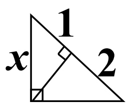
Name: ______________________________

Geometric Mean

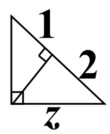
There are many ways to determine measures on a right triangle. Geometric mean is another method of doing this. It works with something called an altitude," which is a segment connecting the right angle to the hypotenuse at another right angle. There are 2 formulas you will use to solve using the geometric mean.

To determine the **legs** (sides not the hypotenuse), use:

$leg^2 = (closest\ part\ of\ the\ hypotenuse)(hypotenuse)$



or



part closest to *x*: 1 **part closest to *z*: 2**

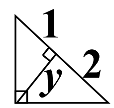
whole hypotenuse: 1 + 2 = 3

$(leg)^2 = (closest)(whole)$
$x^2 = (1)(3)$
$x^2 = 3$
$\sqrt{x^2} = \sqrt{3}$
$x = \boxed{\sqrt{3}}$

$(leg)^2 = (closest)(whole)$
$z^2 = (2)(3)$
$z^2 = 6$
$\sqrt{z^2} = \sqrt{6}$
$z = \boxed{\sqrt{6}}$

To determine the **altitude** (segment going through) use:

$altitude^2 = (one\ part\ of\ the\ hypotenuse)(other\ part)$

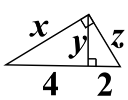


one part: 1 **other part: 2**

$(altitude)^2 = (one\ part)(other\ part)$
$y^2 = (1)(2)$
$y^2 = 2$
$\sqrt{y^2} = \sqrt{2}$
$y = \boxed{\sqrt{2}}$

Determine the value of each variable.

EXAMPLE



part closest to *x* = 4
part closest to *z* = 2
whole hypotenuse = 4 + 2 = 6

The legs:

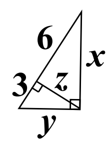
$(leg)^2 = (closest)(hypotenuse)$
$x^2 = (4)(6)$
$x^2 = 24$
$\sqrt{x^2} = \sqrt{24}$
$x = \sqrt{4}\sqrt{6} = \boxed{2\sqrt{6}}$

$z^2 = (2)(6)$
$z^2 = 12$
$\sqrt{z} = \sqrt{12}$
$z = \sqrt{4}\sqrt{3} = \boxed{2\sqrt{3}}$

The altitude:

$(altitude)^2 = (one\ part)(the\ other)$
$y^2 = (4)(2)$
$y^2 = 8$
$\sqrt{y^2} = \sqrt{8}$
$y = \sqrt{4}\sqrt{2} = \boxed{2\sqrt{2}}$

EXAMPLE



part closest to *x* = 6
part closest to y = 3
whole hypotenuse = 6 + 3 = 9

The legs:

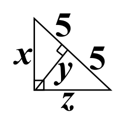
$(leg)^2 = (closest)(hypotenuse)$
$x^2 = (6)(9)$
$x^2 = 54$
$\sqrt{x^2} = \sqrt{54}$
$x = \sqrt{9}\sqrt{6} = \boxed{3\sqrt{6}}$

$y^2 = (3)(9)$
$y^2 = 27$
$\sqrt{y^2} = \sqrt{27}$
$y = \sqrt{9}\sqrt{3} = \boxed{3\sqrt{3}}$

The altitude:

$(altitude)^2 = (one\ part)(the\ other)$
$z^2 = (3)(6)$
$z^2 = 18$
$\sqrt{z^2} = \sqrt{18}$
$z = \sqrt{9}\sqrt{2} = \boxed{3\sqrt{2}}$

EXAMPLE



part closest to *x* = 5
part closest to *z* = 5
whole hypotenuse = 5 + 5 = 10

The legs:

$(leg)^2 = (closest)(hypotenuse)$
$x^2 = (5)(10)$
$x^2 = 50$
$\sqrt{x^2} = \sqrt{50}$
$x = \sqrt{25}\sqrt{2} = \boxed{5\sqrt{2}}$

$z^2 = (5)(10)$
$z^2 = 50$
$\sqrt{z} = \sqrt{50}$
$z = \sqrt{25}\sqrt{2} = \boxed{5\sqrt{2}}$

The altitude:

$(altitude)^2 = (one\ part)(the\ other)$
$y^2 = (5)(5)$
$y^2 = 25$
$\sqrt{y^2} = \sqrt{25}$
$y = \boxed{5}$

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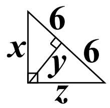

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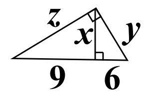

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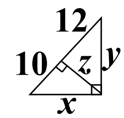

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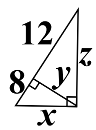

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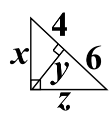

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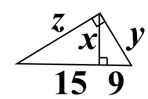

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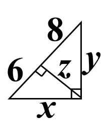

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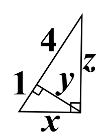

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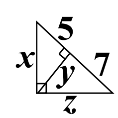

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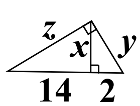

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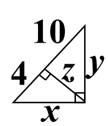

12.