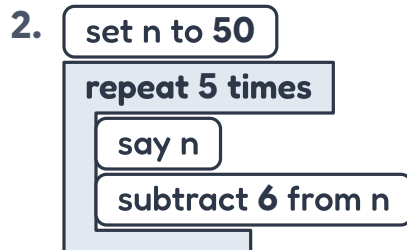


Repeat and Nested Loops

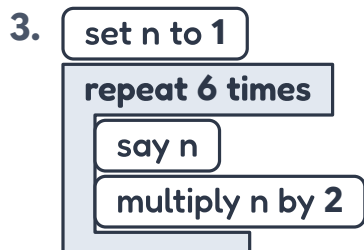
Run each program. Write the numbers it says, in order.



It says 3 7 11 15 19



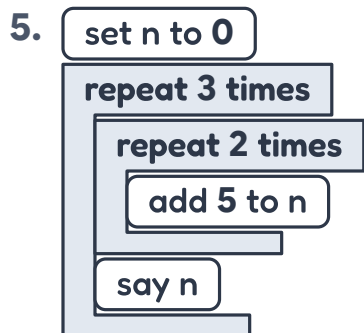
It says _____



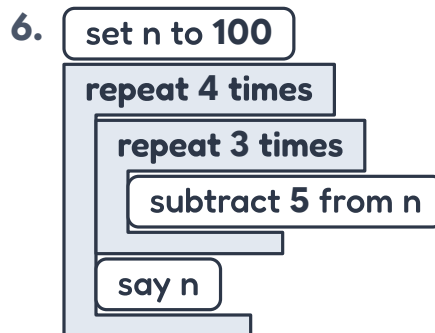
It says _____



It says _____



It says _____



It says _____

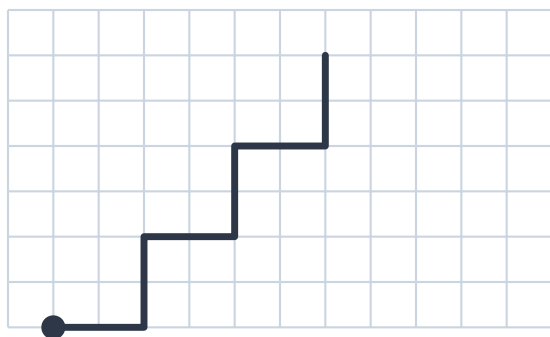
Repeat and Nested Loops

Start at the dot. Draw the path the program makes.

1. **repeat 3 times** Example

- move right 2**
- move up 2**

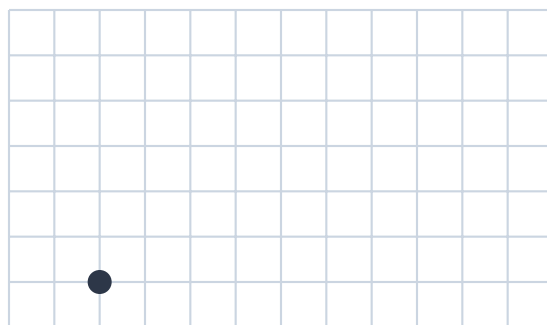
Length 12 units



2. **repeat 4 times**

- move up 3**
- move right 1**
- move down 3**
- move right 1**

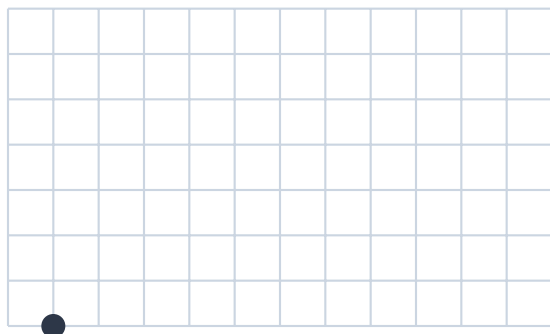
Length _____ units



3. **repeat 2 times**

- repeat 3 times**
 - move right 1**
 - move up 1**
- move right 2**

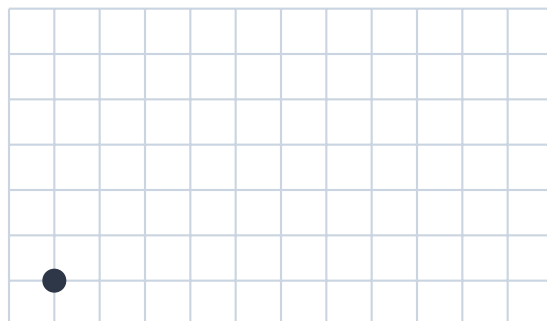
Length _____ units



4. **repeat 2 times**

- repeat 2 times**
 - move up 2**
 - move right 2**
- move down 4**
- move right 1**

Length _____ units



Repeat and Nested Loops

How many times does each step run? Count, then write.

