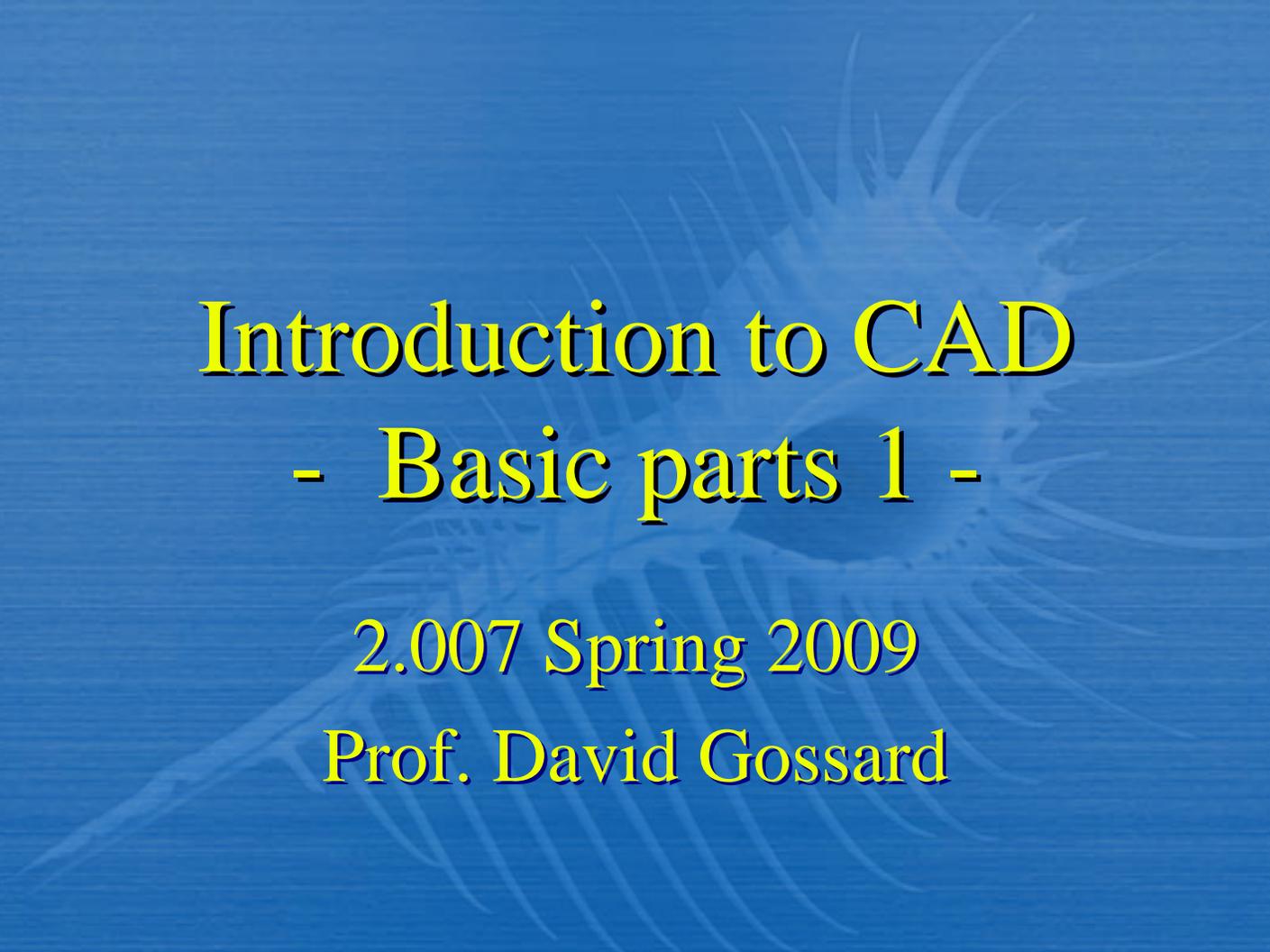


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2.007 Design and Manufacturing I  
Spring 2009

