

Creating Video Games

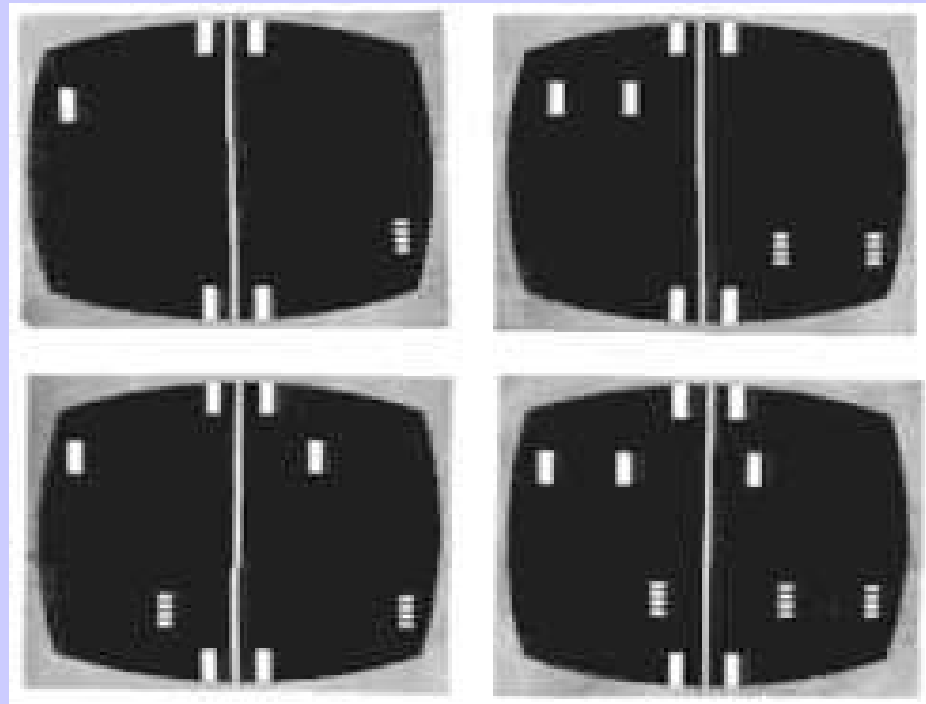
What's Going on in the Game Industry?

Jeff Lander



History of Video games

- ◆ What did it take to get from here...



History of Video games

◆ To here...



Console Game Systems

- ◆ Atari 2600 (1977)
 - ◆ 8bit, 128 Bytes RAM
 - ◆ 320x200
 - ◆ Team Sizes 1-5 common
 - ◆ Sales 25 M
 - ◆ Budgets <\$100K

- ◆ Sega Genesis (1989)
 - ◆ 16bit, 128K RAM/VRAM
 - ◆ 320x224
 - ◆ Team Sizes 5-15
 - ◆ Sales 150 M
 - ◆ Budgets <\$250K



Console Game Systems

- ◆ Sony Playstation (1994)
 - ◆ 32bit, 2M RAM/1M VRAM
 - ◆ Graphics 320x240
 - ◆ CD Media 640MB
 - ◆ Team Sizes 5-50
 - ◆ Sales 100 M+
 - ◆ 8000+ titles, 950M+ sold
 - ◆ Budgets <\$1M



Console Game Systems

- ◆ Sony Playstation 2(2000)
 - ◆ 128bit, 32M RAM, 4M VR
 - ◆ 640x440
 - ◆ DVD Media 4 GB
 - ◆ Team Sizes 15-100
 - ◆ Sales 75 M+
 - ◆ Budgets \$5-12M+



Console Game Systems

- ◆ Sony Playstation 3 (2006?)
 - ◆ 256M RAM, 256M VR
 - ◆ 2 TFLOPS
 - ◆ 1920x1080
 - ◆ BlueRay Media 25-50 GB
 - ◆ Team Sizes 50+?
 - ◆ Budgets \$8M+?
 - ◆ Sales ???



