

# INHERITANCE

CS202: Computer Science II

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UNR Fall 2022



# TOPICS

- Inheritance
  - Design



# INHERITANCE REFRESHER

- **Child** inherits from **parent**
  - **Parent:** common factors between children
  - **Child:** apply changes to parent, extend with unique parts
- Includes go in the “lowest level” .h file (not in .cpp unless in driver)



# DEMO

- There are two ways to look at a holiday:
  - A special event that has a date (composition - we did this)
  - A date that has a special name (inheritance)
    - Let's alter the code that code that we wrote so that it holiday inherits date, rather than a composition relationship

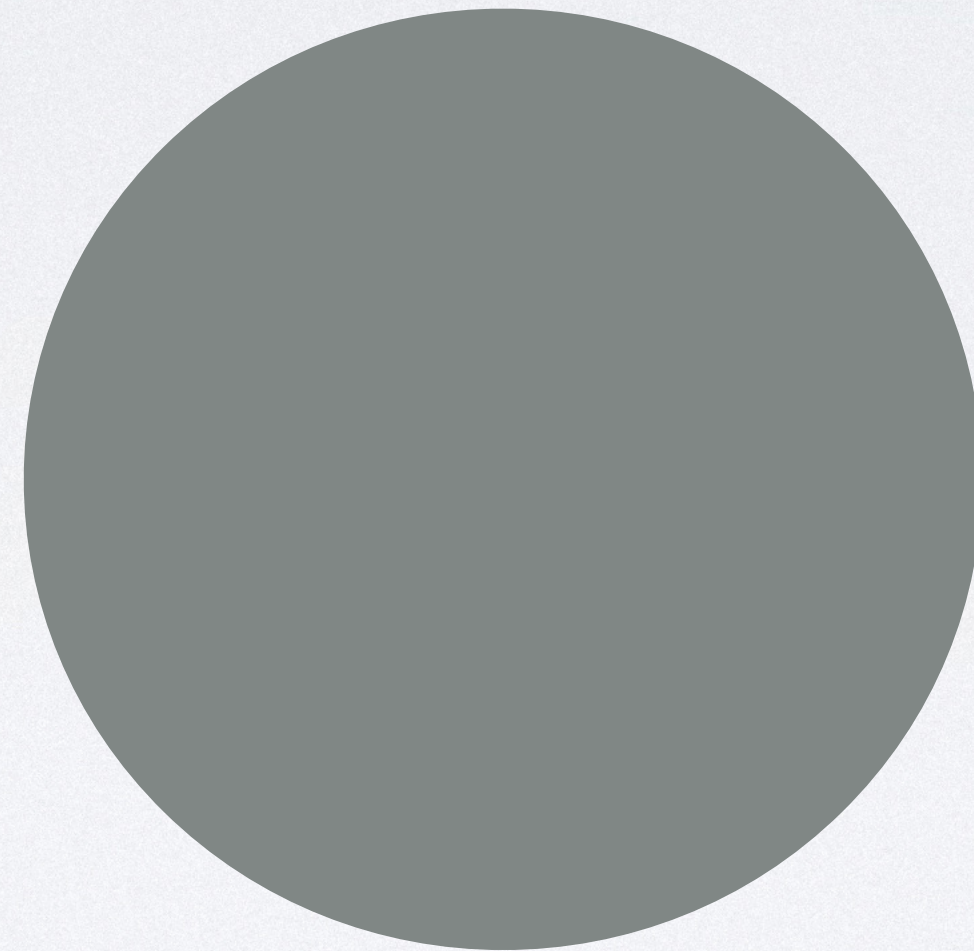
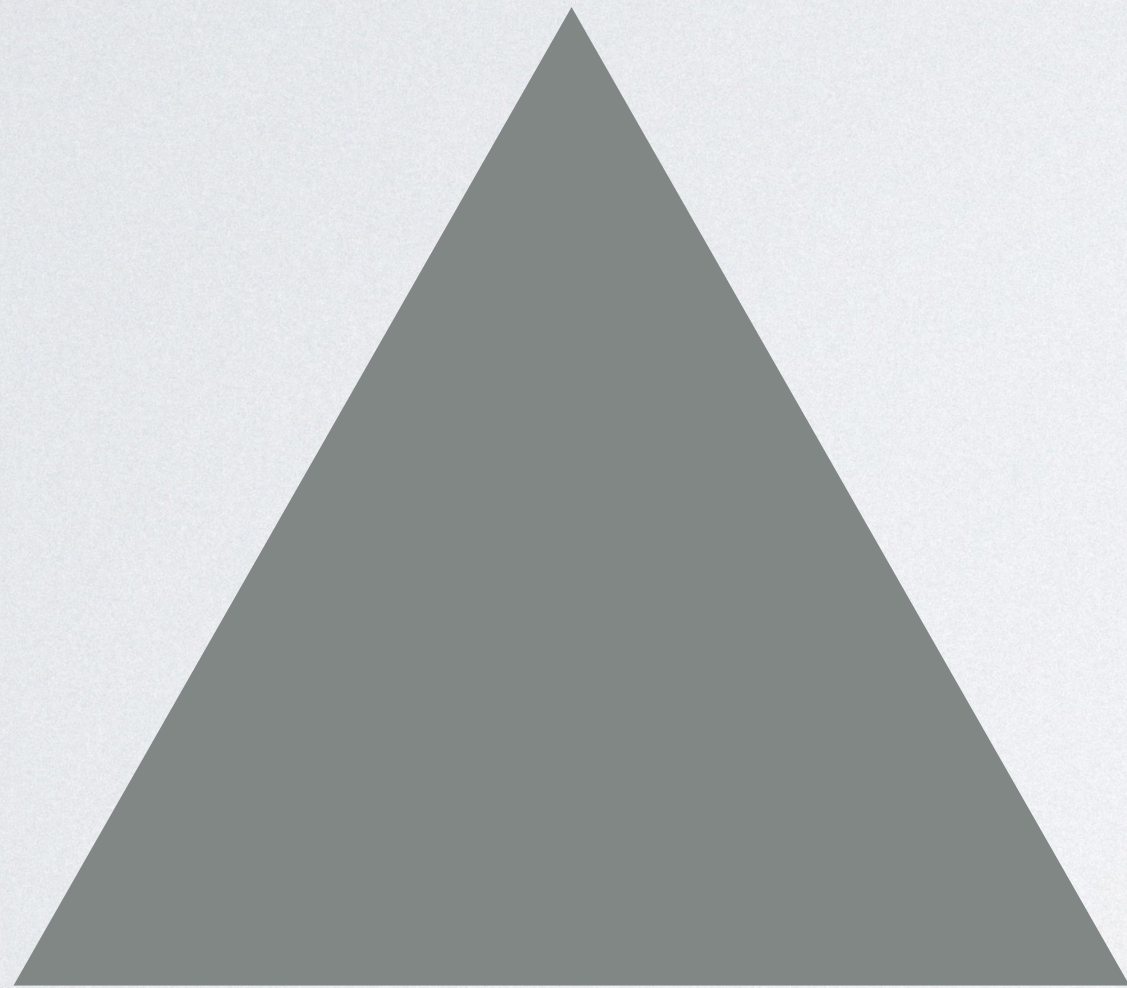


# INHERITANCE

- Circle, triangle, trapezoid are all shapes
  - Create a parent class that contains what they have in common
  - Create child classes that contain the unique attributes



