



Computer Science 1033 – Week 8

ANIMATION



"Live action writers will give you a structure, but who the hell is talking about structure? Animation is closer to jazz than some kind of classical stage structure." → Ralph Bakshi

Overview of Today's Topics

- Announcements
- Hints about Web Assignment
- Finish Page Rank/Google
- Animation

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Announcements

- Web Assignment due Friday (March 13th)
- Final Exam
 - Thursday, April 23rd at 2:00 pm
 - All multiple choice – 2 hour time period
 - Bring:
 - Pencil (soft) and eraser
 - Student card
 - Do NOT bring: calculator, iPod, hat, etc..
- OUR WHOLE CLASS HAS THEIR EXAM IN ALUMNI HALL:

COMPSCI	Class No.	Class Sect.	Day	Month	Date	Time	Bldg/Room	From	To
1033B	001		Thursday	April	23	2:00 PM	AH 15	ABDELM	GRIECO
1033B	001		Thursday	April	23	2:00 PM	AH 201/STAGE	GU	ZOU

Textbook Readings for this Week

- Animation

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Hints for Web Assignment

- Remember:
 - Titles
 - Headers
 - File names, spaces, lowercase
 - Images
 - Alt, Title
 - Size within page
 - On each page
 - Banner
 - No Scrolling horizontal/vertically to see buttons
 - Consistency
 - Buttons → look, ease of use
- Back to top
- References page layout
- Text colours, contrast
- Broken links
 - Check from a different computer!
- Underlining
- Colours
 - Link Colours
- Paragraphs
- Padding
- Followed the instructions (make the anchor links, etc..)

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How to do Web Assignment

- Colours → look at: <http://kuler.adobe.com/>
- <https://www.design-seeds.com/>
- Marks for:
 - Nice Banner
 - Good Colour Scheme
 - Alt/title tag on banner/images
 - No scrolling horizontally EVER at 1000 pixels
 - Consistency in the layout of the pages and the buttons/NICE LAYOUT ON EVERY PAGE
 - NO Underlining

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- Roll over buttons get 1 or 2 marks more
- PROPERTY TITLES! Website – Web Page
 - Grade 8 Designs – Home
 - Grade 8 Designs – References
- Must use table to lay things out
- Headings on pages
- Use an image for each page/good size
- Layout paragraphs well (don't squish on edge)
- Bold/highlight headings

Announcements

- Web Assignment
 - IT will take you longer than you think, give yourself LOTS of time to finish it and to hand it in (Hand it in on before Wednesday, the labs will be VERY busy on Thursday and Friday).
 - Hints:
 - Remember your titles
 - Think about layout, consistency, ease of use!
 - Follow the specs
 - Use a table for a clean layout (put the banner in the top row and content in the bottom row)
 - Common Mistakes → <http://www.csd.uwo.ca/~lreid/cs1033/assignment3/SamplesOfCommonMistakes/>

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Announcements

- Web Assignment Hints
 - THINGS THAT CAN GO HORRIBLY WRONG ☹
 - <http://cs1033.gaul.csd.uwo.ca/~lreid2/other/student1/>
 - <http://cs1033.gaul.csd.uwo.ca/~lreid2/other/student2/>
 - <http://cs1033.gaul.csd.uwo.ca/~lreid2/other/student3/assign3/howtohelp.html> (need to scroll for buttons, bullets, banner)
 - <http://cs1033.gaul.csd.uwo.ca/~lreid2/other/student9/major/> (consistency)
 - <http://cs1033.gaul.csd.uwo.ca/~lreid2/other/student19/> (not named index.html in main folder) – click on webpages
 - <http://cs1033.gaul.csd.uwo.ca/~lreid2/other/student20/> (edges)
 - <http://cs1033.gaul.csd.uwo.ca/~lreid2/other/student14/> (scrolling and banner on next page) <http://cs1033.gaul.csd.uwo.ca/~lreid2/other/student22/>
 - <http://cs1033.gaul.csd.uwo.ca/~lreid2/other/student18/Contact%20Us.html> (file names and button movement)
 - THINGS THAT CAN GO RIGHT ☺
 - <http://cs1033.gaul.csd.uwo.ca/~lreid2/other/student8/assign3/registration.html>
 - <http://cs1033.gaul.csd.uwo.ca/~lreid2/other/student22/assign3/>
 - <http://cs1033.gaul.csd.uwo.ca/~lreid2/other/student15/index.html>

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- Paragraphs → Centering → DON'T
- Hyphens on lists
- Emails links
- Back to top, anchors
- Think about link colours
- Link lengths
 - http://www.csd.uwo.ca/images/CSD_long_photo_l6.jpg vs.
 - [Middlesex](#)
- Common Mistake: renaming files/folder... this will TOTALLY SCREW up your website if you do not do it correctly!

