

Sequences Retrieve and Connects

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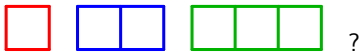
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Retrieve and Connect

Q1. Matchstick Pattern



- (a) Draw the 4th shape.
(b) How many matchsticks does it use?

Q2. Complete the Sequence

5, 10, 15, 20, __, __, __

Q3. Write the first 5 terms of the sequence with position-to-term rule: $2n$

__, __, __, __, __

Q4. Sam writes the 3 times table: 3, 6, 9, 12, 15...
He then **adds 2** to every term. Write the first 5 terms of Sam's sequence.
What is the n th term rule?

Q5. Extending Q1

Using the matchstick pattern from Q1:

- (a) How many matchsticks in the **10th** shape?
(b) Write a rule for the n th shape.

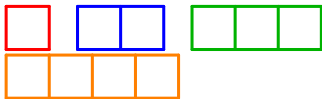
Q6. Challenge

Is **100** a term in the sequence with n th term $3n + 1$?

Show how you know.

Retrieve and Connect

Q1. Matchstick Pattern



- (a) Draw the 4th shape.
(b) How many matchsticks does it use?
(b) 13 matchsticks

Q2. Complete the Sequence

5, 10, 15, 20, 25, 30, 35
(add 5 each time)

Q3. Write the first 5 terms of the sequence with position-to-term rule: $2n$

2, 4, 6, 8, 10

Q4. Sam writes the 3 times table: 3, 6, 9, 12, 15...

He then **adds 2** to every term. Write the first 5 terms of Sam's sequence.
What is the n th term rule?

Terms: 5, 8, 11, 14, 17. n th term: $3n + 2$

Q5. Extending Q1

Using the matchstick pattern from Q1:

- (a) How many matchsticks in the 10th shape?
(b) Write a rule for the n th shape.
(a) 31 matchsticks.
(b) position-to-term rule: $3n + 1$

Q6. Challenge

Is 100 a term in the sequence with n th term $3n + 1$?

Show how you know.

Yes, when $n = 33$,
 $3n + 1 = 3 \times 33 + 1 = 99 + 1 = 100$

Worked Solution: Retrieve and Connect 1, Question 1

Question: The matchstick pattern shows 1 square, then 2 squares, then 3 squares. (a) Draw the 4th shape. (b) How many matchsticks does it use?

Worked Solution: The 4th shape is four squares in a row.



Count the matchsticks: there are 4 on the top, 4 on the bottom, and 5 vertical matchsticks. Hence

$$4 + 4 + 5 = 13.$$

Equivalently, shape n uses $3n + 1$ matchsticks: 4 for the first square and 3 extra for each added square. So the 4th shape uses

$$3 \times 4 + 1 = 12 + 1 = 13.$$

Worked Solution: Retrieve and Connect 1, Question 2

Question: Complete the sequence:

5, 10, 15, 20, -, -, -

Worked Solution: The sequence increases by 5 each time.

$$20 + 5 = 25, \quad 25 + 5 = 30, \quad 30 + 5 = 35.$$

So the completed sequence is

5, 10, 15, 20, 25, 30, 35.

Worked Solution: Retrieve and Connect 1, Question 3

Question: Write the first 5 terms of the sequence with position-to-term rule $2n$.

Worked Solution: Substitute $n = 1, 2, 3, 4, 5$ into $2n$:

$$2(1) = 2, \quad 2(2) = 4, \quad 2(3) = 6, \quad 2(4) = 8, \quad 2(5) = 10.$$

So the first five terms are

$$2, 4, 6, 8, 10.$$

Worked Solution: Retrieve and Connect 1, Question 4

Question: Sam writes the 3 times table and then adds 2 to every term. Write the first 5 terms and find the n th term rule.

