
This is CS50.

Think.
Pair.
Share.

cs50.ly/questions

- Why are we using **C**?
- How can we **read** and **write** code that includes **variables**, **conditionals**, and **loops**?
- Why do we care about **data types**?
- What does it mean to **compile** a C program?
- How many years will it take to double our llamas?

SECOND EDITION

THE C PROGRAMMING LANGUAGE

BRIAN W. KERNIGHAN
DENNIS M. RITCHIE

PRENTICE HALL SOFTWARE SERIES

Part 1

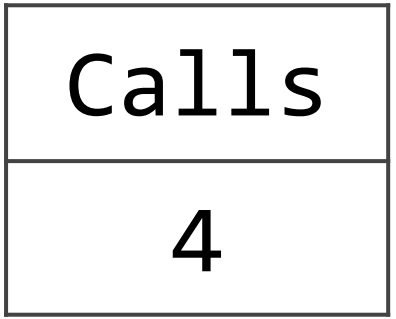
Variables and Types
Input and Printing

Variables

Calls
4

Variables

```
int calls = 4;
```



Variables

```
int calls = 4;
```

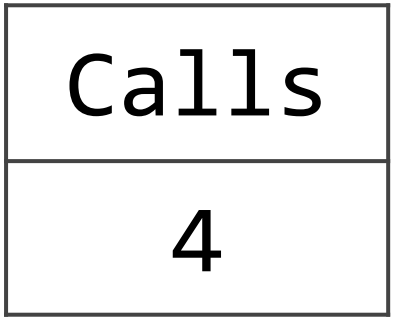
name

Calls
4

Variables

```
int calls = 4;
```

type



Variables

```
int calls = 4;
```

value

Calls
4

Variables

```
int calls = 4;
```

assignment operator

Calls
4

Variables

```
int calls = 4;
```

type name | value

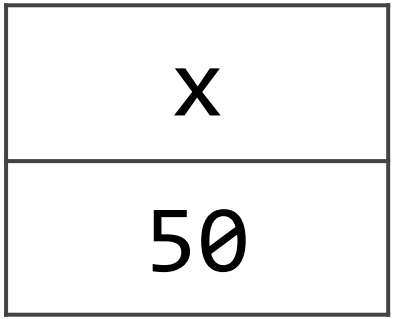
assignment operator

Calls
4

"Create an **integer** named **calls** that **gets** the **value 4**."

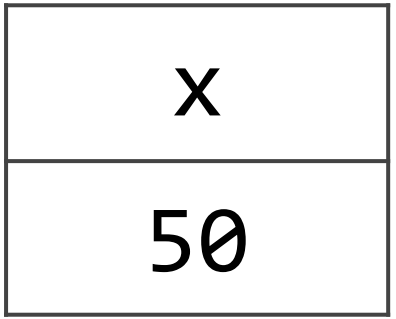
Variables

```
int x = 50;
```



Variables

```
int x = 50;
```



"Create an **integer** named **x** that **gets** the **value 50**."

Think.
Pair.
Share.

Why does C care about data types?

01000001

int

65

01000001

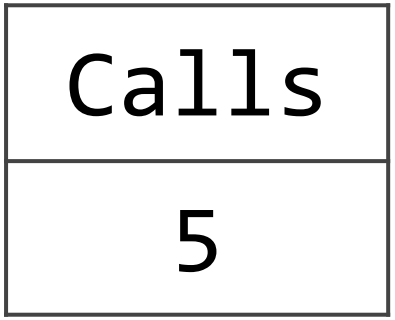
char

'A'

01000001

Variables

```
int calls = 4;
calls = 5;
```

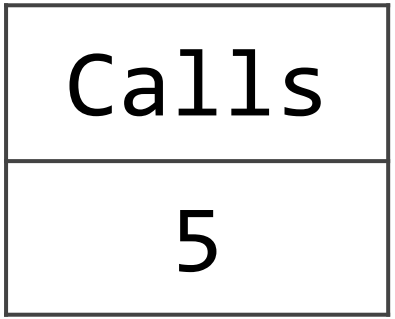


Variables

```
int calls = 4;
calls = 5;
```

name | value

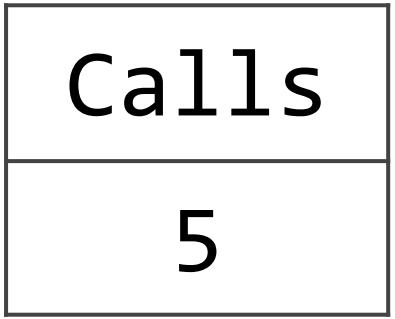
assignment operator



"Calls gets 5."

