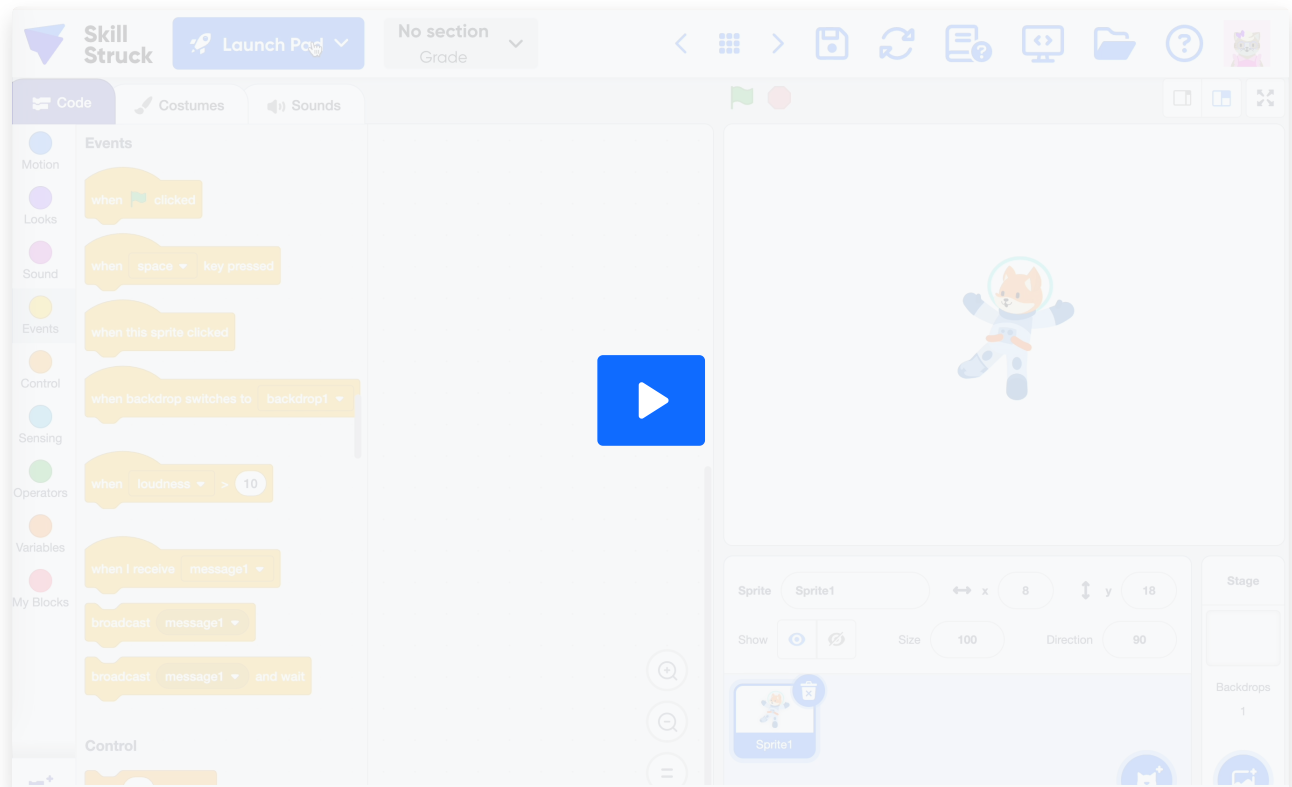
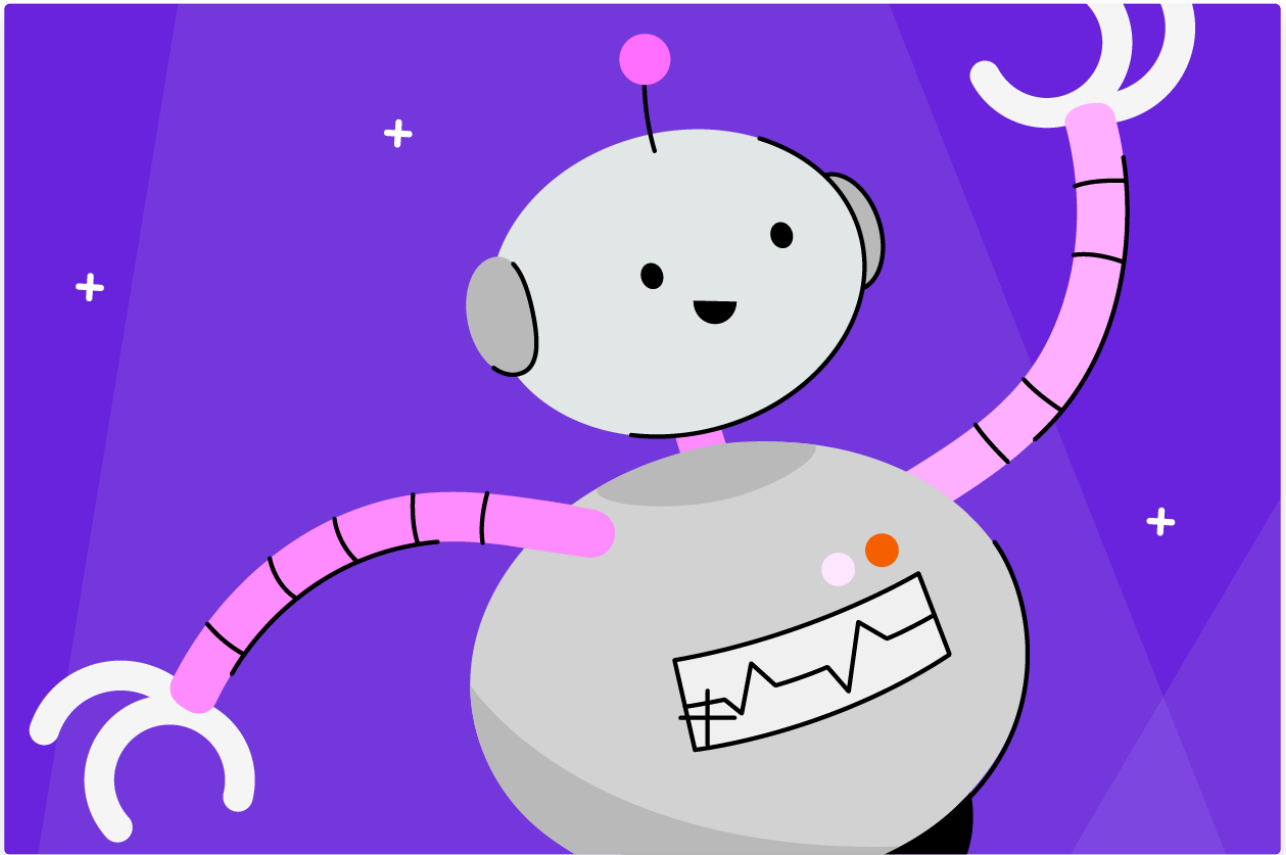


