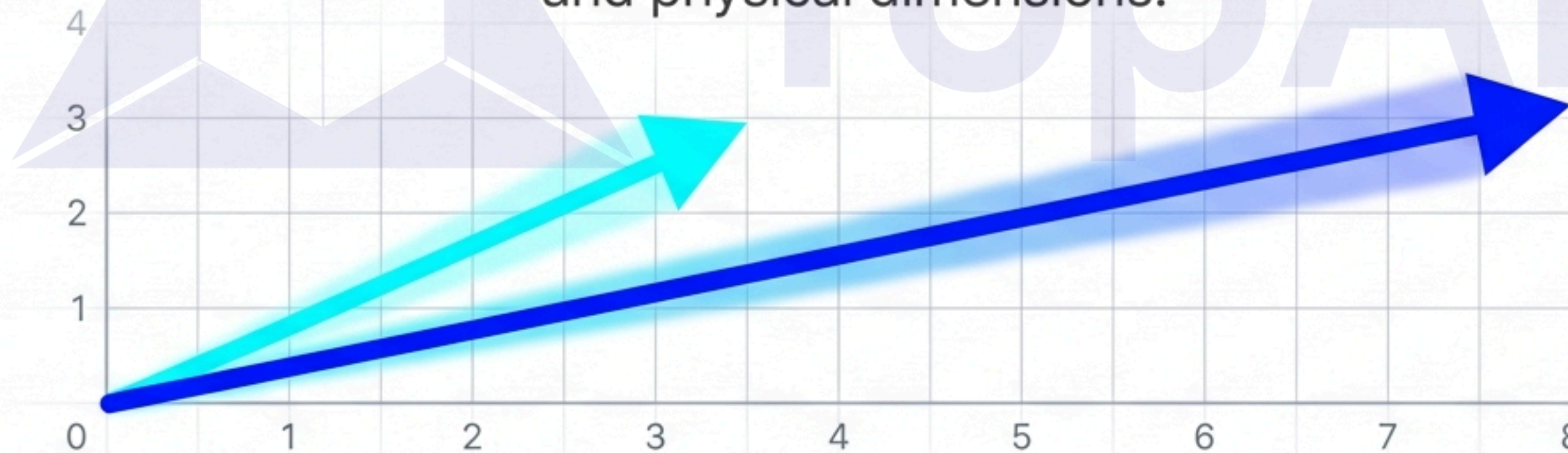


Motion in a Plane · Concept 2

Multiplication of Vectors by Real Numbers

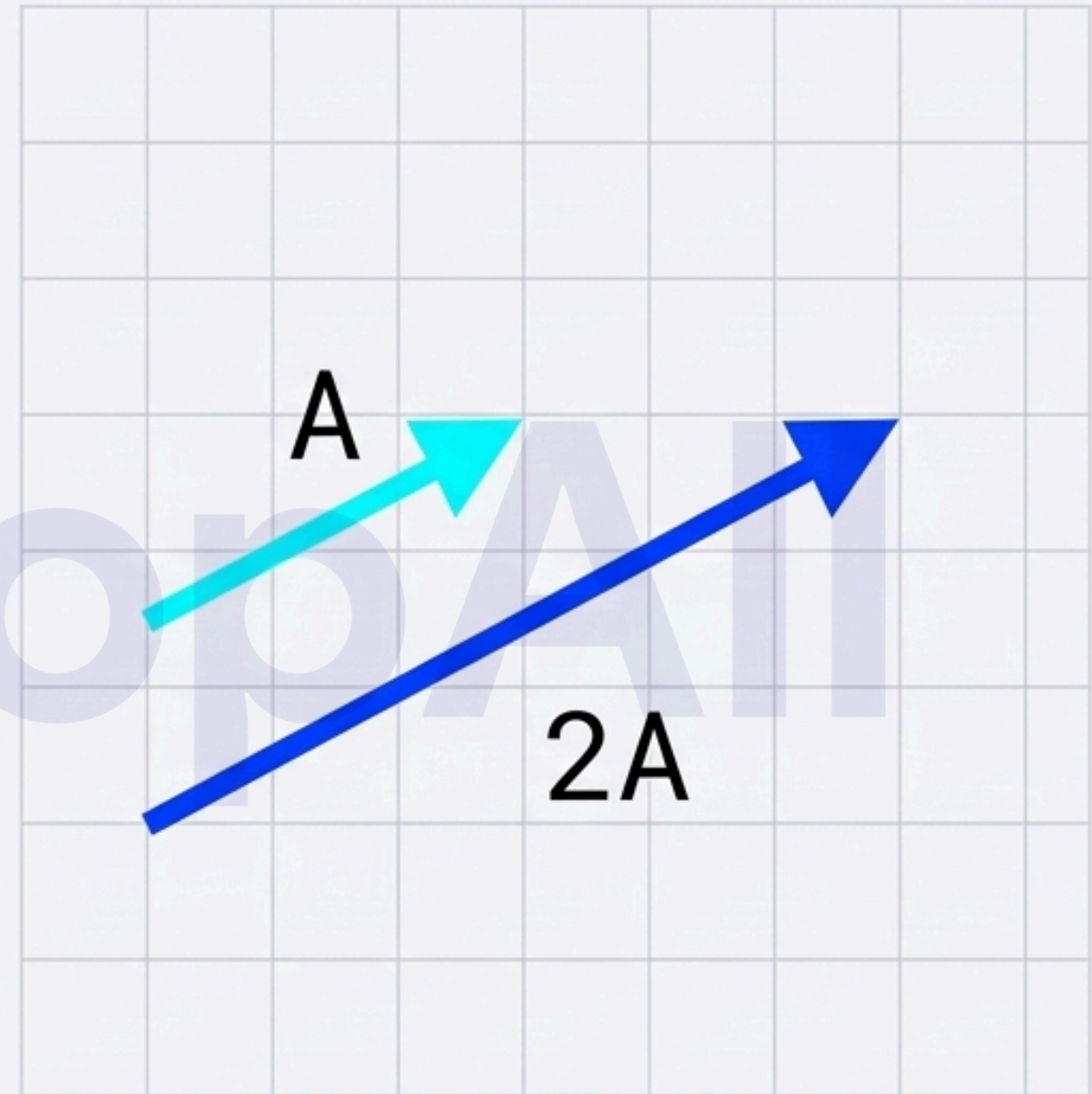
Understanding how scalars alter magnitude, direction,
and physical dimensions.



The Positive Multiplier

Multiplying a vector by a positive number λ yields a vector whose magnitude is changed by the factor λ , but the direction remains identical.

$$|\lambda A| = \lambda |A| \text{ if } \lambda > 0$$





You've Learned the Theory. Let's Test Them Now.

$$E=mc^2$$



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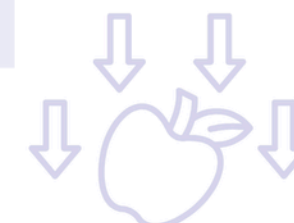
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Key Highlights

