

POST-CLASS STUDENT ACTIVITY 4.1: ANIMATE BASIC CHARACTERS

Lesson Objective 4.1:

Animate basic characters. *Topics:* movement, frames per second (FPS), apply sprite animation.

Additional learning resources:

MSDN®:

XNA® Game Studio: <http://msdn.microsoft.com/en-us/library/cc178930.aspx>

Animating a Sprite: <http://msdn.microsoft.com/en-us/library/bb203866.aspx>

Other resources (books, e-reference):

Miles, Rob. Microsoft XNA Game Studio 4.0: Learn Programming Now! (Redmond, Wash.: Microsoft Press, 2011)

Resources, software, and additional files needed for this lesson:

1. None

Student Activity:

Directions to the student:

Read the following scenario. Answer the questions. Request assistance from the instructor as needed. Verify your answers with the instructor.

Scenario:

Dean Halstead is a programmer who works for Tailspin Toys. Recently, the company has decided to enter the online game marketplace with some small educational applications for children. The project entailed more work than Dean had planned, so he decided to hire a student intern to help with some of the animation tasks. The candidates must have some understanding of basic animation concepts. He wrote a few questions that will hopefully indicate if an interviewee is qualified.

Content:

1. How do characters (sprites) move? What information do you need to program an object to move across the screen?
2. How does the frame per second (FPS) rate affect the animation? What is the typical FPS?
3. What is a sprite sheet?
4. What is a matrix, and how is it used in animation?
5. What are shaders? How are they used?
6. What does it mean to generate objects from a user-indexed primitive?
7. What are keyframes? How are they used to define motion between keyframes?

KEY 4.1: ANIMATE BASIC CHARACTERS

Content:

1. How do characters (sprites) move? What information do you need to program an object to move across the screen?

Movement is based on speed, direction, and rotation of an object. All movement and measurements are in pixels. To move sprites accurately, you need to know their current coordinate position (in 2-D, it would be the upper-left coordinate point in (x,y) format, and for a 3-D game, it is (x,y,z) format.

2. How does the frame per second (FPS) rate affect the animation? What is the typical FPS?

The greater the FPS rate, the smoother the animation. The typical speed is 60 FPS, which is similar to the effect of a flip-book animation.

3. What is a sprite sheet?

A sprite sheet is a single graphic file that contains many sprites that can be used by specifying a source rectangle to determine which sprite to draw. This is much more efficient when you need multiple images.

4. What is a matrix, and how is it used in animation?

A matrix is a math term used in linear algebra to define a rectangular array of numbers represented in rows and columns (commonly used in a transformation of points). This is similar to matrix algebra.

5. What are shaders? How are they used?

Animation uses two shaders: Vertex shaders and Pixel shaders. They are used to apply color and texture to a pixel or vertex.

6. What does it mean to generate objects from a user-indexed primitive?

Primitives in animation are basic geometric shapes used to form more complicated objects. Common primitives include triangles, lines, and points.

7. What are keyframes? How are they used to define motion between keyframes?

Keyframes combine a timer and interpolation to determine the location of game objects and the path they will take. This allows an image to follow the path, but it eliminates the task of identifying each coordinate on the path because that is done automatically.