## Advanced Motion

### Textbook

## Advanced Motion





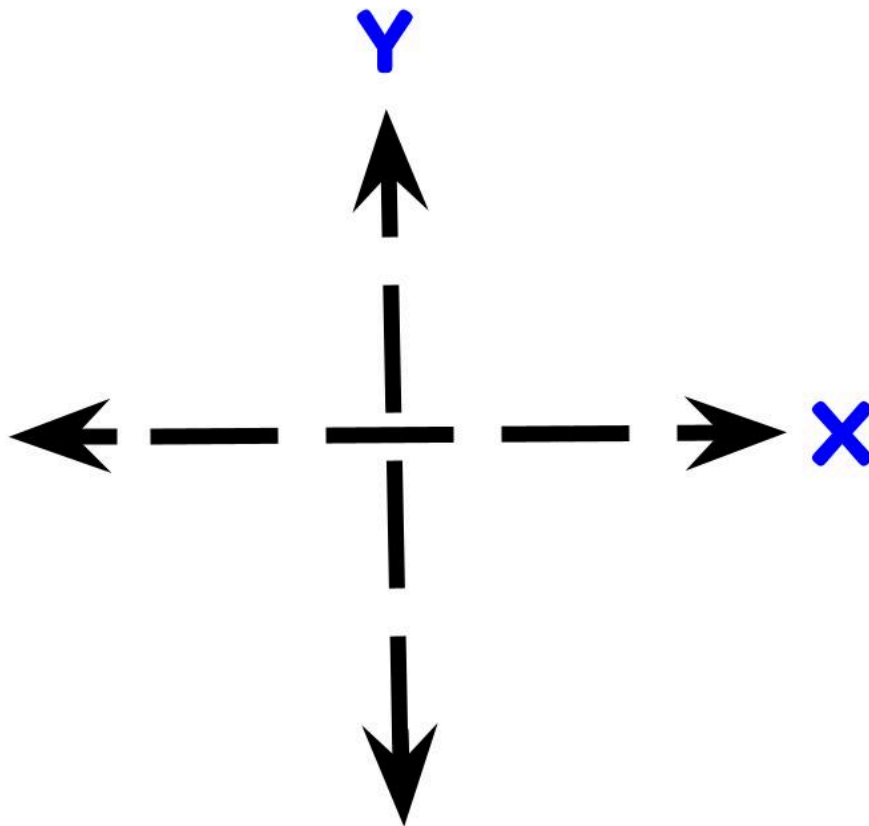
Think about all the different ways animals and people move! We jump, slide, crawl, wiggle, swim, slither, and fly. With all these different kinds of motion, we need to learn some more advanced ways to program motion with our sprites.

