

## Animal Tracking and Converting Data Types

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### Textbook

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## Animal Tracking and Converting Data Types

### Foundation

There will be times when you want to change the variable type. Remember that we've learned about two variable types so far.

"23" is a **string**

23 is an **integer**

Doing math with strings produces interesting results.

If you tried to complete the command `"23" * 4`, it would print out `"23232323"`. It is duplicating the string of "23" four times. If you wanted to do math with the string "23", you would need to first change it to an integer.

Changing a variable type is done with [converting](#).



## Converting

Converting is done by specifying the variable type when assigning a value to the variable.

- **Integers** `int()`
- **Strings** `str()`

You can change the "3" from a string to an integer using the `int()` function.

```
1 kilometers = "25"  
2 kilometers = int("25")  
3  
4 print(kilometers + 5)
```

Try it!

You can also change integers into strings using the `str()` function. This is useful for concatenation because you can only concatenate with strings.

```
1 temperature = 10  
2  
3 print("It was " + str(temperature) + " degrees outside!")
```

Try it!

## Converting Inputs

Remember the lesson on inputs/outputs? This is very important. **Inputs are automatically accepted as a string.** Take this code for example:

```
family = input("How many dolphins were there?")
```

If the user answers with the number 5, the computer accepts it as a **string** with the number 5 in it. Like this: "5".

This becomes very important when you need to use that number to do math. The following code will throw an error.

```
1 dolphins = input("How many dolphins were there?")  
2  
3 baby = dolphins + 1  
4  
5 print(baby)
```

Try it!

You will need to change your input into an integer before you can do math.

```
1 dolphins = int(input("How many dolphins were there?"))
2
3 baby = dolphins + 1
4
5 print(baby)
```

Try it!

**To be very clear: Inputs are automatically accepted as a string! To do math with a number input, it will need to be converted into an integer.**

## Checkpoint

### Tracking Animal Converting Data Types

Declare and print variables Create two variables:

1. One integer variable.
2. One string variable that is a number (e.g. "23").
3. Create a new variable and assign it to the string converted to an integer. Then print the converted variable in a separate print statement.
4. Create a new variable and assign it to the integer converted to a string. Then print the converted variable in a separate print statement.

For example, your code could look something like this:

```
watermelons = 0.5
```

```
converted_float = int(watermelons)
```

```
print(converted_string)
```

As a reminder, there are often several ways to write code that are all correct. For this particular checkpoint, the autograder is looking for the above approach?

### Requirements:

- Create one integer variable.
- Create one string variable with a number value.
- Create a new variable and assign it to the string converted to an integer. Then print the converted variable.
- Create a new variable and assign it to the integer converted to a string.

## Questions (6)

**1. What will print out with the following code? print("4" \* 3)**

MULTIPLE CHOICE

**Choose the correct answer:**

- A. 12
- B. 444
- C. 7
- D. 1

MULTIPLE CHOICE

## 2. What data type are inputs automatically accepted as?

Choose the correct answer:

- A. an integer
- B. a string

MULTIPLE CHOICE

## 3. What data type is this? "27"

Choose the correct answer:

- A. integer
- B. string

## 4. Debug the following code. Assume you are converting the variable named pumpkins to an integer.

DEBUG CODE

Code to Debug:

```
1 pumpkins = int"3"
```

## 5. Debug the following code. Assume you are changing the variable named candy to a string.

DEBUG CODE

Code to Debug:

```
1 candy = string(5)
```

MULTIPLE CHOICE

## 6. What is the term that means to change a variable type?

Choose the correct answer:

- A. converting
- B. concatenate
- C. integrate
- D. input

## Challenges (3)

### 1. Convert Kilometers to Miles

As a marine biologist, you will often work in kilometers. But at times you might write articles to a population that uses miles.

Create a program that will convert kilometers to miles. The user will input a kilometer value and the program will print the miles in this format: " `The animal went 12.42 miles.` "

**Hint: a kilometer is equal to .621 miles.**

For example:

Input (kilometers) : `20`

Output (miles) : `The animal went 12.42 miles.`

Another example:

Input: 15

Output: `The animal went 9.315 miles.`

Remember that you will need to switch back and forth from string to integer and back to a string.

NOTE ABOUT THE AUTOGRADER

The autograder will check for the correct output exactly. This means it will check capitalization, spacing, spelling, and punctuation to see if it matches exactly.

It also checks all the print statements. So if you have multiple print statements, it will assume that is part of your answer. So before hitting "submit", make sure that you have only 1 print statement total in your code.