Operators

```
int calls = 4;
calls = calls + 1;
```



Operators

```
int calls = 4;
calls = calls - 1;
```

Calls
3

Operators

```
int calls = 4;
calls = calls * 2;
```

Calls
8

Operators

```
int calls = 4;
calls = calls / 2;
```

Calls
2

Getting input

```
int calls = get_int("Calls: ");
```

type

name

assignment operator

function

Functions

```
int calls = get_int("Calls: ");
```

function

Functions

```
int calls = get_int("Calls: ");
```

function name

Functions

```
int calls = get_int("Calls: ");
```

function input

Functions

```
int calls = get_int("Calls: ");
```

function

Return values

```
int calls = 4;
```

value

Storing return values

```
int calls = 4;
```

type name | value

assignment operator

Calls
4

"Create an **integer** named **calls** that **gets** the **value 4**."

Printing values

```
int calls = 4;
printf("calls equals %i", calls);
```

Printing values

```
int calls = 4;
printf("calls equals %i", calls);
```

format code

Printing values

```
int calls = 4;
printf("calls equals %i", calls);
```

Types and format codes

Numbers	Text	True/False
`int (%i)`	`char (%c)`	`bool (%i)`
`float (%f)`	`string (%s)`	

Exercise

Create a C program that prompts a user for:

- A name
- An age
- A phone number

Print the values back to the user as confirmation.

Part 2

Breaking down loops and conditionals

```
if (calls < 1)
{
  printf("Call more often!");
}
```

boolean expression

```
if (calls < 1)
{
  printf("Call more often!");
}
```

conditional

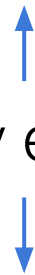
```
if (calls < 1)
{
   printf("Call more often!");
}
```

```
if (calls < 1)
{
   printf("Call more often!");
}
```

conditional code

```
if (calls < 1)
{
  printf("Call more often!");
}
else
{
  printf("Thanks for calling!");
}
```

```
if (calls < 1)
{
  printf("Call more often!");
}
else
{
  printf("Thanks for calling!");
}
```



mutually exclusive

```
int i = 0;
while (i < 10)
{
   printf("%i\n", i);
   i = i + 1;
}
```

initialization

```
int i = 0;
while (i < 10)
{
    printf("%i\n", i);
    i = i + 1;
}
```

boolean expression

```
int i = 0;
while (i < 10)
{
   printf("%i\n", i);
   i = i + 1;
}
```

```
int i = 0;
while (i < 10)
{
   printf("%i\n", i);
   i = i + 1;
}
```

increment

```
int i = 0;
while (i < 10)
{
   printf("%i\n", i);
   i = i + 1;
}
```

```
for (int i = 0; i < 10; i++)
{
  printf("%i\n", i);
}
```

initialization

```
for (int i = 0; i < 10; i++)
{
  printf("%i\n", i);
}
```

boolean expression

```
for (int i = 0; i < 10; i++)
{
  printf("%i\n", i);
}
```

increment

```
for (int i = 0; i < 10; i++)
{
  printf("%i\n", i);
}
```

```
for (int i = 0; i < 10; i++)
{
  printf("%i\n", i);
}
```

```
int n;
do
{
  n = get_int("N: ");
}
while (n <= 0);
```

```
int n;
do
{
  n = get_int("N: ");
}
while (n <= 0);
```

```
int n;
do
{
    n = get_int("N: ");
}
while (n <= 0);
```

Part 3 Population

- Work an example yourself
- Write down exactly what you did
- Create a generalization (algorithm) after working multiple examples
- Test your algorithm by hand
- Translate your algorithm to code
- Find bugs in your code by running test cases
- Debug (and critique) your code

- Work an example yourself
- Write down exactly what you did
- Create a generalization (algorithm) after working multiple examples
- Test your algorithm by hand
- Translate your algorithm to code
- Find bugs in your code by running test cases
- Debug (and critique) your code

We have a population of **n** llamas.

