

# *Creating Video Games*

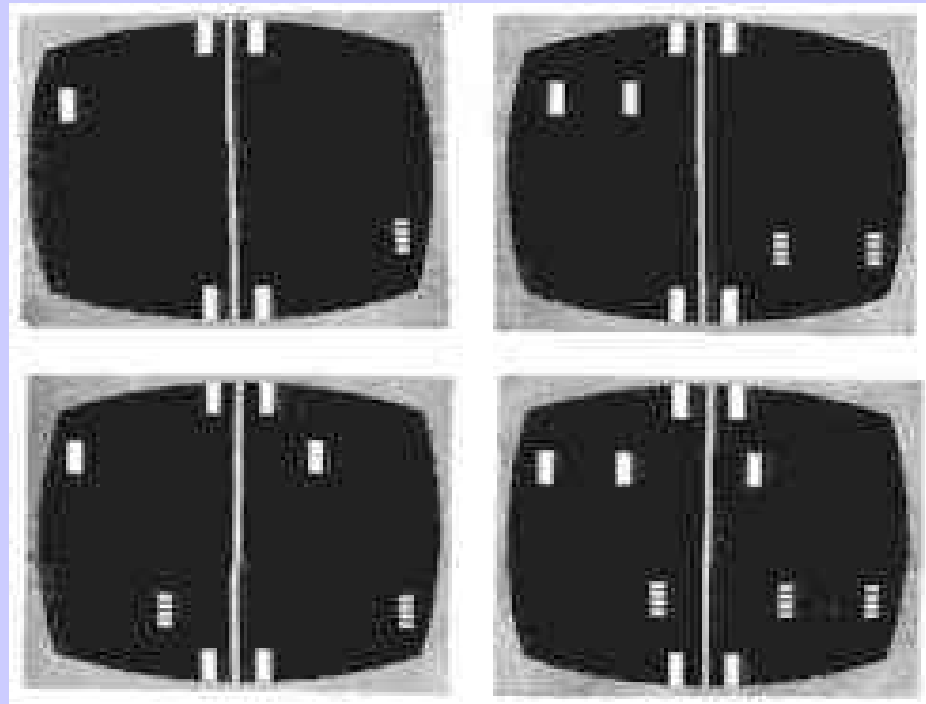
What's Going on in the Game Industry?