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Web Assignment

- Reasons for lost marks on website assignments:
 - Forgot proper titles
 - Forgot images folder or called it Images
 - Called file Index.html instead of index.html
 - Called index.html something like home.html
 - Called aboutus.html something like About Us.html
 - Forgot to check links or images ☹
 - Didn't make the references working links
 - Filepaths should be relative and case-sensitive!
 - Save your work frequently.

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Make sure you get a copy of all your work!

- Your websites will only be posted for the next month (till about June 1, 2020) so copy of everything you want onto a stick. YOU WILL NOT BE ABLE TO GET IT BACK AFTER THAT DATE!

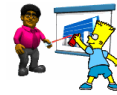
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Good Review for Searching!

- https://www.youtube.com/watch?v=LVV_93mBfSU

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What is animation



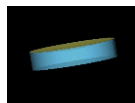
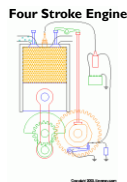
- A sequence of images that create the illusion of movement when played in succession.
- How does the illusion work, what is each still image called?
- Here are some simple examples:



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Why use animation?

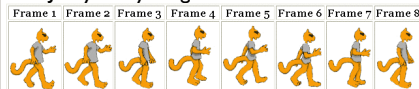
- Easier to show somebody how something works then to try and explain it.
- Also animation:
 - Indicate movement
 - Illustrate change over time
 - Visualize three-dimensional objects
 - Attracts attention



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How does animation work?

- Simulation of movement through a series of pictures that have objects in slightly different positions
- Each drawing is called a **frame** (a snapshot of what's happening at a particular moment)
- Required Frames Per Second FPS:
 - Movies on film → 24 fps
 - TV → 30 fps
 - 9000 frames for five minute cartoon
 - Computer animation → 12 to 15 fps
- Jerky if anything less



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Sampling and Quantizing of Motion

- Since each frame is just an image →
 - Each frame is sampled into a discrete samples and each sample becomes a pixel → **Sampling process**
 - Remember:
 - More samples means better quality (same image represented in 10 pixels by 10 pixels or in 200 pixels by 200 pixels)
 - More samples means bigger file sizes (10 pixels by 10 pixels vs 200 pixels by 200 pixels)
 - Each pixel gets assigned a colour, maybe just 2 colours (black and white → 1 bit colour) or maybe 16 million colour (24 bit colour) → **Quantization process**
- **Question:** What else can we "**Sample**" with **MOTION**?

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Frame Rate (Frames Per Second FPS)

- **Frame Rate:** indicates the playback speed of the animation in frames per second



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2-D Animation

- two types of 2-D animation:
 - **Cel Animation** (also called traditional animation, classical animation, hand-drawn animation, frame by frame animation)
 - **Path Based Animation**
- Both types still are made of frames:
 - The more frames per second, the more believable the movement will be.
 - The more frames per second, the bigger the final version of the movie file will be (more bytes)

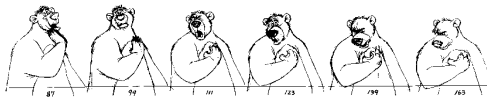
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5 Types of Animation

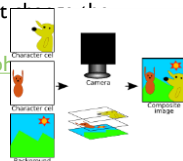
- <https://www.youtube.com/watch?v=NZbrdCAsYqU> (start at 30 seconds)
 - Traditional Animation (**Cel Animation**)
 - Rotoscoping is one type
 - 2D Animation (**Path Based Animation**) *** this is what we will be doing
 - Computer Animation
 - Motion Graphics
 - Stop Motion (5:30)

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Cel Animation



- An animator must **HAND** draw every single frame!
- To simplify, one background is drawn and then the item that will move is drawn on a clear sheet of plastic (a cel), one drawing for each frame.
- When moving to the next scene, just change background
- http://www.youtube.com/watch?v=jblre=player_embedded (start at 55)
- For example: **Charlie Brown**



