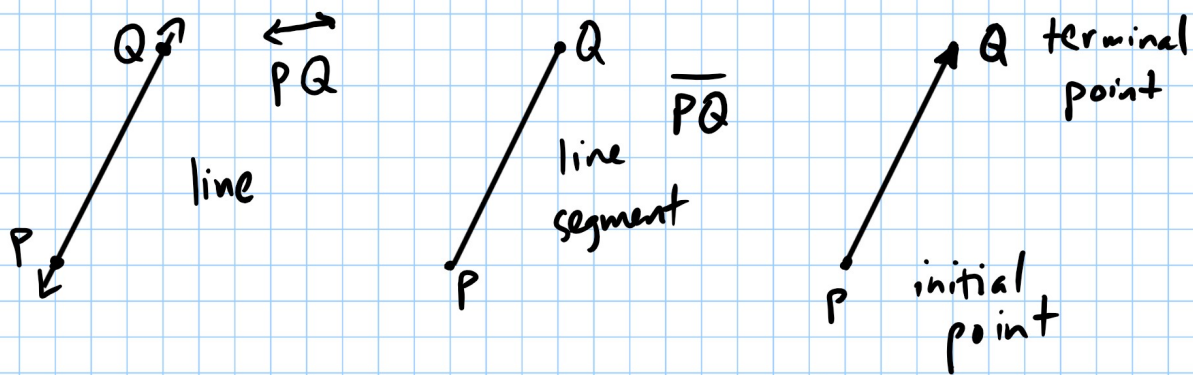


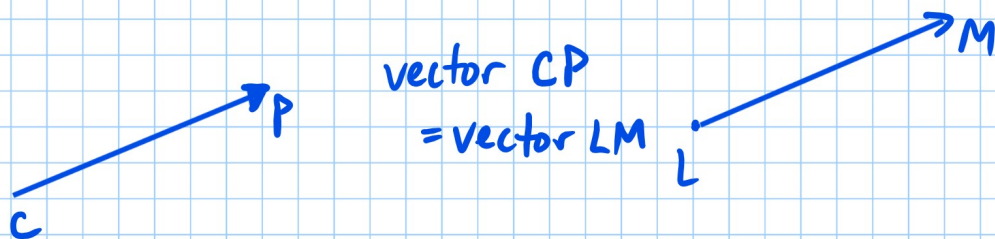
Section 8.4 Vectors

A vector is a quantity that has both magnitude and direction. An arrow represents the direction and the magnitude is the length.

We represent vectors with directed line segments.



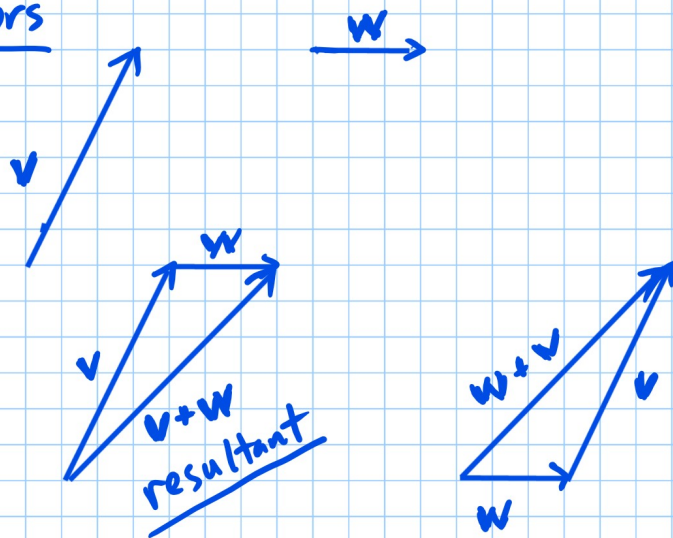
Two vectors are equal if they ^{have} the same magnitude and direction



We use bold letters to indicate a vector.

so if $\mathbf{v} = \overrightarrow{CP}$ and $\mathbf{w} = \overrightarrow{LM}$ then $\mathbf{v} = \mathbf{w}$

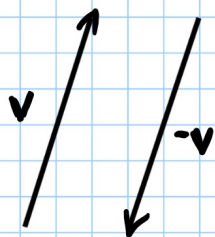
Adding Vectors



Commutative: $v + w = w + v$

Associative: $(u + v) + w = u + (v + w)$

$-v$ has the same magnitude as v but has opposite direction.

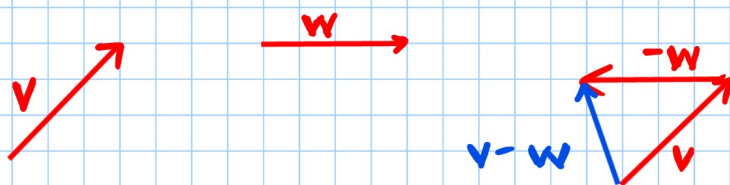


$$v + (-v) = \mathbf{0}$$

zero vector

which is a vector
with no magnitude

So $v - w = v + (-w)$



If α is a scalar (a real number), the scalar product αv is:

- 1) If $\alpha > 0$, αv is in the same direction of v with a magnitude of α times the magnitude of v .

ex: $\begin{array}{c} \xrightarrow{v} \\ \xrightarrow{3v} \end{array}$

- 2) If $\alpha < 0$, αv is in the opposite direction of v with magnitude α times magnitude of v .

ex: $\begin{array}{c} \downarrow v \\ \uparrow -\frac{1}{2}v \end{array}$

- 3) If $\alpha = 0$, then $\alpha v = \mathbf{0}$

p628 1-7 odd, 9-16 all