Let's learn more specific ways we can move the sprites on our page.

## XY Coordinates

Move a sprite left and right by using coordinates. Coordinates are a set of numbers that represent a position on a map. Coordinates look something like this: (4, 6). These are called XY coordinates.

XY coordinates are a way to pinpoint a location on a scene using horizontal (X) and vertical (Y) numbers. It's like a graph, where X represents left/right and Y represents up/down.



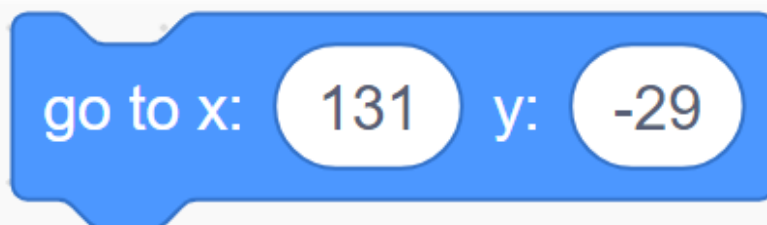
Change X by [10]

'X' represents left and right. This block will move your sprite right 10 spaces. Change it to a negative number to move left.

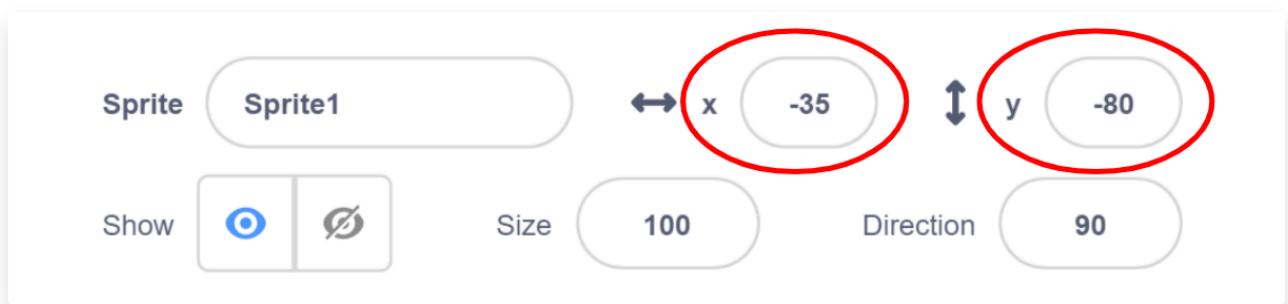
Change Y by [10]

'Y' represents up and down. This block will move your sprite up 10 spaces. Change it to a negative number to move down.

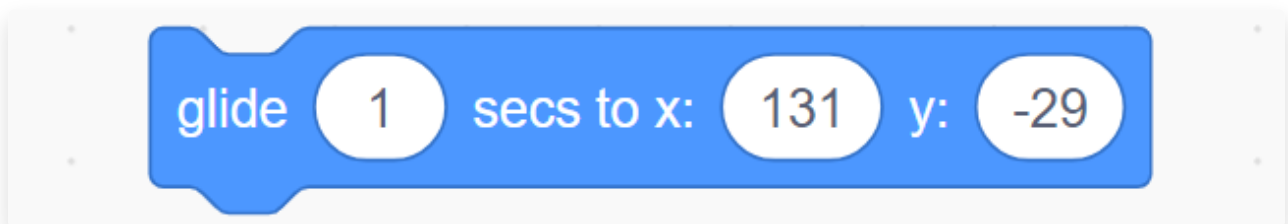
## Go to XY



This block is helpful if you want your sprite to instantly move to another point on your scene. To know what the XY coordinates are, drag your sprite to where you want it to move to on the page. Then, look at the XY coordinates below the scene and enter in the coordinates.



