QT Quadratic Sequences


1．A quadratic sequence is given by $U_{n}=n^{2}+2 n-4$
Write down the first six terms in the sequence．
（2 marks）

$$
\begin{aligned}
& \text { let }=(1)^{2}+2(1)-4 \\
& \begin{aligned}
& =-1 \\
2 r \theta & =(L)^{2}+L(L)-\varphi
\end{aligned} \\
& 4=(x)^{2}+2(x)-4 \\
& =4 \\
& 3 Q=(3)^{2}+2(3)-\varphi \\
& =20 \\
& \text { Ln } \theta=(L)^{2}+L(L)-\varphi \quad \text { 但 }=(\bar{\sigma})^{2}+2(\sigma)-v \\
& =1 \quad=4
\end{aligned}
$$

2．A quadratic sequence is given by $U_{n}=n^{2}+3 n$
Write down the first six terms in the sequence．
（2 marks）

$$
\begin{aligned}
(r t & =(1)^{2}+3(1) & 4 \& & =(4)^{L}+3(t) \\
& =4 & & =28 \\
2+\theta & =(L)^{L}+3(L) & 5 \& & =(5)^{2}+3(5) \\
& =10 & & =40 \\
3+Q & =(3)^{L}+3(3) & \text { S里 } & =(6)^{L}+3(6) \\
& =(8 & & =54
\end{aligned}
$$

3．The nth term of a sequence is $3 n^{2}+2 n-2$
Work out the 10th term of the sequence
（2 marks）

$$
\begin{aligned}
100 & =3(10)^{2}+2(10)-2 \\
& =3(100)+20-2 \\
& =318
\end{aligned}
$$

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4. Here are the first 6 terms of a quadratic sequence

$$
\begin{array}{llllll}
3 & 6 & 11 & 18 & 27 & 38
\end{array}
$$

Find an expression, in terms of $n$, for the $n$th term of this sequence.

$$
\begin{aligned}
& \begin{aligned}
& a+b+c=1 \\
& 3 a+b=\frac{6}{3} \underbrace{5}_{2} \underbrace{11}_{2} \underbrace{18}_{2} \underbrace{11}_{2} \\
& 28 \\
& 27
\end{aligned} \\
& 3 a+b=3 \\
& a+1+c=3 \\
& 3(1)+b=3 \quad 1+0+c=3 \\
& 3+b=3 \\
& c=2 \\
& b=0
\end{aligned}
$$

5. Here are the first 5 terms of a quadratic sequence

$$
\begin{array}{lllll}
5 & 9 & 17 & 29 & 45
\end{array}
$$

Find an expression, in terms of $n$, for the nth term of this sequence.

$$
\begin{aligned}
& 3 a+b=4 \quad a+b+c=5 \\
& 3(2)+b=4 \quad 2-2+c=5 \\
& 6=-2 \quad c=5
\end{aligned}
$$

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6. Here are the first 6 terms of a quadratic sequence

$$
\begin{array}{llllll}
2 & 9 & 22 & 41 & 66 & 97
\end{array}
$$

Find an expression, in terms of $n$, for the $n$th term of this sequence.
7. Here are the first 5 terms of a quadratic sequence

$$
\begin{array}{lllll}
18 & 11 & -2 & -21 & -46
\end{array}
$$

(a) Find an expression, in terms of n , for the $n$th term of this sequence. (3 marks)

$$
b=L
$$

(b) Calculate the 10th term in the sequence.

$$
\begin{aligned}
& -3 n^{2}+2 n+19 \\
& -3(10)^{2}+2(10)+19 \\
& -3(100)+20+19=-261
\end{aligned}
$$

$$
\begin{aligned}
& 3 a+b=-7 \\
& a+b+c=18 \\
& 3(-3)+b=-7 \\
& -3+2+c=18 \\
& -9+6=-7 \\
& -1+c=18 \\
& c=19
\end{aligned}
$$

$$
\begin{aligned}
& 3 a+b=7 \\
& a+b+c=2 \\
& 3(3)+6=2 \\
& b-2+c=2 \\
& 9+6=3 \\
& b=-L \\
& c=1
\end{aligned}
$$