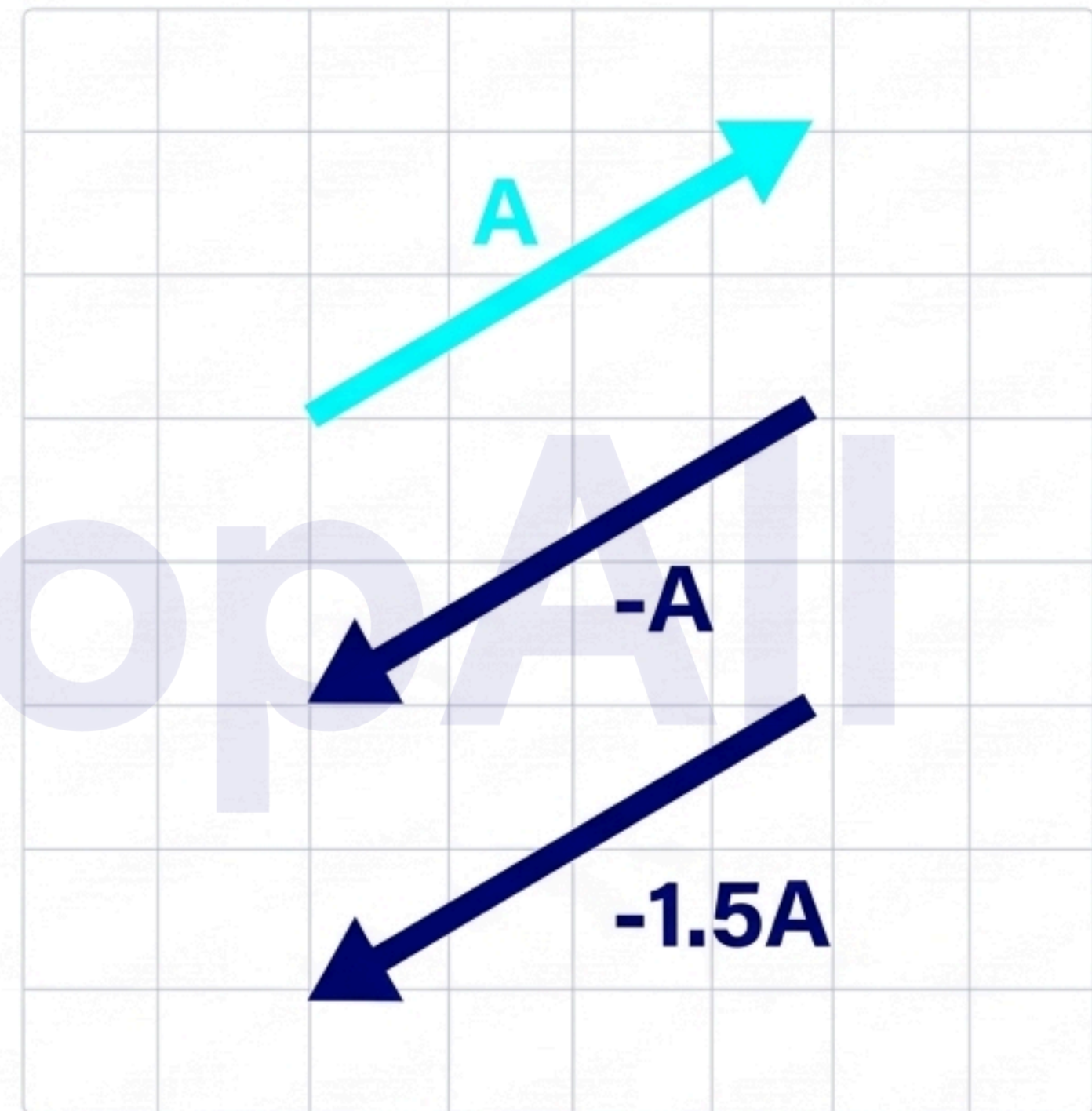
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The Negative Multiplier

Multiplying a vector by a negative number $-\lambda$ yields a vector whose direction is exactly opposite to the original, with its magnitude scaled by λ .

Multiplier < 0 : Reverses Direction



Physical Dimensions in Vector Multiplication

The factor λ can be a scalar having its own physical dimension. The dimension of the resultant vector is the product of both dimensions.