Worked Solution: The 3 times table has n th term $3n$. Adding 2 to every term gives

$$3n + 2.$$

Now substitute $n = 1, 2, 3, 4, 5$:

$$3(1)+2 = 5, \quad 3(2)+2 = 8, \quad 3(3)+2 = 11, \quad 3(4)+2 = 14, \quad 3(5)+2 =$$

So Sam's sequence is

$$5, 8, 11, 14, 17$$

and the n th term rule is

$$3n + 2.$$

Worked Solution: Retrieve and Connect 1, Question 5

Question: Using the matchstick pattern from Q1: (a) How many matchsticks are in the 10th shape? (b) Write a rule for the n th shape.

Worked Solution: From Q1, the n th shape uses $3n + 1$ matchsticks.

(a) For the 10th shape,

$$3(10) + 1 = 30 + 1 = 31.$$

(b) The position-to-term rule is

$$3n + 1.$$

Worked Solution: Retrieve and Connect 1, Question 6

Question: Is 100 a term in the sequence with n th term $3n + 1$? Show how you know.

Worked Solution: We need an integer n such that

$$3n + 1 = 100.$$

Subtract 1 from both sides:

$$3n = 99.$$

Divide by 3:

$$n = 33.$$

Since $n = 33$ is a whole number, 100 is indeed the 33rd term of the sequence.

Retrieve and Connect

Q1. Dot Pattern



- (a) Draw the 4th picture.
(b) How many dots does it contain?

Q2. Complete the Sequence

4, 8, 12, 16, __, __, __

Q3. Write the first 5 terms of $3n + 1$

_, _, __, __, __

Q4. Alex writes the 5 times table: 5, 10, 15, 20, 25... He then **subtracts 1** from every term. Write the first 5 terms of Alex's sequence. What is the n th term rule?

Q5. Extend Q1

Using your dot pattern from Q1:

- (a) How many dots in the **10th** picture?
(b) Write a rule for the n th picture.

Q6. Challenge

Sequence A has n th term $4n - 2$.

Sequence B has n th term $2n + 6$.

Do they share a term
at the same position?

Retrieve and Connect

Q1. Dot Pattern



- (a) Draw the 4th picture.
(b) How many dots does it contain?

(b) 16 dots

Q4. Alex writes the 5 times table: 5, 10, 15, 20, 25... He then **subtracts 1** from every term. Write the first 5 terms of Alex's sequence. What is the n th term rule?

Terms: 4, 9, 14, 19, 24. n th term: $5n - 1$

Q5. Extend Q1

Using your dot pattern from Q1:

- (a) How many dots in the **10th** picture?
(b) Write a rule for the n th picture.

(a) 40 dots. (b) Rule: $4n$

Q2. Complete the Sequence

4, 8, 12, 16, 20, 24, 28
(add 4 each time)

Q3. Write the first 5 terms of $3n + 1$

4, 7, 10, 13, 16

Q6. Challenge

Sequence A has n th term $4n - 2$.

Sequence B has n th term $2n + 6$.

Do they share a term
at the same position?

$4n - 2 = 2n + 6 \Rightarrow n = 4$. Both
equal **14** at position $n = 4$.

Worked Solution: Retrieve and Connect 2, Question 1

Question: The dot pattern shows rows of 4 dots. (a) Draw the 4th picture. (b) How many dots does it contain?

Worked Solution: The 4th picture has 4 rows with 4 dots in each row.



So the number of dots is

$$4 \times 4 = 16.$$

The pattern has $4n$ dots in the n th picture, so the 4th picture has $4(4) = 16$ dots.

Worked Solution: Retrieve and Connect 2, Question 2

Question: Complete the sequence:

4, 8, 12, 16, -, -, -

Worked Solution: The sequence increases by 4 each time.

$$16 + 4 = 20, \quad 20 + 4 = 24, \quad 24 + 4 = 28.$$

So the completed sequence is

4, 8, 12, 16, 20, 24, 28.

Worked Solution: Retrieve and Connect 2, Question 3

Question: Write the first 5 terms of the sequence with n th term $3n + 1$.

