Math 3 7.5 Pythagorean Identities Unit 7

*SWBAT verify expressions involving Pythagorean trigonometric identities.*

Let’s go on a great exploration to find out our true identities. You will put on your Smarticle Caps and use your calculator to fill out the following chart. Make sure NEVER to use rounded values – either store values and re-use, or calculate in place. Let’s begin!

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **θ** | **sin θ** | **cos θ** | **sin2θ** | **cos2θ** | **sin2θ + cos2θ** |
| 33.5° |  |  |  |  |  |
| -96° |  |  |  |  |  |
| 200° |  |  |  |  |  |
| 180° |  |  |  |  |  |
| 137.2° |  |  |  |  |  |
| -9876° |  |  |  |  |  |

Your detective work leads you to conjecture that: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Your mathematical training makes you want to prove it without a doubt:

|  |  |  |
| --- | --- | --- |
| **sin θ + cosθ** | = | (rewrite using “x, y, r” definitions of sine and cosine) |
| **sin2θ + cos2θ** | = | (use your algebra skills and the “x, y, r” definitions to adjust) |
|  | = | (combine correctly into one fraction) |
|  | = | (consider Pythagorean Theorem and reference triangle information to simply the numerator) |
|  | = | (Simplify and VOILA!) |

**Conclusion: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

Using your CORRECT conclusion equation/identity:

* Rewrite the equation isolating the cos2θ term: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* Rewrite the equation isolating the sin2θ term: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

|  |  |
| --- | --- |
| Pythagorean Identities | sin2θ + cos2θ = 1 |
| Divide by sin2θ |  |  |
| * Rewrite the equation isolating the cot2θ term:
 |
| Divide by cos2θ |  |  |
| * Rewrite the equation isolating the tan2θ term:
 |

**Example 1**: Verify sec2θ – sec2θcos2 θ = tan2 θ Side Notes on Process

**You Try!** Verify cotθtanθ + tan2θ = sec2θ

**Example 2:** Verify $tan^{2}θ-sin^{2}θ=tan^{2}θsin^{2}θ$

**You Try!** Verify the identity $sec^{2}θ-sec^{2}θcos^{2}θ=tan^{2}θ$