

## Introduction to Measurements

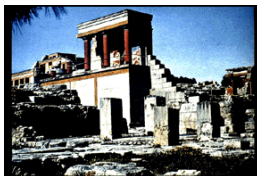
### Why do we need measurements?

## Introduction to Measurements

- In science, measurement is the process of estimating or determining the magnitude of a quantity, such as length or mass, relative to a unit of measurement, such as a meter or a kilogram.
- The term measurement can also be used to refer to a specific result obtained from the measurement process.
- The word **measurement** is derived from the Greek word "metron," which means a limited proportion.

## Introduction to Measurements

- Some of the earliest surviving measuring devices include gold scales recovered in present-day Greece from the tombs of Mycenaean kings.



## Introduction to Measurements

- The tombs of Egyptian pharaohs — the pyramids — were constructed by builders using no more than simple rulers: the pyramids are regular, symmetric and aligned with the Earth's axis.



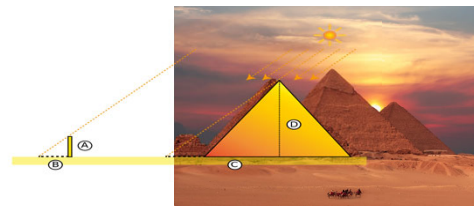
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## Introduction to Measurements

- Babylon, Egypt, and the city states of Greece all had standards for commercial measuring devices.
- By about 500 B.C., Athens had its own central depository of official weights and measures — the Tholos.



## Introduction to Surveying

### Early History of Surveying

- It is impossible to determine when surveying was first used by man.
- **"Remove not the ancient landmark, which thy fathers have set"** Proverbs 22:28
- The word **geometry** is derived from the Greek meaning *earth measurements*.

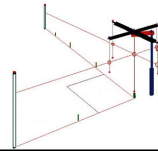
## Introduction to Surveying

### Early History of Surveying

- In Egypt, surveyors were called "rope stretchers" because they used ropes to measure
- Roman surveyors got their name gromatici from the groma



(<http://www.bbc.co.uk/dna/h2g2/brunel/A24591099>)



## Introduction to Surveying

### Types of Surveys

- **Land surveys** - oldest type of surveys and have been performed since earliest recorded
- **Topographic surveys** - location of objects and measuring the relief, roughness, or three-dimensional variations
- **Route surveys** - location of natural and artificial objects along a proposed route for a highway, railroad, canal, pipeline, power line, or other utility



## Introduction to Surveying

### Types of Surveys

- **City or municipal surveys** - use to lay out streets, plan sewer systems, and prepare maps
- **Construction surveys** - locating structures and providing required elevation points during their construction
- **Hydrographic surveys** - pertain to lakes, streams, and other bodies of water

## Introduction to Surveying

### Types of Surveys

- **Marine surveys** - related to hydrographic surveys, but they are thought to cover a broader area
- **Mine surveys** - relative positions and elevations of underground shafts, geological formations, etc.
- **Forestry and geological surveys**
- **Photogrammetric surveys** - photographs (generally aerial) are used in conjunction with limited ground surveys

## Introduction to Surveying

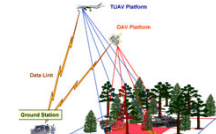
### Types of Surveys

- **As-built surveys** - provide the positions and dimensions of the features of the project as they were actually constructed
- **Control surveys** - provides vertical and horizontal reference points

## Introduction to Surveying

### Types of Surveys

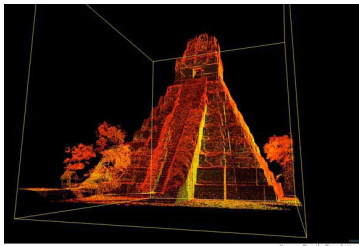
- **Lidar (also written LIDAR, LiDAR or LADAR)** is a surveying technology that measures distance by illuminating a target with a laser light.
- Lidar is sometimes considered an acronym of Light Detection And Ranging



## Introduction to Surveying

### Types of Surveys

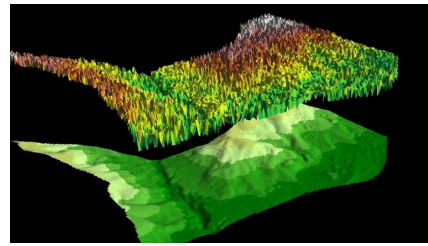
- **Lidar**



## Introduction to Surveying

### Types of Surveys

- **Lidar**



## Introduction to Surveying

### Geographic Information Systems (GIS)

- A geographic information system (GIS) lets us visualize, question, analyze, interpret, and understand data to reveal relationships, patterns, and trends.
- GIS benefits organizations of all sizes and in almost every industry. There is a growing awareness of the economic and strategic value of GIS.

## Introduction to Surveying

### Geographic Information Systems (GIS)

#### Top Five Benefits of GIS

The benefits of GIS generally fall into five basic categories:

1. Cost Savings and Increased Efficiency
2. **Better Decision Making**
3. Improved Communication
4. Better Recordkeeping
5. Managing Geographically

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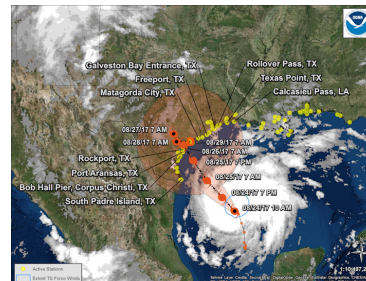
### Geographic Information Systems (GIS)

Better Decision Making

- GIS is the go-to technology for making better decisions about location.
- Common examples include real estate site selection, route/corridor selection, evacuation planning, conservation, natural resource extraction, etc.
- Making correct decisions about location is critical to the success of an organization.

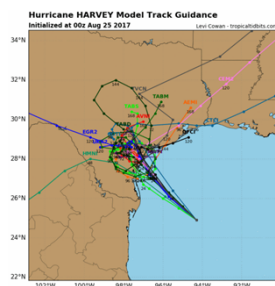
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### Geographic Information Systems (GIS)



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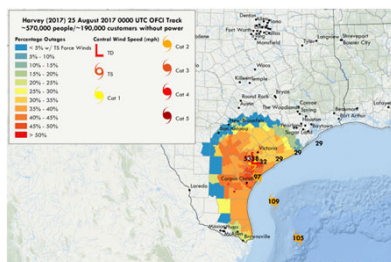
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### Geographic Information Systems (GIS)



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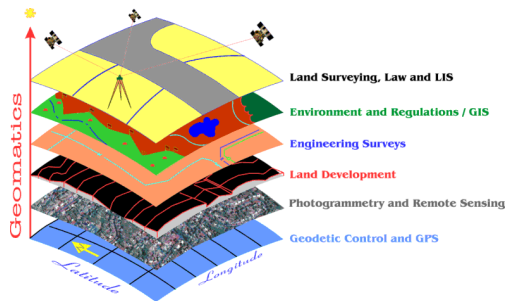
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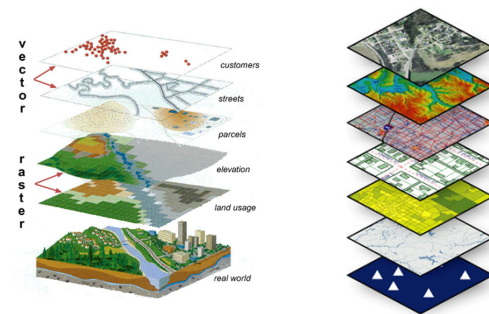


## Introduction to Surveying

### Geographic Information Systems (GIS)



## Introduction to Surveying



## Introduction to Surveying

Any Questions?