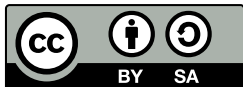


# Cool Geometry Formulas!

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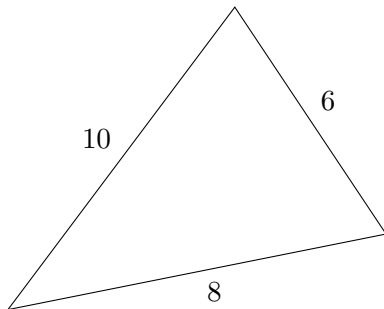
# What's semiperimeter?

## Formulas

In order to use these next formulas, we need to know about a wonderful concept called semiperimeter.

Semiperimeter, as the name suggests, refers to half the length of a shape's overall perimeter!

For example, the semiperimeter of the triangle below is 12! Easy, right?



# Heron's formula: a neat way to calculate area!

## Formulas

A formula that can be used to calculate the area of triangles using semiperimeter!



# Heron's formula: a neat way to calculate area!

## Formulas

A formula that can be used to calculate the area of triangles using semiperimeter!

The formula is:

$$A = \sqrt{s(s-a)(s-b)(s-c)}$$

Where:

$A$  is the area

$s$  is the semiperimeter

$a$ ,  $b$ , and  $c$  are the sides of the triangle

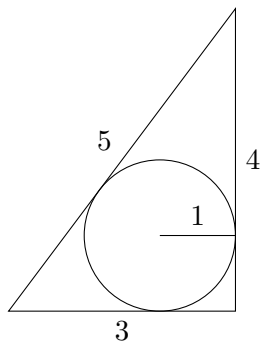


# More triangles and semiperimeters!

## Formulas

The area of a triangle is also the product of a circle's inradius and its semiperimeter, or  $A = rs$ .

A triangle's inradius refers to the radius of its incircle, or the circle that can be inscribed within the triangle.



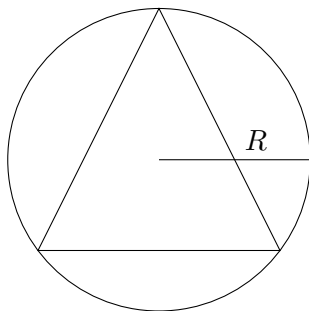
# Another formula

## Formulas

Here's a formula that can be used to calculate the circumradius!

$$R = \frac{abc}{4\sqrt{s(s-a)(s-b)(s-c)}} = \frac{abc}{4A}$$

A circumradius refers to, you can probably guess, the radius of the circle that the triangle can be inscribed in!



# Brahmagupta's Formula: The key to cyclic quads

## Formulas

Similarly to Heron's formula, Brahmagupta's formula is another way to calculate area, however it involves the semiperimeter of a cyclic quadrilateral!

Remember: a cyclic quadrilateral is a quadrilateral where all of the vertices lie on one circle.





# Brahmagupta's Formula: The key to cyclic quads

## Formulas

Similarly to Heron's formula, Brahmagupta's formula is another way to calculate area, however it involves the semiperimeter of a cyclic quadrilateral!

Remember: a cyclic quadrilateral is a quadrilateral where all of the vertices lie on one circle.

The formula is:

$$K = \sqrt{(s-a)(s-b)(s-c)(s-d)}$$

Where:

$K$  is the area

$s$  is the semiperimeter

$a$ ,  $b$ ,  $c$ , and  $d$  are the sides of the quadrilateral



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1 Formulas

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# Now let's try some questions!

Questions

# Now let's try some questions!



# Question 1

## Questions

Calculate the sides of a triangle  $\triangle ABC$  with area  $883 \text{ cm}^2$ , if the ratio of the sides is  $a : b : c = 15 : 7 : 19$ .



## Question 2

### Questions

A rhombus has a side length of 23 cm and one of its diagonals is 36 cm long. Calculate its area.



# Question 3

## Questions

Calculate the circumference of the circle inscribed in a triangle with sides 418, 59, and 430.



# Question 4

## Questions

In a newly built park, there will be a permanently placed rotating sprayer in order to irrigate the lawns. Determine the largest radius of the circle which can be irrigated by sprayer  $P$ , so not to spray park visitors on line  $AB$ . Distance  $AB = 55$  m,  $AP = 36$  m and  $BP = 28$  m.

