Match the corresponding terms:

2n 2xn

2 + n add 2 onto n

$\frac{n}{2}$ $n \div 2$

$2n^2$ 2 xn xn

Completing a sequence

What

- are the next 3 terms of these sequences?
- the 30th term?

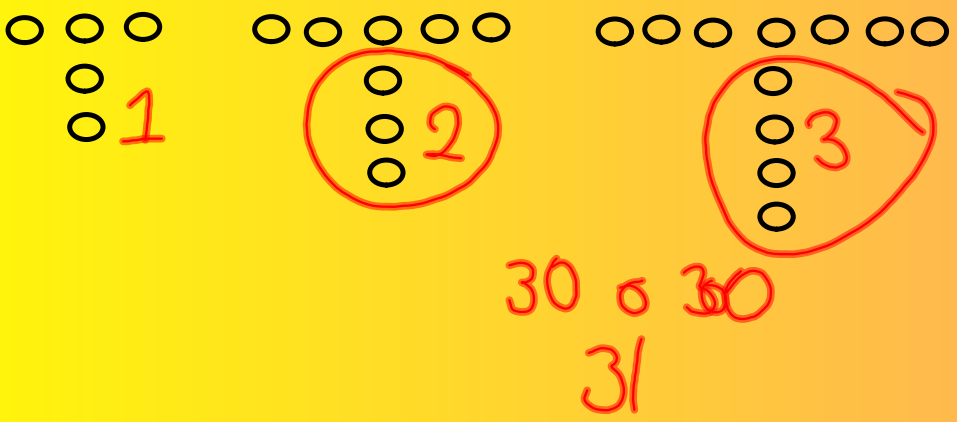
1. 2, 4, 6, 8... 10, 12, 14 — 60

2. 5, 7, 9, 11... 13, 15, 17 — 63

3. 5, 10, 15, 20... 25, 30, 35 — 150

4. 6, 11, 16, 21... 26, 31, 36 — 151

5.



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The nth term (x tables)

n	1	2	3	4	5	6	10	n^{th}
	2	4	6	8	10	12	20	2n
	3	6	9	12	15	18	30	3n
	4	9	14	19	24	29	49	5n-1
	5	10	15	20	25	30		

The rule is:

5n

The nth term

n 1 2 3 4 5 6 10 n^{th}

3, 5, 7, 9, 11, 13,

2n 2 4 6 8 10 $T_{10}=21$ $T_n=2n+1$

9,19,29,39,49,59,

10n 10 20 30 40 50 60 $T_n=10n-1$

7, 12, 17, 22, 27, 32 $T_{10}=99$

5n 5 10 15 20 25 30 $T_n=5n+2$

$T_{10}=52$

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Finding rules

n	1	2	3	4	5	6	7	8	9
	2	4	6	8	10	12	14	16	18
	0	1	2	3	4	5	6	7	8
	3	5	7	9	11	13	15	17	19
	5	10	15	20	25	30	35	40	45
	3	7	11	15	19	23	27	31	35

How to find the rule for a sequence

Look at the first 5 terms of sequence.
Work out the difference between each term
If the difference is always the same your rule
begins: difference x n.
Compare your sequence with that one.
Example:

5, 7, 9, 11, 13...

Difference is always 2, so the rule begins 2n.

compare 5, 7, 9, 11, 13...
with 2n: 2, 4, 6, 8, 10....

You need to add 3 each time
So the rule is 2n + 3.

Worksheet.

Descending Sequences

Find the 10th term and the nth term.

10,9,8,7,6..

$-n$ $-1\ -2\ -3\ -4\ -5\ \ldots$

$T_{10} = 1$

$T_n = -n + 11$

$T_n = 11 - n$

4,2,0,-2,-4..

$-2n$ $-2, -4, -6, -8, -10\ldots$ $T_n = 6 - 2n$ $T_{10} = 6 - 20 = -14$

7,4,1,-2,-5..

$-3n$ $-3, -6, -9, -12, -15\ldots$ $+10$ $T_n = 10 - 3n$

$T_{10} = 10 - 30 = -20$

$6n$ 6, 12, 18, 24

4,10,16,22,28...

Find the 10th term 58

Find the nth term $T_n = 6n - 2$

Which term has a value of 88?

