Precalculus Notes: More Applications of Dot Product

Application: Using the dot product to determine whether two vectors are *orthogonal* (perpendicular) or parallel.

**Rule:** If the dot product of two non-zero vectors is equal to 0, then the vectors are *orthogonal.*

**Rule**: Two vectors **u** and **v** are parallel to each other if  , i.e. their dot product is equal to the opposite of the product of their magnitudes.

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Are the following pairs of vectors orthogonal, parallel, or neither?

Ex 1:  and  Ex 2:  and 

Ex 3:  and 

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Application: Using the dot product to determine “work”: the constant force acting on an object to move the object from point A to point B. To calculate work, find the dot product of the force and the displacement.

*Work = force  displacement* (Work is commonly measured in foot-pounds or Newtons/meter (joules))

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Ex 4: A person pushes a car with a constant force of 120 newtons at a constant angle of 35°. Find the work done (in joules) in pushing the car 10 meters.

Ex 5: Determine the work done in moving an object from (8,7) to (-12, 2) by a force **F** <-5, -3>.

Ex 6: A 30 N force being applied at 110° moves an object 20 meters at 15°. Find the work done.