

Vector Arithmetic

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+ and - operators

What: Addition and Subtraction of Vectors

Why: Detailed computations

Time To Complete: 2 hours



+

```
//+ addition ;  
  
v1 = {a,2,c}+{1,b,3};  
  
show v1;  
  
save as addition;
```

Output:

```
"v1" → {1 + a, 2 + b, 3 + c}
```

'//': **Comment Operator** instructing the Grammarian to ignore its sentence

'v1': identifier for a variable or **variable name**

'=': **Assignment Operator** copying the **Right Hand Side** to **Left Hand Side**

'{ }': curly brackets, **enclosing** the list of elements in between

'a,2,c': **Elements** of the vector enclosed in '{ }' brackets

';': **Delimiter** called semicolon indicating the end of a Free Form sentence, **separating** sentences

'show': textually displays the followed variables

'save as': instructs the Grammarian to save the Free Form script and all its interim computations in cloud objects

-

```
//- subtraction ;  
  
v1 = {a,2,c}-{1,b,3};  
  
show v1;  
  
save as subtraction;
```

Output:

```
"v1" → {-1 + a, 2 - b, -3 + c}
```

Properties

0-vector

```
//+ 0 ;  
  
v1 = {a,b,c} + {0, 0, 0};  
  
show v1;  
  
save as subtraction;
```

Output:

```
"v1" → {a, b, c}
```

```
//- 0 ;  
  
v1 = {a,b,c} - {0, 0, 0};  
  
show v1;  
  
save as subtraction;
```

Output:

```
"v1" → {a, b, c}
```

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*: Scale Factor

What: Scale a vector

Why: Computations to alter the length and direction of a vector

Time To Complete: 1-3 hours



Multiply a vector by a numeral from the **left**.

```
v = 5.4 * {x,y};  
  
show v;  
  
save as scale;
```

Multiply a vector by a numeral from the **right**.

```
v = {x,y}*5.4;  
  
show v;  
  
save as scale;
```

Output

```
"v" → {5.4*x, 5.4*y}
```

u ought to be a variable/symbol or a numeral. **u** cannot be another vector.

```
v = u * {a, b, c, d, e, f};  
  
show v;  
  
save as scale;
```

Output

```
"v" → {a*u, b*u, c*u, d*u, e*u, f*u}
```


Scale Factor < 0

What: Negative scale factor

Why: How to reverse a vector to point in the opposite direction

Time To Complete: 1-3 hours



```
v1 = {1,1};  
v2 = -1*v1;  
  
//list of pivots;  
pivots = {{0,0}, {0,0}};  
  
//list of vectors;  
vectors = {v1,v2};  
  
vectorplot pivots vectors;  
  
save as scale;
```

Output

{pivots, vectors}

