Question	Answer	Marks	Guidance
1	State or imply that $\cos\theta = \frac{1}{3}\sqrt{5}$	B1	or exact equivalent.
	Substitute appropriate values into $\sin\theta\cos 60° + \cos\theta\sin 60°$	M1	
	Obtain $\frac{1}{3} + \frac{1}{6}\sqrt{15}$	A1	or exact equivalent.
		3	

Question Number	Scheme	Marks
8 (i)	Substitutes a value e.g. $n = 6$ into $n^2 + 3n + 1$ where $n^2 + 3n + 1$ is **not prime**	M1
	Correct calculation for that value e.g $n^2 + 3n + 1 = 55$ And conclusion "which is not prime"	A1
		(2)
(ii)	Attempts to find $n^2 - 2$ for either odds or evens E.g Attempts $(2p+1)^2 - 2$ or $(2p)^2 - 2$	M1
	Achieves either $(2p+1)^2 - 2 = 4p^2 + 4p - 1$ or $(2p)^2 - 2 = 4p^2 - 2$ and shows or gives a reason why the expression is not a multiple of 4 where required (see notes)	A1
	Attempts to find $n^2 - 2$ for both odds and evens (See above)	dM1
	Achieves both $(2p+1)^2 - 2 = 4p^2 + 4p - 1$ and $(2p)^2 - 2 = 4p^2 - 2$ and shows or gives reasons why these are not multiples of 4 where required (see notes) With a conclusion that they are not multiples of 4. *	A1*
		(4)
		(6 marks)

Question Number	Scheme	Marks
5 (a)	$D = 8 + 5\sin\left(\frac{\pi \times 2}{6} + 3\right) = 4.07$	B1
		(1)
(b)	(b) $6 = 8 + 5\sin\left(\frac{\pi t}{6} + 3\right) \Rightarrow \sin\left(\frac{\pi t}{6} + 3\right) = -\frac{2}{5}$	M1 , A1
	$\Rightarrow \left(\frac{\pi t}{6} + 3\right) = \arcsin\left(-\frac{2}{5}\right) = \text{Any of } 3.55,\ 5.87, 9.84, 12.2$	dM1
	$\Rightarrow t = \text{Any of } \frac{6(3.55-3)}{\pi}, \frac{6(5.87-3)}{\pi}, \frac{6(9.84-3)}{\pi}, \frac{6(12.2-3)}{\pi}$	ddM1
	13:04 or 1:04 pm	A1
		(5)
		Total 6

Question Number	Scheme		Marks
1.			
		One correct set a, b & c	B1
		Two correct rows	M1
		Fully correct + statement	A1
			(3 marks)

a	b	c	abc
2	**15**	**3**	**90**
3	**9**	**8**	**216**
4	**1**	**15**	**60**
All values of abc are multiples of 6			

Question	Scheme	Marks
3(i)	E.g. $n=1:\ 2^3-1^3=7$, $n=2: 3^3-2^3=19$, $n=3:\ 4^3-3^3=\ldots$ Or identifies counterexample directly.	M1
	e.g. $6^3-5^3=91=7\times13$ so not true for n = 5, hence statement is not true.	A1
		(2)
	Notes for part (i) **M1:** Shows evidence of trying to find a counter example for a positive integer (at least one attempt). 2^3-1^3 is prime is sufficient. **A1:** Gives a correct counter example with reason (shows factorisation) and concludes e.g. "which is not prime". Ignore any previous "incorrect" attempts e.g. $6^3-5^3=91$ which is prime. Note n = 7 (169 = 13×13) and n = 8 (217 = 7×31) and n = 12 (469 = 7×67) are the next few counter examples. (Bigger examples are not likely to be seen!) Allow equivalent reasons for not being prime e.g. 169/13 = 13 or 169 is divisible by 13 (condone "can be divided by 13") **Generally algebraic approaches score no marks unless they substitute numbers as indicated above.**	
3(ii)	**The majority of methods here will follow ways 1, 2 or 3 below** **In these cases the general guidance is as follows:** M1: Attempts to find • the gradient of any relevant line, e.g. *AC* or *BC* **or** • the length of any relevant line, e.g. AB/AB^2 or BC/BC^2 or AC/AC^2 **or** • the mid-point *M* of line *AB* A1: Correct **relevant** calculation of • gradients *AC* and *BC* • lengths of lines AB/AB^2, BC/BC^2 and AC/AC^2 • mid-point of line *AB* dM1: Full attempt at combining all **relevant** information required to solve the problem • attempts product of gradients or equivalent • attempts to show Pythagoras $AB^2 = AC^2 + BC^2$ • attempts to show $MA^2 = MC^2$ A1: Correct calculations or equivalent providing required evidence for the above A1: Provides correct reason and conclusion with all previous marks scored.	

