

1 Processing: Translation and Rotation

CST112

2 The translate() Function

- The translate() function specifies a relative amount to displace (move) the *origin* ($x = 0$, $y = 0$) of the *coordinate system* within the output window
 - Origin when the sketch initially runs is located in the upper-left corner
- Format:
`translate(xTranslation, yTranslation);`
- Examples:
`translate(width / 2, height / 2) translate(100, 50);`

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8 Try It Out

- Translate1.pde
- Translate2.pde

9 The pushMatrix() Function (Page 1)

- The pushMatrix() function saves the current coordinate system to the “matrix stack”
- Any *translate* operations between the pushMatrix() and popMatrix() functions effectively are *temporary*

10 The pushMatrix() Function (Page 2)

- Format:
`pushMatrix();`
- Example:
`pushMatrix();
translate(100, 50);
drawStar();
popMatrix();`

11 The popMatrix() Function (Page 1)

- The popMatrix() function retrieves the saved coordinate system from the “matrix stack”
- Any *translate* operations between the pushMatrix() and popMatrix() functions effectively are *temporary*

12 The pushMatrix() Function (Page 2)

- Format:
 `pushMatrix();`
- Example:
 `pushMatrix();`
 `translate(100, 50);`
 `drawStar();`
 `popMatrix();`

13 Try It Out

- Translate3.pde

14 The rotate() Function

- The rotate() function rotates an object the amount specified by the *angle* parameter
 - Angles should be specified in *radians* (for the 360 degrees of a circle between 0 and 2π) or converted to radians with the radians() function
- Format:
 `rotate(angle);`
- Examples:
 `rotate(PI / 36);` `// 5 degrees`
 `rotate( radians(5) );`

15 Try It Out

- Rotate1.pde
- Rotate2.pde
- Rotate3.pde
- Rotate4.pde

16 The rotateX() Function

- A three-dimensional (3D) function rotates an object around its x-axis (the horizontal-axis) by the amount specified by the *angle* parameter
 - Angles should be specified in *radians* or converted to radians with the radians() function
- Format:
 `rotateX(angle);`
- Example:
 `rotateX(PI / 2);`

17 The rotateY() Function

- A three-dimensional (3D) function rotates an object around its y-axis (the vertical-axis) by the amount specified by the *angle* parameter
 - Angles should be specified in *radians* or converted to radians with the radians() function
- Format:

```
rotateY(angle);
```

- Example:

```
rotateY(PI / 2);
```

18 The rotateZ() Function

- A three-dimensional (3D) function rotates an object around its z-axis (the depth-axis) by the amount specified by the *angle* parameter

➤ Angles should be specified in *radians* or converted to radians with the radians() function

- Format:

```
rotateZ(angle);
```

- Example:

```
rotateZ(PI / 2);
```

19 Three-Dimensional (3D) Rotation

- The three rotation functions require passing either the P3D or OPENGLE constant as an optional third parameter in the size() function

- Format:

```
size(width, height, P3D|OPENGLE);
```

- Examples:

```
size(100, 100, P3D);
```

```
size(100, 100, OPENGLE);
```

20 Try It Out

- Rotate5.pde

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