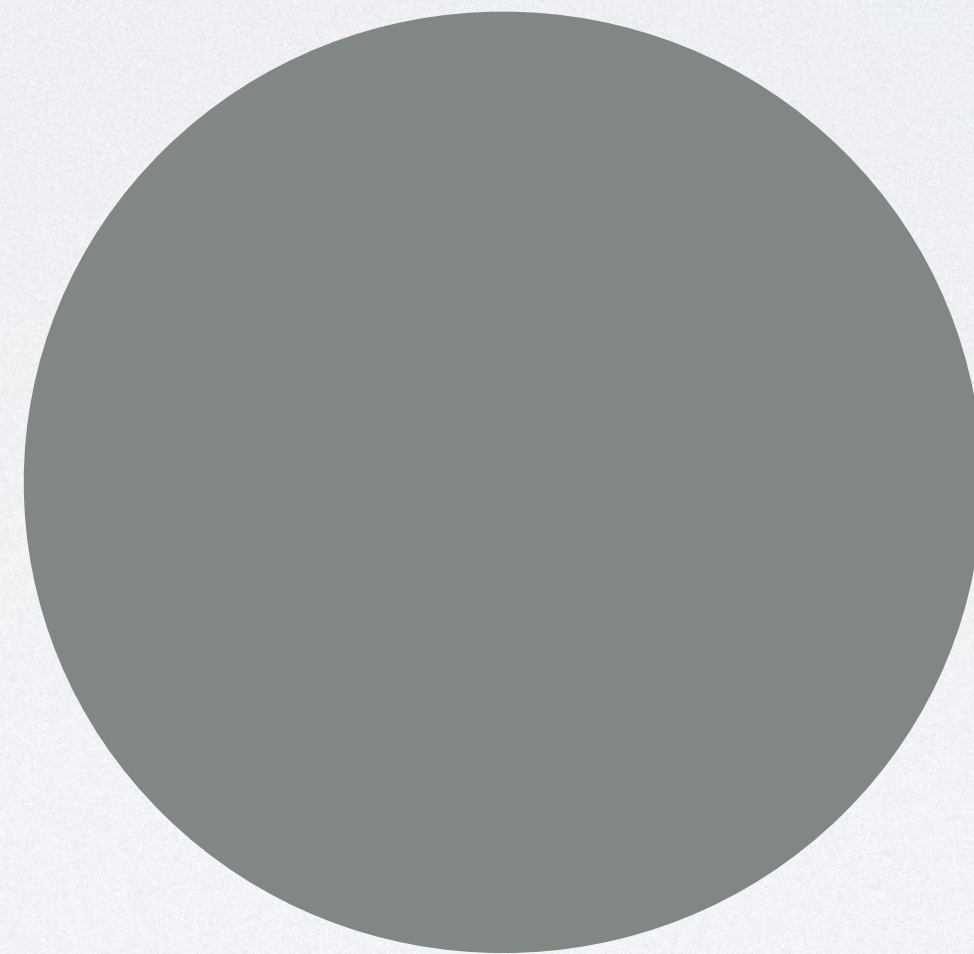
