Forces

Write Letter Here

How do forces determine an object's motion?

OBJECTIVE 1: You should be able to predict the motion of an object from its free body diagram.

03:07

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Motion: describes how an object moves (direction, speed, acceleration)

Velocity: speed; how fast or slow something is (ex: 100 km/h or 10 m/s^2)

Acceleration: change in velocity; if something is speeding up or slowing down (m/s^2)

04:01 06:35

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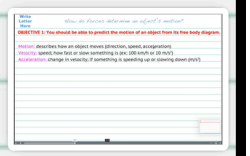
To predict an object's motion, you must figure out if the forces are balanced, or unbalanced.

Unbalanced forces = acceleration. Balanced Forces = motion does not change.



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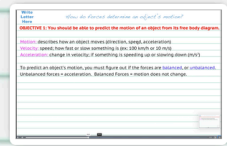
Bag Sitting On Table

Video

F_{norm} = 5N up

F_g = 5N down

Motion: Balanced Forces = no change.



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Bag Sitting On Table

F_{norm} = 5N up

F_g = 5N down

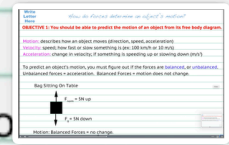
Motion: Balanced Forces = no change.

Bag Without a Table

F_g = 5N down

Motion: Unbalanced Forces = do

acceleration (9.8 m/s^2)



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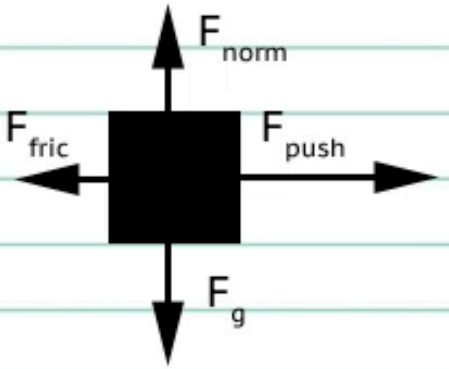
How do forces determine an object's motion?

A car from 0 km/h to 50 km/h



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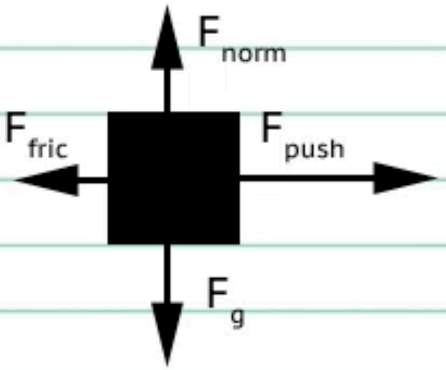
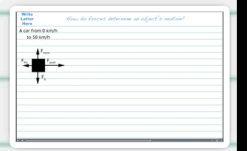


Unbalanced forces, accelerates to + the right.



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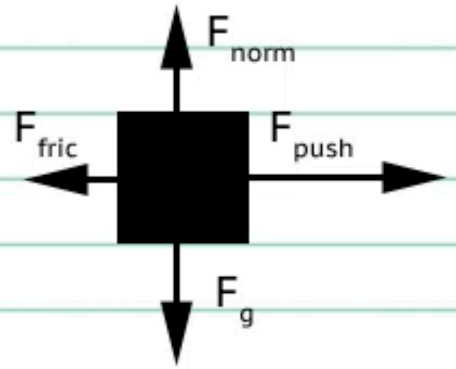
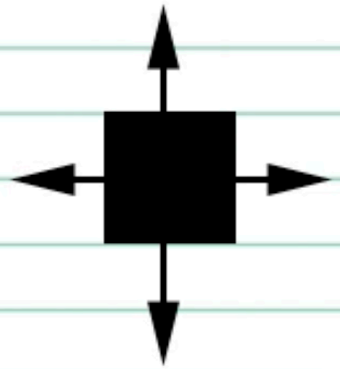


Unbalanced forces, accelerates to the right.

A car at 50 km/h not speeding up or slowing down.