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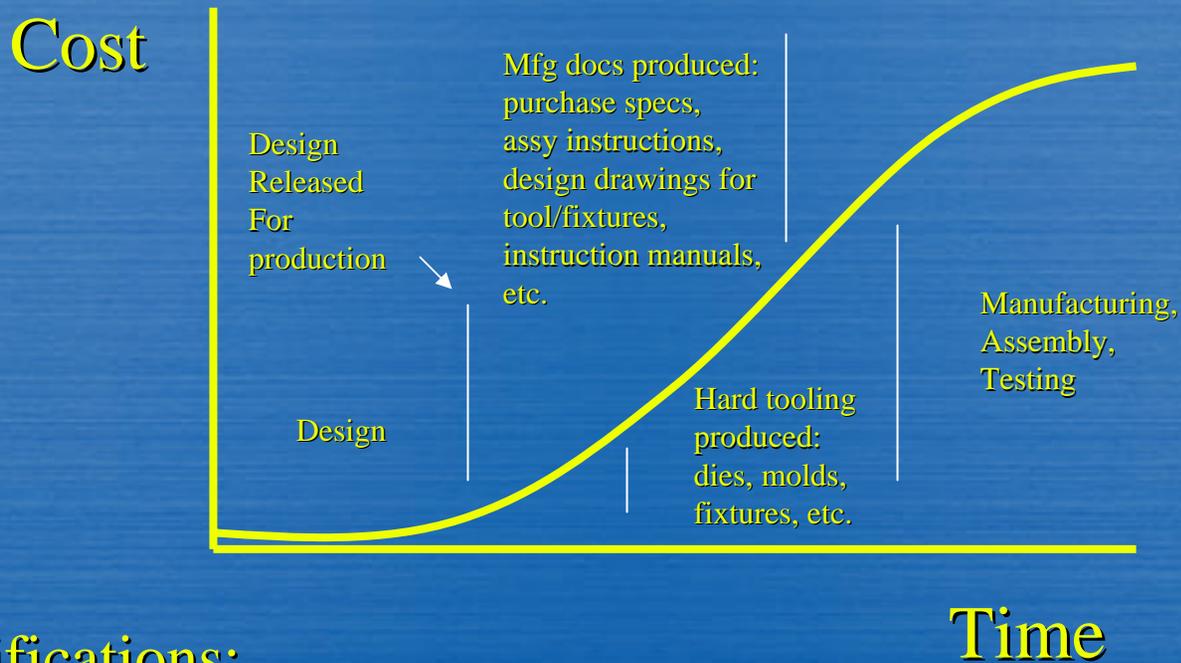
# Introduction to CAD

## - Basic parts 1 -

2.007 Spring 2009

Prof. David Gossard

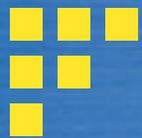
# Product Development Cycle Costs



Ramifications:

Early decisions have large leverage

Late changes are very costly



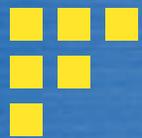
# Motivation

- Computer-based models permit designers to better understand how their products will look and function before physical models are made

Make better early decisions

Eliminate late changes

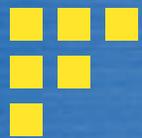
(Enables you to work on your machine even when the shop is closed...)



