PHYSICS

ADDING VECTORS IN 2-D

Learning Goals

B2.5 - Solve problems involving distance, position, and displacement using a vector diagram.

B3.2 - Distinguish between scalar and vector quantities as they relate to uniform and non-uniform motion.

Success Criteria

☐ What is a displacement vector?

☐ What is the rule for adding vectors?

☐ When solving algebraically, why is it important to define which direction is positive?

☐ Can you draw a vector diagram to illustrate solving vectors in 2D?

☐ Are you able to use Pythagorean Theorem and Primary Trig Ratios to calculate Resultant Displacement?
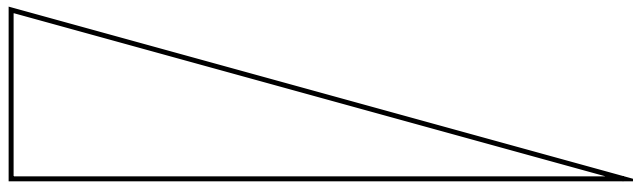
PHYSICS

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TRIG PRACTICE

Pythagorean Theorem

Pythagorean Theorem is used for ***Right-Angled Triangles*** in order to solve for a side length.

$$c^2 = a^2 + b^2$$

Ex: Find the hypotenuse of a right angled triangle with a base of 3m and a height of 4m.

Ex: Find the base of a right-angled triangle with a hypotenuse of 13m and a height of 5m.
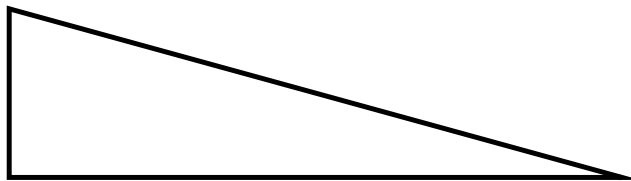
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TRIG PRACTICE

Primary Trig Ratios

Primary Trig Ratios are used for **Right-Angled Triangles** in order to find an angle.

SOH CAH TOA

Ex: Find the angle between a 5m hypotenuse and a 4m base of a right-angled triangle.

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ADDING VECTORS IN 2-D

Recall: *When adding vectors algebraically, you must first define what direction is going to be positive. Then, convert your givens accordingly.*

The goal when adding vectors that are not colinear (not in the same line) is to simplify the vectors to **TWO** reduced vectors that are perpendicular.

Ex: Solve for the resultant displacement.

d_1 = 8 km [N]
d_2 = 6 km [E]
d_3 = 4 km [S]
d_4 = 3 km [W]

PHYSICS

2D - Vector Assignment

2D - Vector Assignment NAME: _____

Ernie the lumberjack is travelling around the forest cutting down trees. In the morning, he travels 4.2 km [N] then 3.2 km [E]. He then realizes that he's lost and tries to head back to his log house. So he travels 5.4 km [S] and 4.0 km [W]. His walking time throughout the day is 4.5 hours.

a) What is his distance travelled?
b) What is his speed?

c) What is his resultant displacement, including specific direction?
d) What is his velocity?

BONUS: What direction should Ernie travel to get himself back home (Be specific)?

PHYSICS

HOMEWORK

Displacement Worksheet

Calculate the distance and displacement of the following situations:

1.   David walks 3 km north, then turns and walks 4 km east.

2.   Amy runs 2 blocks south, then turns around and runs 3 miles north.

3.   Jermaine runs exactly 2 laps around a 400 meter track.

4.   Derrick crawls 4 feet then turns 90 degrees and crawls 6 feet.

5.   Ray runs 30 feet north, 30 feet west, and then 30 feet south.

6.   Jamison turns around 5 times.

7.   Cassidee walks 1 mile then turns 90 degrees and walks 2 miles.

8.   Taja walks two miles from her door to the park, then returns home to her door.

9.   Sandy ran 3 blocks north, and then 2 blocks west.

10.   Neva swam 3 complete laps in a 50 meter pool. (1 lap is to the other side and back)