## Glide to XY



This block moves the sprite smoothly to the XY coordinates over the span of some number of seconds.

There are lots of motion blocks. Explore them all in these coding activities!

## Critical Thinking Questions

1. Why is it important to control direction and movement in both dance and coding?
2. Imagine you are coding a sprite to look like a bouncy ball. If you want the ball to move straight *up* and then quickly *drop* back down to the same spot, which blocks would you use? Explain why you chose those blocks to make it look like a bounce, and not a smooth glide or a teleport!

## Questions (5)

### 1. What are coordinates?

MULTIPLE CHOICE

Choose the correct answer:

- A. Letters in the alphabet
- B. Dots on a page
- C. A set of numbers that represent a position on a map.
- D. Shapes

### 2. What directions does the X coordinate represent?

MULTIPLE CHOICE

Choose the correct answer:

- A. Left/Right
- B. Up/Down

**3. What directions does the Y coordinate represent?**

Choose the correct answer:

- A. Left/right
- B. Up/down

**4. How do you move a sprite up using XY coordinates?**

Choose the correct answer:

- A. Change X [number]
- B. Glide to XY
- C. Go to XY
- D. Change Y [number]

**5. How is 'Glide to XY' different from 'Go to XY'?**

Choose the correct answer:

- A. Glide to XY moves the sprite instantly; Go to XY moves it smoothly.
- B. Glide to XY changes the backdrop; Go to XY changes the sprite's costume.
- C. Glide to XY changes the sprite's size; Go to XY changes its rotation.
- D. Glide to XY moves the sprite smoothly over time; Go to XY moves it instantly.

## Games (2)

### 1. Advanced Motion Matching Game

Full Screen

Audio

Instructions

Answer Key

Pause


Clear All

Check Matches


Attempts: 0

Moving up and down.


Moving left and right.




Y axis




Instantly moves the sprite to a location





Smoothly glides a sprite to a location







X axis







### 2. Advanced Motion Typing Game

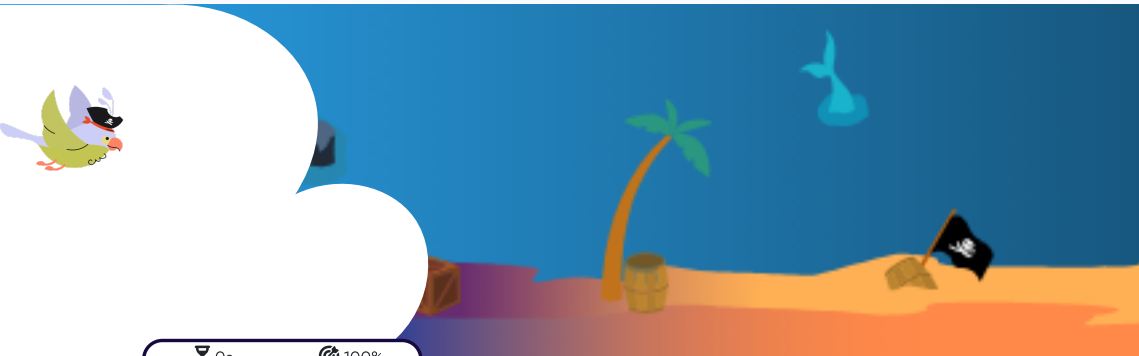

Full Screen

Audio

Instructions

Restart

Pause



0s

100%

Move a sprite left and rig

# Blocks Pro Challenges (3)

## 1. Spotlight

Challenge

Textbook

### Spotlight

Choose the spotlight backdrop. Then, program your sprite to move to a random position when the green flag is clicked.

Click the green flag as many times as you need to get your sprite standing in the spotlight.

Requirements

0/2

1 Motion

1 Event

Blocks must be connected to an Event block in order to pass the requirements

Submit

Code

Costumes

Sounds

Motion

move 10 steps

turn 15 degrees

turn 15 degrees

go to random position

go to x: 0 y: 0

glide 1 secs to random position

glide 1 secs to x: 0 y: 0

point in direction 90

point towards mouse-pointer

change x by 10

set x to 0

change y by 10

set y to 0

if on edge, bounce

set rotation style left-right

x position

Sprite

Sprite1

x 0 y 0

Size 100 Direction 90

Sprite1

Stage

Backdrops 1

## 2. Four Corners

Challenge

Textbook

### Four Corners

Start your sprite in the middle of the scene. Program your sprite to move to the following coordinates when you click the corresponding key arrows.

