

Hooke's Law: physics of springs



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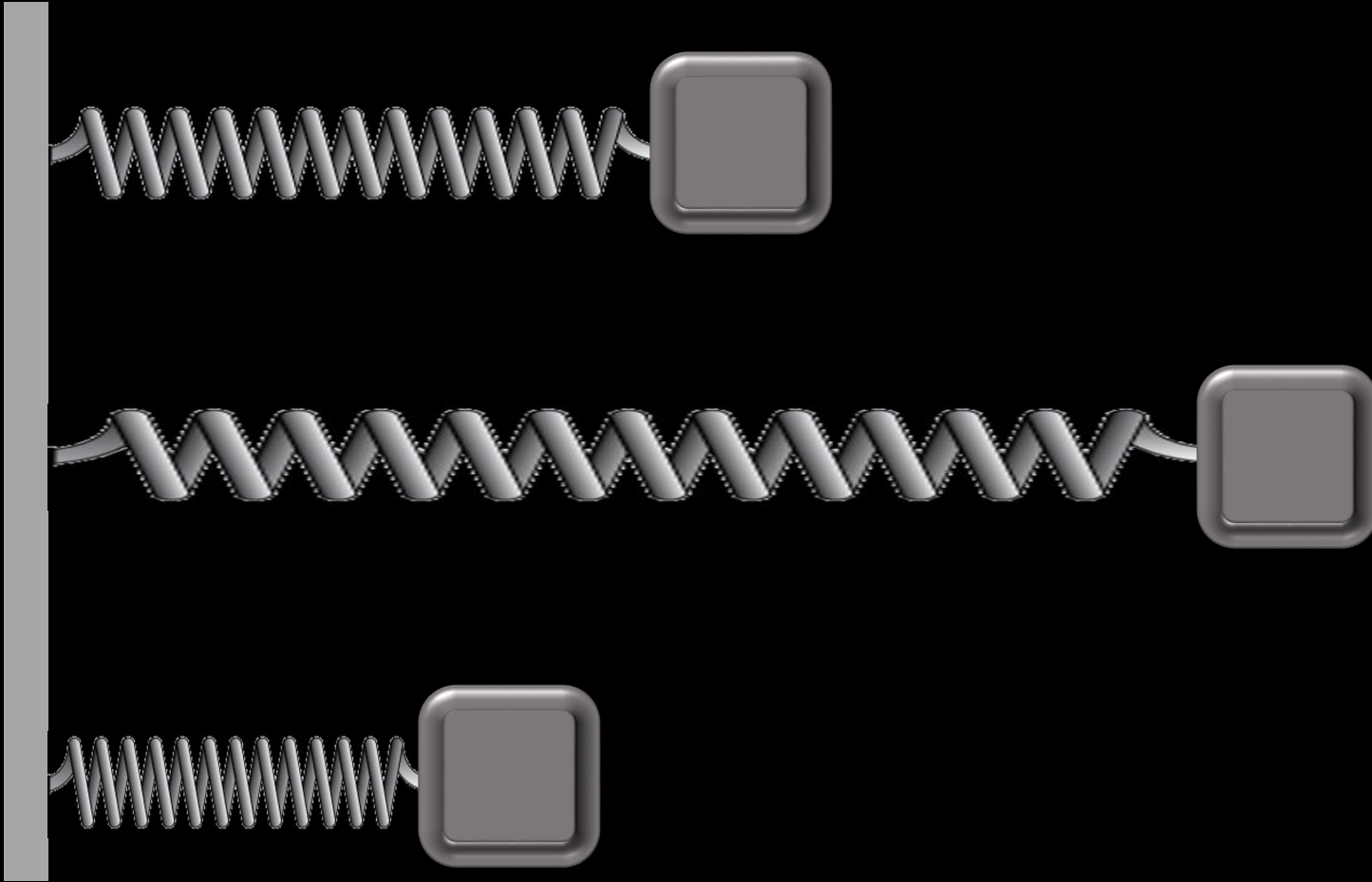
What do you know about the behavior of springs? What are the important properties of springs? (open discussion)

Consider a spring, one end firmly attached to a wall, and the other of object of mass m that is free to move.