Worked Solution: Substitute $n = 1, 2, 3, 4, 5$:

$$3(1)+1 = 4, \quad 3(2)+1 = 7, \quad 3(3)+1 = 10, \quad 3(4)+1 = 13, \quad 3(5)+1 =$$

So the first five terms are

$$4, 7, 10, 13, 16.$$

Worked Solution: Retrieve and Connect 2, Question 4

Question: Alex writes the 5 times table and subtracts 1 from every term. Write the first 5 terms and find the n th term rule.

Worked Solution: The 5 times table has n th term $5n$.

Subtracting 1 gives

$$5n - 1.$$

Now substitute $n = 1, 2, 3, 4, 5$:

$$5(1)-1 = 4, \quad 5(2)-1 = 9, \quad 5(3)-1 = 14, \quad 5(4)-1 = 19, \quad 5(5)-1 =$$

So Alex's sequence is

$$4, 9, 14, 19, 24$$

and the n th term rule is

$$5n - 1.$$

Worked Solution: Retrieve and Connect 2, Question 5

Question: Using the dot pattern from Q1: (a) How many dots are in the 10th picture? (b) Write a rule for the n th picture.

Worked Solution: The n th picture has $4n$ dots.

(a) For the 10th picture,

$$4(10) = 40.$$

(b) The rule for the n th picture is

$$4n.$$

Worked Solution: Retrieve and Connect 2, Question 6

Question: Sequence A has n th term $4n - 2$. Sequence B has n th term $2n + 6$. Do they share a term at the same position?

Worked Solution: Set the two expressions equal:

$$4n - 2 = 2n + 6.$$

Subtract $2n$ from both sides:

$$2n - 2 = 6.$$

Add 2:

$$2n = 8.$$

Divide by 2:

$$n = 4.$$

At position $n = 4$,

$$4(4) - 2 = 14 \quad \text{and} \quad 2(4) + 6 = 14.$$

Yes, they both equal 14 at position $n = 4$.

Retrieve and Connect

Q1. Matchstick Triangles



- (a) Draw the 4th shape.
(b) How many matchsticks does it use?

Q2. Complete the Sequence

7, 14, 21, 28, __, __, __

Q3. Write the first 5 terms of $5n - 2$

_, _, __, __, __

Q4. A sequence **starts at 5** and **increases by 3** each time. Write the first 5 terms. What is the n th term rule?

Q5. Extending Q1

Using your triangle pattern from Q1:

- (a) Write a rule for the n th shape.
(b) How many matchsticks in the **20th** shape?

Q6. Challenge

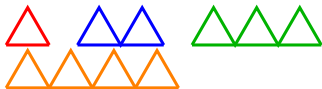
The n th term of a sequence is $4n + 3$.

Which term is the **first to exceed 75**?

Show your working clearly.

Retrieve and Connect

Q1. Matchstick Triangles



- (a) Draw the 4th shape.
(b) How many matchsticks does it use?
(b) 12 matchsticks

Q2. Complete the Sequence

7, 14, 21, 28, 35, 42, 49
(add 7 each time — the $7\times$ table)

Q3. Write the first 5 terms of $5n - 2$

3, 8, 13, 18, 23

Q4. A sequence **starts at 5** and **increases by 3** each time. Write the first 5 terms. What is the n th term rule?

Terms: 5, 8, 11, 14, 17. n th term: $3n + 2$

Q5. Extending Q1

Using your triangle pattern from Q1:

- (a) Write a rule for the n th shape.
(b) How many matchsticks in the 20th shape?
(a) Rule: $3n$. (b) 60 matchsticks.

Q6. Challenge

The n th term of a sequence is $4n + 3$.

Which term is the **first to exceed 75**?

Show your working clearly.

$4n + 3 > 75 \Rightarrow n > 18$. 19th term: $4(19) + 3 = 79$.

Worked Solution: Retrieve and Connect 3, Question 1

Question: The matchstick triangle pattern is shown. (a) Draw the 4th shape. (b) How many matchsticks does it use?

Worked Solution: The 4th shape is four triangles side by side.



