What feature of the Schrodinger equation implies that the sum of any two solutions is a solution?

A) The fact that it has only one time derivative.

B) The fact that each term has only a single Psi in it.

C) Nothing in particular; this is true for any differential equation.

D) The fact thaf Psi is a complex function.

E) The fact that it's a partial differential equation (meaning, it's a differential equation with partial derivatives in it).

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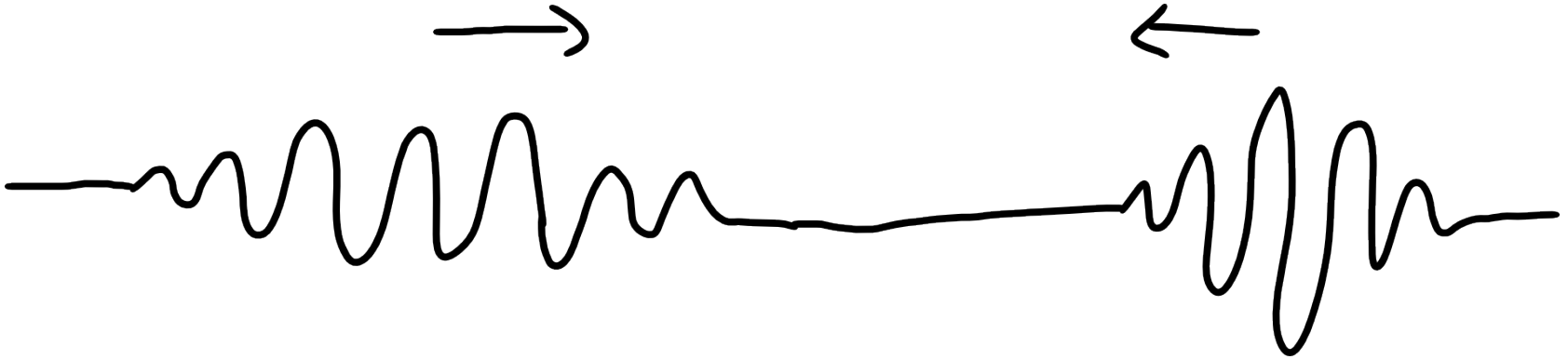
See the proof in the lecture notes; try to see what would happen if you replaced Psi with, say, $Psi^2$ in the Schrodinger equation.

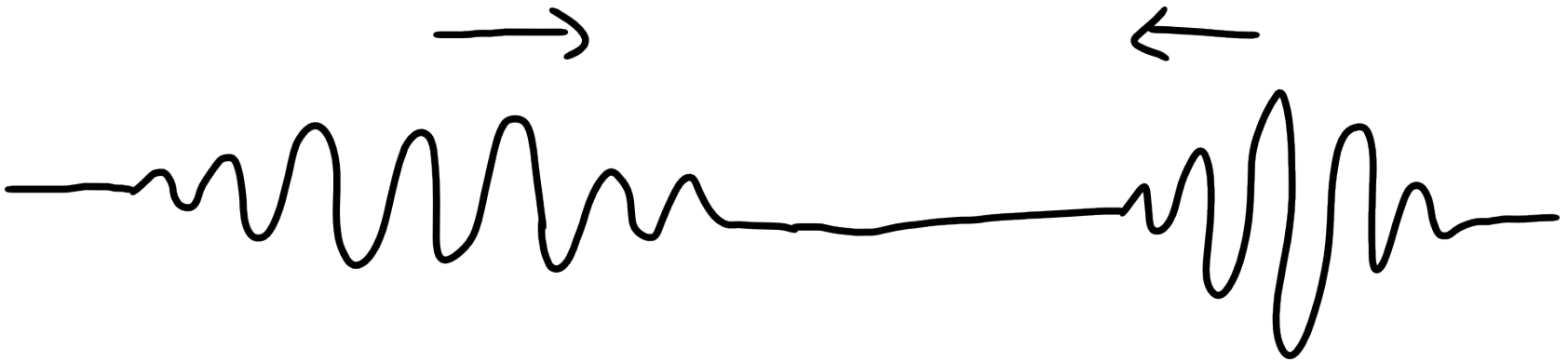


The wavefunction for an electron involves two wavepackets traveling in opposite directions. When they meet, the wavepackets will...

A) pass right through each other.

B) repel each other and reverse direction.

C) attract each other and form a bound state.