1. **repeat 3 times** Example

```

  graph TD
    A[repeat 3 times] --> B[clap]
    A --> C[clap]
    A --> D[stomp]
  
```

clap runs 6 times

stomp runs 3 times

2. **repeat 4 times**

```

  graph TD
    A[repeat 4 times] --> B[repeat 3 times]
    B --> C[clap]
    A --> D[jump]
  
```

clap runs _____ times

jump runs _____ times

3. **repeat 2 times**

```

  graph TD
    A[repeat 2 times] --> B[stomp]
    A --> C[repeat 5 times]
    C --> D[clap]
  
```

stomp runs _____ times

clap runs _____ times

4. **set n to 0**

```

  graph TD
    A[set n to 0] --> B[repeat 3 times]
    B --> C[repeat 4 times]
    C --> D[add 2 to n]
  
```

add 2 to n runs _____ times

n at the end _____

5. **repeat 5 times**

```

  graph TD
    A[repeat 5 times] --> B[jump]
    A --> C[repeat 2 times]
    C --> D[clap]
    C --> E[stomp]
  
```

jump runs _____ times

clap runs _____ times

stomp runs _____ times

6. **set n to 1**

```

  graph TD
    A[set n to 1] --> B[repeat 3 times]
    B --> C[multiply n by 2]
    B --> D[repeat 2 times]
    D --> E[add 1 to n]
  
```

add 1 to n runs _____ times

n at the end _____

Repeat and Nested Loops

Write each long code again, shorter, with a repeat loop.

1. Long code

1	move up 1	4	move right 2
2	move right 2	5	move up 1
3	move up 1	6	move right 2

With a loop

Example

repeat 3 times

move up 1

move right 2

2. Long code

1	set n to 10	6	say n
2	say n	7	add 5 to n
3	add 5 to n	8	say n
4	say n	9	add 5 to n
5	add 5 to n		

With a loop

set n to 10

repeat times

3. Long code

1	clap	5	clap
2	clap	6	clap
3	clap	7	clap
4	stomp	8	stomp

With a loop

repeat times

repeat times

4. Long code

1	stomp	6	clap
2	clap	7	stomp
3	clap	8	clap
4	stomp	9	clap
5	clap		

With a loop

repeat times

repeat times

Repeat and Nested Loops

Change the code. Write what it says now, and what changed.



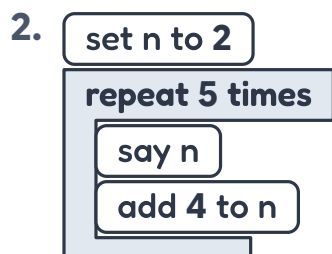
It says 5, 8, 11, 14

Example

Change repeat 4 times to repeat 6 times.

Now it says 5 8 11 14 17 20

What changed? It says 2 more numbers: 17 and 20.

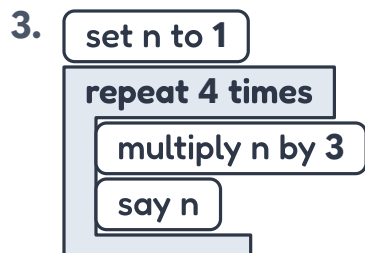


It says 2, 6, 10, 14, 18

Change add 4 to n to add 10 to n.

Now it says _____

What changed? _____

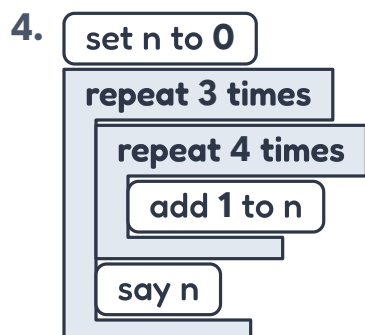


It says 3, 9, 27, 81

Move say n above multiply n by 3.

Now it says _____

What changed? _____



It says 4, 8, 12

Change the inside loop to repeat 5 times.

