5}\right)^2$ oe or **M1** for $\frac{3}{r} = \cos 67.5$ or $\frac{\sin 45}{6} = \frac{\sin 67.5}{r}$	
2(a)	87.[0] or 86.98 to 86.99	**3**		**M2** for $\sqrt{82^2 + 55^2 - 2 \times 82 \times 55 \times \cos 76}$ oe OR **M1** for $82^2 + 55^2 - 2 \times 82 \times 55 \times \cos 76$ oe **A1** for 7570 or 7566 to 7567	
2(b)	66.1 or 66.2 or 66.13 to 66.17	**3**		**M2** for $\frac{82 \times \sin 76}{their(\mathbf{a})}$ oe or **M1** for $\frac{82}{\sin C} = \frac{their(\mathbf{a})}{\sin 76}$ oe	

Question	Answer	Marks	AO Element	Notes	Guidance
2(c)	13.3 or 13.30 to 13.31	**3**		**M2** for $AG = 55\cos 76$ oe or **M1** for recognition that CG is perpendicular to AB	
2(d)	54.1 or 54.13… **and** 125.9 or 125.86 to 125.87	**5**		**B4** for 54.1 or 54.13… or 125.9 or 125.86 to 125.87 or **M3** for $[\sin Q =] \frac{0.5 \times 82 \times 55 \times \sin 76}{0.5 \times 90 \times 60}$ oe or **M2** for $0.5 \times 82 \times 55 \times \sin 76 = 0.5 \times 60 \times 90 \times \sin Q$ oe or **M1** for $0.5 \times 82 \times 55 \times \sin 76$ oe or for $0.5 \times 60 \times 90 \sin Q = \textit{their}$ area of ABC If **B4** not scored then **SC1** for two angles seen that sum to 180 (from use of sine ratio) but not 0 and 180.	

Question	Answer	Marks	AO Element	Notes	Guidance
3	77.8 or 77.77 to 77.80	**5**		**B4** for answer 22.2[%] or 22.20[%] to 22.23[%] OR **M1** for $\tan^{-1}\left(\frac{11}{4}\right)$ oe or $\tan^{-1}\left(\frac{4}{11}\right)$ oe **M2** for $4 \times 11 - \frac{\textit{their acute angle}}{360} \times \pi \times 4^2$ oe or **M1** for $\frac{\textit{their acute angle}}{360} \times \pi \times 4^2$ oe **M1** for $\frac{\textit{their shaded area}}{4 \times 11}$ [$\times 100$] oe or $\frac{\textit{their sector area}}{4 \times 11} \times 100$ oe	

Question	Answer	Marks	AO Element	Notes	Guidance
4(a)	41.2 or 41.21 to 41.23	**4**		**M1** for $SQ = 2 \times 32 \times \sin\left(\frac{1}{2} \times 56\right)$ oe or $\sqrt{32^2 + 32^2 - 2 \times 32 \times 32 \times \cos 56}$ oe or $\frac{32 \sin 56}{\sin((180 - 56) \div 2)}$ oe **M2** for $SR^2 = 47^2 + (theirSQ)^2 - 2 \times 47 \times theirSQ \times \cos 60$ or **M1** for implicit form	
4(b)	28.3 or 28.25 to 28.29…	**3**		**M2** for $32 \times \sin 62$ oe or **M1** for recognition that line from P is perpendicular to SQ	
5	14.1 or 14.12...	**3**		**M2** for $\sin 65 = \frac{12.8}{BC}$ oe or better or **M1** for recognition that the line from B is perpendicular to AC	

Question	Answer	Marks	AO Element	Notes	Guidance
6	456 or 456.4…	**4**		**M2** for $\frac{18.2}{\tan 62}$ oe or **M1** for $\tan 62 = \frac{18.2}{x}$ oe **M1** for $\frac{1}{2}((\textit{their trapezium base}) + 15.4) \times 18.2$ oe	

Question	Answer	Marks	AO Element	Notes	Guidance
7	16.6 or 16.64…	**5**		**M2** for $21 \times \frac{18}{13.5} = [AC]$ oe or **M1** for scale factor $\frac{13.5}{18}$ or $\frac{18}{13.5}$ oe soi Then Pythagoras method: and **M2** for $\sqrt{28^2 + 18^2}$ $[\div 2]$ or $\sqrt{(their\ AC)^2 + 18^2}$ $[\div 2]$ or **M1** for $AD^2 = 28^2 + 18^2$ or $AD^2 = (their\ AC)^2 + 18^2$ OR alternative trigonometry method e.g. **M1** for $\tan E = \frac{21}{13.5}$ and **M1** for $AD = \frac{18}{\cos\ their\ 57.3}$	

