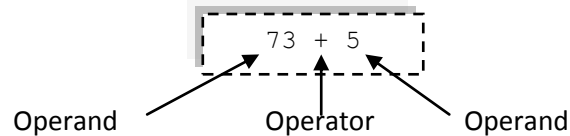


Computers are able to perform mathematical operations. Programming languages are able to do this with both numbers and numbers that are stored in variables or constants.



Mathematical **operations** have **operands** as inputs and an **operator** that performs an **operation** on the inputs to give an output. In this case, + is the operator, 73 and 5 are both operands. The result of the operation is 78.

The table below shows operators used in programming.

| Operator | Name | Explanation | Examples |
|----------|-------------------------|---|--|
| + | Addition | Adds two numbers together, or the numbers stored in variables. The result can be assigned to a variable | total ← 5 + 7 score ← score + 1 |
| - | Subtraction | Subtracts the second operand from the first | discountedTotal ← 5 - 3 score ← score - 1 |
| * | Multiplication | Used to multiply two numbers together | area ← 5 * 2 vat ← 23.47 * 0.2 |
| / | Division | Used to divide one number by another | triangleArea ← 25 / 2 average ← total / 20 |
| MOD | Modulus | Used to find the remainder (modulus) after division. Many languages will use the % symbol to mean MOD | 25 MOD 5 [answer is 0] 25 MOD 8 [answer is 1] 25 MOD 7 [answer is 4] numberOfMonths ← 365 MOD 30 [answer is 5] |
| DIV | Integer division | Used to find the quotient (integer number before the decimal point) after division. Some languages use the // for this | 25 DIV 5 [answer is 5] 25 DIV 8 [answer is 3] 25 DIV 7 [answer is 3] numberOfMonths ← 365 DIV 30 [answer is 12] |

Examples:

```
playerAge ← 15
constant DAYS_IN_A_YEAR ← 365
daysAlive ← playerAge * 365
hoursAlive ← daysAlive * 24
tomorrowDavsAlive ← davsAlive + 1
```

```
score1 ← 92
score2 ← 84
score3 ← 63
total ← score1 + score2 + score3
average ← total / 3
```

Explanation:

Assign 15 to the variable playerAge
Assign 365 to the constant DAYS_OF_THE_YEAR
Multiply playerAge (15) by 365, then assign to daysAlive
Multiply daysAlive by 24 and assign to hoursAlive
Add 1 to daysAlive and then assign to tomorrowDaysAlive

Assign 3 numbers into the variables score1, score2 and score3

Add the 3 scores and assign to the variable total
Divide the value in the variable total by 3 then assign to the variable average

Q 14

1. For each of the following operations, what are the symbols used as the operator? The first has been done for you.

| Operation | Symbol for operator |
|----------------|---------------------|
| Addition | + |
| Multiplication | |
| Division | |
| Modulus | |

[3]

2. Calculate each of the following expressions. The first has been done for you.

| Expression | Answer |
|-------------|-----------|
| 5 + 7 | 12 |
| 13 - 8 | |
| 5 * 3 | |
| 12 / 4 | |
| (5 + 3) / 2 | |

[4]

3. Look at the following code and then answer the questions beneath.

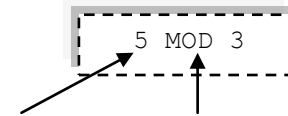
```
stone ← 7
pounds ← 5
totalPounds ← (7 * 14) + 5
totalKilograms ← 0.45 * totalPounds
newWeight ← totalKilograms + 1
```

- a) What is the value of totalPounds? _____ [1]
- b) What is the value of totalKilograms? _____ [1]
- c) What is the value of newWeight? _____ [1]

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Numeric Operations - Questions

4. Label the expression below using the words *operator* and *operand*.



_____ [2]

5. Calculate each of the following expressions.

| Expression | Answer |
|------------|--------|
| 5 MOD 3 | |
| 15 MOD 5 | |
| 5 / 2 | |
| 20 DIV 7 | |
| 30 DIV 10 | |

[5]

6. Look at the following code and then answer the questions beneath.

```
playersInGame ← 7
goldCoins ← 23
coinsPerPlayer ← goldCoins DIV playersInGame
remainingCoins ← goldCoins MOD playersInGame
averageCoinsEach ← goldCoins / playersInGame
```

- a) What is the value of coinsPerPlayer? _____ [1]
- b) What is the value of remainingCoins? _____ [1]
- c) What is the value of averageCoinsEach? _____ [1]

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