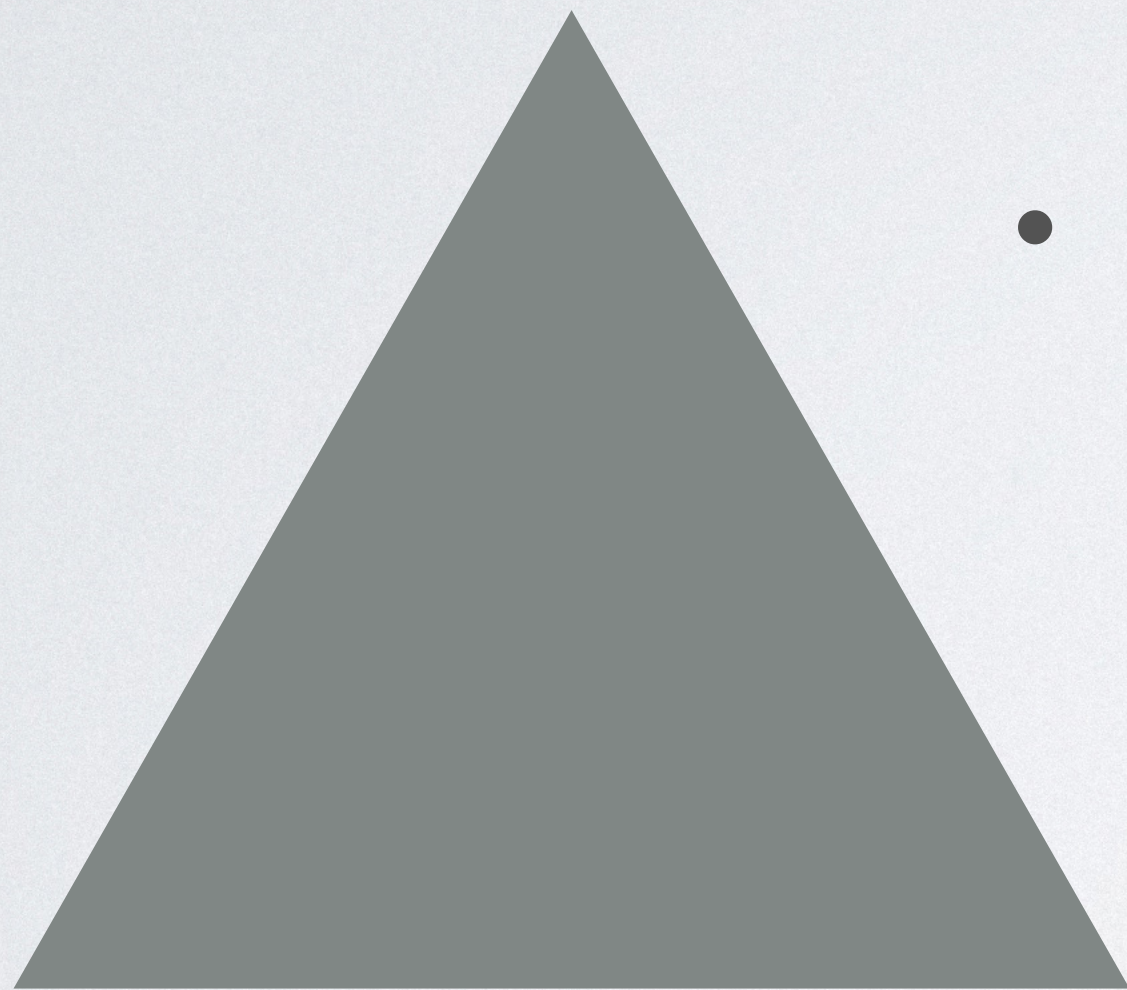
WHAT DO THESE HAVE IN COMMON?