## History of New CAD/CAM Functionality

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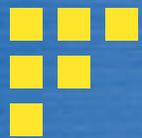
- 1960's - Design of complex surfaces, programming of NC machine tools
- 1970's - Automation of Drawings
- 1980's – Solids
- 1990's - Parametric Feature-based Solids



# Key Concept

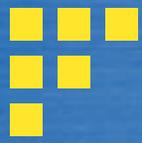
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- “Parametric”, “Associativity”
  - Changes in dimensions propagate between parts, drawings, assemblies
- Movie



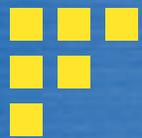
# Philosophy of CAD Lectures

- Demonstrate small fraction of available functionality
  - Ideally the most useful fraction...
- Accelerate your learning process
  - Get you up-to-speed as quickly as possible...
- Promote self-discovery
  - Motivate you to learn more on your own...
- Demonstrate use as a design tool
  - Not (just) a detailing/documentation tool



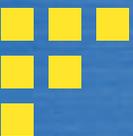
# Reminder

- To those who have “seen it before”:
  - bear with us
  - help those who haven't



# Features

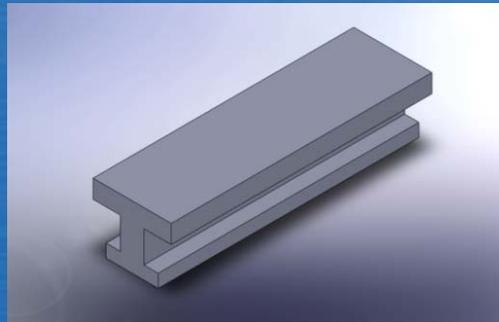
- *Sketched*
  - *2D geometry (sketch) swept along a 3D path*
  
- *Applied*
  - *Attached to existing geometry*



# Sketched Feature Types

- Extrude

- Constant cross-section
- along a straight line



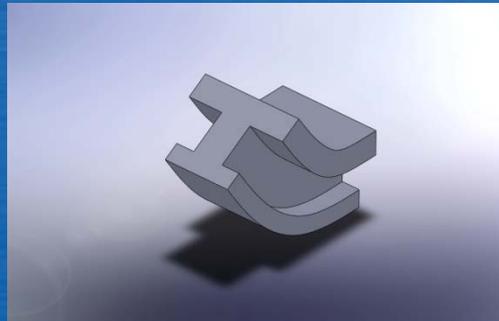
- Revolve

- Constant cross-section
- around an axis of revolution



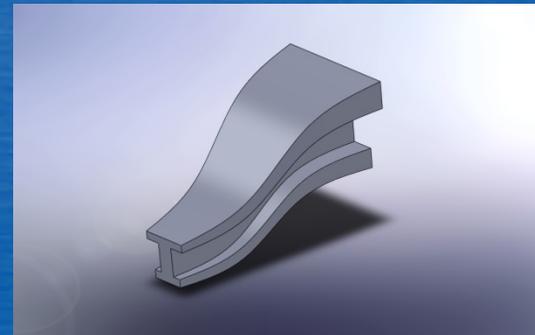
- Sweep

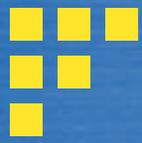
- Constant cross-section
- along a space curve



- Loft

- Multiple cross-sections
- along a space curve

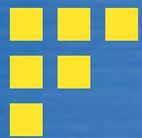




# Sketched Features

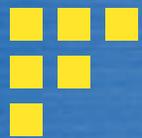
- May add or subtract material !

Sketched	(add)	(subtract)	
• Extrude	boss/base	cut	Hole Wizard
• Revolve	boss/base	cut	
• Sweep	boss/base	cut	} Require more complex mfg methods
• Loft	boss/base	cut	



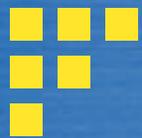
# Applied Features

- Attached to existing geometry
    - e.g. edges, faces
  
  - Types
    - Fillet
    - Pattern
    - Shell
    - Draft
    - Rib
- } Injection-molded parts



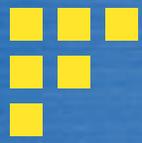
# The Drill...