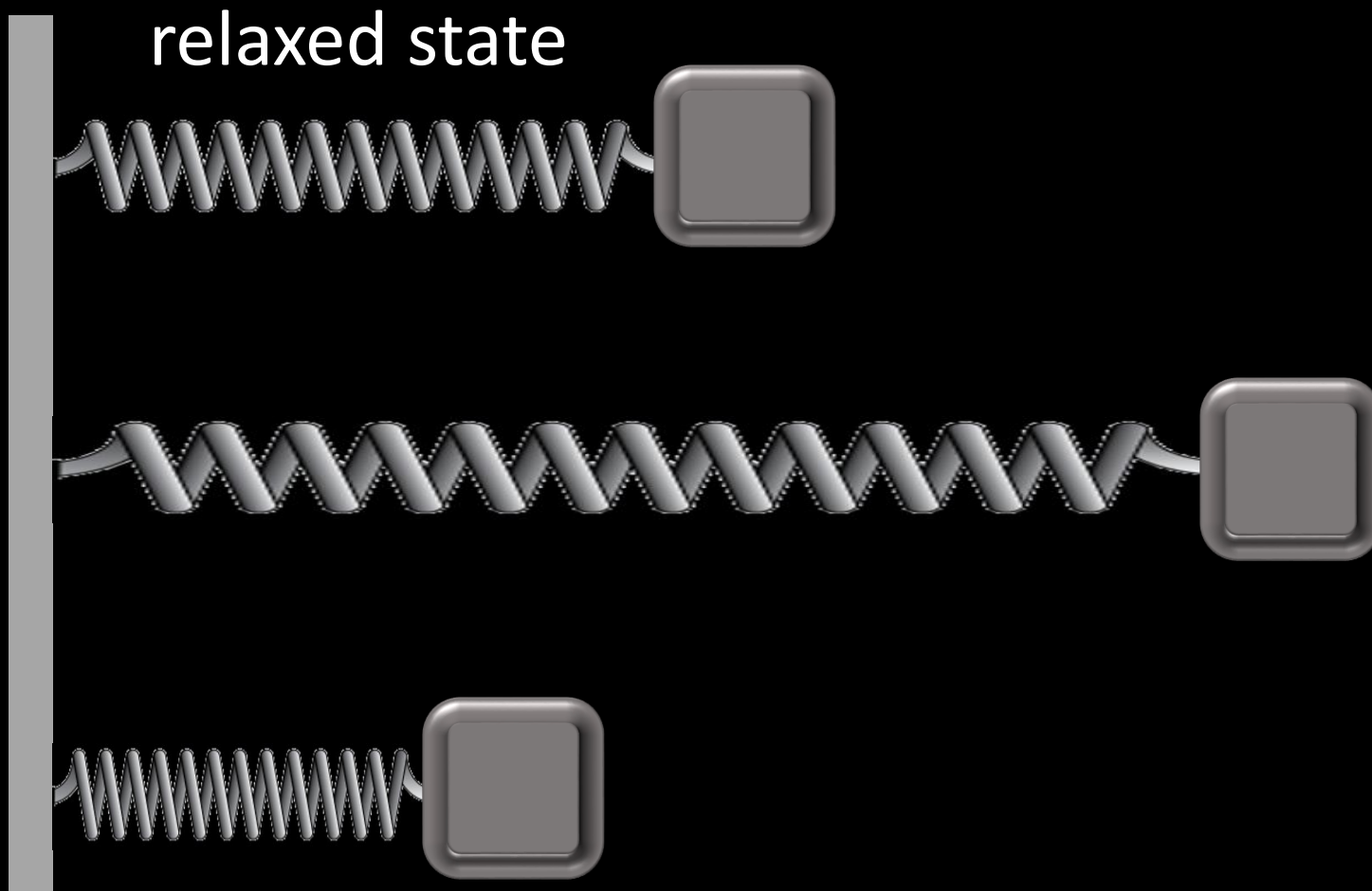
Under what conditions will the spring act on the mass?



