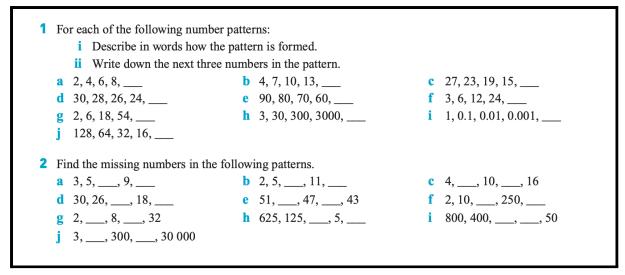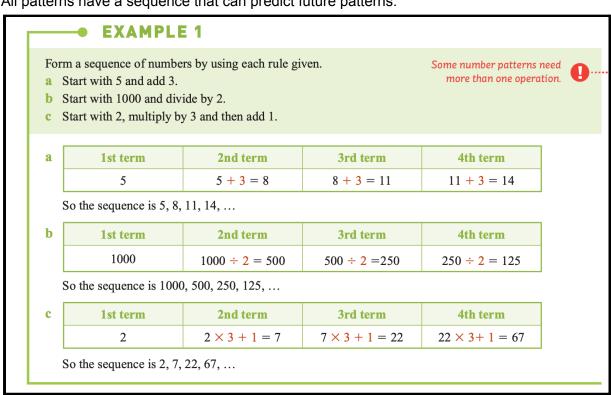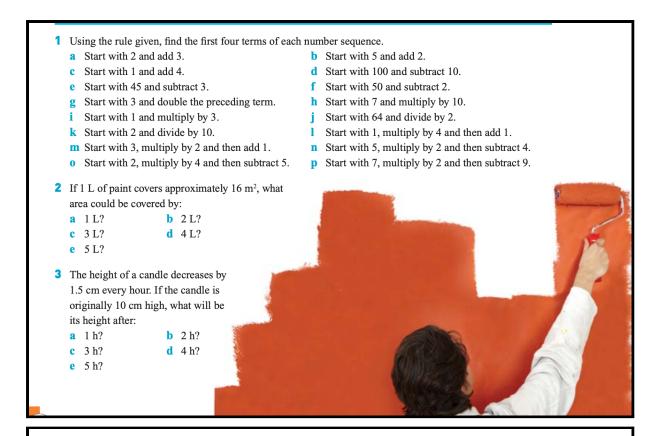Walt complete number patterns and find the rule for each pattern

Success Criteria I can understand the sequence of the pattern given and make up a rule

1 For each of the following number patterns:
   i Describe in words how the pattern is formed.
   ii Write down the next three numbers in the pattern.

a 2, 4, 6, 8, ____
b 4, 7, 10, 13, ____
c 27, 23, 19, 15, ____
d 30, 28, 26, 24, ____
e 90, 80, 70, 60, ____
f 3, 6, 12, 24, ____
g 2, 6, 18, 54, ____
h 3, 30, 300, 3000, ____
i 1, 0.1, 0.01, 0.001, ____
j 128, 64, 32, 16, ____

2 Find the missing numbers in the following patterns.

a 3, 5, ____, 9, ____
b 2, 5, ____, 11, ____
c 4, ____, 10, ____, 16
d 30, 26, ____, 18, ____
e 51, ____, 47, ____, 43
f 2, 10, ____, 250, ____
g 2, ____, 8, ____, 32
h 625, 125, ____, 5, ____
i 800, 400, ____, ____, 50
j 3, ____, 300, ____, 30 000

Walt Build patterns and create a rule

Success Criteria I know I can create a pattern and a rule associated with the pattern.

All patterns have a sequence that can predict future patterns.

EXAMPLE 1

Form a sequence of numbers by using each rule given.

a Start with 5 and add 3.
b Start with 1000 and divide by 2.
c Start with 2, multiply by 3 and then add 1.