- Series of demonstrations/exercises
  - Demonstration: You watch it done
  - Exercise: You do it

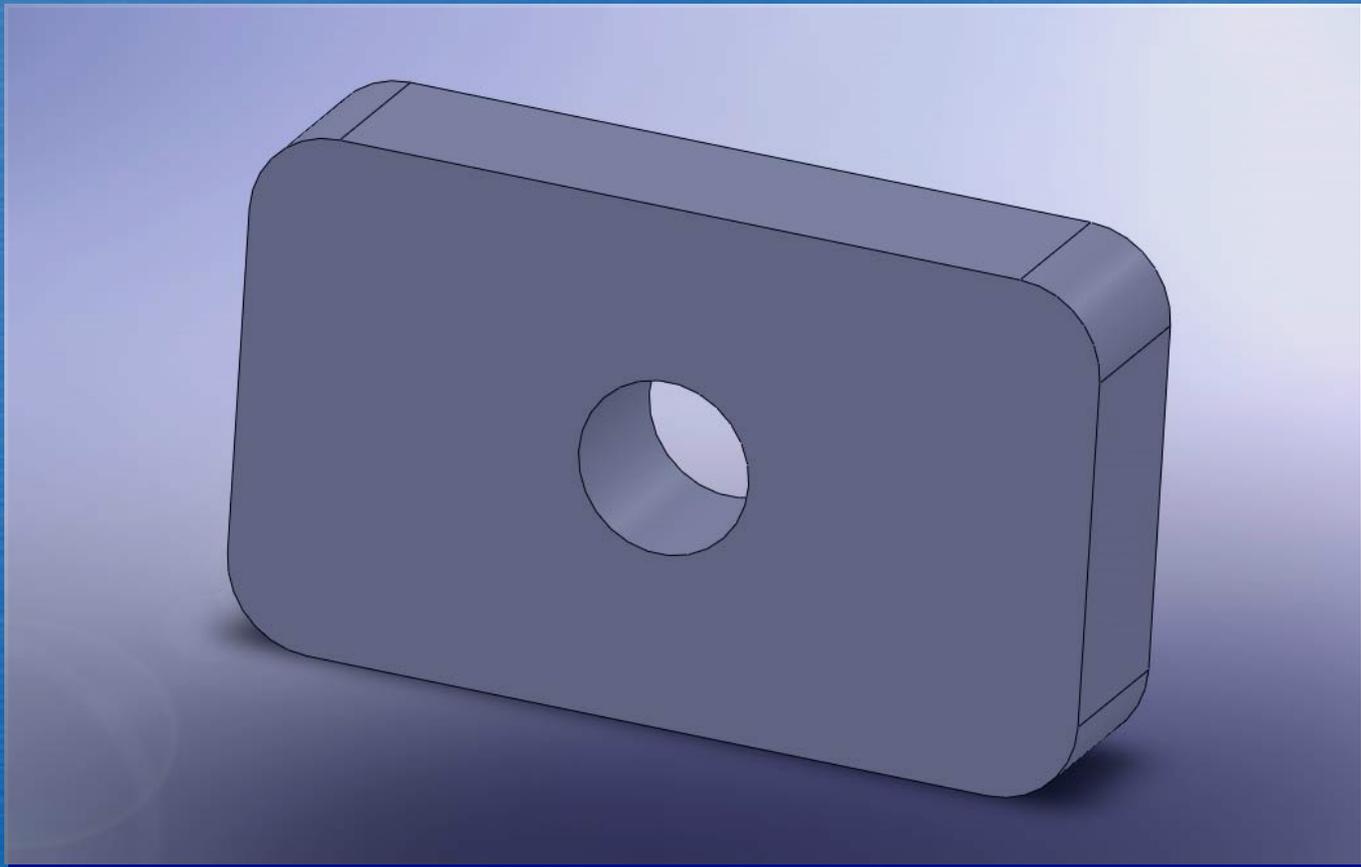


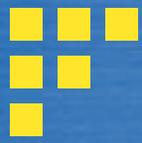
# Demonstrations / Exercises

- Screen/window layout
- View control
- Make a simple part
- Dimensions & sketch relations
- Linkages & Blocks
- Symmetry