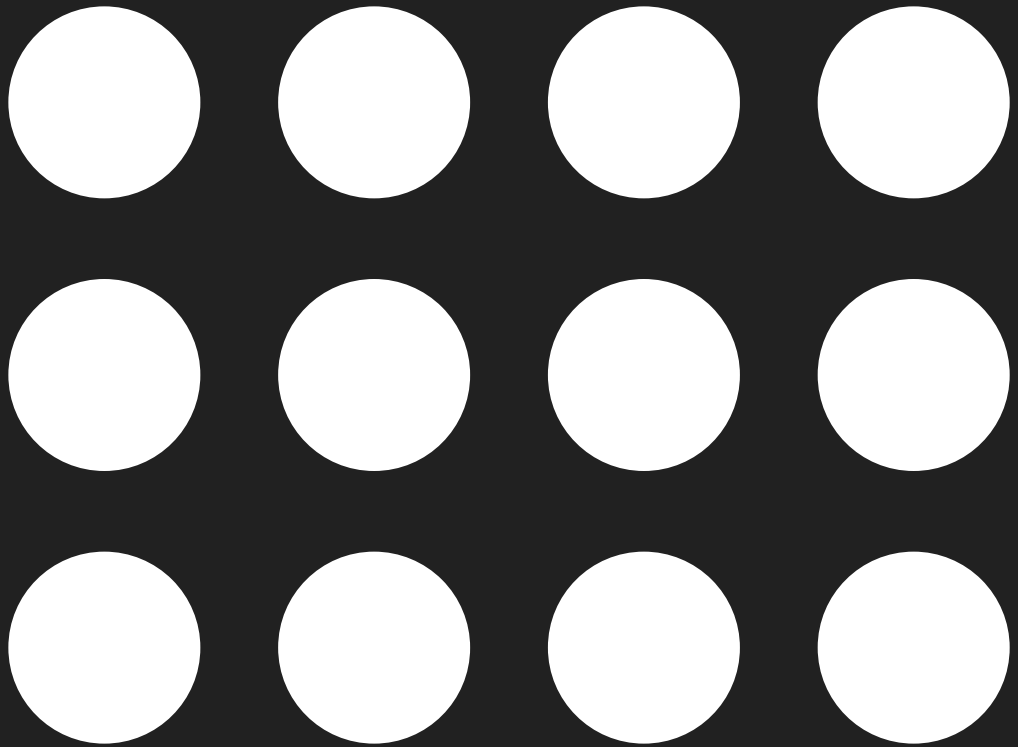
Each year, **n/3** new llamas are born, and **n/4** llamas pass away.

How many years will it take to have a population of **x** llamas?

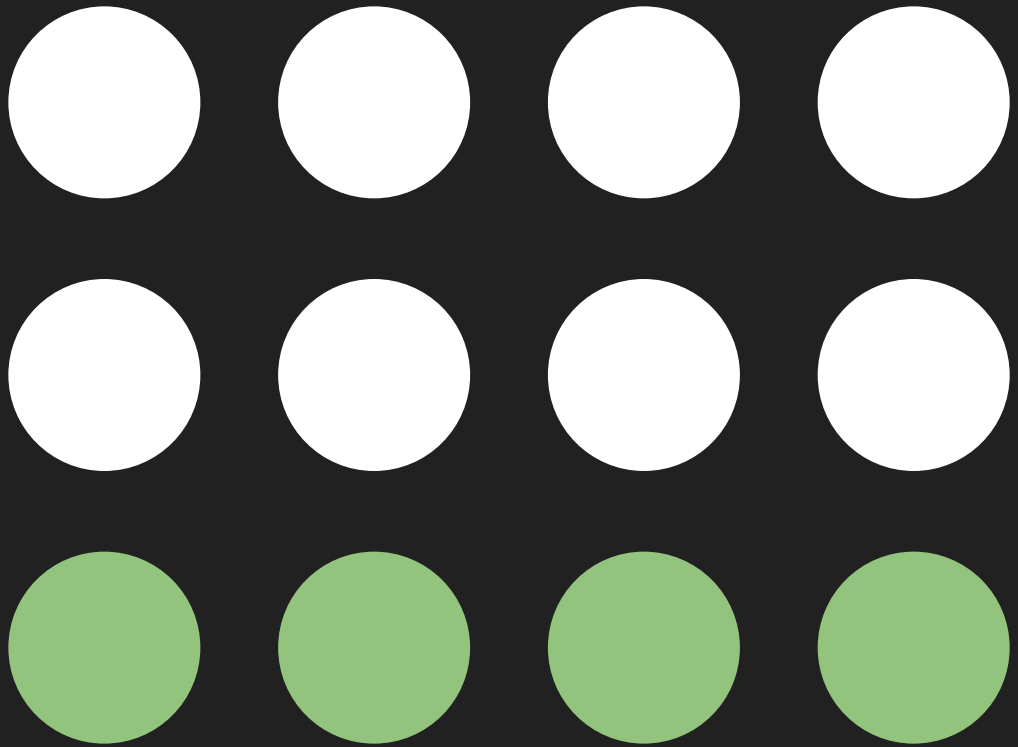
We have a population of **`12`** llamas.

