Homework: Pages 65-70.and Review C, pages 93-96 Happy New Year! See you next Year!

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| **Area of a Triangle Part I** | http://www.mathgoodies.com/lessons/vol1/images/perimeter_area_logo2.jpg | [**Unit 1**](http://www.mathgoodies.com/lessons/toc_vol1.html) **>** |

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| The area of a [polygon](javascript:popUpWindow('polygon')) is the number of square units inside that polygon. Area is 2-dimensional like a carpet or an area rug. A **triangle** is a three-sided polygon. We will look at several types of triangles in this lesson. | [IMAGE] |

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| [IMAGE] | To find the area of a triangle, multiply the base by the height, and then divide by 2. The division by 2 comes from the fact that a [parallelogram](javascript:popUpWindow('parallelogram')) can be divided into 2 triangles. For example, in the diagram to the left, the area of each triangle is equal to one-half the area of the parallelogram. |

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| Since the area of a parallelogram is A = b x h, the area of a triangle must be one-half the area of a parallelogram. Thus, the formula for the area of a triangle is: | | | | |
| |  |  |  | | --- | --- | --- | | http://www.mathgoodies.com/lessons/vol1/images/area_triangle1.gif | or | http://www.mathgoodies.com/lessons/vol1/images/area_triangle2.gif | | | | | |
| where bis the base, his the height and **·** means multiply. | | | | |
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| The base and height of a triangle must be [perpendicular](javascript:popUpWindow('perpendicular')) to each other. In each of the examples below, the base is a side of the triangle. However, depending on the triangle, the height may or may not be a side of the triangle. For example, in the right triangle in Example 2, the height is a side of the triangle since it is perpendicular to the base. In the triangles in Examples 1 and 3, the lateral sides are not perpendicular to the base, so a dotted line is drawn to represent the height. | | | | |
|  | http://www.mathgoodies.com/lessons/vol1/images/perimeter_area_logo2.jpg | | [**Unit 1**](http://www.mathgoodies.com/lessons/toc_vol1.html) **>** | |
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| Example 1: | | Find the area of an [acute triangle](javascript:popUpWindow('acute_triangle')) with a base of 15 inches and a height of 4 inches. | | [IMAGE] |
| Solution: | | http://www.mathgoodies.com/lessons/vol1/images/area_triangle1.gif | |
|  | | A= http://www.mathgoodies.com/lessons/vol1/images/one_half.gif**·** (15 in) **·** (4 in) | |
|  | | A=http://www.mathgoodies.com/lessons/vol1/images/one_half.gif **·** (60 in2) | |
|  | | A= 30 in2 | |
|  | | | | |
| Example 2: | | Find the area of a [right triangle](javascript:popUpWindow('right_triangle')) with a base of 6 centimeters and a height of 9 centimeters. | | [IMAGE] |
| Solution: | | http://www.mathgoodies.com/lessons/vol1/images/area_triangle1.gif | |
|  | | A=http://www.mathgoodies.com/lessons/vol1/images/one_half.gif **·** (6 cm) **·** (9 cm) | |
|  | | A=http://www.mathgoodies.com/lessons/vol1/images/one_half.gif **·** (54 cm2) | |
|  | | A= 27 cm2 | |
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| Example 3: | | Find the area of an [obtuse triangle](javascript:popUpWindow('obtuse_triangle')) with a base of 5 inches and a height of 8 inches. | | [IMAGE] |
| Solution: | | http://www.mathgoodies.com/lessons/vol1/images/area_triangle1.gif | |
|  | | A=http://www.mathgoodies.com/lessons/vol1/images/one_half.gif **·** (5 in) **·** (8 in) | |
|  | | A=http://www.mathgoodies.com/lessons/vol1/images/one_half.gif **·** (40 in2) | |
|  | | A= 20 in2 | |  |
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| Example 4: | | The area of a triangular-shaped mat is 18 square feet and the base is 3 feet. Find the height. *(Note: The triangle in the illustration to the right is NOT drawn to scale.)* | | http://www.mathgoodies.com/lessons/vol1/images/trianglular_mat.gif |
| Solution: | | In this example, we are given the area of a triangle and one dimension, and we are asked to work backwards to find the other dimension. | |
|  | | http://www.mathgoodies.com/lessons/vol1/images/area_triangle1.gif | |
|  | | 18 ft2 =http://www.mathgoodies.com/lessons/vol1/images/one_half.gif **·** (3 ft) **·** h | |
|  | | Multiplying both sides of the equation by 2, we get: | |
|  | | 36 ft2 = (3 ft) **·** h | |
|  | | Dividing both sides of the equation by 3 ft, we get: | |
|  | | 12 ft = h | |
|  | | Commuting this equation, we get: | |
|  | | * = 12 ft | |
|  | | | | |
| Summary: | | Given the base and the height of a triangle, we can find the area. Given the area and either the base or the height of a triangle, we can find the other dimension. The formula for area of a triangle is: | | [IMAGE] |
|  | | |  |  |  |  | | --- | --- | --- | --- | | http://www.mathgoodies.com/lessons/vol1/images/area_triangle1.gif | or | http://www.mathgoodies.com/lessons/vol1/images/area_triangle2.gif | where bis the base, his the height | | |