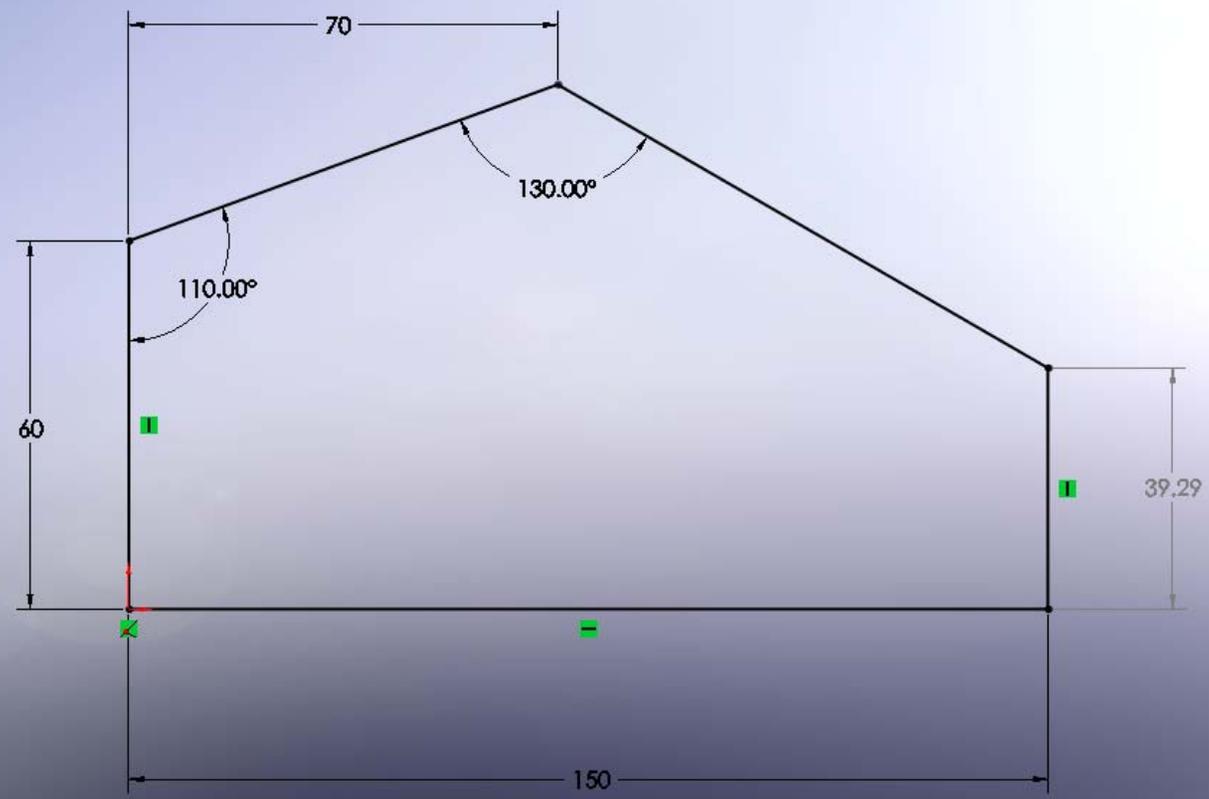


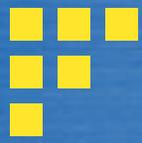
# Make a simple part



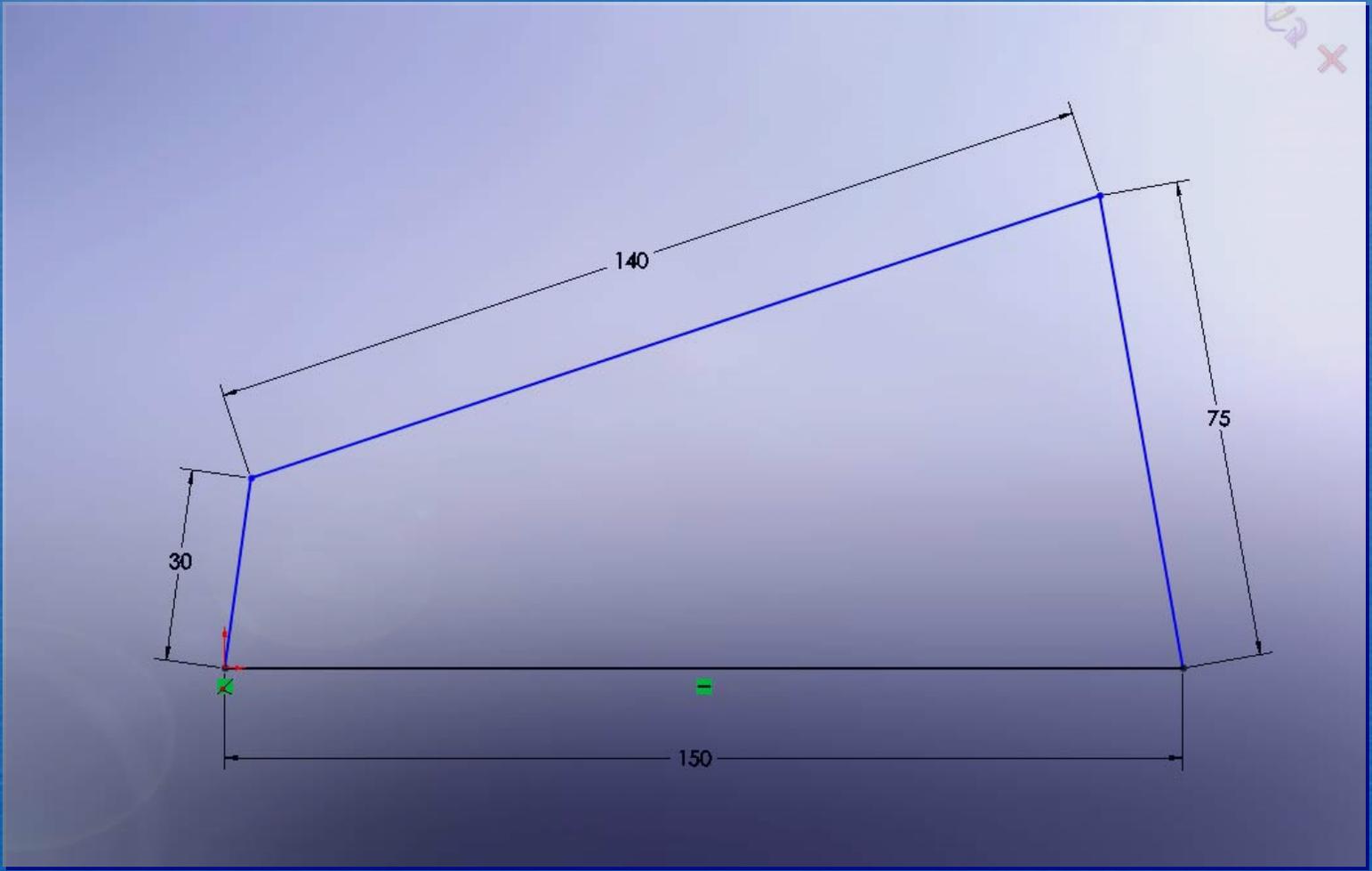


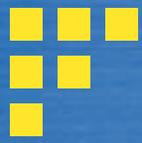