Jeff Lander

**DARWIN**  *Software  
Creation*

# *History of Video games*

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



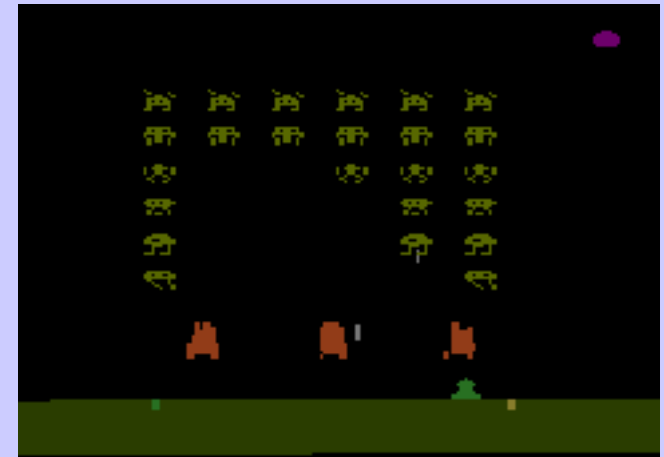
# *History of Video games*

◆ 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



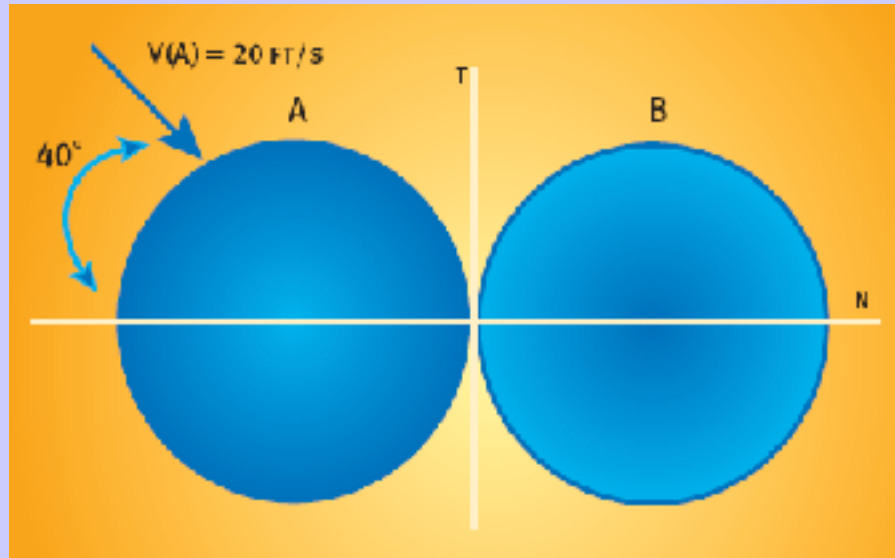
# *Math*

## ◆ Vector, Matrices, Dot Products, Trig

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

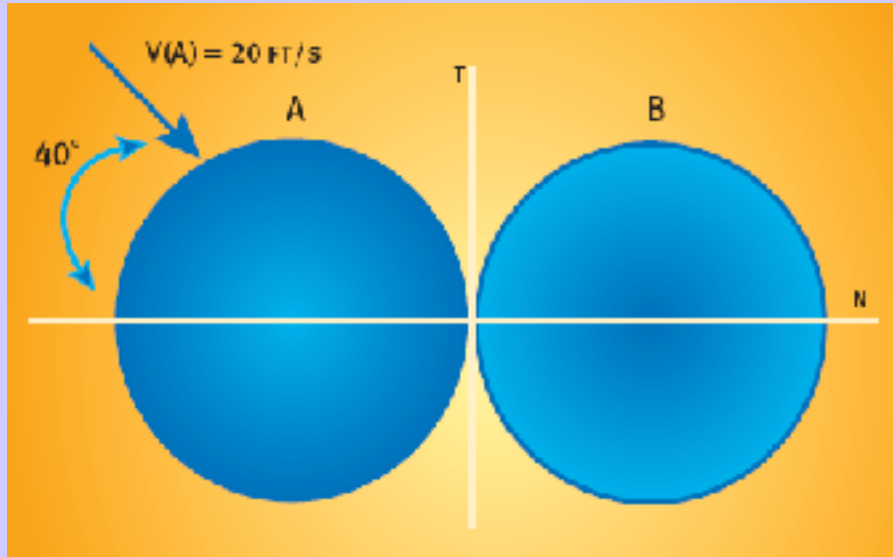
This is one of the most powerful tools in our belt. Anyone recognize it?

# *Math*



A little game of pool

# Math



```
VdotN = contact->normal.Dot(&ball->v);  
Vn = contact->normal * VdotN;  
Vt = ball->v - Vn;  
Vn1 = Vn * contact->Kr;  
ball->v = Vt - Vn1;  
Vn1 = Vn * (1.0f - contact->Kr);  
ball2->v += Vn1;
```

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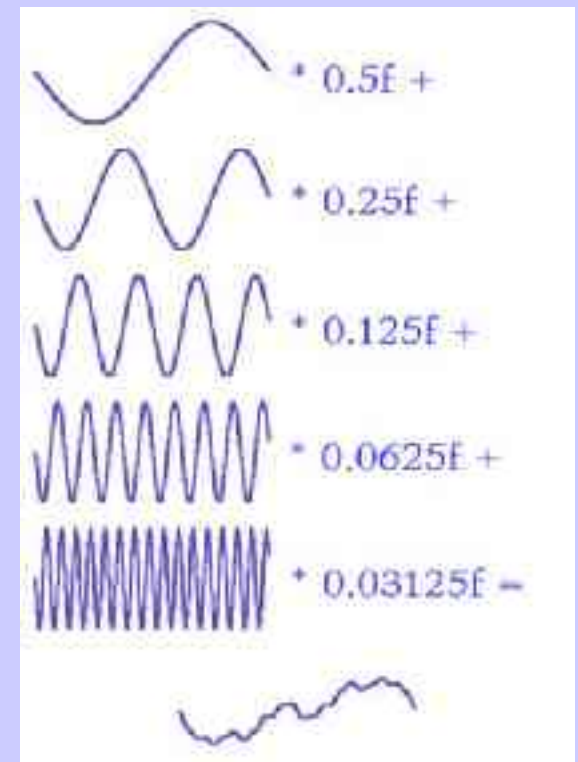
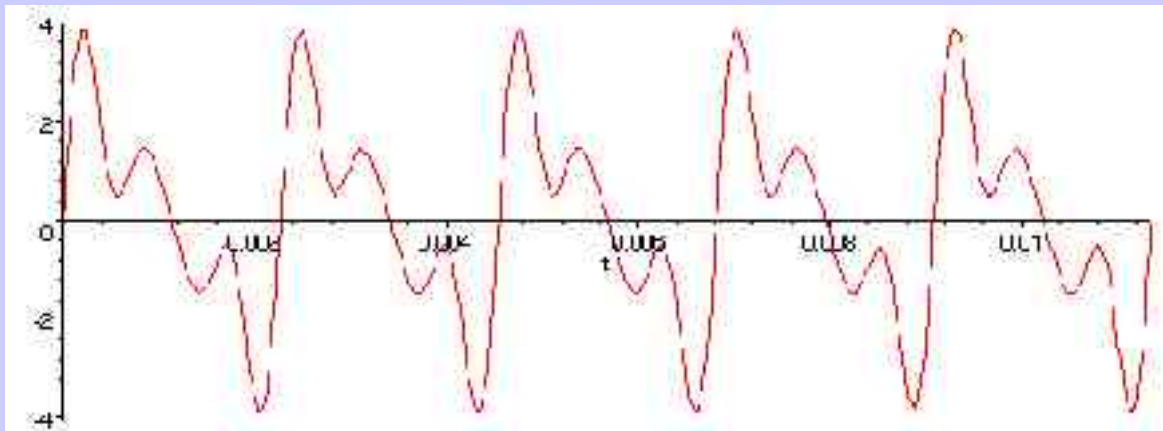
- ◆ I want waves of alien spaceships to attack the player.
- ◆ It needs to be a pattern the player can learn
  - ◆ It can't be random.
  - ◆ Must be repeatable
- ◆ Has to look chaotic and fun
- ◆ How would you design such a system?





# *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](http://www.darwin3d.com)
- ◆ [jeffl@darwin3d.com](mailto:jeffl@darwin3d.com)
- ◆ [www.igda.org](http://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.