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The principle of superposition says they will not interact with each other.

What equation in classical physics does the Schrodinger equation for a free particle replace?

A) Maxwell's equations

B) The classical wave equation

C) Newton's second law  $F = m a$

D) Newton's first law, v = const. in the absence of forces

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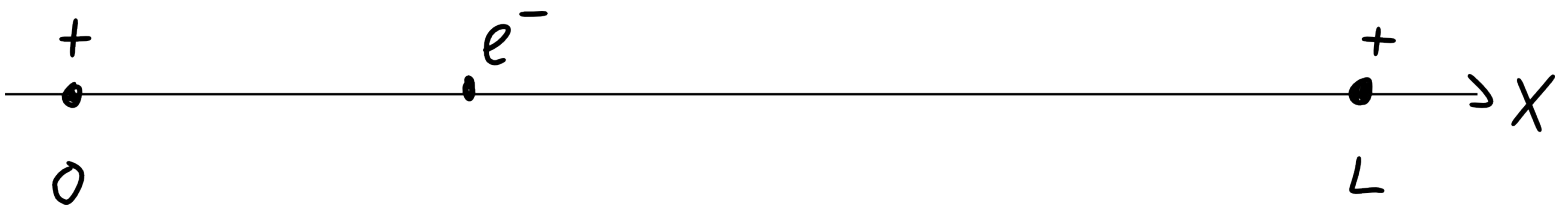
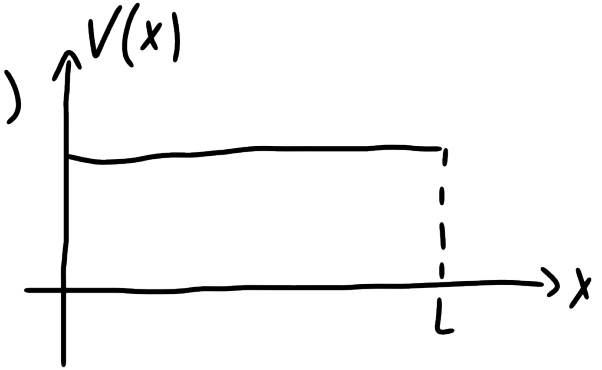
It govers the behaviour of a free particle in quantum mechanics, just like the 1st law does in classical mechanics.

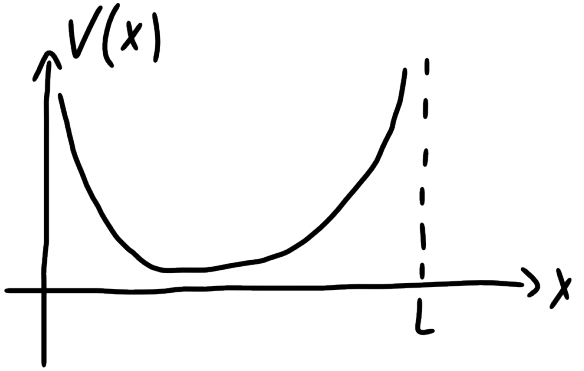



Which of the following diagrams best represents the potential energy of an electron moving along the x-axis between two positive charges?

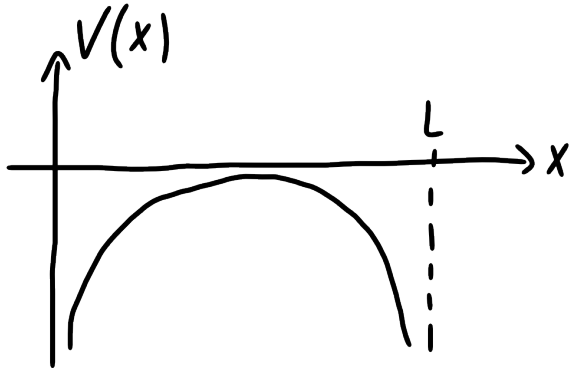
(A)



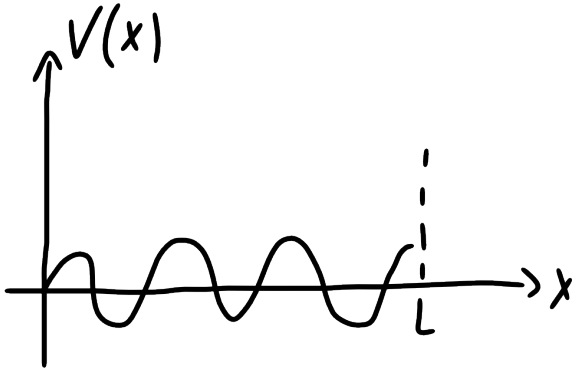

(B)