Each year, **`12/3`** new llamas are born, and **`12/4`** llamas pass away.

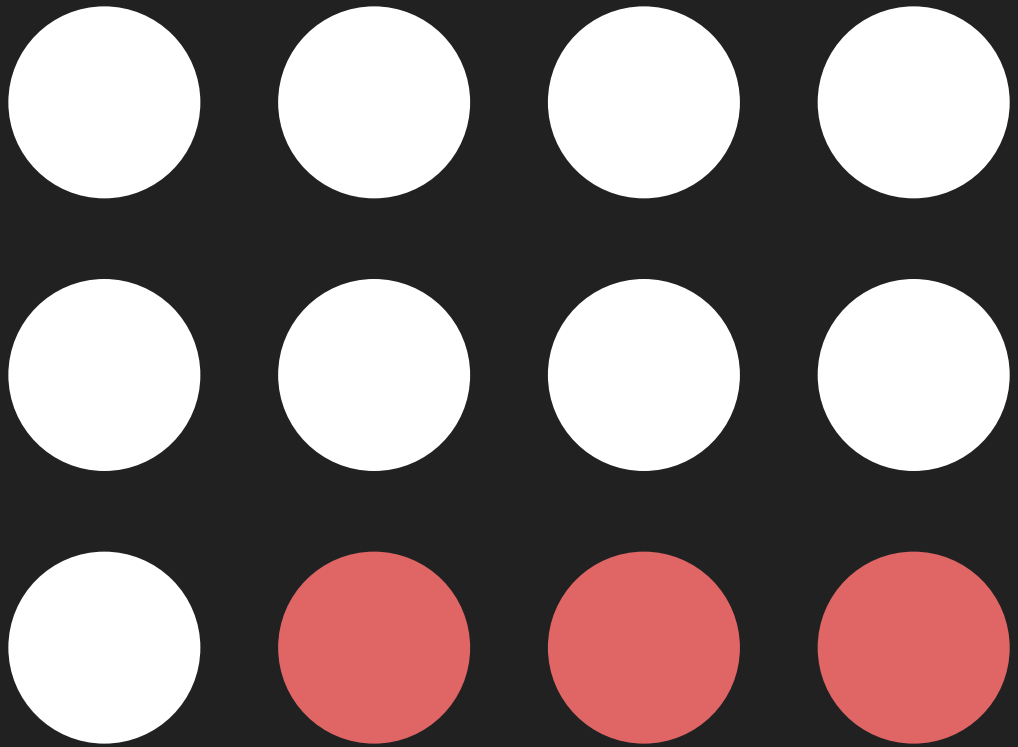
How many years will it take to have a population of **`13`** llamas?