Worked Example

velocity vector $\times$ time duration = displacement vector

$$[L][T]^{-1} \times [T] = [L]$$



velocity



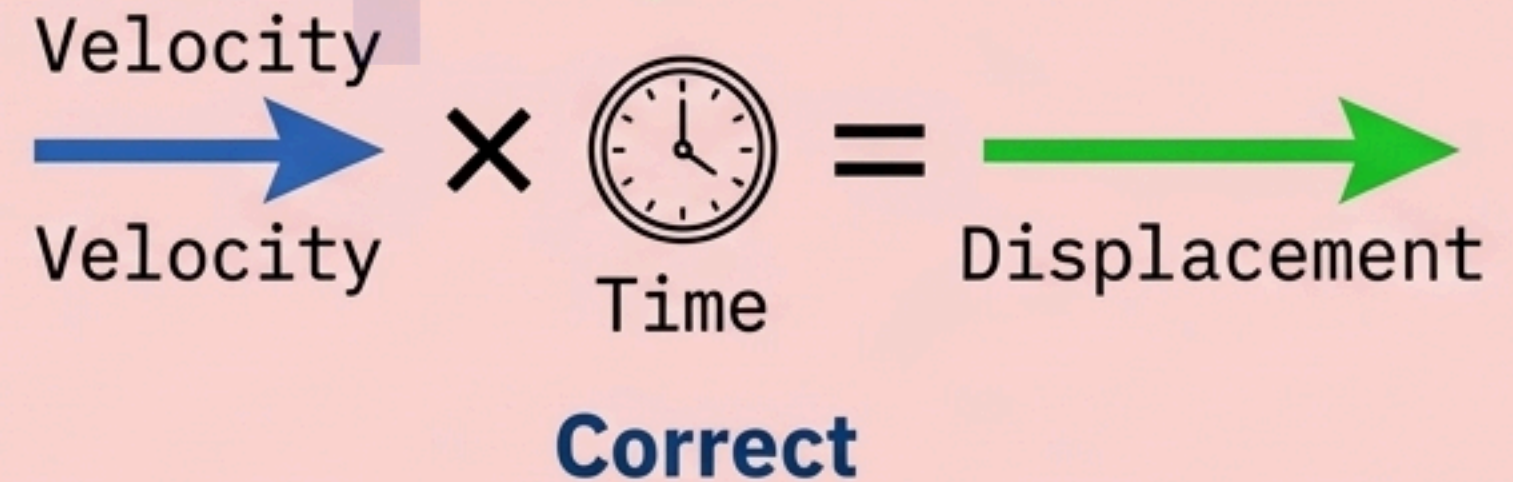
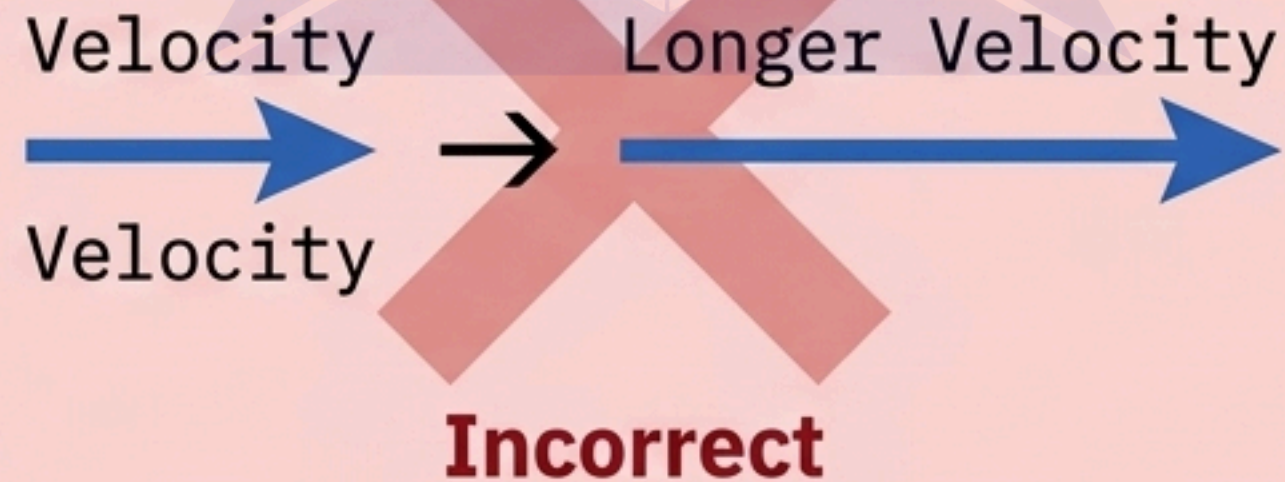
time



displacement

Trap Alert!

λ can carry its own physical dimension — the result's dimension is the product of λ 's and A 's dimensions, not just a magnitude change.





Key Takeaways

1. Positive λ preserves direction and scales magnitude;
2. Negative λ reverses direction;
3. λ 's own dimension carries into the result.

$$v = \lambda A \rightarrow [v] = [\lambda] \times [A]$$



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