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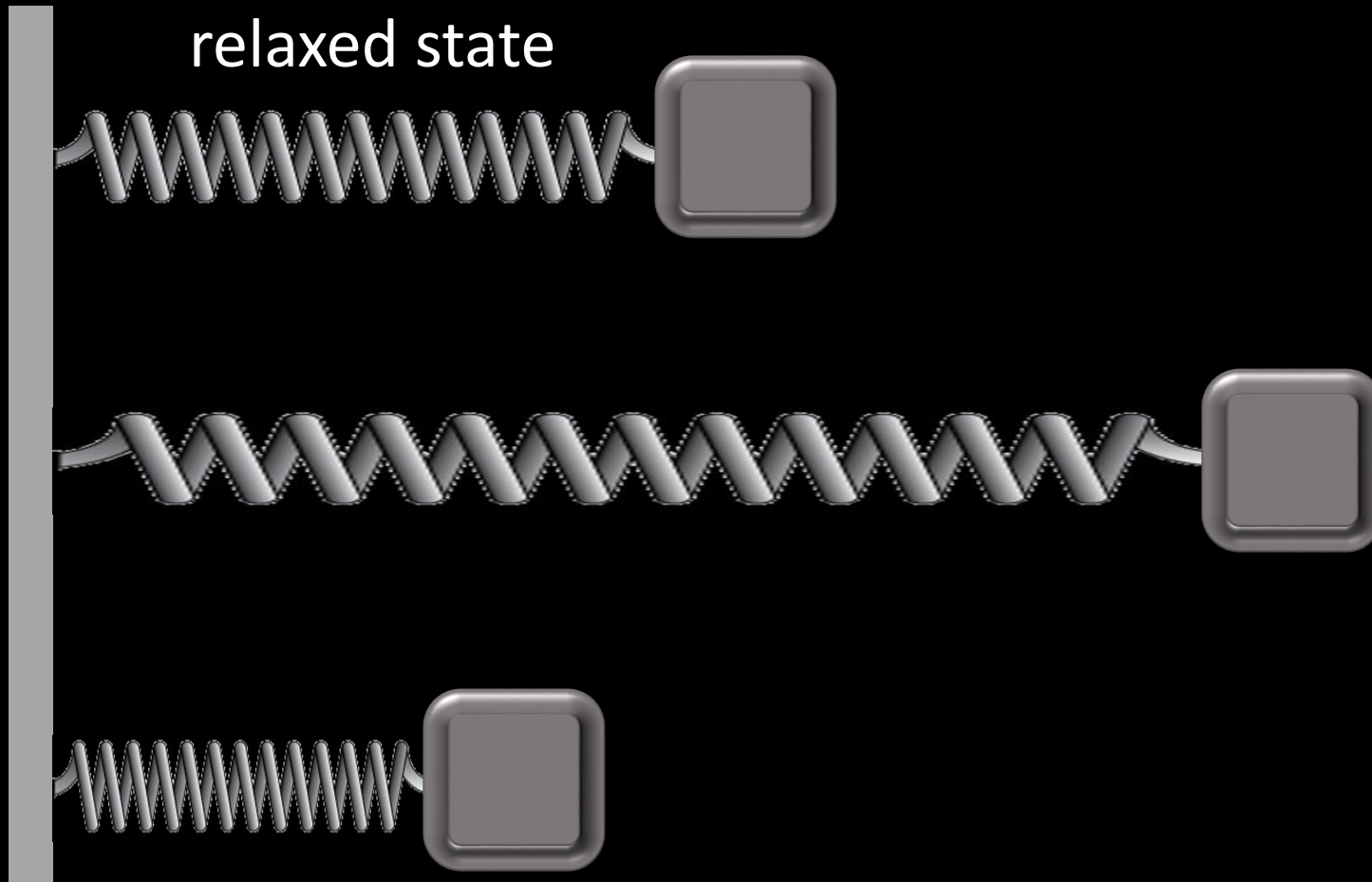