Each triangle uses 3 matchsticks: one base matchstick and two sloping matchsticks. So 4 triangles use

$$4 \times 3 = 12.$$

The 4th shape uses 12 matchsticks.

Worked Solution: Retrieve and Connect 3, Question 2

Question: Complete the sequence:

7, 14, 21, 28, -, -, -

Worked Solution: The sequence increases by 7 each time.

$$28 + 7 = 35, \quad 35 + 7 = 42, \quad 42 + 7 = 49.$$

So the completed sequence is

7, 14, 21, 28, 35, 42, 49.

Worked Solution: Retrieve and Connect 3, Question 3

Question: Write the first 5 terms of the sequence with n th term $5n - 2$.

Worked Solution: Substitute $n = 1, 2, 3, 4, 5$:

$$5(1) - 2 = 3, \quad 5(2) - 2 = 8, \quad 5(3) - 2 = 13, \quad 5(4) - 2 = 18, \quad 5(5) - 2 =$$

So the first five terms are

$$3, 8, 13, 18, 23.$$

Worked Solution: Retrieve and Connect 3, Question 4

Question: A sequence starts at 5 and increases by 3 each time. Write the first 5 terms. What is the n th term rule?

Worked Solution: Start at 5 and add 3 each time:

$$5, \quad 5 + 3 = 8, \quad 8 + 3 = 11, \quad 11 + 3 = 14, \quad 14 + 3 = 17.$$

So the first five terms are

$$5, 8, 11, 14, 17.$$

The n th term rule is

$$3n + 2,$$

since when $n = 1$, $3(1) + 2 = 5$, and each later term adds 3.

Worked Solution: Retrieve and Connect 3, Question 5

Question: Using the triangle pattern from Q1: (a) Write a rule for the n th shape. (b) How many matchsticks are in the 20th shape?

Worked Solution: Each triangle uses 3 matchsticks, so the n th shape uses

$$3n$$

matchsticks.

(a) The rule is $3n$.

(b) For the 20th shape,

$$3(20) = 60.$$

The 20th shape uses 60 matchsticks.

Worked Solution: Retrieve and Connect 3, Question 6

Question: The n th term of a sequence is $4n + 3$. Which term is the first to exceed 75? Show your working clearly.

Worked Solution: We need

$$4n + 3 > 75.$$

Subtract 3:

$$4n > 72.$$

Divide by 4:

$$n > 18.$$

The first integer value of n is 19. The 19th term is

$$4(19) + 3 = 76 + 3 = 79.$$

So the 19th term is the first term to exceed 75.

Retrieve and Connect

Q1. Dots



- (a) Draw the 4th pattern.
(b) How many dots does it contain?

Q2. Complete the Sequence

1, 5, 9, 13, __, __, __

Q3. Write the first 5 terms of $10 - 2n$

—, —, —, —, —

Q4. Mia writes the 6 times table: 6, 12, 18, 24, 30... She then **subtracts 4** from every term. Write the first 5 terms, find the n th term, and find the 50th term.

Q5. Find the n th Term

1, 5, 9, 13, 17, ...

What is the n th term rule?

Q6. Challenge

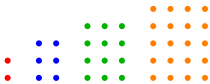
The n th term of a sequence is $10 - 2n$.

Which is the **last positive term**?

What is the **first negative term**?

Retrieve and Connect

Q1. Dots



- (a) Draw the 4th pattern.
(b) How many dots does it contain?

(b) 20 dots

Q2. Complete the Sequence

1, 5, 9, 13, 17, 21, 25
(add 4 each time)

Q3. Write the first 5 terms of $10 - 2n$

8, 6, 4, 2, 0

Q4. Mia writes the 6 times table: 6, 12, 18, 24, 30... She then **subtracts 4** from every term. Write the first 5 terms, find the n th term, and find the 50th term.

Terms: 2, 8, 14, 20, 26. n th term: $6n - 4$. 50th term: **296**.

Q5. Find the n th Term

1, 5, 9, 13, 17, ...

What is the n th term rule?