What kind of Jobs are there?

- ◆ Programmers
 - ◆ Most technical and traditional education required
 - ◆ Salaries \$55K-\$300K average \$62K
 - ◆ Junior, Tools, Graphics, Engine, AI, Networking, Lead

What kind of Jobs are there?

◆ Artists

- ◆ Includes most creators of game content
- ◆ Salaries \$55K-\$200K average \$58K
- ◆ Modeling, Texture, 2D, 3D, Level Design, Animation, Art Director

What kind of Jobs are there?

- ◆ Design
 - ◆ Requires much experience and dedication
 - ◆ Salaries \$50K-\$200K average \$57K
 - ◆ Game Designer, Level Designer, Writer, Lead

What kind of Jobs are there?

- ◆ Audio
 - ◆ More important every project
 - ◆ Salaries \$45K-\$130K average \$57K
 - ◆ Sound designer, Composer, Audio programmer, Foley artist

What kind of Jobs are there?

- ◆ Production
 - ◆ Makes sure the project finishes
 - ◆ Salaries \$60K-\$160K average \$66K
 - ◆ Game tester, Test lead, Associate producer, Project Manager, Producer

What kind of Jobs are there?

- ◆ Other stuff needed to run a business
 - ◆ Network administrators
 - ◆ Legal
 - ◆ Office workers
 - ◆ Marketing
 - ◆ Finance

Game Production

- ◆ Modern console games
 - ◆ 2 years+ for development
- ◆ Steps for production
 - ◆ Pitch and Design (3-6 months)
 - ◆ Preproduction (3-6 months)
 - ◆ Production (1.5 – 2 years)
 - ◆ Post-production
 - ◆ Testing, balance, localization

Diversity

- ◆ Inclusive and welcoming industry
 - ◆ Need to meet and exceed the entry requirements
 - ◆ Meritocracy
 - ◆ Too few women represented (but are welcome)
 - ◆ Lack of local talent leads to searching the world
 - ◆ Current team has 20% work visa employees
 - ◆ Representing 15+ countries
- ◆ Production focus
 - ◆ Can lead to long hours and hard work
 - ◆ Maturing industry with growing pains

Education is the Key

- ◆ Math and Physics are our main tools
 - ◆ Writing and Language skills are useful as well
- ◆ Geometry, Trigonometry, Linear Algebra
 - ◆ Some calculus
- ◆ Newtonian Physics
 - ◆ Personally have never needed Einstein but...
- ◆ Advanced High School level is ideal
 - ◆ Many need to relearn forgotten skills