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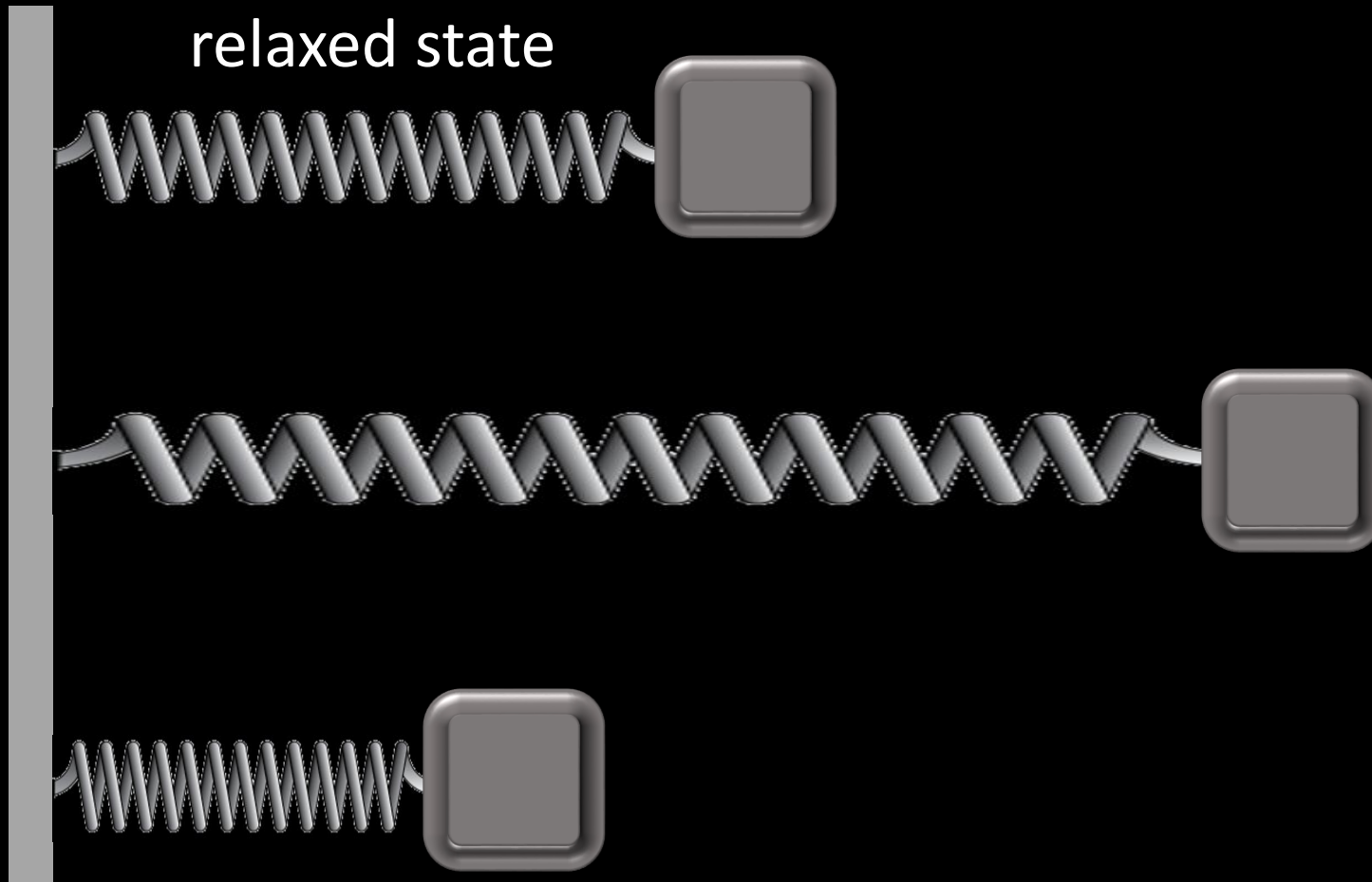
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For the 3 situations below, where applicable, draw vector arrows to show the force on the mass from the spring.