Question	Answer	Marks	AO Element	Notes	Guidance
8(a)	**M1** for $\left[BC^2 =\right] 80^2 + 115^2 - 2 \times 80 \times 115 \cos 72$ oe **A2** for 118.06…	**3**		**A1** for 13939…	
8(b)	67.8 or 67.9 or 67.83 to 67.88	**3**		**M2** for $[\sin B =] \frac{115 \times \sin 72}{118.1}$ oe or **M1** for $\frac{115}{\sin B} = \frac{118.1}{\sin 72}$ oe	
8(c)(i)	255	**3**		**B1** for bearing of *B* from *A* is 75 soi **M1** for 180 + 75 oe	
8(c)(ii)	[00]7.2	**2**		**M1** for *their* **(c)(i)** – *their* **(b)** –180	
8(d)	11.8 or 11.82 to 11.83	**3**		**M1** for 115 ÷ 35 oe **M1** for *their* speed in m/s × 60 × 60 ÷ 1000	

Question	Answer	Marks	AO Element	Notes	Guidance
8(e)	76.1 or 76.08 to 76.09	**3**		**M2** for $\frac{\text{distance}}{80} = \sin 72$ oe or **M1** for distance required is perpendicular to AC soi	
9(a)	**M2** for $(4x - 5)(x + 3) + (x + 1)(x - 3) = 342$ or $2x(4x - 5) - (3x - 6)(x - 3) = 342$ **M2** for $4x^2 + 12x - 5x - 15$ oe and $x^2 + x - 3x - 3$ oe seen OR $8x^2 - 10x$ and $3x^2 - 15x + 18$ seen **A1** for $5x^2 + 5x - 18 = 342$ leading to $x^2 + x - 72 = 0$	**5**		**M1** for $(4x - 5)(x + 3)$ or $(x + 1)(x - 3)$ or for $2x(4x - 5)$ or $(3x - 6)(x - 3)$ **M1** for each no errors or omission	
9(b)	**M2** for $(x + 9)(x - 8)$ **B1** for 8, –9	**3**		**B1** for $(x - a)(x + b)$ where $ab = -72$ or $a + b = 1$ and a, b are integers	

Question	Answer	Marks	AO Element	Notes	Guidance
9(c)	86	**2**		**FT** for $12 \times$ *their* $x - 10$ (x positive) **B1** for any one of 27, 11, 16 seen or for $2x + 2x + 4x - 5 + 4x - 5$ oe or better soi	
9(d)	22.2 or 22.16 to 22.17	**2**		**M1** for $\tan = \frac{11}{27}$ or $\frac{\textit{their } x + 3}{4 \times \textit{their } x - 5}$	
10(a)	[0]38 or [0]37.9 or [0]37.87...	**2**		**M1** for $\tan = \frac{350}{450}$ oe If 0 scored, **SC1** for answer [0]52 or [0]52.1 or [0]52.12 to [0]52.13	

Question	Answer	Marks	AO Element	Notes	Guidance
10(b)	624 or 623.8 to 623.9	**6**		**M2** for $450 - 400\sin 50$ or **M1** for $\sin 50 = \frac{\ldots}{400}$ **M2** for $350 + 400\cos 50$ or **M1** for $\cos 50 = \frac{\ldots}{400}$ **M1** for $(\textit{their}\ (450 - 400\sin 50))^2 + (\textit{their}\ (350+400\cos 50))^2$	
10(c)	10 min 8 s	**4**		**B3** for 10.1 or 10.13… or **M2** for (400 + 350 + 450 + *their DA*) ÷ 3 [÷ 60] oe or **M1** for any distance ÷ 3 **M1** for rounding *their* minutes into minutes and seconds to nearest second if clearly seen	

Question	Answer	Marks	AO Element	Notes	Guidance
11(a)	**B2** for $\angle ACD = 46$ soi **M2** for $\frac{58 \sin 108}{\sin \textit{their}46}$ **A1** for 76.68… nfww	**5**		**B1** for angle $ADC = 108$ or angle $DCB = 18$ **M1** for $\frac{\sin 108}{x} = \frac{\sin \textit{their}46}{58}$ oe	
11(b)	10.9 or 10.91 to 10.94	**3**		**B2** for [AB =] 68.9 or 68.91 to 68.94 or **M2** for a correct explicit statement for AB or BD or **M1** for $\frac{AB}{76.7} = \cos 26$ oe	
					[Total: 96]