Differences: +4. First term: 1.
Rule: $4n - 3$

Q6. Challenge

The n th term of a sequence is $10 - 2n$.

Which is the **last positive term**?

What is the **first negative term**?

$n = 4$: +2 (last positive).

$n = 5$: 0.

$n = 6$: -2 (first negative).

Worked Solution: Retrieve and Connect 4, Question 1

Question: The dot pattern shows a rectangle of dots. (a) Draw the 4th pattern. (b) How many dots does it contain?

Worked Solution: The 4th pattern has 4 columns and 5 rows.



So it contains

$$4 \times 5 = 20$$

dots.

Worked Solution: Retrieve and Connect 4, Question 2

Question: Complete the sequence:

1, 5, 9, 13, -, -, -

Worked Solution: The sequence increases by 4 each time.

$$13 + 4 = 17, \quad 17 + 4 = 21, \quad 21 + 4 = 25.$$

So the completed sequence is

1, 5, 9, 13, 17, 21, 25.

Worked Solution: Retrieve and Connect 4, Question 3

Question: Write the first 5 terms of the sequence with n th term $10 - 2n$.

Worked Solution: Substitute $n = 1, 2, 3, 4, 5$:

$$10 - 2(1) = 8, \quad 10 - 2(2) = 6, \quad 10 - 2(3) = 4, \quad 10 - 2(4) = 2, \quad 10 - 2(5) = 0$$

So the first five terms are

$$8, 6, 4, 2, 0.$$

Worked Solution: Retrieve and Connect 4, Question 4

Question: Mia writes the 6 times table and subtracts 4 from every term. Write the first 5 terms, find the n th term, and find the 50th term.

Worked Solution: The 6 times table has n th term $6n$.

Subtracting 4 gives

$$6n - 4.$$

First five terms:

$$6(1)-4 = 2, \quad 6(2)-4 = 8, \quad 6(3)-4 = 14, \quad 6(4)-4 = 20, \quad 6(5)-4 =$$

So the sequence starts

$$2, 8, 14, 20, 26.$$

The 50th term is

$$6(50) - 4 = 300 - 4 = 296.$$

Worked Solution: Retrieve and Connect 4, Question 5

Question: Find the n th term rule for the sequence

$$1, 5, 9, 13, 17, \dots$$

Worked Solution: The differences are

$$5 - 1 = 4, \quad 9 - 5 = 4, \quad 13 - 9 = 4.$$

So the sequence goes up by 4 each time. Starting from 1, the n th term is

$$1 + 4(n - 1) = 1 + 4n - 4 = 4n - 3.$$

Thus the rule is

$$4n - 3.$$

Worked Solution: Retrieve and Connect 4, Question 6

Question: The n th term of a sequence is $10 - 2n$. Which is the last positive term? What is the first negative term?

Worked Solution: Work out the terms around where the sequence changes sign:

$$10 - 2(4) = 10 - 8 = 2, \quad 10 - 2(5) = 10 - 10 = 0, \quad 10 - 2(6) = 10 - 12 = -2$$

Zero is neither positive nor negative, so the last positive term is

$$2$$

at position $n = 4$, and the first negative term is

$$-2$$

at position $n = 6$.

Retrieve and Connect

Q1. Dots



- (a) Draw the 4th shape.
(b) How many dots in shape 5?

Q5. Jake says:

"I start at 3 and add 4 each time."
(a) Write his first 5 terms, (b) find the n th term rule, and (c) decide whether 59 is in his sequence. Show your reasoning.

Q2. Complete the Sequence

1, 4, 9, 16, __, __, __

Q3. Write the first 5 terms of $2n + 5$

_, _, __, __, _

Q4. Find the n th Term

- (a) 3, 5, 7, 9, 11, ...
(b) 6, 10, 14, 18, 22, ...

Q6. Challenge

Mia's sequence has n th term $3n + 1$.
Jake's sequence has n th term $2n + 6$.
Find the **first three values** that appear in *both* sequences. What do you notice about them?

Retrieve and Connect

Q1. Dots



- (a) Draw the 4th shape.
(b) How many dots in shape 5?

