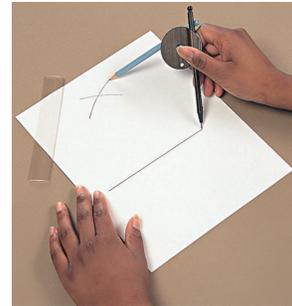


# Don't Just Cover Geometry, Discover Geometry

*Hands-on activities for a student  
centered classroom*



***HCTM Geometry Mini-course***  
**Saturday October 24, 2015**  
**St. Anthony Jr.-Sr. High School, Maui**

## Notes for: **Don't Just Cover Geometry, Discover Geometry**

### *Hands-on activities for a student centered classroom*

#### What should math students be doing?

- “Learn by doing”
- Write their own definitions
- Invent their own constructions
- Discover their own geometry properties
- Read, write, talk geometry daily
- Have less anxiety and a whole lot more fun

#### How to Discover Geometry

- Use technology
- Use patty paper
- Make a table
- Repeated calculations
- Paper cutting
- Use geometry tools
- Use physical objects

#### Make a Table

- Interior & exterior angle sum
- Special right triangles

#### Repeated Calculations

- Special right triangles

#### Patty Paper Discoveries

- Vertical angles conjecture
- Parallel properties
- Interior and exterior angle sums
- Parallelogram properties
- Circle properties
- Transformations

#### Geometry Tools

- DESE – constructions, rhombus properties
- Compass & straightedge –  $\Delta \cong$ , similarity
- Ruler & protractor –  $\Delta$  inequalities

#### Paper Cutting

- Poly sums
- Area
- Pythagorean Theorem
- Center of Gravity

#### Physical Objects

- String – definitions
- String – converse of PT
- String, balloons –  $\pi$

### **Notes: Interior and Exterior Angle Sums**

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### **Notes: Isosceles right triangles and 30-60-right triangles**

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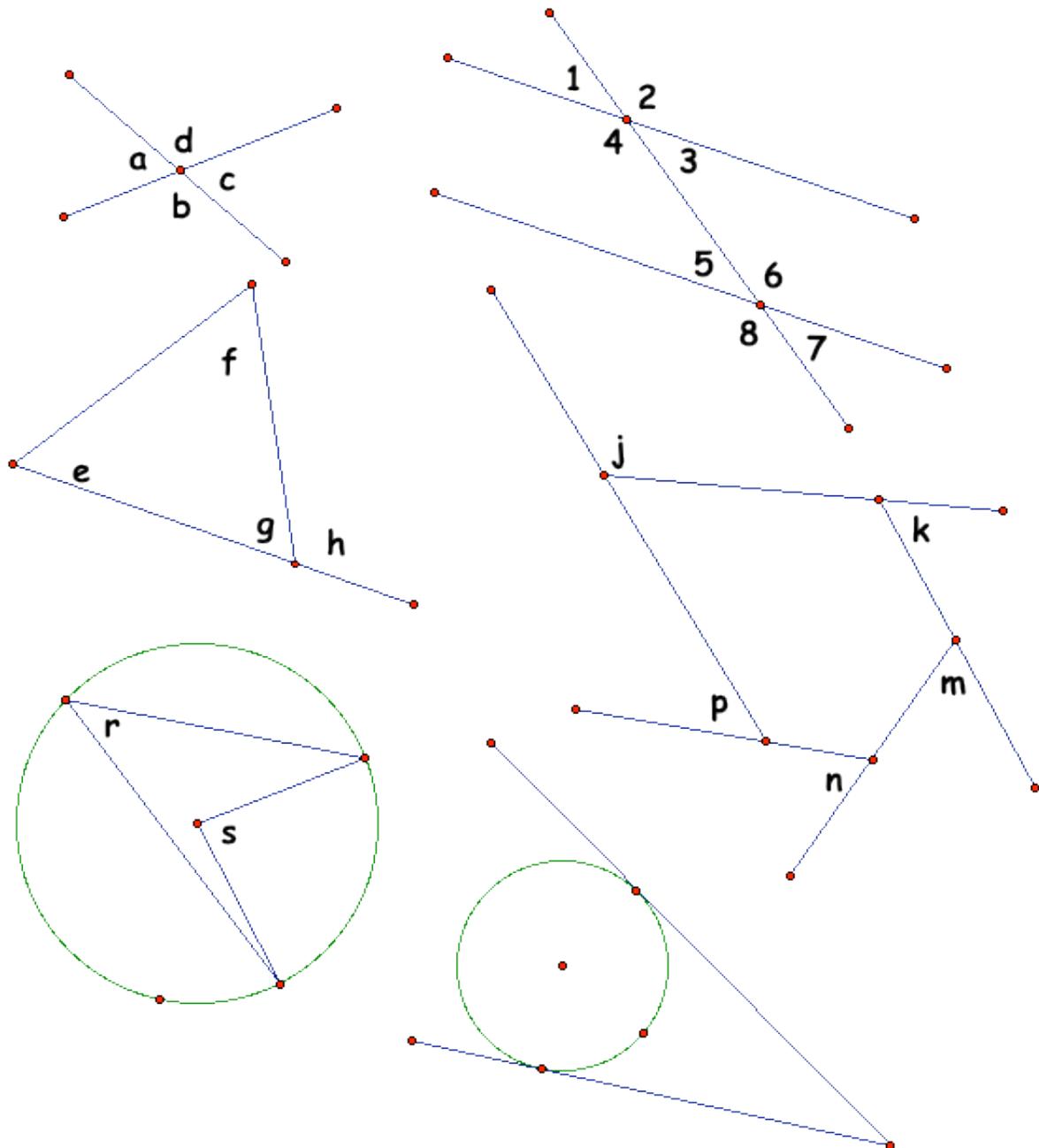
## Euclidean Constructions with Patty Paper