Question Number	Scheme	Marks
10	Sets $m=3p+1$ or $m=3p+2$ ($p>0$) o.e. and attempts m^2+3m+2	M1
	E.g. $m^2+3m+2=(3p+1)^2+3(3p+1)+2=9p^2+15p+6=3(3p^2+5p+2)$	A1
	Sets $m=3p+1$ and $m=3p+2$ ($p>0$) and attempts m^2+3m+2	dM1
	E.g. $m^2+3m+2=(3p+2)^2+3(3p+2)+2=9p^2+21p+12=3(3p^2+7p+4)$	
	And gives a minimal conclusion *	A1*
		(4 marks)

Question Number	Scheme	Marks
9.(a)	(If x and y are positive) $(\sqrt{x}-\sqrt{y})^2 \ldots 0 \Rightarrow x - \ldots\sqrt{xy} + y \ldots 0$	M1
	$\Rightarrow x-2\sqrt{xy}+y \ldots 0$	A1
	$\Rightarrow \dfrac{x+y}{2} \ldots \sqrt{xy}$	A1*
		(3)
(b)	States for example when $x=-8, y=-2$, $\dfrac{x+y}{2}=-5$, $\sqrt{xy}=4$ so	B1
	$\dfrac{x+y}{2} < \sqrt{xy}$	**(1)**
		(4 marks)

Question	Answer	Marks	Guidance
1	Solve $2x-5=x$ to obtain $x=5$	**B1**	
	Attempt solution of linear equation where signs of $2x$ and x are different	**M1**	
	Obtain $x=\frac{5}{3}$	**A1**	
	Conclude $x<\frac{5}{3}$, $x>5$	**A1**	Must be 2 separate inequalities. Allow equivalents $\left(-\infty,\dfrac{5}{3}\right)\cup(5,\infty)$.
	Alternative method for question 1		
	State or imply non-modulus equation $(2x-5)^2=x^2$	**B1**	
	Attempt solution of 3-term quadratic equation	**M1**	
	Obtain $\frac{5}{3}$ and 5	**A1**	
	Conclude $x<\frac{5}{3}$, $x>5$	**A1**	Must be 2 separate inequalities. Allow equivalents $\left(-\infty,\dfrac{5}{3}\right)\cup(5,\infty)$.
		4	

Question	Answer	Marks	Guidance
3	Expand at least one of $\sin(2\theta+30)$ and $\cos(2\theta+60)$ correctly	B1	
	Attempt expansions and division by $\cos 2\theta$ to obtain equation in $\tan 2\theta$ only	*M1	
	Obtain $\tan 2\theta = \frac{4}{6\sqrt{3}}, \frac{2}{3\sqrt{3}}, \frac{2\sqrt{3}}{9}, 0.3849...$	A1	OE
	Obtain $\theta = 10.5$	A1	AWRT, e.g. 10.525… A0 for 0.184 radians
	Use correct process to find second value of θ	DM1	$\frac{180^\circ + their 2\theta}{2}$ or $90^\circ + their\theta$ Allow if using radians correctly
	Obtain $\theta = 100.5$	A1 FT	AWRT; and no other answers within the range.
		6	