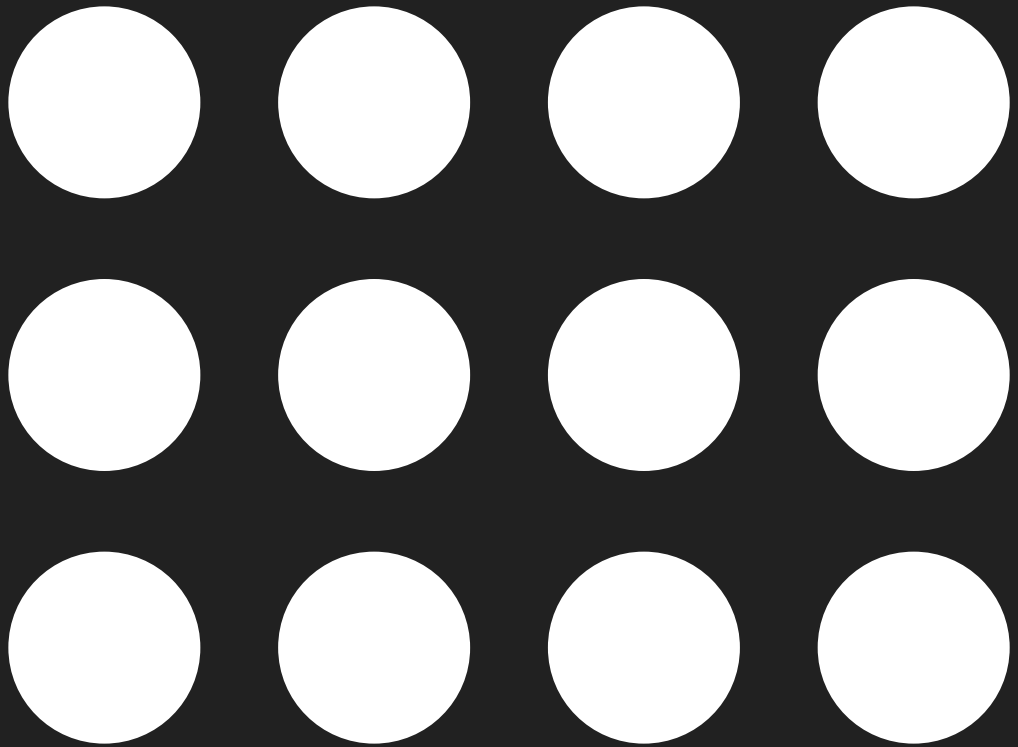
Year 0



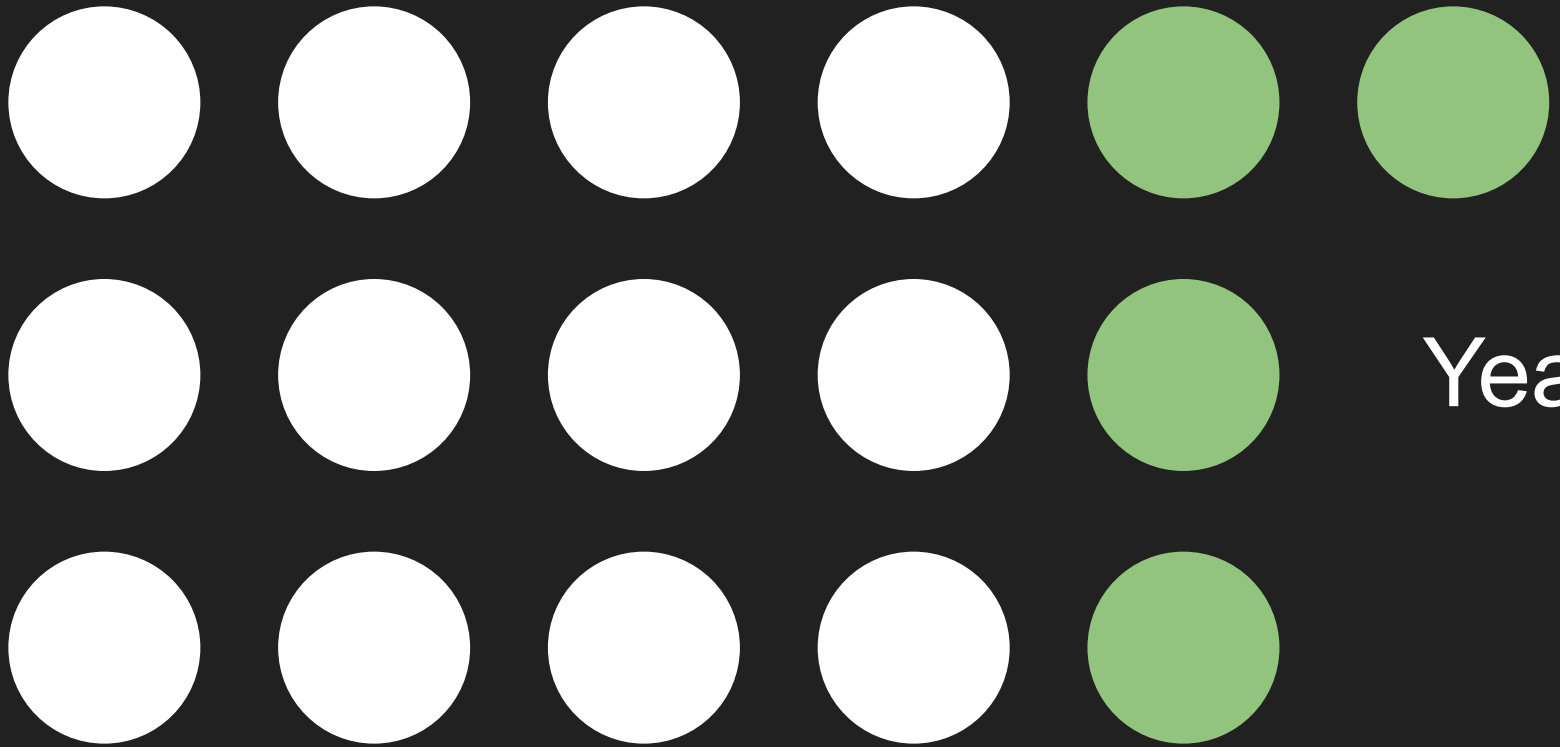
Year 0

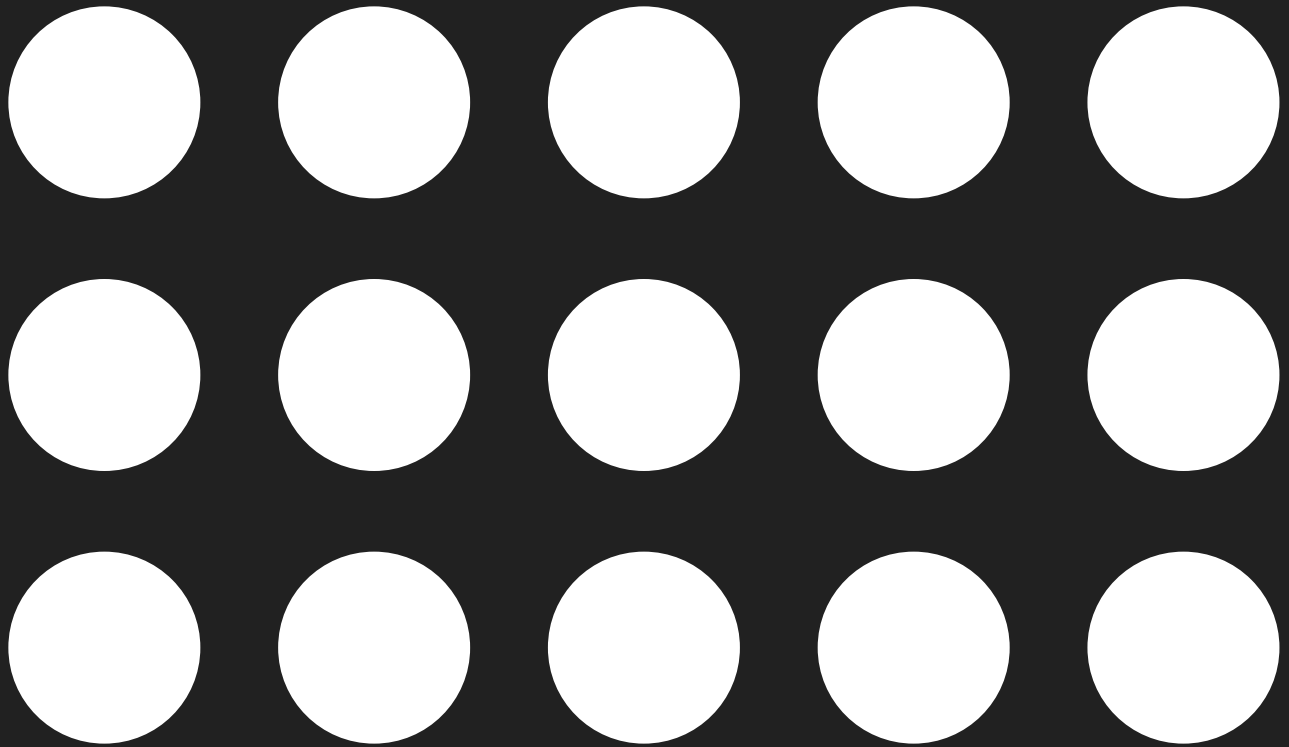


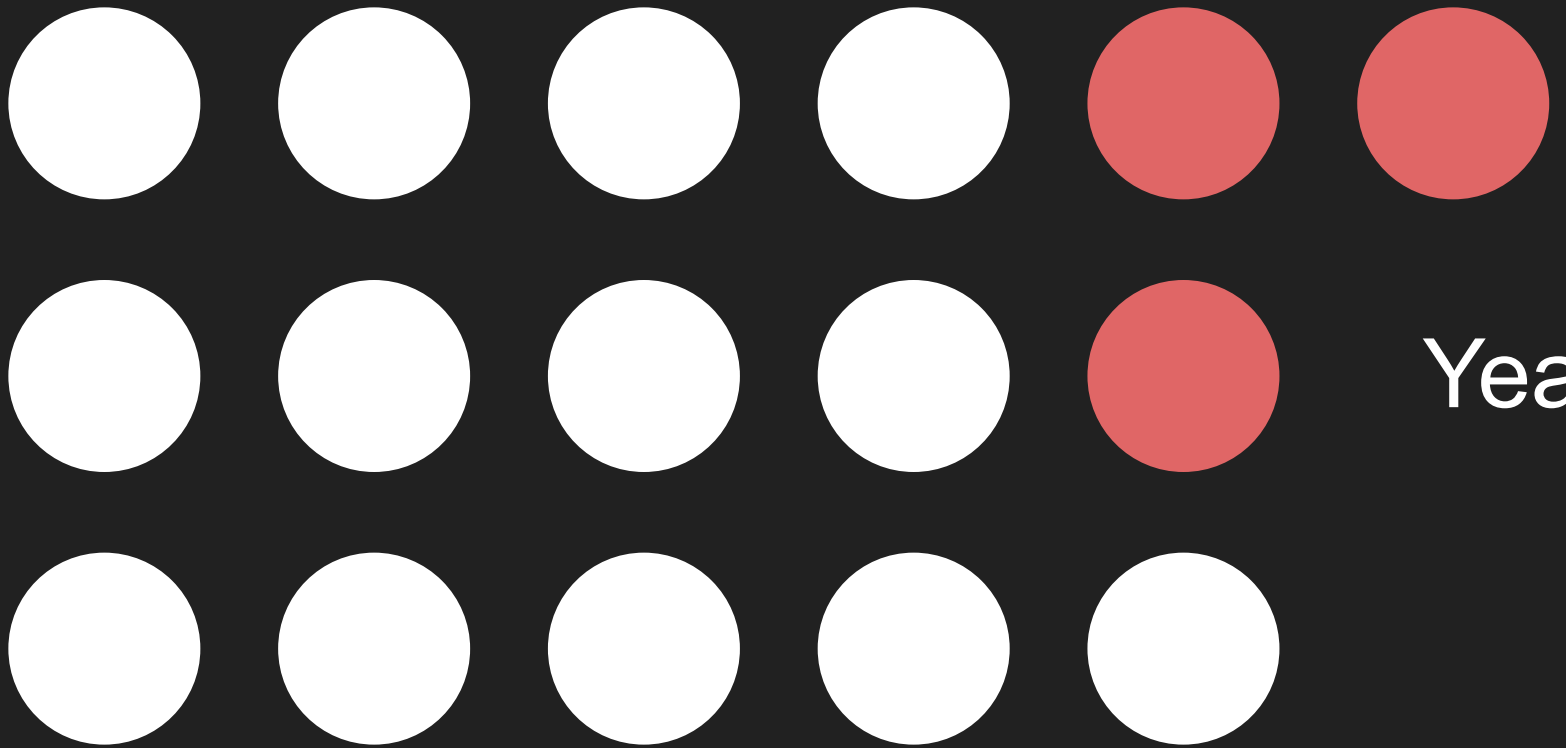
Year 0