$6n - 2 = 88$

$6n = 88 + 2$

$6n = 90$

$n = 15$

(-2) 30, 28, 26, 24, 22 ... ↑ +32

$-2n$ $-2, -4, -6, -8, -10 \ldots$

$T_n = -2n + 32$

40, 37, 34, 31, 28 .... (-3)

$-3n$ $-3, -6, -9, -12, -15 \ldots$ ↑ +43

$T_n = -3n + 43$

33, 28, 23, 18, 13 .. ↑ (-5)

$-5n$ $-5, -10, -15, -20, -25$ +38

$T_n = -5n + 3$

Exam style questions

Here are some sequences.
Find
a) the next 3 terms
b) the 20th term
c) the term number of the term shown in red.
d) The rule for the sequence

1) 6, 11, 16, 21, 26, 31.... 36, 41, 46 156

2) 7, 9, 11, 13, 15, 17.. 19, 21, 23 101

3) -11, -1, 9, 19, 29, 39.. 49, 59, 69 279

4) 6, 4, 2, 0, -2, -4, -6 ... -22

5) 1, 4, 9, 16, 25, 36..... 196

$T_n = 5n+1$

$T_{20} = 101$

$5n+1 = 156$
$5n = 155$
$n = 31$

$T_n = 2n+5$

$T_{20} = 45$

$2n+5 = 101$
$2n = 96$
$n = 48$

$T_n = 10n-21$

$T_{20} = 179$

$10n-21 = 279$
$10n = 300$
$n = 30$

$T_n = -2n+8$

$T_{20} = -40+8$
$= -32$

$-2n+8 = -22$
$22+8 = 2n$
$30 = 2n$
$n = 15$

Generating sequences

n	1	2	3	4	5	6	7	8	9	10	11	100
2n	2	4	6	8	10	12	14	16	18	20	22	
2n+1	3	5	7	9								
n-1	0	1	2	3	4	5	6	7	8	9	10	99
3n	3	6	9	12	15	18	21	24	27	30	33	300
3n+2	5	8	11	14	17							302

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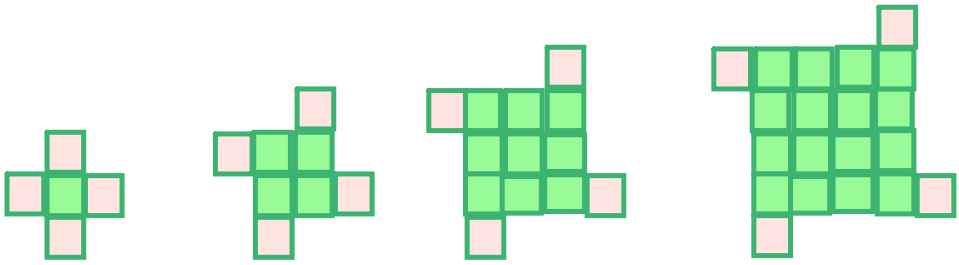
Some important sequences.

Write down the first 5 terms of sequences that have these rules:

1. n
2. $2n$
3. $2n-1$
4. $10n$
5. n^2



Windmills

1.Describe the next term

2. What will the tenth term look like?

3. How many tiles will there be on the 20th term?

4. What is the rule for finding the number of tiles?

5.Which pattern no will have 148 tiles?

Quadratic Sequences

Quadratics have a squared term.

Eg

$T_n = n^2$

n^2 1, 4, 9, 16, 25

$n^2 - 3$ -2, 1, 6, 13, 22

$n^2 + n$ 2, 6, 12, 20, 30....

Generate the first five terms of these quadratic sequences:

n^2
1
4
9
16
25

$T = 3n^2$ 3, 12, 27, 48, 75

$T = n^2 + 5$ 6, 9, 14, 21, 30

$T = 2n^2 - 3$ -1, 5, 15, 29, 47...

$T = n^2 + n$ 2, 6, 12, 20, 30....

Looking at differences:

$T = n^2$

$T = 3n^2$

$T = n^2 + 5$

$T = 2n^2 - 3$

$T = n^2 + n$

Generating quadratic sequences

	1	2	3	4	5
n^2					
n^2+3					
n^2-2					
$5n^2$					
$2+5n^2$					

Looking at differences

n^2 **1, 4, 9, 16, 25.....**

Find the first difference: 3, 5, 7, 9....

Second diff 2, 2, 2, 2....

Halve the second difference to find the co-efficient of n^2 (the no. n^2 is multiplied by)

0, 3, 8, 15, 24, 35....

1 4 9 16 25 36

First diff 3, 5, 7, 9, 11....

2nd diff 2, 2, 2, 2

related to n^2

$T_n = n^2 - 1$

6, 24, 54, 96, 150, 216, 294

6 24 54

$T_n = 6n^2$

1st diff 18, 30, 42, 54, 78 . . .

