Question Number	Scheme	Marks
1(a)	$(1-4x)^7$	
	Correct form for term 3 or term 4: Either $\frac{7\times6}{2}(...x)^2$ **or** $\frac{7\times6\times5}{6}(...x)^3$ o.e.	M1
	$\frac{7\times6}{2}(-4x)^2$ **or** $\frac{7\times6\times5}{6}(-4x)^3$ o.e.	A1
	$=\underline{1-28x}+336x^2-2240x^3$	B1, A1
		(4)
(b)	Sets $"336"\times5-"28"k=1316$	M1
	$(k=)\ 13$	A1
		(2)
		(6 marks)

(a) Note that a correct expression scores 4/4

M1: Correct form for x^2 or x^3. Look for the correct binomial coefficient with the correct power of x. You do not need to be concerned with the -4 which may have been omitted.

Allow alternative equivalent notation for the binomial coefficient for this mark e.g. ${}^7C_2$ or ${}^7C_5$ or $\binom{7}{2}$ or $\frac{7!}{2!5!}$ etc

Condone invisible brackets for this mark e.g. ${}^7C_2\ 1^5-4x^2$

A1: Correct x^2 **or** x^3 term (which may be unsimplified). They must have a numerical expression or value for their binomial coefficient for this mark. i.e. do not allow e.g. ${}^7C_3$

Do not condone poor bracketing for this mark but may be implied by further work.

B1: For the series starting $1-28x$ (terms may be in any order or as a list)

Condone $1-28x^1$ but not e.g. $1+-28x$

isw if they subsequently incorrectly attempt to simplify their answer.

A1: $336x^2-2240x^3$ Do not accept e.g. $336x^2+-2240x^3$ unless already penalised for B1.

Allow the terms to be written as a list.

isw once the correct simplified terms have been found

(b)

M1: Adds the correct two terms using their coefficients from (a) and sets equal to 1316. (Allow misread)

Look for $"336"\times5\pm"28"k=1316$ i.e. they do not need to proceed to a value for k for this mark

If they still have x and x^2 present in the equation then these must be removed or implied by further work to score the mark. Condone transcription errors from their part (a).

If just a value is stated following an incorrect part (a), then you will need to check this.

A1: $(k=)\ 13$

Question Number	Scheme	Marks
2(a)	Midpoint of $(-2,5)$ and $(4,15)$ is $\left(\frac{-2+4}{2},\frac{5+15}{2}\right)=(1,10)$	B1
	Attempts radius ^{2} or diameter ^{2}: e.g. $D^2=(4--2)^2+(15-5)^2=136$	M1
	Radius^2 = 34	A1
	$(x-1)^2+(y-10)^2=34$	M1, A1
		(5)
(b)	$(1,10-\sqrt{34})$	B1 , dB1
		(2)
		(7 marks)

(a)

B1: Finds the midpoint of the two given points. Must be simplified to score this mark.
Can be implied by circle formula. Allow e.g. $x=1,\ y=10$ or may be without brackets. May be seen on a diagram.

M1: Attempts to find the radius^2 or diameter^2. Can be implied by the circle formula e.g.
$(x\pm...)^2+(y\pm...)^2=34$
It does not need to be correctly labelled but they must be attempting to find the difference between the *x* coordinates and the difference between the *y* coordinates before squaring.
Condone square rooting to find the radius or diameter (which may be all that is seen)
e.g. $2\sqrt{34}$, $\sqrt{136}$ $(=11.66..)$, $\sqrt{34}$ $(=5.83...)$. Allow decimals for this mark.
May be seen embedded within $x^2+y^2+2fx+2gy+c=0$

A1: Calculates the radius^2 = 34 o.e. (or allow to be implied by radius = $\sqrt{34}$)
Can be implied by circle formula or a value of $c=67$ in $x^2+y^2+2fx+2gy+c=0$

M1: Attempts correct form for the circle $(x\pm"1")^2+(y\pm"10")^2="34"$ or $(x\pm"1")^2+(y\pm"10")^2=\frac{"136"}{4}$
Do not allow this mark if they have clearly attempted to use their radius instead of their radius^2
If they have found the length of the diameter or diameter^2 however they have labelled it, then they must have attempted to divide by 4.
They may alternatively attempt $x^2+y^2+2fx+2gy+c=0$ where $f="\pm1"$, $g="\pm10"$ and $c="\pm67"$
If a centre has not been found or attempted with just values appearing in the equation then they must be correct.

A1: $(x-1)^2+(y-10)^2=34$ but not $(x-1)^2+(y-10)^2=\left(\sqrt{34}\right)^2$ isw after a correct answer
Also allow equivalent expressions e.g. $x^2+y^2-2x-20y+67=0$

(b) Note coordinates may be seen on a diagram. Do not allow $x=1$ if just the midpoint from (a) is stated.

B1: Either $x=1$ or $y=10-\sqrt{34}$ Condone lack of labelling for this mark.
Isw after an exact coordinate is seen.

dB1: Both $x=1$ and $y=10-\sqrt{34}$ Isw after both exact coordinates are seen. **Note B0B1 is not possible.**