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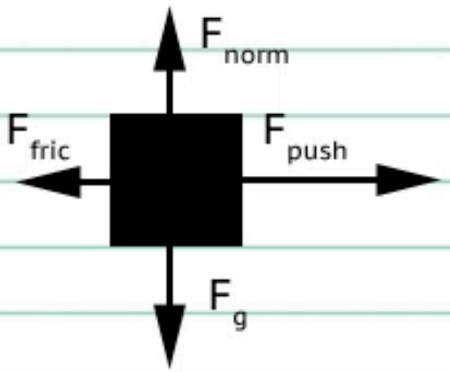

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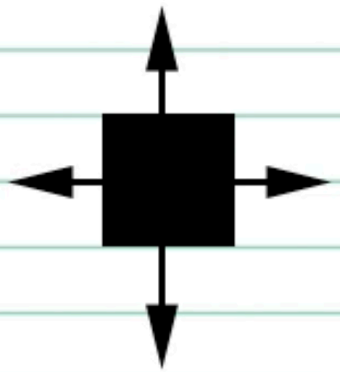

Balanced forces, no acceleration, keeps moving at 50 km/h

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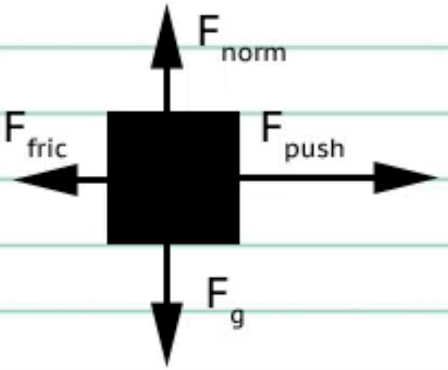

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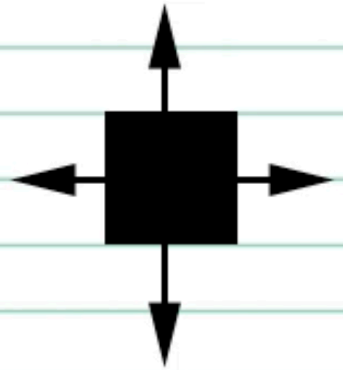
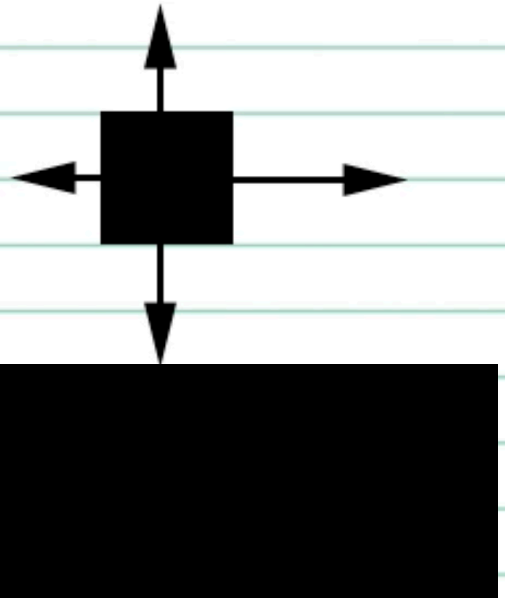


Balanced forces, no acceleration, keeps moving at 50 km/h

A car speeding up from 50 km/h to 100 km/h



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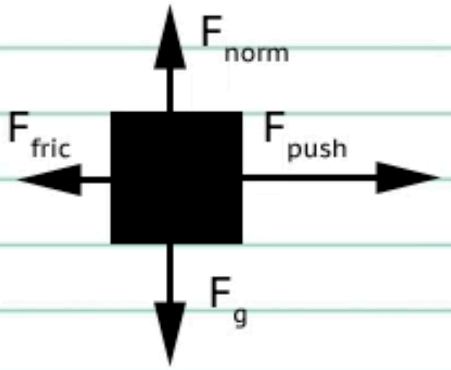
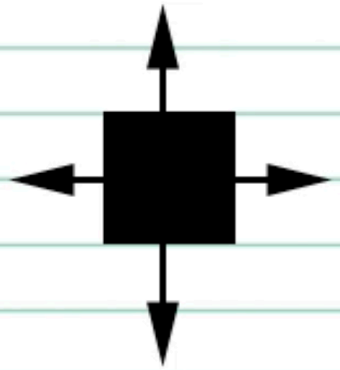
A car from 0 km/h to 50 km/h