2nd diff 10, 40, 90, 160, 250, 360, 490

12, 12, 12, 12

Halve this!

related to $6n^2$

1 4 9 16 25

2 8 18 32 50

$T_n = 2n^2 + 1$

3, 9, 19, 33, 51.....

6 10 14 18

4 4 4

related $2n^2$

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2,6,12,20,30,42....

Quadratic sequences

Find the rule for these sequences.

n	1	2	3	4	5	6	7	8	9	10	11
	1	4	9	16	25	36	49	64	81	100	121
	3	6	11	18	27	38	51	66	83	102	123
	-3	0	5	12	21	32	45	60	77	96	117
	2	8	18	32	50	72	98	128	162	200	242

2	15	20	27	36	47	60	75	92

12	15	20	27	36	47	60	75	92

0	2	6	12	20	30	42	56	72

Which group of numbers do these rules generate?

T= 2n-1

T=1/2 n (n+1)

T=2n

$T=n^2$

Making the Rules

Find the rules for these sequences.
Use your rule to find the 20th term of each sequence.

1. 4, 5, 6, 7, 8, ...
2. 5, 9, 13, 17, 21....
3. 4, 15, 26, 37, 48, 59...
4. 32, 62, 92, 122, 152....
5. 3, 2, 1, 0, -1, -2.....
6. 8, 6, 4, 2, 0, -2.....
7. 2.5, 3, 3.5, 4, 4.5....
8. 7.5, 5, 2.5, 0, -2.5.....
10. 2, 5, 10, 17, 26, ...

How to use excel to generate a sequence

1. Start a new excel page
2. Type in column A the first term of your sequence.
3. In column B type your rule, starting with =.
4. Using the small black cross drag across 20 cells.

Finding Rules

Find rules for these sequences:

4 8 12 16

h 4

5,9,13,17, 21, 25...

$T_n = 4n+1$

1 4 9 16 25

-2, 1, 6, 13, 22, 33 $T_n = n^2 - 3$

1 4 9 16 25

3 12 27

3 5 7

7,16,31,52,79,112..