Now it says _____

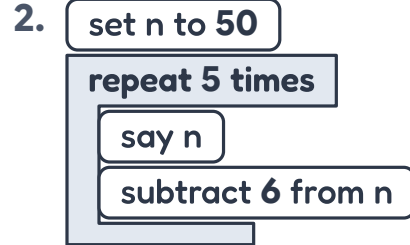
What changed? _____

Repeat and Nested Loops

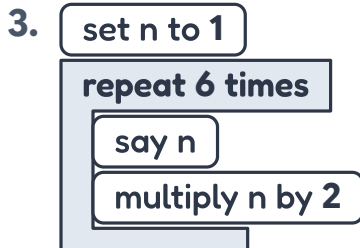
Run each program. Write the numbers it says, in order.



It says 3 7 11 15 19



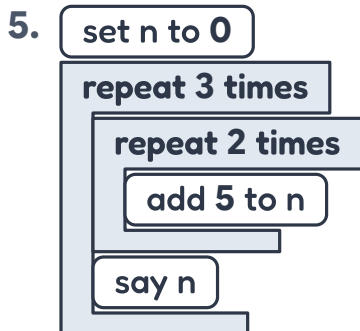
It says 50 44 38 32 26



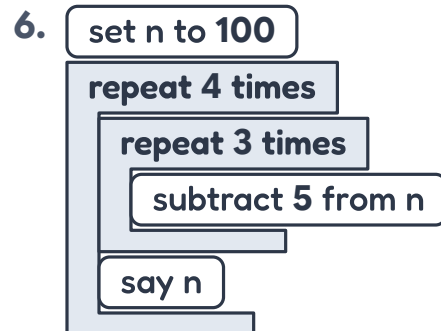
It says 1 2 4 8 16 32



It says 5 8 11 14



It says 10 20 30

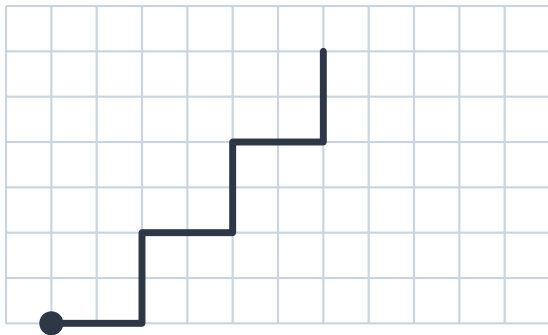


It says 85 70 55 40

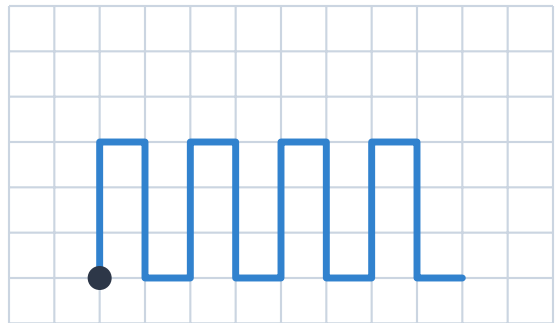
Repeat and Nested Loops

Start at the dot. Draw the path the program makes.

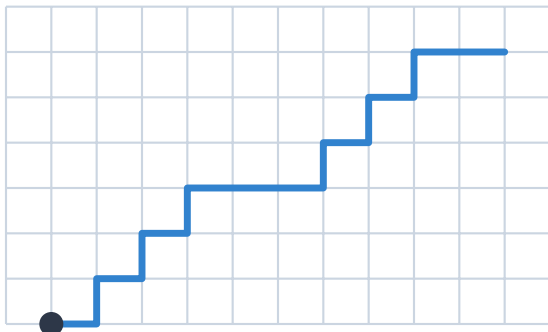
1. **repeat 3 times**
 move right 2
 move up 2
- Length**
12 units



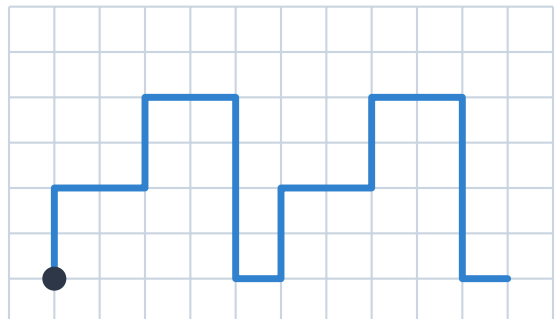
2. **repeat 4 times**
 move up 3
 move right 1
 move down 3
 move right 1
- Length**
32 units



3. **repeat 2 times**
 repeat 3 times
 move right 1
 move up 1
 move right 2
- Length**
16 units



4. **repeat 2 times**
 repeat 2 times
 move up 2
 move right 2
 move down 4
 move right 1
- Length**
26 units



Repeat and Nested Loops

How many times does each step run? Count, then write.