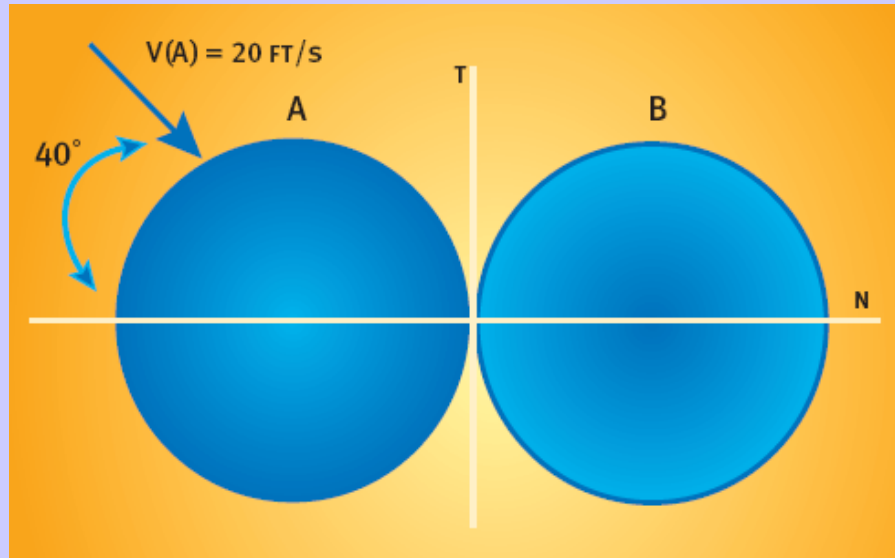
Math

◆ Vector, Matrices, Dot Products, Trig

$$h = h_0 + v_0t - (gt^2)/2$$

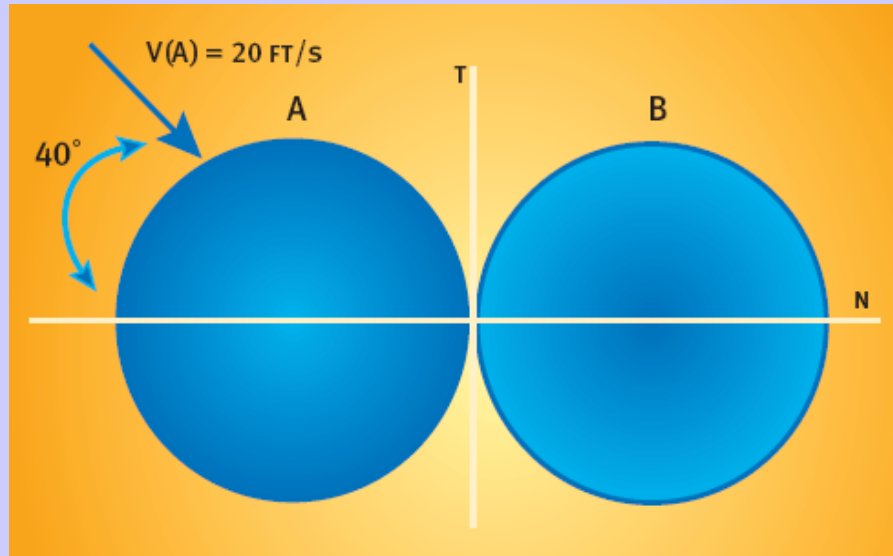
This is one of the most powerful tools in our belt. Anyone recognize it?

Math



A little game of pool

Math



$V_{dotN} = \text{contact} \rightarrow \text{normal} \cdot \text{Dot}(\&\text{ball} \rightarrow v);$

$V_n = \text{contact} \rightarrow \text{normal} * V_{dotN};$

$V_t = \text{ball} \rightarrow v - V_n;$

$V_{n1} = V_n * \text{contact} \rightarrow K_r;$

$\text{ball} \rightarrow v = V_t - V_{n1};$

$V_{n1} = V_n * (1.0f - \text{contact} \rightarrow K_r);$

$\text{ball2} \rightarrow v += V_{n1};$

No Math for Me!

- ◆ What about artists and designers?
 - ◆ Are math and science skills required
 - ◆ A common language is needed to convey ideas

No Math for Me! I do the art.

- ◆ Give me that motion in 8 directions.
 - ◆ What angles would those be at?
- ◆ I need a walking turn that goes 10 meters and ends at 130 degrees.
- ◆ Euler angles, IK effectors, keyframes, meters per second.

No Math for Me! I do the design.

- ◆ I am created a puzzle where the player needs to compete to jump the furthest.
- ◆ What controls are important for the player to use in this design?