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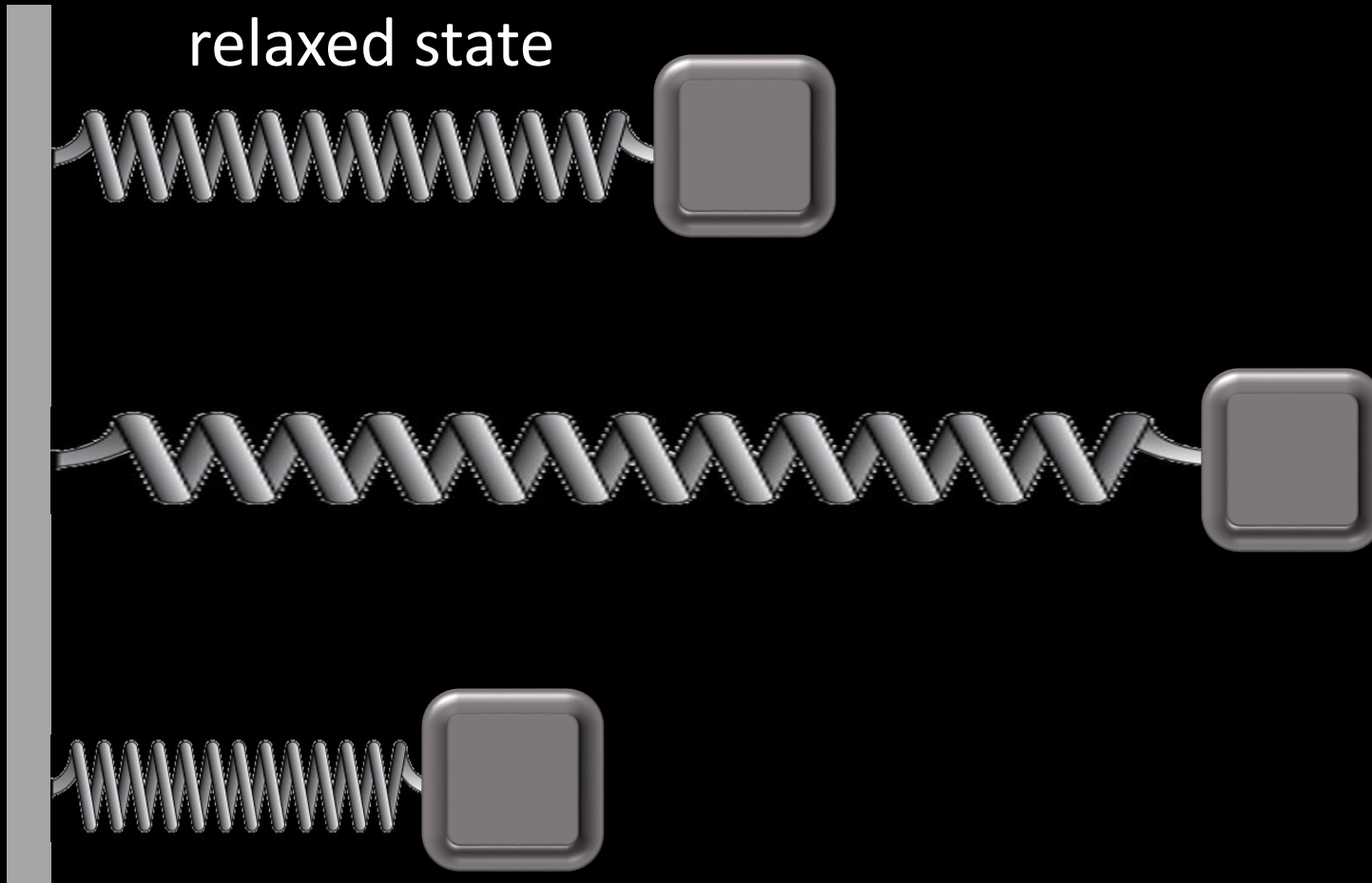
For the 3 situations below, where applicable, draw vector arrows to show the force on the mass from the spring.



Explain how the direction, and relative sizes, of your force vectors where chosen.