(b) Shape 5 has 17 dots

Q5. Jake says:

"I start at 3 and add 4 each time."

- (a) Write his first 5 terms, (b) find the n th term rule, and (c) decide whether 59 is in his sequence. Show your reasoning.

(a) 3, 7, 11, 15, 19.

(b) n th term: $4n - 1$.

(c) $4n - 1 = 59 \Rightarrow n = 15$. **Yes!**
(15th term)

Q2. Complete the Sequence

1, 4, 9, 16, 25, 36, 49
(square numbers, n^2)

Q3. Write the first 5 terms of $2n + 5$

7, 9, 11, 13, 15

Q4. Find the n th Term

(a) 3, 5, 7, 9, 11, ... $2n + 1$

(b) 6, 10, 14, 18, 22, ... $4n + 2$

Q6. Challenge

Mia's sequence has n th term $3n + 1$.

Jake's sequence has n th term $2n + 6$.

Find the **first three values** that appear in *both* sequences. What do you notice about them?

Shared values: 10, 16, 22, ... (they increase by 6 each time).

Worked Solution: Retrieve and Connect 5, Question 1

Question: The cross/plus dot pattern is shown. (a) Draw the 4th shape. (b) How many dots are in shape 5?

Worked Solution: Shape 1 has 1 dot. Each new shape adds one dot on each of the four arms:

$$1, \quad 1 + 4 = 5, \quad 5 + 4 = 9, \quad 9 + 4 = 13.$$

So the 4th shape is



Shape 4 has 13 dots, and shape 5 has

$$13 + 4 = 17.$$

Shape 5 has 17 dots.

Worked Solution: Retrieve and Connect 5, Question 2

Question: Complete the sequence:

1, 4, 9, 16, -, -, -

Worked Solution: These are the square numbers:

$$1^2 = 1, \quad 2^2 = 4, \quad 3^2 = 9, \quad 4^2 = 16, \quad 5^2 = 25, \quad 6^2 = 36, \quad 7^2 = 49.$$

So the completed sequence is

1, 4, 9, 16, 25, 36, 49.

Worked Solution: Retrieve and Connect 5, Question 3

Question: Write the first 5 terms of the sequence with n th term $2n + 5$.

Worked Solution: Substitute $n = 1, 2, 3, 4, 5$:

$$2(1)+5 = 7, \quad 2(2)+5 = 9, \quad 2(3)+5 = 11, \quad 2(4)+5 = 13, \quad 2(5)+5 =$$

So the first five terms are

$$7, 9, 11, 13, 15.$$

Worked Solution: Retrieve and Connect 5, Question 4

Question: Find the n th term rule for each sequence. (a)

3, 5, 7, 9, 11, ... (b) 6, 10, 14, 18, 22, ...

Worked Solution: (a) The differences are +2 and the first term is 3, so

$$3 + 2(n - 1) = 2n + 1.$$

Thus the rule is $2n + 1$.

(b) The differences are +4 and the first term is 6, so

$$6 + 4(n - 1) = 4n + 2.$$

Thus the rule is $4n + 2$.

Worked Solution: Retrieve and Connect 5, Question 5

Question: Jake says, “I start at 3 and add 4 each time.” (a) Write his first 5 terms. (b) Find the n th term rule. (c) Decide whether 59 is in his sequence. Show your reasoning.

Worked Solution: (a) Starting at 3 and adding 4:

$$3, 7, 11, 15, 19.$$

(b) The n th term is

$$3 + 4(n - 1) = 3 + 4n - 4 = 4n - 1.$$

(c) Check whether 59 is a term:

$$4n - 1 = 59.$$

Add 1:

$$4n = 60.$$

Divide by 4:

$$n = 15.$$

Since $n = 15$ is an integer, 59 is the 15th term of Jake's sequence.

Worked Solution: Retrieve and Connect 5, Question 6

Question: Mia's sequence has n th term $3n + 1$. Jake's sequence has n th term $2n + 6$. Find the first three values that appear in both sequences. What do you notice about them?