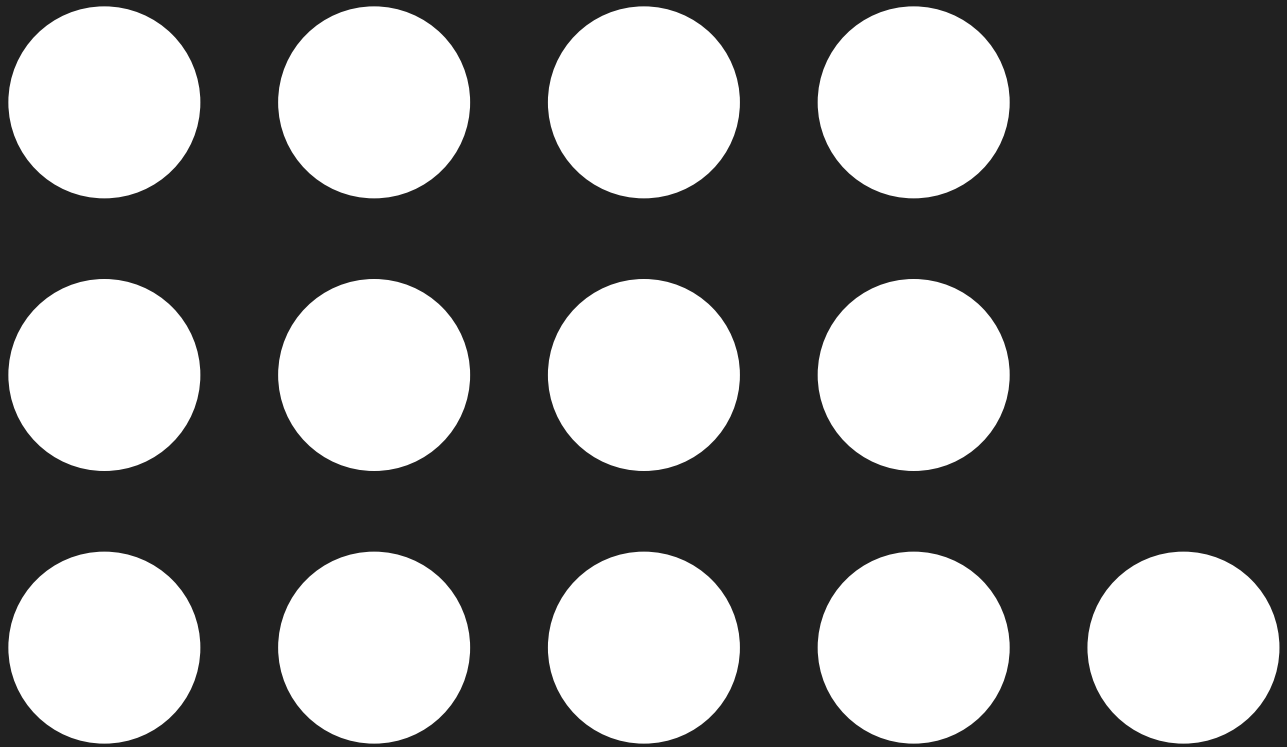


Year 0


Year 1


Year 1


Year 1



Year 1

We have a population of **12** llamas.

Each year, **12/3** new llamas are born, and **12/4** llamas pass away.

How many years will it take to have a population of **24** llamas?

- Work an example yourself
- Write down exactly what you did
- Create a generalization (algorithm) after working multiple examples
- Test your algorithm by hand
- Translate your algorithm to code
- Find bugs in your code by running test cases
- Debug (and critique) your code

Tutorials

Office Hours

cs50.ly/studybuddy

cs50.ly/attend


This was CS50.