**Secondary Math 2 3.0 Homework Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Period: \_\_\_\_\_\_\_**

Pythagorean Theorem

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| Pyth Triangle.png | Named for the Greek mathematician, Pythagoras, this theorem relates the sides of a right triangle with the formula:$$a^{2}+b^{2}=c^{2}$$where $a, b$ are the lengths of the legs of the right triangle and $c$ is the length of the hypotenuse of the right triangle.Points are represented by upper case letters. The side of the triangle opposite the angle at a given point is represented with the lower case version of the same letter (e.g., point B is directly across from the side with a length of b). |

**Example 1**: Find the missing side length of the triangle:

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| Pyth Problem 7 24 x.png | $$a^{2}+b^{2}=c^{2}$$$$7^{2}+24^{2}=c^{2}$$$$49+576=c^{2}$$$$625=c^{2}$$$$ \pm 25=c $$$$ 25=c $$ | Write the Pythagorean Theorem.Use information from the figure.Evaluate the exponentials.Addition.Square root each side.We prefer to consider distances as positive values, so we eliminate the negative solution. |

The Distance Formula

The Pythagorean theorem helps us find the distance of a side length of a right triangle. The distance formula is a tool similar to the Pythagorean theorem that helps us find the distance between two points.

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| $c^{2}=a^{2}+b^{2}$, *𝑎=*$x\_{2}-x\_{1}$, $$b=y\_{2}-y\_{1}$$ | Pythagorean Theorem |
| $$c=\sqrt{\left(x\_{2}-x\_{1}\right)^{2}+\left(y\_{2}-y\_{1}\right)^{2}}$$Written as:$$d=\sqrt{\left(x\_{2}-x\_{1}\right)^{2}+\left(y\_{2}-y\_{1}\right)^{2}}$$ | Distance Formula |
| To find the distance of two points it is sometimes easier to think of it as constructing a right triangle and using the Pythagorean Theorem. |  |

**Example 2**: Find the distance between the two points:

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|  | $$d=\sqrt{\left(x\_{2}-x\_{1}\right)^{2}+\left(y\_{2}-y\_{1}\right)^{2}}$$$$d=\sqrt{\left(6-2\right)^{2}+\left(1-4\right)^{2}} $$$$d=\sqrt{\left(4\right)^{2}+\left(-3\right)^{2}}$$$$d=\sqrt{16+9}$$$$d=\sqrt{25}$$$$d=5$$ | Write the Distance Formula.Use information from the figure.Subtract the numbers in parenthesis.Evaluate the exponentials.Addition.Square root. |

Practice Exercises:

Pythagorean Theorem

Find the missing side lengths of the right triangles using the Pythagorean Theorem given $∆ABC$:



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| 1) | $a=5, b=6; $Find $c$. | 2) | $a=6, b=8; $Find $c$. | 3) | $a=5, b=12; $Find $c$. |

Distance Formula

Find the distance between the two given points.

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| 4) | $$\left(1,3\right) and \left(4,2\right)$$ | 5) | $$\left(-6,3\right) and \left(5,-3\right)$$ | 6) | $$\left(7,4\right) and \left(7,8\right)$$ |
| 7) | $$\left(1,1\right) and \left(-4,-2\right)$$ | 8) | $$\left(10,-1\right) and \left(4,3\right)$$ | 9) | $$\left(5,0\right) and \left(-1,2\right)$$ |