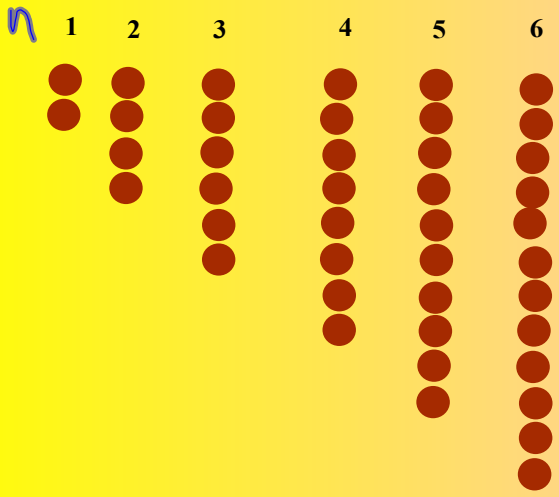
2 2

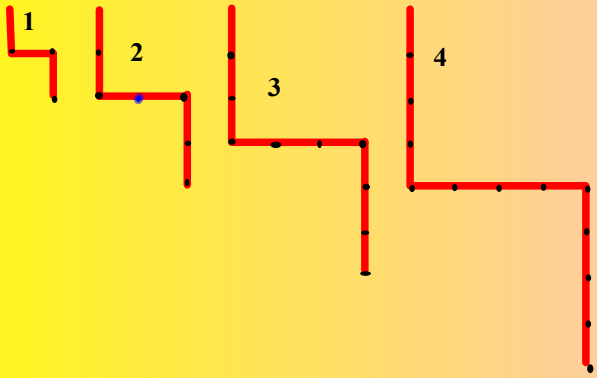
9 15 21 27 33

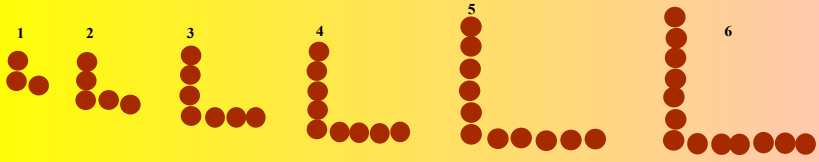
6 6 6

$T_n = 3n^2 + 4$

Patterns and rules







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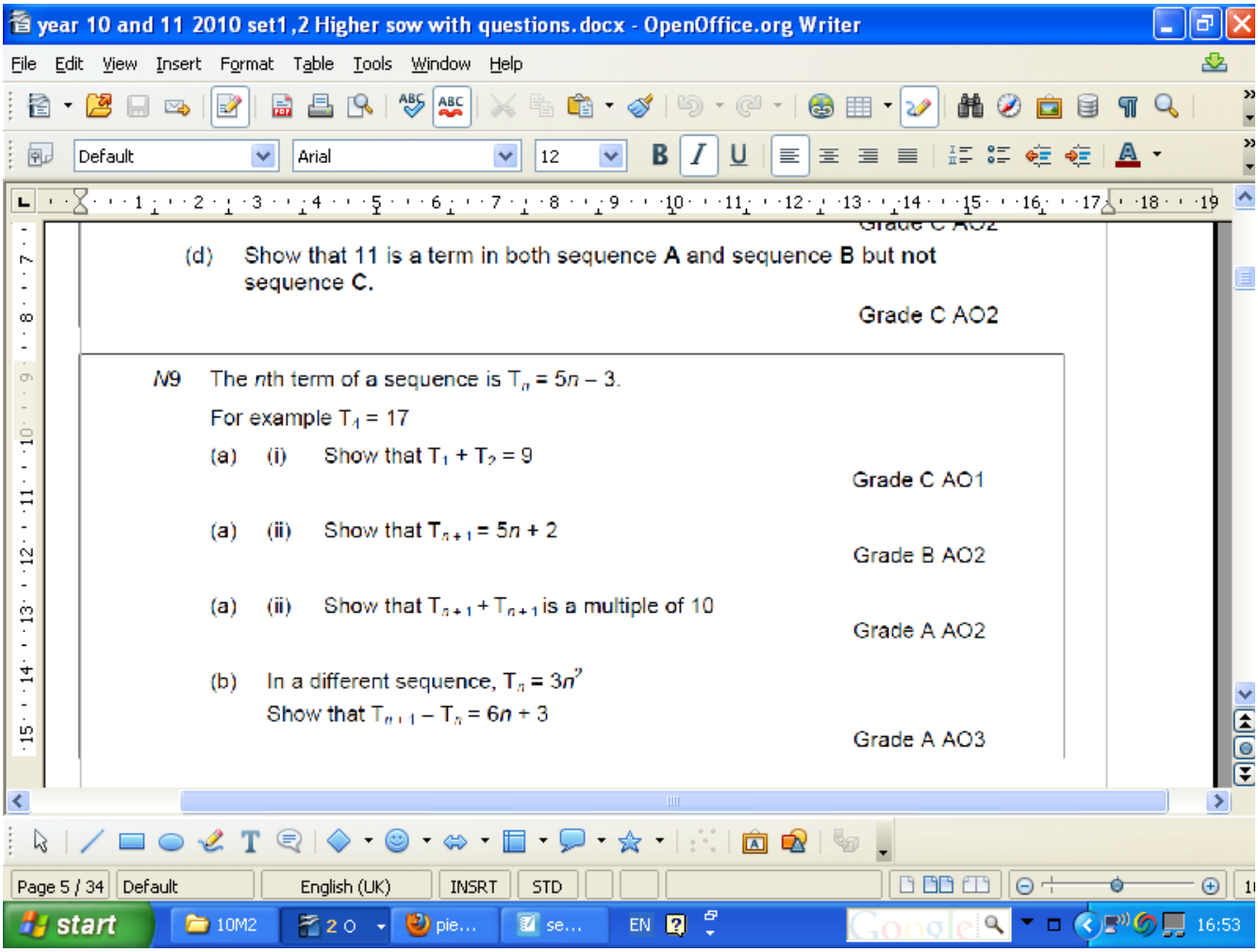
year 10 and 11 2010 set1 ,2 Higher sow with questions.docx - OpenOffice.org Writer
File Edit View Insert Format Table Tools Window Help
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(d) Show that 11 is a term in both sequence A and sequence B but not sequence C.
Grade C AO2
N9 The nth term of a sequence is $T_n = 5n - 3$.
For example $T_1 = 17$
(a) (i) Show that $T_1 + T_2 = 9$
Grade C AO1
(a) (ii) Show that $T_{n+1} = 5n + 2$
Grade B AO2
(a) (ii) Show that $T_{n+1} + T_{n+1}$ is a multiple of 10
Grade A AO2
(b) In a different sequence, $T_n = 3n^2$
Show that $T_{n+1} - T_n = 6n + 3$
Grade A AO3
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