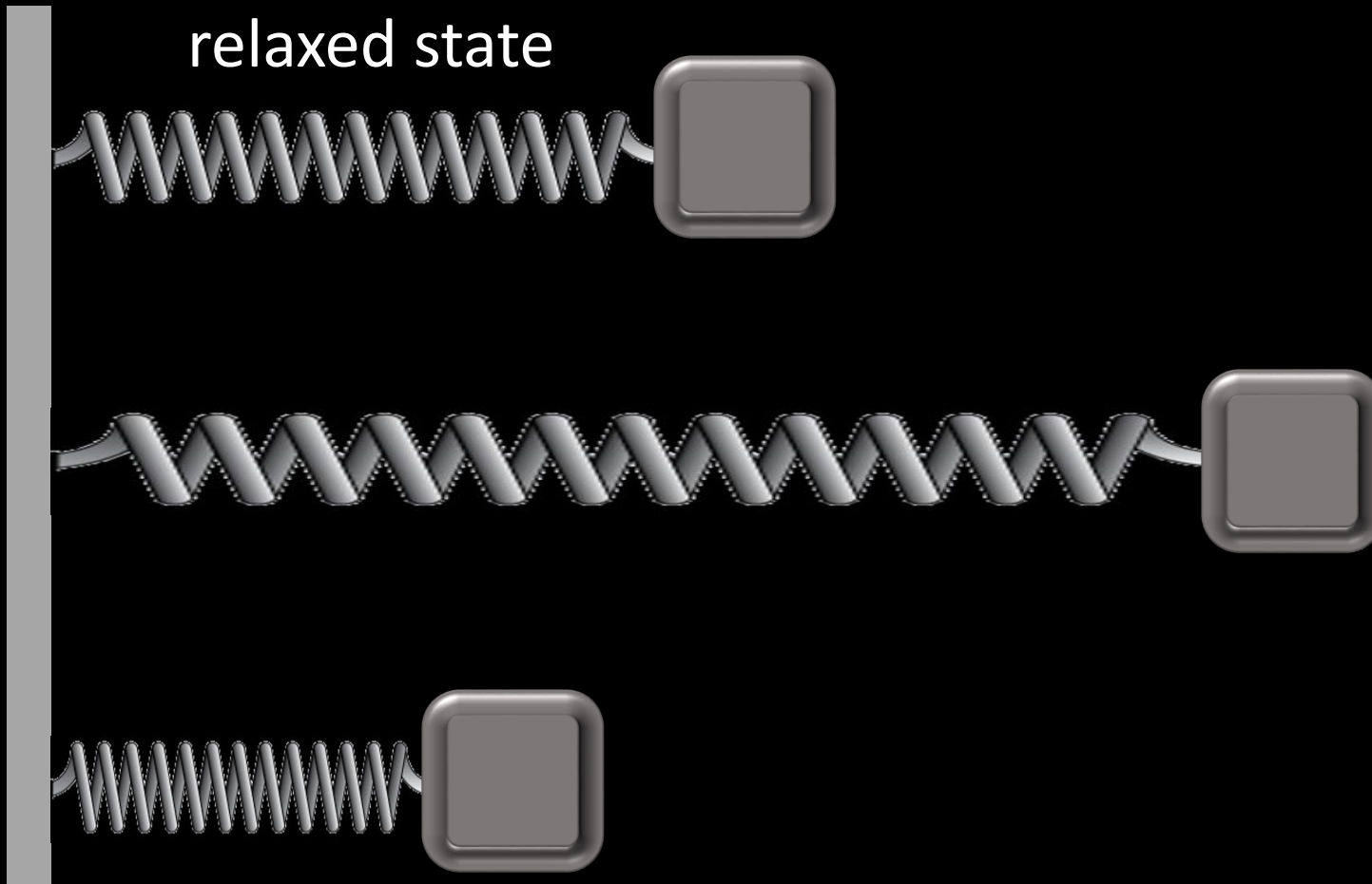
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Now draw the displacement vectors for each mass.



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What is the relationship between the force vector and the displacement vector?

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Build a mass on a spring on the demo bench. (better name?)