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- Duplicate a given segment, duplicate a given angle.
- Construct the bisector of an angle.
- Construct a perpendicular bisector of a given segment.
- Construct a perpendicular through a point on a line.
- Construct a perpendicular from a point to a line.
- Construct a line through a given point parallel to a given line.

## Geometric Discoveries with Patty Paper

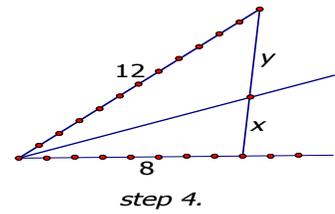
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## Notes: Use Basic Geometry Tools for Discovery

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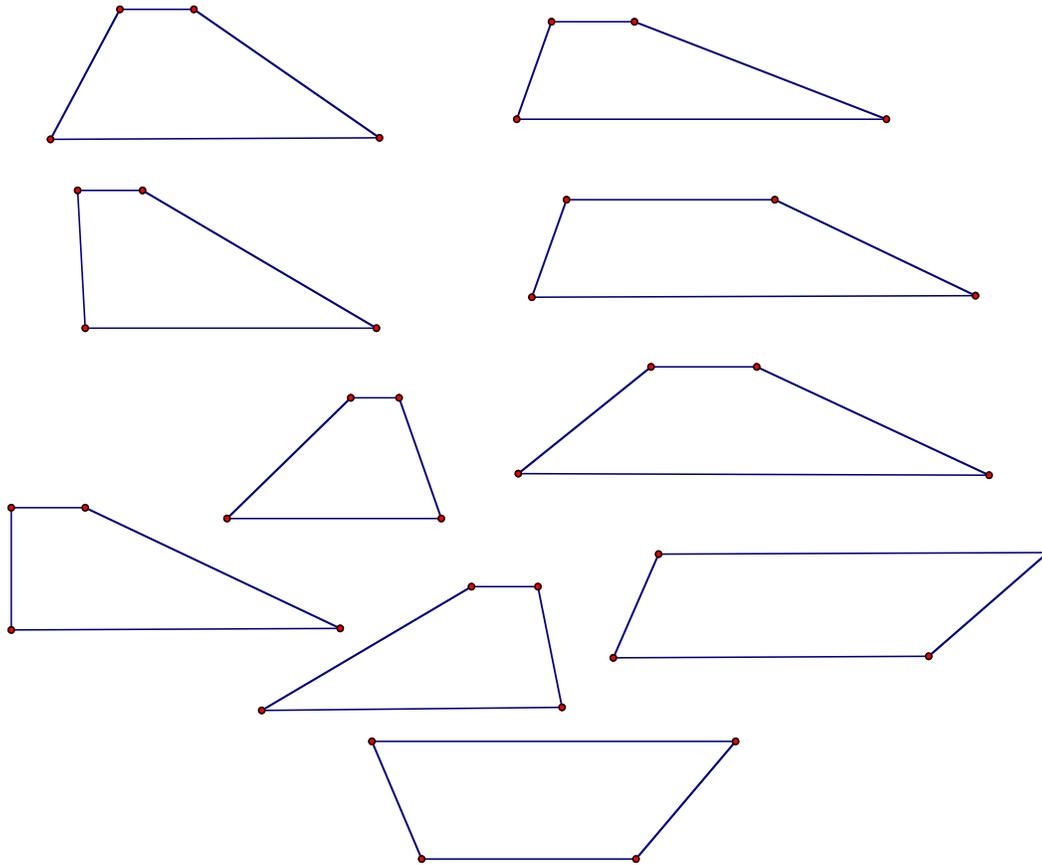
1. Construct an angle.
2. Mark off equal units on both rays.
3. Select a nice ratio for the lengths of the two sides.
4. Make triangle. Bisect angle.



## Discovering the Area Formula for a Trapezoid

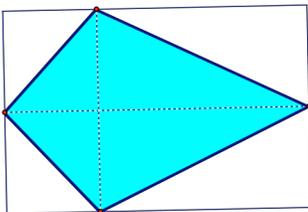
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How many “nice” ways can you discover the area formula of a trapezoid?



## Discovering the Area Formula for a Kite

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## Notes: Discovering Definitions with Patty Paper and String

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## Notes: Discovering Converse of Pythagorean Theorem

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{3, 4, 5}; {5, 12, 13}; {7, 24, 25}; {9, 40, 41}; (8,15,17);

## Notes: Discovering Pi

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## Resources

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- *Discovering Geometry*, 4<sup>th</sup> Edition, by Michael Serra
  - *Patty Paper Geometry*, by Michael Serra
- [www.michaelserra.net](http://www.michaelserra.net)