When **left arrow** key pressed, move to (-150, 100)

When **down arrow** key pressed, move to (-150, -100)

When **right arrow** key pressed, move to (150, -100)

When **up arrow** key pressed, move to (150, 100)

Requirements

0/2

4 Motion

4 Event

Blocks must be connected to an Event block in order to pass the requirements

Code

Costumes

Sounds

Motion

move 10 steps

turn 15 degrees

turn 15 degrees

go to random position

go to x: 0 y: 0

glide 1 secs to random position

glide 1 secs to x: 0 y: 0

point in direction 90

point towards mouse-pointer

change x by 10

set x to 0

change y by 10

set y to 0

if on edge, bounce

set rotation style left-right

x position

Sprite

Sprite1

x 0 y 0

Size 100 Direction 90

Sprite1

Stage

Backdrops 1

### 3. Gliding Jellyfish

Challenge

Textbook

#### Gliding Jellyfish

Use the underwater backdrop and select the jellyfish sprite.

Program the jellyfish to glide to a random position whenever you click the green flag. It will look like it's swimming through the water!

Requirements

0/2

1 Motion

1 Event

Blocks must be connected to an Event block in order to pass the requirements

Submit

Code

Costumes

Sounds

Motion

Looks

Sound

Events

Control

Sensing

Operators

Variables

My Blocks

move 10 steps

turn 15 degrees

turn 15 degrees

go to random position

go to x: 0 y: 0

glide 1 secs to random position

glide 1 secs to x: 0 y: 0

point in direction 90

point towards mouse-pointer

change x by 10

set x to 0

change y by 10

set y to 0

if on edge, bounce

set rotation style left-right

x position

Sprite1

x 0 y 0

Size 100 Direction 90

Sprite1

Stage

Backdrops 1

Sprite1

Stage

Backdrops 1



## Answer Keys & Solutions

### Questions

#### 1. What are coordinates?

MULTIPLE CHOICE

Correct Answer:

- A. Letters in the alphabet ✗ Incorrect
- B. Dots on a page ✗ Incorrect
- C. A set of numbers that represent a position on a map. ✓ Correct
- D. Shapes ✗ Incorrect

#### Explanation:

Coordinates look like (4, 6) or (3, 8)

#### 2. What directions does the X coordinate represent?

MULTIPLE CHOICE

Correct Answer:

- A. Left/Right ✓ Correct
- B. Up/Down ✗ Incorrect

#### Explanation:

The Y coordinate represents up/down.

#### 3. What directions does the Y coordinate represent?

MULTIPLE CHOICE

Correct Answer:

- A. Left/right ✗ Incorrect
- B. Up/down ✓ Correct

#### Explanation:

The X coordinate represents left/right.

#### 4. How do you move a sprite up using XY coordinates?

MULTIPLE CHOICE

**Correct Answer:**

- A. Change X [number] ✗ Incorrect
- B. Glide to XY ✗ Incorrect
- C. Go to XY ✗ Incorrect
- D. Change Y [number] ✓ Correct

**Explanation:**

'Y' coordinates control vertical movement.

#### 5. How is 'Glide to XY' different from 'Go to XY'?

MULTIPLE CHOICE

**Correct Answer:**

- A. Glide to XY moves the sprite instantly; Go to XY moves it smoothly. ✗ Incorrect
- B. Glide to XY changes the backdrop; Go to XY changes the sprite's costume. ✗ Incorrect
- C. Glide to XY changes the sprite's size; Go to XY changes its rotation. ✗ Incorrect
- D. Glide to XY moves the sprite smoothly over time; Go to XY moves it instantly. ✓ Correct

**Explanation:**

Consider the movement characteristics of each block.

## Games

### 1. Advanced Motion Matching Game

**Matching Game Solutions:**

1. →
2. →

3.  A code block that says "Go to x:121 y:-29" →

4.  A code block that says "Glide 1 secs to x:121 y:-29" →

*Students must drag items from the left to match with corresponding items on the right.*

## 2. Advanced Motion Typing Game

*Typing game - no answer key needed. Students practice typing the provided content.*