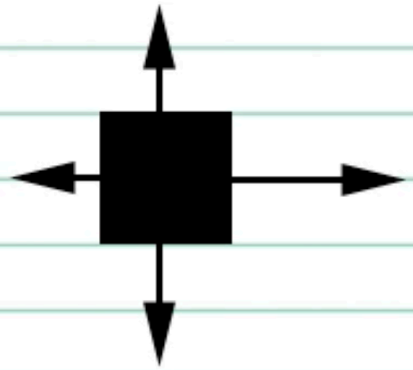
Unbalanced forces, accelerates to the right.

A car at 50 km/h not speeding up or slowing down.



Balanced forces, no acceleration, keeps moving at 50 km/h

A car speeding up from 50 km/h to 100 km/h



Unbalanced forces, accelerates to the right.

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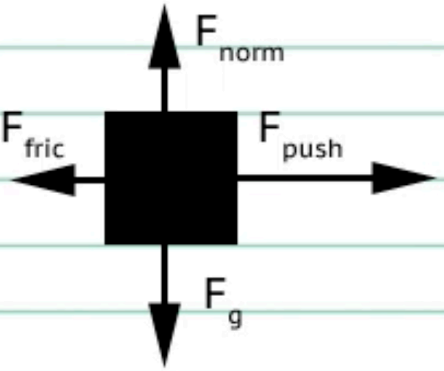
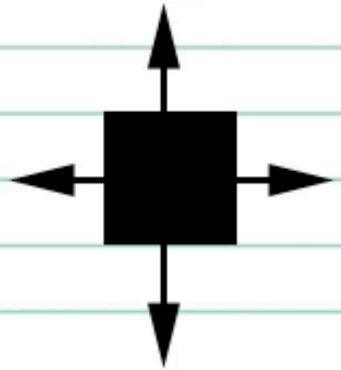
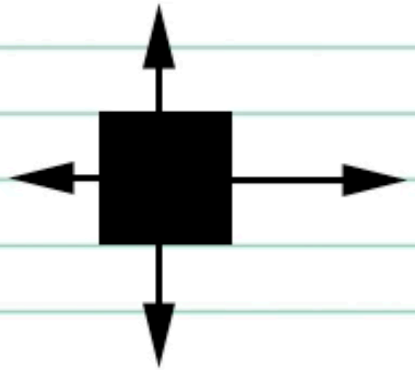
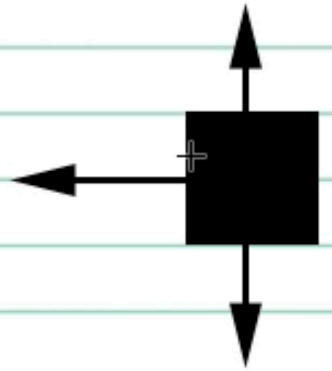
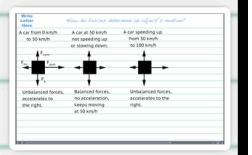
How do forces determine an object's motion?

A car from 0 km/h to 50 km/h	A car at 50 km/h not speeding up or slowing down.	A car speeding up from 50 km/h to 100 km/h	A car stopping (going from 100km/h to 0 km/h)
			
Unbalanced forces, accelerates to the right.	Balanced forces, no acceleration, keeps moving at 50 km/h	Unbalanced forces, accelerates to the right.	