Path Based Animation

- Pick:
 - a starting point for an object, (start frame)
 - an ending point for an object (end frame)
 - a path for the object to follow
- And then the computer generated all the frames in between (called **TWEENING**), so that the artist doesn't have to draw the intermediate frames (like the artist did in cel based animation)



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Path Based Animation

- **Question** If I have a 40 frame movie playing at 5 frames per second, how long will the movie be? _____ seconds

- **Question :**

A – 10 sec
B – 3 sec
C – 4 sec
D – 6 sec
E – 2 sec
ORDER: EBCDA

Order these movies from shortest to play (in seconds) to longest to play (in seconds)	
Most Popular Order	
E	20 Frames at 10 fps
B	60 Frames at 20 fps
C	20 Frames at 5 fps
A	20 Frames at 2 fps
D	60 Frames at 10 fps

- **Question:** The path the object follows have to be a straight line, **TRUE or FALSE?**
- **Question:** What software allows us to do path based animation?

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Path Based Animation Software

- The software that generates the frames has features such as:
 - **Looping**
 - **Transition (Fade in and Fade out)**
 - **Repetitions** → allows the user to pick how many times the animation repeats
 - Setting the **Frames Per Second**
 - **Question:** What does a bigger FPS imply?

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What can we do to change the motion?

- If the animation appears too slow, we can speed up the motion by:
 - Reduce the number of frames (say pull out every other frame)
- OR
- Increase the frame rate (go from 10fps to 20fps)

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Slowing down the motion by adding more frames

- Assume now that the motion is a bit too fast, 2 ways to slow it down:
 - **Way 1: Add more frames:**
 - Keep the frame rate the same
 - Increase the number of frames between the keyframes to stretch out the animation
 - **Way 2: Lower the frame rate (go from 20fps to 5fps)**
 - Keep the same number of frames as original but stretches out movie
- Original Clip has 5 frames, at 20 fps, so finishes playing at 0.2 seconds, too fast!
 - **Way 1:** still have 20 fps, but add in extra frames between, now have 20 frames
 - **Way 2:** holds frame on screen for 0.2 seconds, then moves to frame 2, on screen for 0.2 second, etc....

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• Question: What is wrong with Way (c)?

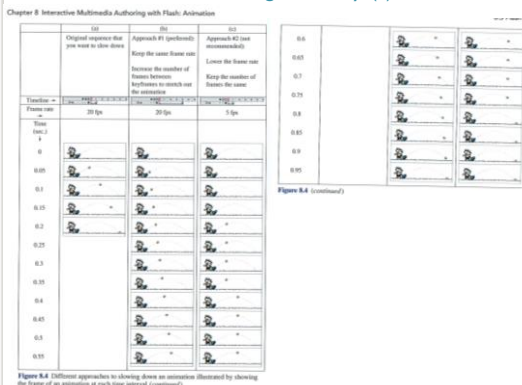


Figure 8.4 Different approaches to slowing down an animation illustrated by showing the frame of an animation at each time interval (continued)

From the text book: Digital Media Primer by Yue-Ling Wong

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Cel Animation vs. Path Based Animation

Figure 8.3a shows a simple nine-frame animation of a bird flying. The visual content of all nine frames are explicitly placed. Figure 8.3b shows an example of a tweened animation, which is discussed next.

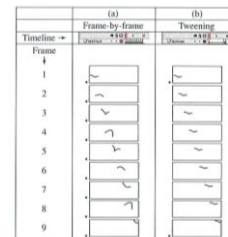


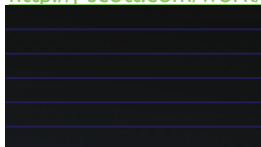
Figure 8.3 Frame-by-frame versus tweening showing the • next to the image frame to indicate that the image is created manually (a) Frame-by-frame (b) Tweening

From the text book: Digital Media Primer by Yue-Ling Wong

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2-D Animation Terminology

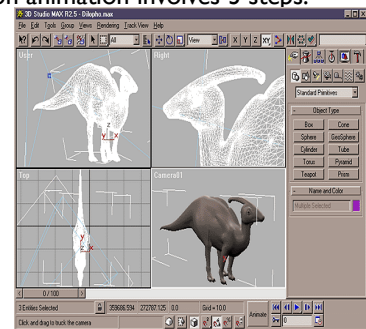
- **Question:** What do these terms mean?
 - **Keyframe**
 - **Tweening**
 - **Onion Skinning**
- Some Inspiration → An amazing animator:
<http://j-scott.com/work/>