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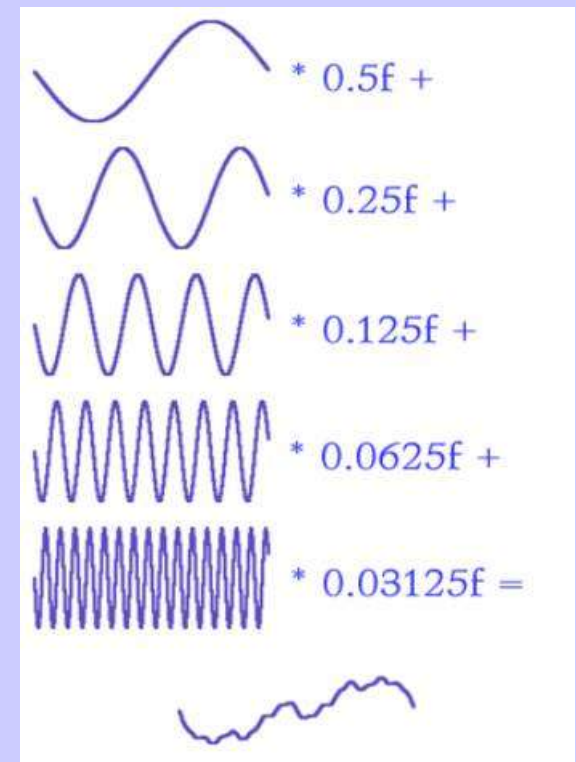
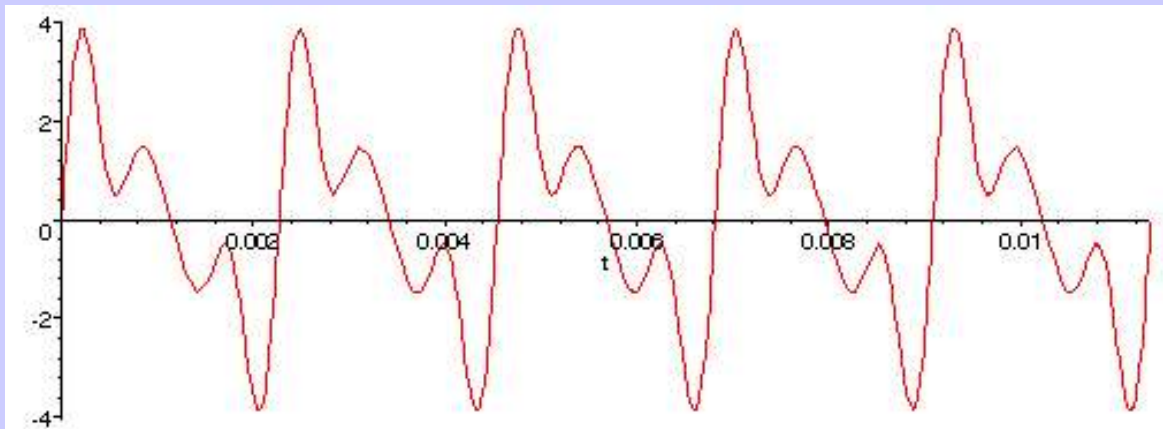
No Math for Me! I do the design.

- ◆ I want waves of alien spaceships to attack the player.
- ◆ It needs to be a pattern the player can learn
 - ◆ It can't be random.
 - ◆ Must be repeatable
- ◆ Has to look chaotic and fun
- ◆ How would you design such a system?



No Math for Me! I do the design.

- ◆ Simple math functions combined reveal complexity.



No Math for Me! I do the design.

- ◆ Modern adventure games have hundreds of weapons, items, spells, with various power and costs.
- ◆ How do you balance and adjust all those various values?
- ◆ Tuning power of enemies and weapons.
 - ◆ $\text{Damage} = \text{strength} * (1 + \text{random}(0.2))$

Conclusion

- ◆ Great opportunities in the Game Industry for people just like you.
- ◆ It does require some work from you.
- ◆ The tools needed are right in front of you.
- ◆ You can tell your parents that your next game is actually research.

More Information

- ◆ www.darwin3d.com
- ◆ jeffl@darwin3d.com
- ◆ www.igda.org
 - ◆ International Game Developer's Association
 - ◆ Chapter meetings here in Los Angeles

No Math for Me! I do the audio.

- ◆ Sound foley is more complex than ever.
 - ◆ 3D positional audio requires velocity and position to determine sound.
 - ◆ Pitch of car engine might be a function of RPM, the gear the motor is in, and the size of engine.