# Dimensions & Sketch Relations



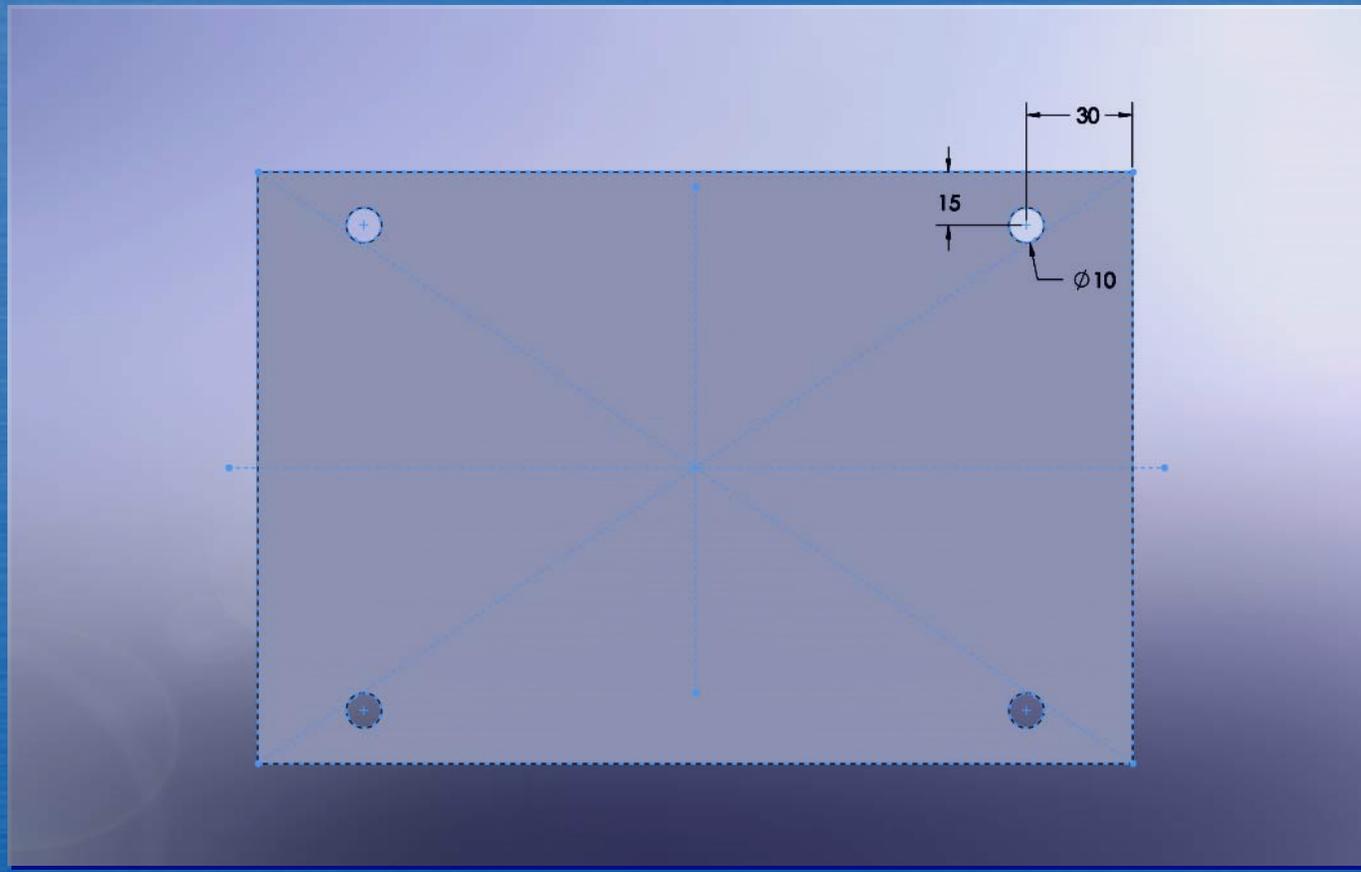


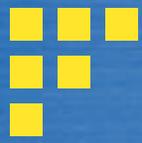
# Linkages & Blocks





# Symmetry

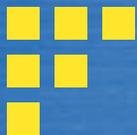




# Case Study – Ramp

- Drop-down ramp (see geometry)
- Companion robot drives onto ramp
- Companion robot (150 lb)
  - is lifted off the ground
  
  - Powered by pneumatic cylinder(s)





END