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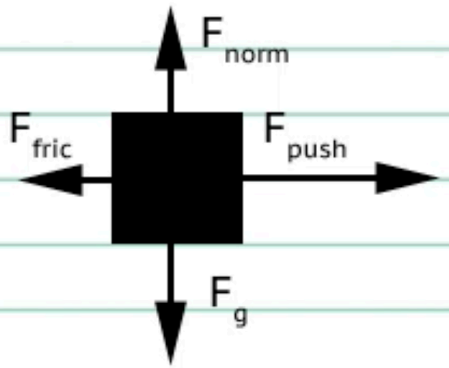
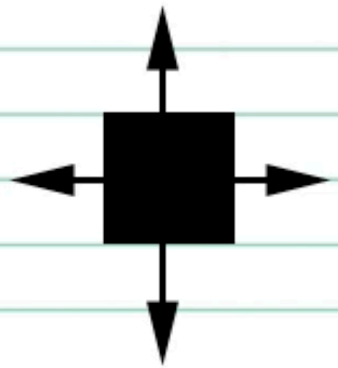
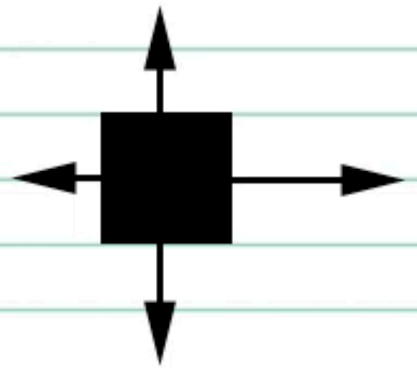
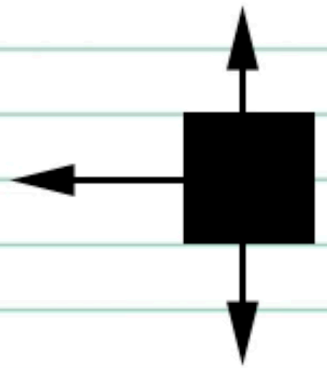
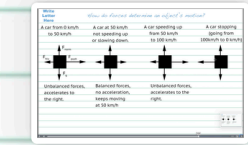
A car from 0 km/h to 50 km/h	A car at 50 km/h not speeding up or slowing down.	A car speeding up from 50 km/h to 100 km/h	A car stopping (going from 100km/h to 0 km/h)
			
Unbalanced forces, accelerates to the right.	Balanced forces, no acceleration, keeps moving at 50 km/h	Unbalanced forces, accelerates to the right.	Unbalanced forces, accelerates to the left (slows down)



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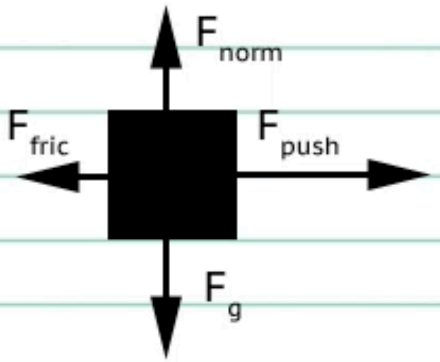
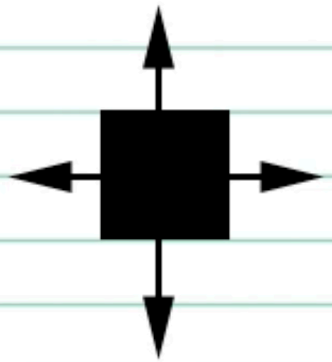
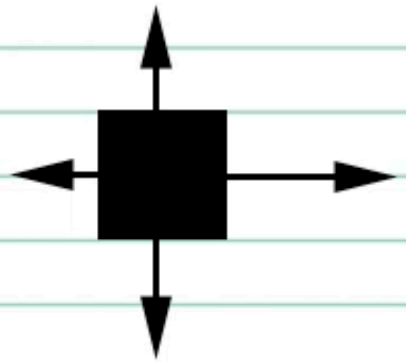
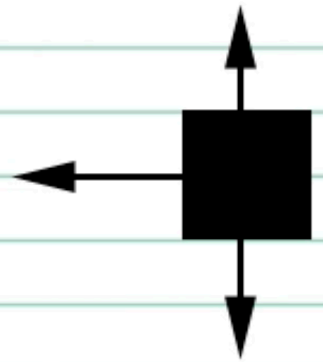
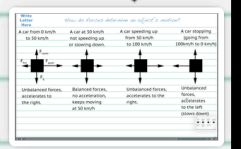
			
Unbalanced forces, accelerates to the right.	Balanced forces, no acceleration, keeps moving at 50 km/h	Unbalanced forces, accelerates to the right.	Unbalanced forces, accelerates to the left (slows down)

Video



- longer arrow = larger force; you must be careful how you draw!
- train your brain to look at left/right separately from up/down. Don't mix them up!
- the object moves in the direction of the net force (the force that is not balanced).