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| **LG #** | **P11** | **Standards:** | **N-VM.2.4, N-VM.2.5** |
| **4.0** | **In addition to Score 3.0, in-depth inferences and applications that go beyond instruction to the standard.****The student will be able to:*** Create two 3-dimentional vectors that are orthogonal to each other.

**No major errors or omissions regarding the score 4.0 content.** |
| **3.5** | In addition to 3.0, in-depth inferences and applications with partial success. |
| **3.0** | **Students will be able to perform operations on vectors.****The student will be able to:*** Understand that the magnitude of a sum of two vectors is typically not the sum of the magnitudes (N-VM.2.4a)
* Given two vectors in magnitude and direction form, determine the magnitude and direction of their sum(N-VM.2.4b)
* Perform scalar multiplication component-wise, e.g., as c(v\_x,v\_y )=(〖cv〗\_x,cv\_y)(N-VM.2.5a)
* Compute the magnitude of a scalar multiple c**v** using ||c**v**|| = |c|**v** (VM.2.5b)
* Compute the direction of c**v** knowing that when |c|**v** ≠ 0, the direction of c**v** is either along **v** (for c > 0) or against **v** (for c < 0)(VM.2.5b)

**No major errors or omissions regarding the score 3.0 content (simple or complex).** |
| **2.5** | No major errors or omissions regarding 2.0 content and partial knowledge of 3.0 content. |
| **2.0** | **The student recognizes and describes specific terminology such as:**

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| * Vector
 | * End-to-end
 | * Parallelogram Rule
 |
| * Magnitude
 | * Direction
 | * Additive Inverse
 |
| * Vector Subtraction
 | * Resultant Vector
 | * Scalar Multiplication
 |
| * Component-wise
 | * Unit Vector
 | * Dot Product
 |

**The student will be able to:*** Add vectors end-to-end, component-wise, and by the parallelogram rule(N-VM.2.4a)
* Understand vector subtraction **v** – **w** as **v** + (–**w**), where –**w** is the additive inverse of **w**, with the same magnitude as **w** and pointing in the opposite direction(N-VM.2.4c)
* Represent vector subtraction graphically by connecting the tips in the appropriate order, and perform vector subtraction component-wise(N-VM.2.4c)
* Represent scalar multiplication graphically by scaling vectors and possibly reversing their direction(N-VM.2.5a)
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| **1.5** | Partial knowledge of the score 2.0 content, but major errors or omissions regarding score 3.0 content. |
| **1.0** | With partial understanding of some of the simpler details and processes and some of the more complex ideas and processes. |
| **0.5** | With help, a partial understanding of some of the simpler details and processes and some of the more complex ideas and processes. |
| **0.0** | Even with help, no understanding or skill is demonstrated |