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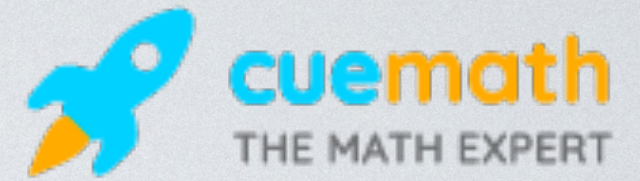
- Area
- Perimeter



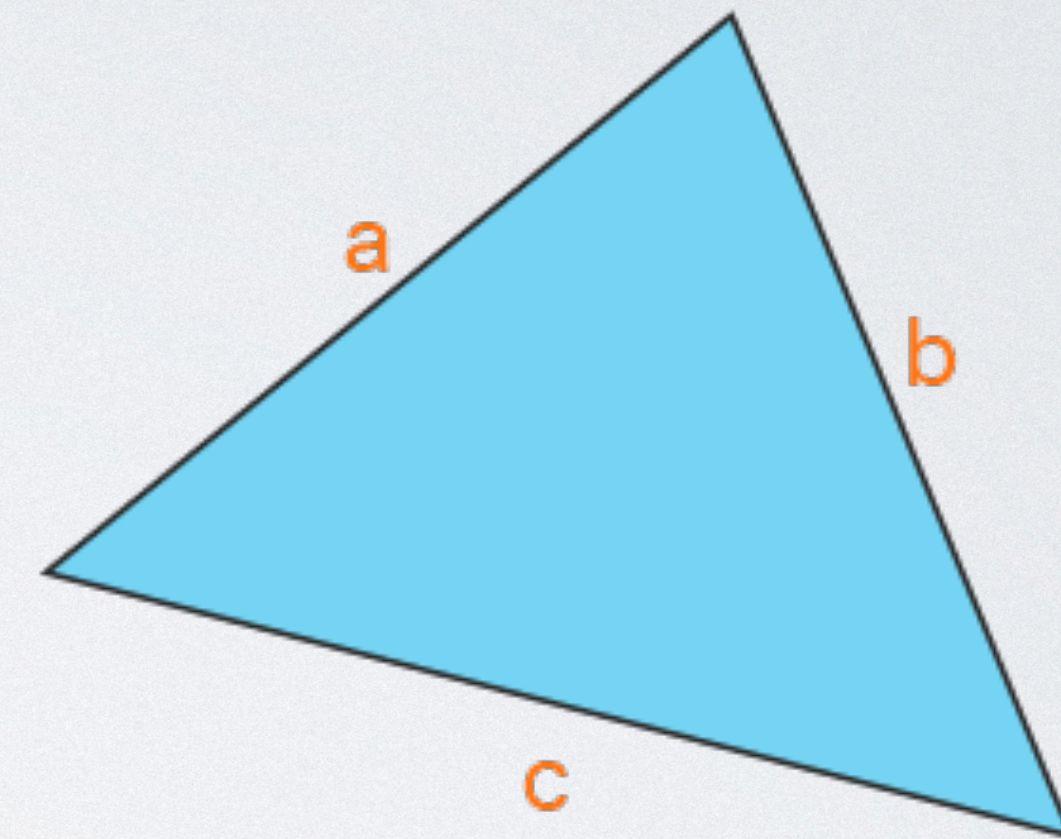


# WHAT'S UNIQUE TO TRIANGLES?

## Heron's Formula



- Side 1
- Side 2
- Side 3
- Perimeter calculation
- Area calculation



$$s = \frac{a + b + c}{2}$$

↓  
Semi Perimeter

$$\text{Area of Triangle} = \sqrt{s(s-a)(s-b)(s-c)}$$



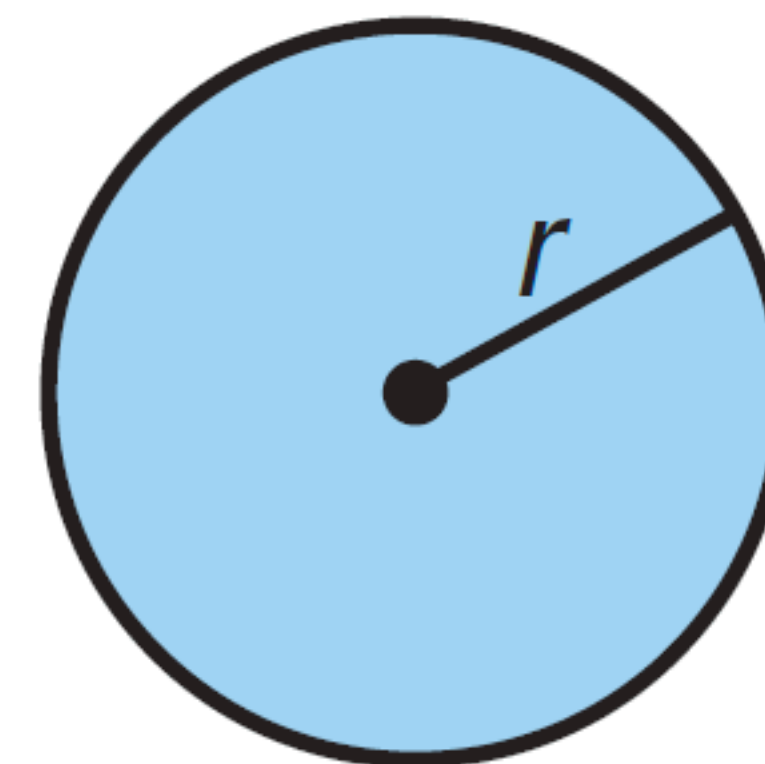
# WHAT'S UNIQUE TO CIRCLES?

