Unit 4 Trig Identities

Lesson 1 – Pythagorean Identities

An **identity** is an equation that is valid for all values of the variable for which the expressions in the equation are defined. For example, *x2 – y2 = (x – y)(x + y)* is valid for all values of x and y.

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| When studying the unit circle, it was observed that a point on the unit circle (the vertex of the right triangle) can be represented by the coordinates http://regentsprep.org/Regents/math/algtrig/ATT9/pythag1.gif.  Since the legs of the right triangle in the unit circle have the values of http://regentsprep.org/Regents/math/algtrig/ATT9/pythag2.gifand http://regentsprep.org/Regents/math/algtrig/ATT9/pythag3.gif, the Pythagorean Theorem can be used to obtain http://regentsprep.org/Regents/math/algtrig/ATT9/pythag4.gif.   |  | | --- | | http://regentsprep.org/Regents/math/algtrig/ATT9/pythag5.gif |   This well-known equation is called a **Pythagorean Identity.**  The value of http://regentsprep.org/Regents/math/algtrig/ATT9/pythag6.gifis immaterial. | |  | | --- | | http://regentsprep.org/Regents/math/algtrig/ATT9/unitcircletrig.gif | |

**\*\*Remember** – *tan(x) = sin(x)/cos(x)*

*cot(x) = 1/tan(x) or cos(x)/sin(x)*

*sec(x) = 1/cos(x)*

*csc(x) = 1/sin(x)*

1. Using the pythagorean identity, divide through by cos2 to obtain the second identity.
2. Using the pythagorean identity, divide through by sin2 to obtain the third identity.

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| Many times it will be necessary to use a "version" of these Pythagorean Identities. Be on the look-out for these variations. | http://regentsprep.org/Regents/math/algtrig/ATT9/j0303418.gif |

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| **Pythagorean Identity** | **Variations** |
| http://regentsprep.org/Regents/math/algtrig/ATT9/pythag17.gif | http://regentsprep.org/Regents/math/algtrig/ATT9/pythag18.gif                  http://regentsprep.org/Regents/math/algtrig/ATT9/pythag19.gif |
| http://regentsprep.org/Regents/math/algtrig/ATT9/pythag20.gif | http://regentsprep.org/Regents/math/algtrig/ATT9/pythag21.gif |
| http://regentsprep.org/Regents/math/algtrig/ATT9/pythag22.gif | http://regentsprep.org/Regents/math/algtrig/ATT9/pythag23.gif |

Examples:

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| **1.** | **http://regentsprep.org/Regents/math/algtrig/ATT9/pythag24.gif** find the value of the other trig functions. |

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| **2.** | http://regentsprep.org/Regents/math/algtrig/ATT9/pythag30.gif |  |

Practice Worksheet – Pythagorean Identities Problems #1-8,13-17