

# IBM Data Analytics

*Course 4: Python for Data Science & AI*

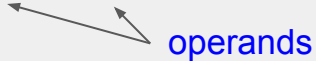
## Variables and Expressions

**Q: What is an expression in Python?**

# Expressions

→ Expressions are operations python performs on numbers or variables

Example: 40 - 5



Operation	Sign used in Python	Examples of Expressions
Addition	+	10 + 17
Subtraction	-	20 - 6
Multiplication	*	5 * 5
Division	/	20/3
Division	//	20//3

# A closer look at division


→ Notice that division is displayed twice in the table below. What is the difference between the single “/” and the double “//” ?

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Addition	+	10 + 17
Subtraction	-	20 - 6
Multiplication	*	5 * 5
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# A closer look at division

→ Notice that division is displayed twice in the table below. What is the difference between the the single “/” and the double “//” ?

Operation	Sign used in Python	Examples of Expressions	Result of Expression
Division (without rounding)	/	20/3	20/3 = 6.666
Division (with rounding)	//	20//3	20//3 = ____




What is the result of this expression?

# A closer look at division

→ Notice that division is displayed twice in the table below. What is the difference between the the single “/” and the double “//” ?

Operation	Sign used in Python	Examples of Expressions	Result of Expression
Division (without rounding)	/	20/3	20/3 = 6.666
Division (with rounding)	//	20//3	20//3 = 6



Notice how the result is rounded to the smaller whole number

# Order of Operations

→ Recall that BEDMAS is used to evaluate expressions

Exercise: Evaluate the following expressions:

Expression	Result of Expression
$(8-5)*4-5$	
$56/8*7-5$	
$15-(3+2)/5$	
$7*5//6$	

# Order of Operations

→ Recall that BEDMAS is used to evaluate expressions

Exercise: Evaluate the following expressions:

Expression	Result of Expression
$(8-5)*4-5$	7
$56/8*7-5$	44
$15-(3+2)/5$	14
$7*5//6$	5



# Variables

→ Variables are used to store values

Example:

Consider the following variables:

**a=7** and **b=5**

Evaluate the following expressions:

$$a + b = ?$$

$$2a / 3 = ?$$

$$5b // 2 = ?$$

$$a * 2b = ?$$

# Variables

→ Variables are used to store values

Example:

Consider the following variables:

**a=7** and **b=5**

Evaluate the following expressions:

$$\mathbf{a + b = 7 + 5 = 12}$$

$$2\mathbf{a} / \mathbf{3} = 2*7 / 3 = 14 / 3 = 4.67$$

$$5\mathbf{b} // \mathbf{2} = 5*5 // 2 = 12$$

$$\mathbf{a * 2b = 7 * 2 * 5 = 70}$$

**Q: What is the data type of each resulting value?**

$$a + b = 7 + 5 = 12$$

$$2a / 3 = 2 * 7 / 3 = 14 / 3 = 4.67$$

$$5b // 2 = 5 * 5 // 2 = 12$$

$$a * 2b = 7 * 2 * 5 = 70$$

# Answer

$$a + b = 7 + 5 = 12$$

INTEGER

$$2a / 3 = 2 * 7 / 3 = 14 / 3 = 4.67$$

FLOAT

$$5b // 2 = 5 * 5 // 2 = 12$$

INTEGER

$$a * 2b = 7 * 2 * 5 = 70$$

INTEGER

# Variables

→ A variable can store the result of an expression

Example:

$$x = 8 * 3$$

$$x = 24$$

$$y = 6 + 6$$

$$y = 12$$

→ You can also perform operations on existing variables and store the result in another variable

Example:

$$w = 2x + 3y$$

$$w = 2*24 + 3*12$$

$$w = 48 + 36$$

$$w = 84$$

**Q: What is the value of x?**

**x = 8**

**x = 3x // 2**

# Answer

$$x = 8$$

$$x = 3x // 2$$

$$x = 3*8 // 2 = 24 // 2 = 12$$

# Identifying the type of data stored in a variable

→ You can use the **type()** command to identify the type of data stored in a variable

**x = 8**

**x = 3x // 2**

**x = 3\*8 // 2 = 24 // 2 = 12**

**What is the data  
type of x?**

**u = 8**

**v = 8u / 7**

**What is the data  
type of v?**



# Identifying the type of data stored in a variable

→ You can use the **type()** command to identify the type of data stored in a variable

**x = 8**

**x = 3x // 2**

**x = 3\*8 // 2 = 24 // 2 = 12**

What is the data  
type of x?

**type(x): int**

**u = 8**

**v = 8u / 7**

What is the data  
type of v?

**type(v): float**

employee_name	pay_per_day	hours_worked_per_day	hourly_wage
Catherine	200	8	
John	150	7	

**Questions:**

- a) What variables will we need to calculate the hourly wage for each employee?
- b) What operations will we need to perform on the variables to calculate the hourly wage?
- c) Write an expression that can be used to calculate the hourly wage
- d) Store the expression in the variable `hourly_wage`. Then, find the value of `hourly_wage` for both Catherine and John

employee_name	pay_per_day	hours_worked_per_day	hourly_wage
Catherine	200	8	
John	150	7	

### Questions:

- a) What variables will we need to calculate the hourly wage for each employee?

**pay\_per\_day**      and      **hours\_worked\_per\_day**

- b) What operations will we need to perform on the variables to calculate the hourly wage?

we need to divide **pay\_per\_day** by **hours\_worked\_per\_day**

- c) Write an expression that can be used to calculate the hourly wage

**pay\_per\_day / hours\_worked\_per\_day**

employee_name	pay_per_day	hours_worked_per_day	hourly_wage
Catherine	200	8	
John	150	7	

### Questions:

d) Store the expression in the variable hourly\_wage. Then, find the value of hourly\_wage for both Catherine and John

**hourly\_wage = pay\_per\_day / hours\_worked\_per\_day**

**Catherine:**

hourly\_wage = 200 / 8 = **25**

**Jon:**

hourly\_wage = 150 / 7 = **21.43**