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8. A quadratic sequence starts:

$$
-8 \quad 2, \quad 16 \quad 34 \ldots
$$

a) Show that the nth term is $2 n^{2}+4 n-14$

$$
\begin{array}{rlrl}
a+b+c=-8 & & =2 \\
3 a+b & =10 \\
2 a & =\frac{16}{4} \\
3 a+b & =10 & a+b+c & =-8 \\
3(2)+b & =10 & 2+4+c & =-8 \\
b & =4 & 6+c & =-8 \\
c & =-14
\end{array}
$$

$$
a n^{2}+b n+c^{(3 \text { marks })}
$$

$$
2 n^{2}+4 n-14
$$

b) Hence find the term that has the value 112.
9. a) Calculate the formula for the nth term of the following sequence:

$$
\begin{array}{r}
a+b+c=-2, \\
3 a+b= \\
2 a=1
\end{array} \underbrace{1}_{1} \underbrace{1}_{1}
$$

$$
\begin{gathered}
a n^{2}+3 n+c \\
0.5 n^{2}-0.5 n-2
\end{gathered}
$$

(3 marks)

$$
\begin{array}{ccc}
3 a+b=1 & a+b+c=-2 & 0 \cdot 5 n^{2}-0.5 n-2 \\
3(0.5)+b=1 & 0.5-0.5+c=-2 & \frac{1}{2} n^{2}-\frac{1}{2} n-2 \\
1.5+b=1 & c=-2 &
\end{array}
$$

$$
b=-0.5
$$

b) Calculate the 10th term in the sequence.

$$
\begin{gathered}
0.5(10)^{2}-0.5(10)-3- \\
50-5-2=43
\end{gathered}
$$

$$
\begin{aligned}
& 2 a^{2}+4 n-14=112 \quad(n+9)(n-2)=0 \\
& n^{2}+2 n-1=56 \\
& \therefore n=-9 \text { or } n=\text { ? } \\
& n^{2}+2 n-63=0 \quad \text { tet tear. }
\end{aligned}
$$

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10. a) Calculate the formula for the $n$th term of the following sequence:

$$
\begin{aligned}
& \begin{aligned}
a+b+c & =19 \\
3 a+b & =\underbrace{15}_{-2} \underbrace{9}_{-2} \underbrace{-8} \\
2 a & =\cdots
\end{aligned} \\
& a n^{2}+b n+c \\
& \text { (3 marks) } \\
& 3 a+b=-4 \\
& n^{2}-n+21 \\
& 3(-1)+b=-4 \quad-1-1+c=19 \\
& -3+6=4 \\
& -2+c=19 \\
& \zeta=-1 \\
& c=21 \\
& \text { b) Calculate the 10th term in the sequence. } \\
& n^{2}-n+21 \\
& (10)^{2}-(10)+21 \\
& 100-10+20=-89 .
\end{aligned}
$$

$$
\begin{aligned}
4 \text { Q } & =(4)^{2}+2(4)+1 \\
& =25 \\
58 & =(5)^{2}+2(5)+1 \\
& =36 \\
68 t & =(6)^{2}+2(6)+1 \\
& =49
\end{aligned}
$$

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12. Here are some patterns made with square tiles.

(a) Write an expression, in terms of $n$, for the number of tiles needed to make the nth pattern in this sequence.
(b) Joe says that one pattern in the sequence is made from exactly 80 tiles. Is Joe correct? Give a reason for your answer.

(b)

$$
\begin{aligned}
& n^{2}+2=80 \\
& n^{2}=28
\end{aligned}
$$

No, 78 is net a repose number ancisise aritagr