Worked Solution: List the first few terms of each sequence.

Mia:

4, 7, 10, 13, 16, 19, 22, 25, 28, ...

Jake:

8, 10, 12, 14, 16, 18, 20, 22, 24, 26, 28, ...

The first three values in both sequences are

10, 16, 22.

They increase by 6 each time.

Retrieve and Connect

Q1. Matchstick Triangles



- (a) Draw the 4th shape.
- (b) How many matchsticks does it use?
- (c) Which times tables does the sequence represent?

Q2. Complete the Sequence

4, 8, 12, 16, __, __, __

Q3. The 3 times table has n th term rule $3n$, what is the n th term rule for the 5 times table? __

Q4. Write the first 5 terms of $3n + 4$

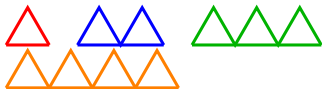
__, __, __, __, __

Q5. A sequence is made by taking the 3 times table and subtracting 2 from every term.

- (a) Write the first 5 terms.
- (b) What is the n th term rule?
- (c) Use your rule to find the **20th** term.
- (d) Is **100** in the sequence? Show your working clearly.

Retrieve and Connect

Q1. Matchstick Triangles



- (a) Draw the 4th shape.
- (b) How many matchsticks does it use?
- (c) Which times tables does the sequence represent?

(b) 12 matchsticks
(c) The 3 times table

Q2. Complete the Sequence

4, 8, 12, 16, 20, 24, 28

Q3. The 3 times table has n th term rule $3n$, what is the n th term rule for the 5 times table? $5n$

Q4. Write the first 5 terms of $3n + 4$

7, 10, 13, 16, 19

Q5. A sequence is made by taking the 3 times table and subtracting 2 from every term.

- (a) Write the first 5 terms.
- (b) What is the n th term rule?
- (c) Use your rule to find the 20th term.
- (d) Is 100 in the sequence? Show your working clearly.

(a) 1, 4, 7, 10, 13. (b) $3n - 2$. (c) $3 \times 20 - 2 = 58$.
(d) $3n - 2 = 100 \Rightarrow 3n = 102 \Rightarrow n = 34$. Yes, 100 is the 34th term.

Worked Solution: Retrieve and Connect 6, Question 1

Question: The matchstick triangle pattern is shown. (a) Draw the 4th shape. (b) How many matchsticks does it use? (c) Which times table does the sequence represent?

Worked Solution: The 4th shape is:



Each triangle uses 3 matchsticks, so the 4th shape uses

$$4 \times 3 = 12$$

matchsticks.

The sequence is

$$3, 6, 9, 12, \dots$$

which is the 3 times table.

Worked Solution: Retrieve and Connect 6, Question 2

Question: Complete the sequence:

4, 8, 12, 16, -, -, -

Worked Solution: The sequence increases by 4 each time.

$$16 + 4 = 20, \quad 20 + 4 = 24, \quad 24 + 4 = 28.$$

So the completed sequence is

4, 8, 12, 16, 20, 24, 28.

Worked Solution: Retrieve and Connect 6, Question 3

Question: The 3 times table has n th term rule $3n$. What is the n th term rule for the 5 times table?

Worked Solution: The 5 times table is

5, 10, 15, 20, 25, ...

Each term is 5 times its position. Therefore the n th term rule is

$5n$.

Worked Solution: Retrieve and Connect 6, Question 4

Question: Write the first 5 terms of the sequence with n th term $3n + 4$.

Worked Solution: Substitute $n = 1, 2, 3, 4, 5$:

$$3(1)+4 = 7, \quad 3(2)+4 = 10, \quad 3(3)+4 = 13, \quad 3(4)+4 = 16, \quad 3(5)+4 = 19$$

So the first five terms are

$$7, 10, 13, 16, 19.$$

Worked Solution: Retrieve and Connect 6, Question 5

Question: A sequence is made by taking the 3 times table and subtracting 2 from every term. (a) Write the first 5 terms. (b) What is the n th term rule? (c) Use the rule to find the 20th term. (d) Is 100 in the sequence?

