

Store It and Scan It

Assignment statements and input



Update the scoreboard

PAUSE AND TRY

The ref says "Home gets its score plus 2." What goes up?

SCOREBOARD	
HOME	AWAY
3	4

Talk with a partner. Which number did you need first? After the update, does the board still show the 3 anywhere?

By the end of class you can...

- 1 Write assignment statements that initialize a variable and later change it.
- 2 Predict the value stored: Java works out the right side first, using current values.
- 3 Name the type of an expression and store it in a variable of a compatible type.
- 4 Use null for a reference variable that has no object yet.
- 5 Read text input from the keyboard with a Scanner.

A large, white, rounded square containing the number '1' in a bold, teal, sans-serif font.

1

PART 1

The assignment operator

The value on the right goes into the variable on the left



The **assignment operator =** stores the value of the expression on its right in the variable on its left. The first time is called **initializing** the variable.

INITIALIZE, THEN CHANGE

```
int tickets = 8;  
System.out.println(tickets);  
tickets = 5;  
System.out.println(tickets);
```

OUTPUT

8
5

Line	What happens
<code>int tickets = 8;</code>	Declare and initialize: tickets holds 8
<code>tickets = 5;</code>	Change: 5 replaces 8

Java works out the right side first

USING A VARIABLE'S OWN VALUE

```
int steps = 300;  
steps = steps + 450;  
System.out.println(steps);
```

OUTPUT

750

LINE 2, STEP BY STEP

1. Look up: steps holds 300 right now.

2. Evaluate: $300 + 450$ is 750.

3. Store: 750 replaces 300 in steps.



During execution, an expression is **evaluated** to produce a single value. Then that one value is stored.

A variable stores a value, not a formula



An assignment runs **once**, when its line runs. Changing a variable later does not update other variables that used it.

WHAT PRINTS?

```
int base = 4;  
int doubled = base * 2;  
base = 10;  
System.out.println(doubled);
```

OUTPUT

8

NOT 20

Line 2 stored the value 8 in doubled. Line 3 changes only base, the variable on its left. Nothing tells doubled to change.

Trace it line by line

PAUSE AND TRY

Fill in the table. What does the code print?

```
int x = 7;
int y = x - 2;
x = y * 2;
y = x % 4;
System.out.println(x);
System.out.println(y);
```

After line	x	y
1		
2		
3		
4		

A large, bold, teal-colored number '2' is centered within a white square that has rounded corners and a slight 3D effect with a shadow.

PART 2

Types, values, and null

Every expression has a type

Expression	Value	Type
7 + 2	9	int
7 / 2	3	int
7 / 2.0	3.5	double
7 % 2	1	int
"seven"	"seven"	String

DOES NOT COMPILE

```
int n = 7 / 2.0;
```

COMPILER SAYS

```
incompatible types: possible lossy  
conversion from double to int
```



A variable can be assigned only a value from a **compatible** data type. Here, use a double variable.

Give it a value before you use it



Every variable must be **assigned a value before it is used** in an expression. The compiler checks this for you.

DOES NOT COMPILE

```
int lives;  
System.out.println(lives);
```

COMPILER SAYS

```
variable lives might not have been  
initialized
```

FIXED

```
int lives;  
lives = 3;  
System.out.println(lives);
```

OUTPUT

```
3
```

null: a reference with no object



The literal **null** means a reference variable is not associated with any object. Reference types can be assigned a new object or null.

A NICKNAME THAT ARRIVES LATER

```
String nickname = null;  
System.out.println(nickname);  
nickname = "Ace";  
System.out.println(nickname);
```

OUTPUT

```
null  
Ace
```

DOES NOT COMPILE

```
double price = null;
```

COMPILER SAYS

```
incompatible types: <null>  
cannot be converted to double
```

Compiles or not?

PAUSE AND TRY

For each snippet: does it compile? If it does, what prints?

1 `double speed = 2 * 1.5;
System.out.println(speed);`

2 `int pages;
pages = 12 / 5;
System.out.println(pages);`

3 `int miles = 10 / 4.0;`

4 `boolean done = null;`

A large, white, rounded square containing the number '3' in a bold, teal, sans-serif font.

3

PART 3

Input with a Scanner

Input, and the Scanner class

Tactile: a tap, a button

Audio: a voice

Visual: a camera

Text: typed words

Scanner reads text input.

Code	What it does
<code>import java.util.Scanner;</code>	At the very top: lets the program use Scanner
<code>Scanner console = new Scanner(System.in);</code>	Makes a Scanner that reads the keyboard
<code>console.nextInt()</code>	Reads the next whole number (int)
<code>console.nextDouble()</code>	Reads the next real number (double)
<code>console.nextLine()</code>	Reads the rest of the line as a String

A program that reads a number

DOGYEARS.JAVA

```
import java.util.Scanner;

public class DogYears {
    public static void main(String[] args) {
        Scanner console = new Scanner(System.in);
        System.out.print("Dog's age: ");
        int age = console.nextInt();
        int humanYears = age * 7;
        System.out.println(humanYears);
    }
}
```

OUTPUT

```
Dog's age: 4
28
```

The user typed 4 and pressed Enter.

nextInt() reads the input and gives back its value. The **assignment** stores that value in age, like any other expression.

Input is read in order, and types must match



If the next piece of input does not match the type the call asks for, the program throws an **InputMismatchException**.

```
int laps = console.nextInt();
int minutes = console.nextInt();
int total = laps * minutes;
System.out.println(total);
```

WHY IT CRASHES

The first `nextInt()` reads 5. The second `nextInt()` meets 2.5, which is not a whole number. It compiles fine; it fails only while running.

USER TYPES 5 2.5

```
Exception in thread "main"
java.util.InputMismatchException
```

Same code, three inputs

PAUSE AND TRY

Same code as the last slide. What happens for each input?

```
int laps = console.nextInt();
int minutes = console.nextInt();
int total = laps * minutes;
System.out.println(total);
```

User types	What happens?
6 3	
3 6	
6 three	

Words to know

Assignment statement

Stores a value in a variable, using =.

Initialize

Assign a variable its first value.

Expression

Code evaluated to one value, which has a type.

Compatible

A value whose type the variable accepts.

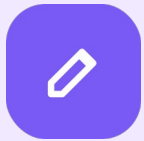
null

A reference variable is not associated with any object.

Scanner

A class that reads text input, such as from the keyboard.

What does = really do?



Explain to your partner, step by step, what Java does when it runs `total = total + price;`

SENTENCE STARTER

First Java _____ the right side using _____, then it _____ the result in _____.

Next: the Store It and Scan It puzzle worksheet.