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3-D Animation

- 3-Dimension animation involves 3 steps:
 - Modelling
 - Rendering
 - Animating
- **Demo**



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5 Tips to Create Realistic Motion

- **Question:** which object is heavier? How do you know this? How did the artist achieve this?
- <https://www.youtube.com/QWRs> (start at 2:10)



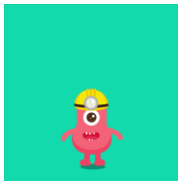
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- **Question:** How does the artist show the speed with the poker chips? What is Ease?



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- **Question:** What do you notice about the movement of the helmet compared to the body in this image?



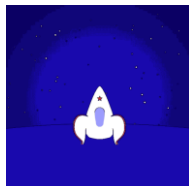
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- **Question:** What do you think the box is about to do? What term do we use when we think something is about to happen?



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- **Question:** What is interesting about the shape of this rocket as it starts and stops? What terms would you use to describe this? What other common object do we often use to display this phenomena?



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Break

- After you grab your coffee, watch this video and see how at the very end of it, it does MORPHING very effectively 😊
 - http://www.youtube.com/watch?v=nUDIoN-_Hxs

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Where can you get animation?

- Purchase CDs or buy off the internet or get free clipart on the internet, for example:
 - <https://classroomclipart.com/clipart/Animations.htm>
- OR, you can create your own:
 - Animated GIFs can be create in Photoshop or in other software tools
 - Using Flash
- We will look at two different file types of animation:
 - Animated gifs
 - Flash animation

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Animated GIFS



- **Question:** What do you think the file size of an animated gif is affected by:
- **Question:** What do you think is the maximum number of colours you can have in an animated gif?
- **No Plug-ins Required:** Animated GIFs require no plug-ins, and the authoring tools to create them are often free and easy to learn.
- **No Sound:** If you need sound in addition to motion, you cannot use an animated GIF by itself. Instead, you may want to consider other animation alternatives, such as Flash, or even video

Plug-in: A program that permits web browser to access and execute files that the browser would not normally recognize. Flash uses Shockwave

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EVERYONE used to use Flash

- A multimedia authoring and playback system
- Launched in 1996 by Macromedia
- Adobe bought it in 2005
- Flash became popular for its animated graphics
- Responsible for much of the animations, advertisements and video components found on today's Web sites
- Flash is the industry's most advanced authoring environment for creating interactive websites, digital experiences and mobile content.

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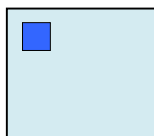
Why was Flash so popular?

- Interactive content rich with video, graphics, animation
- Import multimedia elements from other applications
- Support vector graphics:
 - much more space efficient over bitmapped frames
 - scale up with accurate detail no matter how large the window is resized by the user.
- Flash Player is a **free** client application that works with popular Web browsers to play the animation
- Adobe worked out a deal to have the Flash player preinstalled on machines between the critical time period of 1998-2000 (before most people had broadband). This helped Flash over take Director in terms of popularity (users didn't have to wait to install the player while surfing)
- APPLE sort of KILLED Flash because they didn't allow Flash to be used on Apple Devices
- Flash is now becoming obsolete.

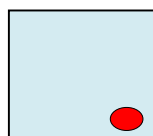
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Flash in action

- **QUESTION:** Suppose we had the following starting picture and the given ending picture, what **THREE** things do you think you would have to consider in order to make it appear animated but it should have a smooth animation, not jerky?
- **Question:** What colour will the tween frames be?



Start picture



End picture

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Essential Flash Terminology



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Essential Flash Terminology

- **Tweening:** Creating the intermediate frames based on the starting keyframe and ending keyframe. There are 3 types of tweens:

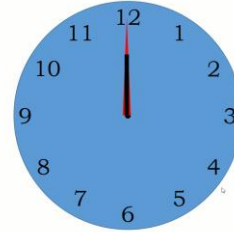
Motion Tween	Shape Tween	Classic Tween (from cs3)
Animates symbols only. Create the tween initially and then go to a frame and move the object and that frame becomes a keyframe	Works with non symbol shapes and vector graphics only	Animates symbols only. Need to manually create all keyframes and connect them with a tween
Can't morph (only position and rotation)	Can morph shapes	Can't morph (only position and rotation)

