Question Number	Scheme	Marks
4 (a)	$(3+2x)^6$	
	First term 3^6 or 729	B1
	Term in x, x^2 or x^3: Award for one of ${}^6C_5(3)^5(2x)^1$, ${}^6C_4(3)^4(2x)^2$ or ${}^6C_3(3)^3(2x)^3$	M1
	Two of $...+2916x+4860x^2+4320x^3+...$	A1
	$(3+2x)^6 = 729+2916x+4860x^2+4320x^3+...$	A1
		(4)
(b)	Attempts one correct term $2x^2\times"729"$ **or** $\pm\frac{1}{6x}\times"4320"x^3$	M1
	Attempts to combine the correct two terms $2x^2\times"729"\pm\frac{1}{6x}\times"4320"x^3=...x^2$	dM1
	738 but condone $738x^2$	A1
		(3)
		Total 7

(a)

B1: Correct first term 3^6 or 729 which must be seen in part (a)

M1: Correct attempt at term 2, 3 or 4. Condone a missing bracket.

Look for the correct binomial coefficient (C notation or bracket form), the correct power of 3 and the correct power of *x*.

So condone attempts such as ${}^6C_4(3)^4\,2x^2$ and even ${}^6C_3(3)^3\,x^3$

If there isn't an intermediate form given, then the mark is awarded for a correct term 2, 3 or 4.

A1: Two correct and simplified of $...+2916x+4860x^2+4320x^3+...$

A1: $(3+2x)^6 = 729+2916x+4860x^2+4320x^3+....$ Allow this to be given/written as a list.

ISW after a correct answer

(b)

M1: Attempts one of the two terms (or one of the two coefficients required to find the coefficient of x^2).

Look for $2x^2\times"729"$ **or** $\pm\frac{1}{6x}\times"4320"x^3$ which may be seen amongst a larger list or sum of terms.

Condone slips, e.g 729 written as 792 but the 2 and/or the $\frac{1}{6}$ must be used correctly.

dM1: Attempts the term in x^2 or the coefficient in x^2 using a correct combination of terms.

Look for $2x^2\times"729"\pm\frac{1}{6x}\times"4320"x^3$ leading to a single term in x^2 or the combined coefficient of x^2

A1: 738 but condone $738x^2$.

Alt (a) via removal of common factor:

$$(3+2x)^6 = 3^6\left(1+\frac{2}{3}x\right)^6 = 3^6\left(1+6\times\frac{2}{3}x+\frac{6\times5}{2}\times\left(\frac{2}{3}x\right)^2+\frac{6\times5\times4}{6}\times\left(\frac{2}{3}x\right)^3+...\right)$$

B1: Correct first term 3^6 or 729 implied by $3^6(1+...x+...)$

M1: Correct attempt at term 2, 3 or 4.

Look for a correct binomial coefficient and a correct power of $\frac{2}{3}x$.

See main scheme regarding what you can condone.

A1: Two correct and simplified of $...+2916x+4860x^2+4320x^3+...$

A1: $(3+2x)^6 = 729+2916x+4860x^2+4320x^3+....$ Allow as a list

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
	$\Rightarrow \left(\frac{\pi t}{6} + 3\right) = \arcsin\left(-\frac{2}{5}\right) =$ Any of $3.55,\ 5.87, 9.84, 12.2$	dM1
	$\Rightarrow t =$ 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

(a)

B1: Scored for sight of $8 + 5\sin\left(\frac{\pi \times 2}{6} + 3\right)$ o.e followed by 4.06, 4.07 or awrt 4.07. Units can be omitted

(b) It is acceptable to set $x = \frac{\pi t}{6} + 3$ which allows access to the first three marks

M1: Substitutes $D = 6$ and proceeds to $\sin\left(\frac{\pi t}{6} + 3\right) = k$

A1: $\sin\left(\frac{\pi t}{6} + 3\right) = -\frac{2}{5}$. o.e

dM1: Takes arcsin*k* where *k* < 0 and achieves any **correct positive value** for their arcsin*k*

Any of $3.55,\ 5.87, 9.84, 12.2$ are acceptable where $k = -\frac{2}{5}$. Follow through on their $-1 < k < 0$

ddM1: Full and complete method to find a positive value of *t*

It is dependent upon both previous M's **AND** $k = -\frac{2}{5}$

Score for $t =$ Any of $\frac{6(3.55-3)}{\pi}, \frac{6(5.87-3)}{\pi}, \frac{6(9.84-3)}{\pi}, \frac{6(12.2-3)}{\pi}$

It can be implied for any *t* value to 3sf,

Score for any *t* value awrt 1.05/1.06, 5.48/5.49, 13.0/13.1, 17.5/17.6 following M1 A1dM1

A1: 13:04 or 1:04 pm. Condone/allow an answer of 13.03 or 1.03pm.

Condone one hour and 4 minutes after midday

Requires $\arcsin(-0.4) =$ awrt 9.84, $t =$ awrt 13.1 and a time of 13:03 o.e.