Some number patterns need more than one operation. ❗

a

1st term	2nd term	3rd term	4th term
5	$5 + 3 = 8$	$8 + 3 = 11$	$11 + 3 = 14$

So the sequence is 5, 8, 11, 14, …

b

1st term	2nd term	3rd term	4th term
1000	$1000 \div 2 = 500$	$500 \div 2 = 250$	$250 \div 2 = 125$

So the sequence is 1000, 500, 250, 125, …

c

1st term	2nd term	3rd term	4th term
2	$2 \times 3 + 1 = 7$	$7 \times 3 + 1 = 22$	$22 \times 3 + 1 = 67$

So the sequence is 2, 7, 22, 67, …

1 Using the rule given, find the first four terms of each number sequence.

a Start with 2 and add 3.
b Start with 5 and add 2.
c Start with 1 and add 4.
d Start with 100 and subtract 10.
e Start with 45 and subtract 3.
f Start with 50 and subtract 2.
g Start with 3 and double the preceding term.
h Start with 7 and multiply by 10.
i Start with 1 and multiply by 3.
j Start with 64 and divide by 2.
k Start with 2 and divide by 10.
l Start with 1, multiply by 4 and then add 1.
m Start with 3, multiply by 2 and then add 1.
n Start with 5, multiply by 2 and then subtract 4.
o Start with 2, multiply by 4 and then subtract 5.
p Start with 7, multiply by 2 and then subtract 9.

2 If 1 L of paint covers approximately 16 m², what area could be covered by:

a 1 L?
b 2 L?
c 3 L?
d 4 L?
e 5 L?

3 The height of a candle decreases by 1.5 cm every hour. If the candle is originally 10 cm high, what will be its height after:

a 1 h?
b 2 h?
c 3 h?
d 4 h?
e 5 h?

4 The cost of hiring a taxi is $5 plus $3.50 for each kilometre travelled. How much does it cost to travel:

a 1 km?
b 2 km?
c 3 km?
d 4 km?
e 5 km?

5 The time taken to roast a piece of meat is 20 min plus an extra 15 min for each $\frac{1}{2}$ kg of meat. How long will it take to roast a piece of meat that weighs:

a $\frac{1}{2}$ kg?
b 1 kg?
c $1\frac{1}{2}$ kg?
d 2 kg?
e $2\frac{1}{2}$ kg?

Check your answers

1 a i Starting with 2, each number is 2 more than the number before it.

ii 10, 12, 14

b i Starting with 4, each number is 3 more than the number before it.

ii 16, 19, 22

c i Starting with 27, each number is 4 less than the number before it.

ii 11, 7, 3

d i Starting with 30, each number is 2 less than the number before it.

ii 22, 20, 18

e i Starting with 90, each number is 10 less than the number before it.

ii 50, 40, 30

f i Starting with 3, each number is 2 times the number before it.

ii 48, 96, 192

g i Starting with 2, each number is 3 times the number before it.

ii 162, 486, 1458

h i Starting with 3, each number is 10 times the number before it.

ii 30 000, 300 000, 3 000 000

i i Starting with 1, each number is $\frac{1}{10}$ of (or 0.1 times) the number before it.

ii 0.0001, 0.000 01, 0.000 001

j i Starting with 128, each number is $\frac{1}{2}$ of the number before it.

ii 8, 4, 2

2 a 7, 11   b 8, 14   c 7, 13

d 22, 14   e 49, 45   f 50, 1250

g 4, 16   h 25, 1   i 200, 100

j 30, 3000

1 a 2, 5, 8, 11, … b 5, 7, 9, 11, …

c 1, 5, 9, 13, … d 100, 90, 80, 70, …

e 45, 42, 39, 36, … f 50, 48, 46, 44, …

g 3, 6, 12, 24, … h 7, 70, 700, 7000, …

i 1, 3, 9, 27, … j 64, 32, 16, 8, …

k 2, 0.2, 0.02, 0.002, … l 1, 5, 21, 85, …

m 3, 7, 15, 31, … n 5, 6, 8, 12, …

o 2, 3, 7, 23, … p 7, 5, 1, −7, …

2 a 16 m² b 32 m² c 48 m²

d 64 m² e 80 m²

3 a 8.5 cm b 7 cm c 5.5 cm

d 4 cm e 2.5 cm

4 a $8.50 b $12 c $15.50

d $19 e $22.50

5 a 35 min b 50 min c 65 min

d 80 min e 95 min