- **Motion Guide:** lets you animation an object along a path that you draw yourself. Only works with symbols

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Laura's venture into the world of Flash and Powerpoint Animation ☺

Time in Abu Dhabi



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We will be using PowerPoint as of Fall 2019 for animation

- First decide on how to create the animation:
 - To make an object arrives
 - To emphasis an object while it is still there
 - To make an object leave
 - To make an object follow a path

Ease in/Ease Out (Smooth Start/End) and Bounce End

- Smooth Start – makes it start slowly (ease in)
- Smooth End – makes it end slowly (ease out)
- Smooth Start + Smooth End <= Duration
- [How to make a ball bounce in PowerPoint](#)

Smooth Start – slow at the beginning, gets quicker at that end

Smooth End – starts quickly but slows down at the end

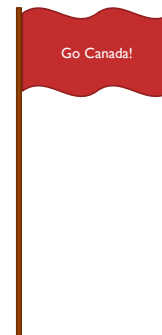


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Regular Smooth Start Smooth End Bounce



Control your Timing and Duration



When motion path (ghosted shape) has a green circle (start) or red circle (end), motion is selected. When motion path has a green triangle (start) or red triangle (end), motion is NOT selected.

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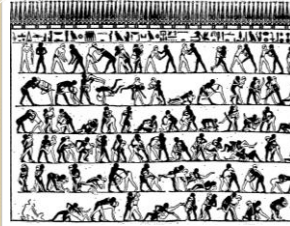
Comparing File Types:

	Animated GIF	Flash	Photoshop	PowerPoint
Created by	Depends	Adobe	Adobe	Microsoft
Extension	Source depends .gif (movie)	.fla (source) .swf (movie) .gif (Flash can make gifs too!)	.psd (source) .mp4 OR .gif	.ppt (source) .mp4 (final version)
File Size	Larger than normal gif	Vector images take up less space than GIF bitmapped images	Fairly large (.mp4 files are compressed but still large)	Fairly large (.mp4 files are compressed but still large)
Need to play it	Nothing	Flash Player (Free and works with most browsers)	No plugin for .gif and most browsers can now play .mp4	No plug in required for .mp4 anymore

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History of Animation:

→ early cave drawings show animals with 8 legs (trying to show animal moving)
 → **1868** – Flip book patented
 → **1877** - Praxinoscope
 Cylinder containing slits that when spun gave the illusion of movement
 → **1892** - Reynaud showed how he could use 12 pictures and loop the pictures. He had 500 frames using something similar to the modern film projector
 → **1898** – **Stop motion** animation introduced



Ancient Egypt Mural attempting to depict movement (4000 years old)



Gertie The Dinosaur

1906 → Blacktons makes "The Humorous Phases of Funny Faces" using a blackboard and frame by frame shots
1914 → McCay makes "Gertie the Dinosaur", the first successful character animation
1928 → Walt Disney uses sound and animation in Steamboat Willie
1937 → first full length feature animation movie: Snow White



Chris Griffin

1960 → first prime time animation TV Show debuted
Question: What was it?
Question: What is the longest running animation prime time show
1982 → Star Trek, The Wrath of Khan includes computer generated effects. TRON, a Disney animation includes 15 minutes of computer generated scenes
1986 → Take On Me by aha, creates much hyped video that uses **rotoscoping** (pencil-sketch animation/live-action combination)
1995 → **Question: What was the first full length completely computer generated animation movie released?**
Question: What is the highest grossing animated film of all time?

Cinemagraphs

- Introduced in 2011
- <https://www.youtube.com/watch?v=ydyGiq7hnOg>
- Usually stored as animated .gif
- Need BOTH a still picture and a video
- <https://flicel.com/cinemagraph/mr605d3hcragiswdy8ci/>
- Laura's first tries at Cinemagraphs ☹️



Let's Review

- <http://www.youtube.com/watch?v=SajxnTf44eg&feature=related>
- Finally: For the major assignment, you must create an animation.
 - Cute major from last term:

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Warm up Questions:

- **Question:** What is the minimum number of frames per second should we have when building an animation for display on a computer?
- **Question:** Which type of animation uses frames:
 - A. Cel Based
 - B. Path Based
 - C. Both
 - D. Neither
- **Question:** If an animation is 40 frames long and the fps is 5, how long will the animation take to play?

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