Worked Solution: (a) The 3 times table is 3, 6, 9, 12, 15.
Subtracting 2 from each term:

$$1, 4, 7, 10, 13.$$

(b) The n th term rule is

$$3n - 2.$$

(c) The 20th term is

$$3(20) - 2 = 60 - 2 = 58.$$

(d) Check whether 100 is a term:

$$3n - 2 = 100.$$

Add 2:

$$3n = 102$$

Retrieve and Connect

Q1. Dots



- (a) Draw the 4th picture.
- (b) How many dots does it contain?
- (c) Which times table does the sequence represent?

Q2. Complete the Sequence

5, 10, 15, 20, __, __, __

Q3. Write the first 5 terms of $4n - 3$

_, _, _, _, _

Q4. Start with the **5 times table** and **add 1** to every term.

- (a) Write the first 5 terms.
- (b) What is the n th term rule?
- (c) Find the 20th term.
- (d) Is **104** in the sequence? Explain how you know.

Retrieve and Connect

Q1. Dots



- (a) Draw the 4th picture.
- (b) How many dots does it contain?
- (c) Which times table does the sequence represent?

(b) 16 dots
(c) The 4 times table

Q2. Complete the Sequence

5, 10, 15, 20, 25, 30, 35

(add 5 each time — the 5 times table)

Q3. Write the first 5 terms of $4n - 3$

1, 5, 9, 13, 17

Q4. Start with the 5 times table and add 1 to every term.

- (a) Write the first 5 terms.
 - (b) What is the n th term rule?
 - (c) Find the 20th term.
 - (d) Is 104 in the sequence? Explain how you know.
- (a) 6, 11, 16, 21, 26. (b) $5n + 1$. (c) $5 \times 20 + 1 = 101$.
(d) $5n + 1 = 104 \Rightarrow 5n = 103 \Rightarrow n = 20.6$. **No**, 104 is not a term.

Worked Solution: Retrieve and Connect 7, Question 1

Question: The dot pattern shows rows of 4 dots. (a) Draw the 4th picture. (b) How many dots does it contain? (c) Which times table does the sequence represent?

Worked Solution: The 4th picture has 4 rows of 4 dots.



It contains

$$4 \times 4 = 16$$

dots.

The sequence is

$$4, 8, 12, 16, \dots$$

which is the 4 times table.

Worked Solution: Retrieve and Connect 7, Question 2

Question: Complete the sequence:

5, 10, 15, 20, -, -, -

Worked Solution: The sequence increases by 5 each time.

$$20 + 5 = 25, \quad 25 + 5 = 30, \quad 30 + 5 = 35.$$

So the completed sequence is

5, 10, 15, 20, 25, 30, 35.

Worked Solution: Retrieve and Connect 7, Question 3

Question: Write the first 5 terms of the sequence with n th term $4n - 3$.

Worked Solution: Substitute $n = 1, 2, 3, 4, 5$:

$$4(1) - 3 = 1, \quad 4(2) - 3 = 5, \quad 4(3) - 3 = 9, \quad 4(4) - 3 = 13, \quad 4(5) - 3 = 17$$

So the first five terms are

$$1, 5, 9, 13, 17.$$

Worked Solution: Retrieve and Connect 7, Question 4

Question: Start with the 5 times table and add 1 to every term.

(a) Write the first 5 terms. (b) What is the n th term rule? (c) Find the 20th term. (d) Is 104 in the sequence? Explain how you know.

Worked Solution: (a) The 5 times table is 5, 10, 15, 20, 25.

Adding 1 to each term:

$$6, 11, 16, 21, 26.$$

(b) The n th term rule is

$$5n + 1.$$

(c) The 20th term is

$$5(20) + 1 = 100 + 1 = 101.$$

(d) Check whether 104 is a term:

$$5n + 1 = 104.$$

Subtract 1:

$$5n = 103.$$