## 2. Convert Celsius to Fahrenheit

As a marine biologist, you will often work in Celsius. But at times you might write articles to a population that use Fahrenheit. How might something like water or air temperature affect wildlife behavior? How might human activity impact water or air temperature? What kinds of human behaviors might contribute to an overall global increase in temperature?

Create a program that will convert Celsius to Fahrenheit. The user will input a Celsius value and the program will print the Fahrenheit in this format: " `The temperature of 0 in Celsius is equal to 32.0 in Fahrenheit.` "

**Hint: Fahrenheit is equal Celsius times 1.8 plus 32.**

*For example:*

Input (Celsius) : `10`

Output (Fahrenheit) : `The temperature of 10 in Celsius is equal to 50.0 in Fahrenheit.`

*Another example:*

Input: `25`

Output: `The temperature of 25 in Celsius is equal to 77.0 in Fahrenheit.`

Remember that you will need to switch back and forth from string to integer and back to a string.

### NOTE ABOUT THE AUTOGRADER

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### 3. Sustainable Ecosystems

A sustainable ecosystem is an aspect of nature that can take care of itself over time. If a shark eats at least **15** fish a day, it needs to live in an ecosystem that produces at least **15** fish a day.

Create a program that tells how many fish a year are needed to sustain an ecosystem with an inputted number of sharks. Assume a shark eats **15** fish a day and a year has **365** days.

For example:

Input (number of sharks): `4`

Output(number of fish per year): `If you have 4 sharks in your ecosystem, you will need at least 43800 fish per year to be sustainable.`

Another example:

Input: `10`

Output: `If you have 10 sharks in your ecosystem, you will need at least 54750 fish per year to be sustainable.`

You can see how quickly the numbers add up! Imagine what might happen to the shark population if humans were also taking fish.

You can learn more about energy in an ecosystem [here](#) :

#### NOTE ABOUT THE AUTOGRADER

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## Answer Keys & Solutions

### Checkpoint Solutions

#### Tracking Animal Converting Data Types

```
1 number = 10
2 word = "23"
3
4 number_converted = str(number)
5 print(number_converted)
6
7 word_converted = int(word)
8 print(word_converted)
```

### Questions

1. What will print out with the following code? `print("4" * 3)`

MULTIPLE CHOICE

Correct Answer:

- A. 12 ✗ Incorrect
- B. 444 ✓ Correct
- C. 7 ✗ Incorrect
- D. 1 ✗ Incorrect

2. What data type are inputs automatically accepted as?

MULTIPLE CHOICE

Correct Answer:

- A. an integer ✗ Incorrect
- B. a string ✓ Correct

3. What data type is this? "27"

MULTIPLE CHOICE

Correct Answer:



A. integer

✗ Incorrect

B. string

✓ Correct

**4. Debug the following code. Assume you are converting the variable named pumpkins to an integer.**

DEBUG CODE

**Incorrect Code:**

```
1 pumpkins = int"3"
```

**Correct Solution:**

```
1 pumpkins = int("3")
```

**Explanation:**

You need parentheses on your conversion.

**5. Debug the following code. Assume you are changing the variable named candy to a string.**

DEBUG CODE

**Incorrect Code:**

```
1 candy = string(5)
```

**Correct Solution:**

```
1 candy = str(5)
```

**Explanation:**

str()

**6. What is the term that means to change a variable type?**

MULTIPLE CHOICE

**Correct Answer:**

A. converting

✓ Correct

B. concatenate

✗ Incorrect

C. integrate

✗ Incorrect

D. input

✖ Incorrect

### Explanation:

This converts that data type from one type to another

## Challenges

### 1. Convert Kilometers to Miles

#### Solution:

```
1 kilometers = int(input("How many kilometers?"))
2
3 miles = kilometers * .621
4
5 print("The animal went " + str(miles) + " miles.")
```

### 2. Convert Celsius to Fahrenheit

#### Solution:

```
1 celsius = int(input("What is the temperature today?"))
2
3 fahrenheit = celsius * 1.8 + 32
4
5 print("The temperature of " + str(celsius) + " in Celsius is equal to " +
  str(fahrenheit) + " in Fahrenheit.")
```

### 3. Sustainable Ecosystems

#### Solution:

```
1 sharks = int(input("How many sharks are there?"))
2
3 fish_per_day = sharks * 15
4 fish_per_year = fish_per_day * 365
5
6
7 print("If you have " + str(sharks) + " sharks in your ecosystem, you will need at
  least " + str(fish_per_year) + " fish per year to be sustainable.")
```