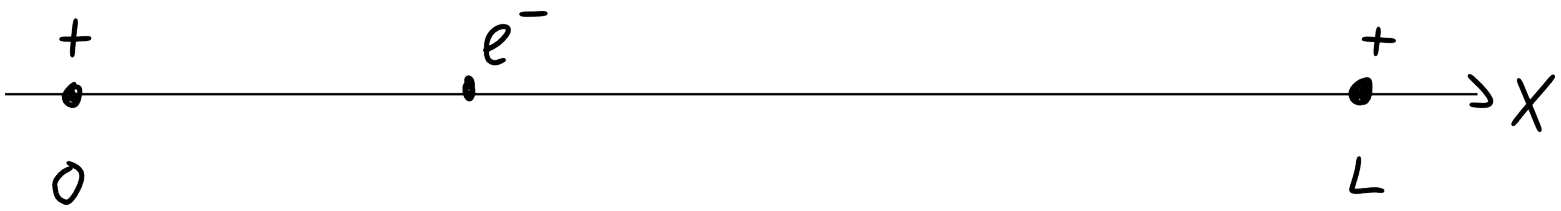



(C)




(D)



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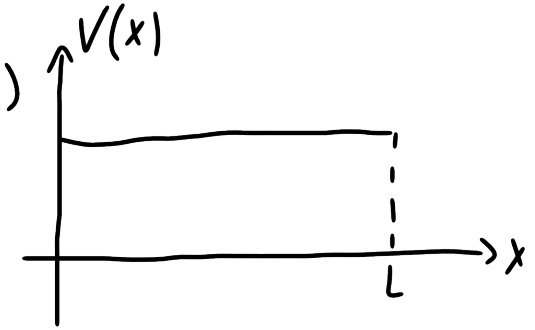
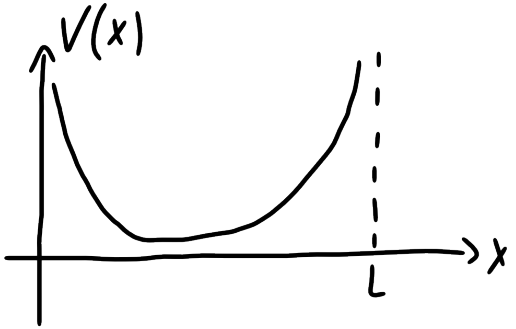
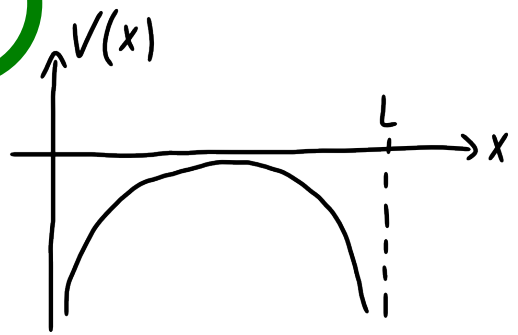



(B)




(C)

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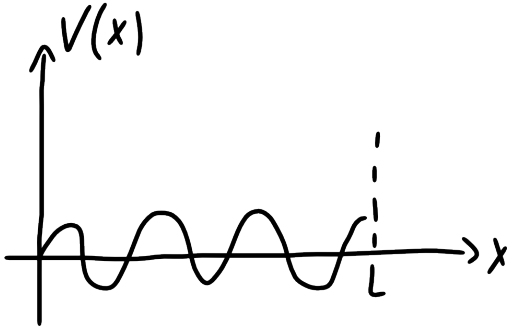


The electron is attracted to both charges.

If an electron is in an energy eigenstate, does the probability density for finding it at a position x vary with time?

A) Yes

B) No

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A) Yes

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Recall that $|e^{ia}| = 1$ FOR ANY $a$ (REAL)

$$\Psi(x,t) = e^{-\frac{i}{\hbar}Et}\,\psi_E(x)$$

$$|\Psi(x,t)|^2 = \left|e^{-\frac{i}{\hbar}Et}\,\psi_E(x)\right|^2 = |\psi_E(x)|^2 = \text{CONST}$$