- Radius
- Perimeter calculation
- Area calculation

radius  $r$

$$C = 2\pi r$$

$$A = \pi r^2$$

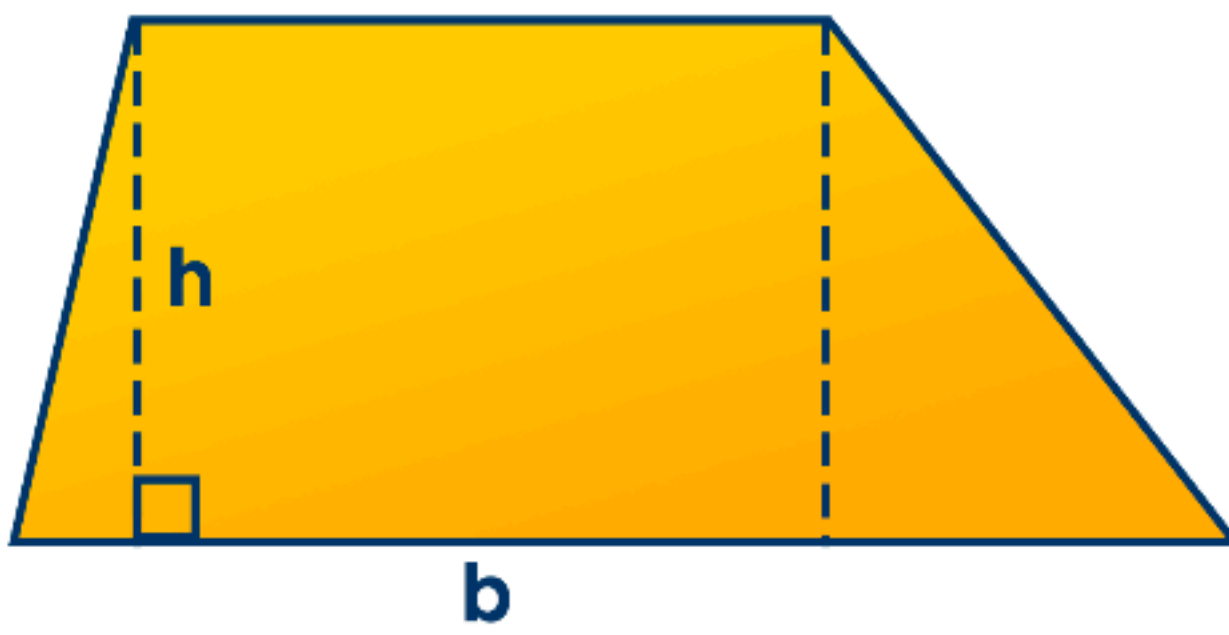




# WHAT'S UNIQUE TO TRAPEZOIDS?

- Base 1
- Base 2
- Height
- Side 1
- Side 2
- Perimeter calculation
- Area Calculation

**Area of a Trapezoid**


$$A = \frac{a + b}{2} h$$

**Where:**

- $A$  = Area of a Trapezoid
- $a$  = length of base 1
- $b$  = length of base 2
- $h$  = height of the trapezoid



PARENT CLASS: SHAPE



# REPLACING THE PARENT CLASS

- **Override** parent function
  - Same function name and parameters
  - Child implements method already present in parent
    - Function now related to object it's called on (**base** vs. **derived**)
- **Overload** parent function- next class
  - Same function name, different parameters



CHILD CLASS: TRIANGLE  
FOLLOW ALONG!



CHILD CLASS: CIRCLE  
DO IT WITH ME!



CHILD CLASS:TRAPEZOID  
YOU DO IT!