1. **repeat 3 times** Example

```

  graph TD
    A[repeat 3 times] --> B[clap]
    A --> C[clap]
    A --> D[stomp]
  
```

clap runs 6 times

stomp runs 3 times

2. **repeat 4 times**

```

  graph TD
    A[repeat 4 times] --> B[repeat 3 times]
    A --> C[clap]
    A --> D[jump]
  
```

clap runs 12 times

jump runs 4 times

3. **repeat 2 times**

```

  graph TD
    A[repeat 2 times] --> B[stomp]
    A --> C[repeat 5 times]
    C --> D[clap]
  
```

stomp runs 2 times

clap runs 10 times

4. **set n to 0**

```

  graph TD
    A[set n to 0] --> B[repeat 3 times]
    B --> C[repeat 4 times]
    C --> D[add 2 to n]
  
```

add 2 to n runs 12 times

n at the end 24

5. **repeat 5 times**

```

  graph TD
    A[repeat 5 times] --> B[jump]
    A --> C[repeat 2 times]
    C --> D[clap]
    C --> E[stomp]
  
```

jump runs 5 times

clap runs 10 times

6. **set n to 1**

```

  graph TD
    A[set n to 1] --> B[repeat 3 times]
    B --> C[multiply n by 2]
    B --> D[repeat 2 times]
    D --> E[add 1 to n]
  
```

add 1 to n runs 6 times

n at the end 22

Repeat and Nested Loops

Write each long code again, shorter, with a repeat loop.

1. Long code

1	move up 1	4	move right 2
2	move right 2	5	move up 1
3	move up 1	6	move right 2

With a loop

Example

```

repeat 3 times
  move up 1
  move right 2
  
```

2. Long code

1	set n to 10	6	say n
2	say n	7	add 5 to n
3	add 5 to n	8	say n
4	say n	9	add 5 to n
5	add 5 to n		

With a loop

```

set n to 10
repeat 4 times
  say n
  add 5 to n
  
```

3. Long code

1	clap	5	clap
2	clap	6	clap
3	clap	7	clap
4	stomp	8	stomp

With a loop

```

repeat 2 times
  repeat 3 times
    clap
  stomp
  
```

4. Long code

1	stomp	6	clap
2	clap	7	stomp
3	clap	8	clap
4	stomp	9	clap
5	clap		

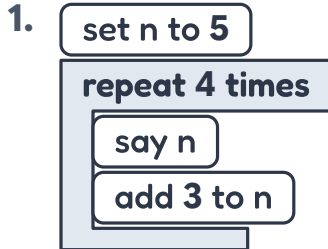
With a loop

```

repeat 3 times
  stomp
  repeat 2 times
    clap
  
```

Repeat and Nested Loops

Change the code. Write what it says now, and what changed.



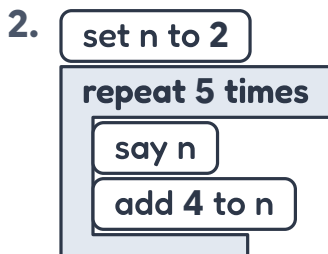
It says 5, 8, 11, 14

Example

Change repeat 4 times to repeat 6 times.

Now it says 5 8 11 14 17 20

What changed? It says 2 more numbers: 17 and 20.

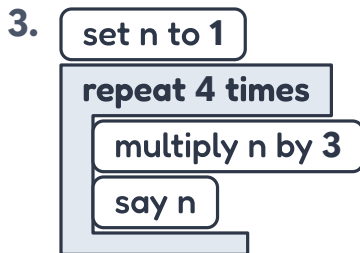


It says 2, 6, 10, 14, 18

Change add 4 to n to add 10 to n.

Now it says 2 12 22 32 42

What changed? It counts on by 10s, not by 4s.

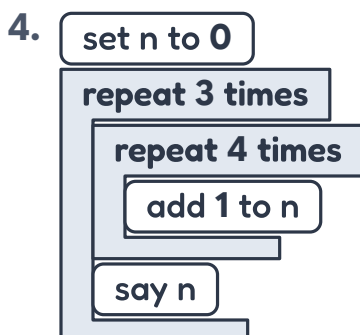


It says 3, 9, 27, 81

Move say n above multiply n by 3.

Now it says 1 3 9 27

What changed? It says n first, so it starts at 1.



It says 4, 8, 12

Change the inside loop to repeat 5 times.

Now it says 5 10 15

What changed? Each time, n goes up by 5, not by 4.