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Vectors (p. 119 – 125)

I. Vectors In Multiple Dimensions

1. **Vectors consist of the properties** Magnitude **and** direction.

2. **How are vectors added together to find the resultant?**

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Placing them tip to tail, draw resultant, connect tail of first vector to tip of second vector.

3. **If you move a vector so the length and direction are unchanged, the vector is unchanged.**

Circle One : (True) False

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4. **The resultant of a vector is drawn from the ~~tip~~ tail of the first vector to the ~~tail~~ tip of the second vector.**

Circle One : True (False)

5. **Write out the formula for the Pythagorean Theorem.**

For angles with 90°

$R^2 = A^2 + B^2$

Squaring a House, Deck, or Driveway

6. **When is the Pythagorean Theorem used when adding vectors?**

To determine the hypotenuse (R, a.k.a. resultant)

7. **Write out the formula for the Law Of Cosines.**

For angles greater than 90°

$R^2 = A^2 + B^2 - 2AB\cos\theta$

8. **Write out the formula for the Law Of Sines.**

$\frac{R}{\sin\theta} = \frac{A}{\sin a} = \frac{B}{\sin b}$

9. **When is the Law Of Cosines or Law Of Sines used when adding vectors?**

When vectors are added at angles other than 90°

II. Components Of Vectors

1. **What are good recommendations for placing a coordinate system when :**

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	X-Axis	Y-Axis
Motion is on the surface :	Point East	Point North
Motion is in the air :	Horizontal	Vertical
Motion is on a hill :	Direction of Motion	Perpendicular to x-axis

2. **Define the term components.**

Components – vectors parallel to the x-axis and another parallel to the y-axis

(A_x = parallel to x-axis) (A_y = parallel to y-axis)

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3. **Complete the following equation relating to components.**

$A = A_x + A_y$ (Not the same as Pythagorean Theorem)

4. **Define the term vector resolution.**

Vector Resolution – process of breaking a vector into its components

5. **The magnitude of an original vector is always larger than either component vector.**

Circle One : (True) False

6. **For the direction of angles, the angles are measured ~~clockwise~~ counterclockwise.**

Circle One : True (False)

7. **Complete the missing parts of the equations.** (Used only for right triangles!)

$\cos\theta = \frac{\text{adjacent side}}{\text{hypotenuse}} = \frac{A_x}{A} = A_x = A\cos\theta$

$\sin\theta = \frac{\text{opposite side}}{\text{hypotenuse}} = \frac{A_y}{A} = A_y = A\sin\theta$

$\tan\theta = \frac{\text{opposite side}}{\text{adjacent side}} = A\tan\theta$

"CAH-SOH-TOA"

8. **When are A cos θ and A sin θ used when calculating vectors.**

To determine missing vector sides of a triangle.

III. Algebraic Addition Of Vectors

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1. **Assuming three vectors (A, B, C) combine to form a particular resultant (R), what equations are used to determine the following?**

$R_x = A_x + B_x + C_x = \Sigma R_x$ (Vertical Line – parallel to y-axis)

$R_y = A_y + B_y + C_y = \Sigma R_y$ (Horizontal Line – parallel to x-axis)

$R^2 = R_x^2 + R_y^2 = R = \sqrt{R_x^2 + R_y^2}$

2. **Identify the two other equations used to determine angles with right triangles and when they are used.**

On Calculator

1. Push $\tan^{-1}$(value)
2. Divide by 1°

(If set for radians!)

	When Used
$\theta = \tan^{-1}\left(\frac{R_y}{R_x}\right)$	– when opposite and adjacent sides known.
$\theta = \cos^{-1}\left(\frac{R_x}{R}\right)$	– when adjacent and hypotenuse sides known.
$\theta = \sin^{-1}\left(\frac{R_y}{R}\right)$	– when opposite and hypotenuse sides known.