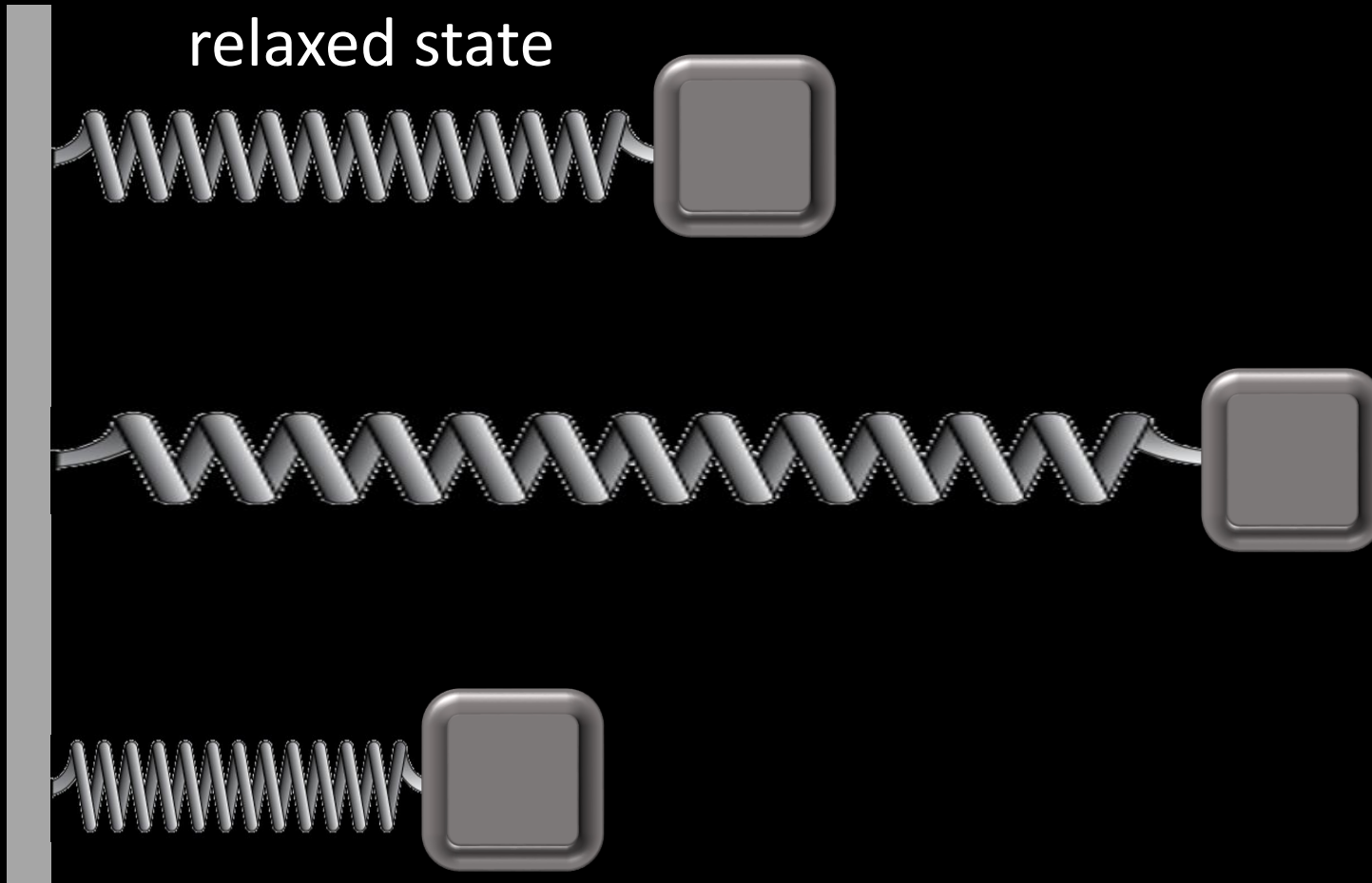
Set the system into motion and describe what you see.



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Enable the spring force vector arrows for the mass.

Move the mass and check to see if the force arrows you drew match the simulation.



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Create a graph of force magnitude v. displacement magnitude.

Move the mass along the horizontal direction and take a few data points.

Once you have a few data points, describe a mathematical relationship for Force F as a function of displacement x . $F(x) = ?$



$$F(x) = -kx$$

k = spring constant. What are the units on k?

Quick Write:

In your own words- what property of the spring does k describe?

More to come—

$$F(x) = -kx$$

Build and second mass on a spring. Open the spring force menu and decrease the spring constant by a factor of 2 and compare to the first mass and spring.