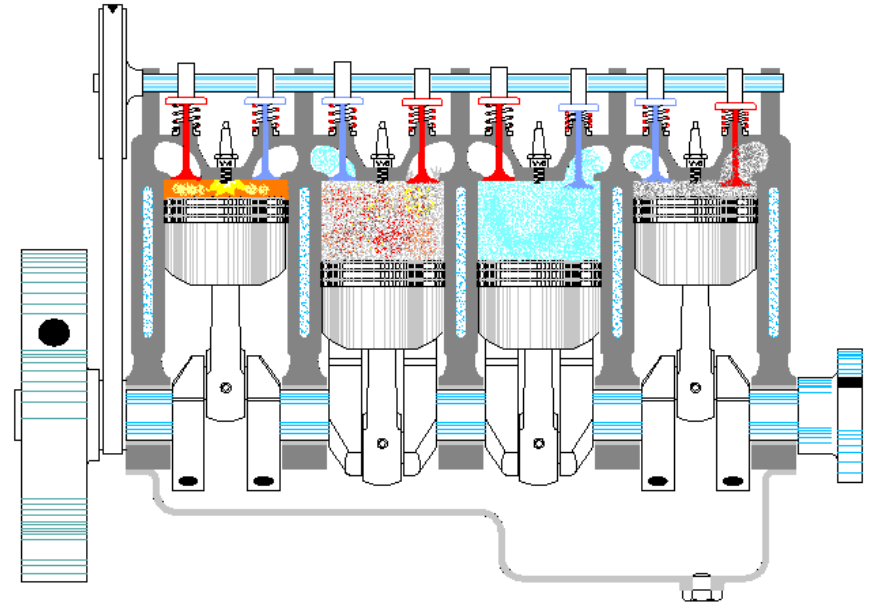


**The Secrets of the
4-stroke Engine Revealed...**

Fact

All internal combustion engines produce power by going through what is known as a ...

Power Cycle

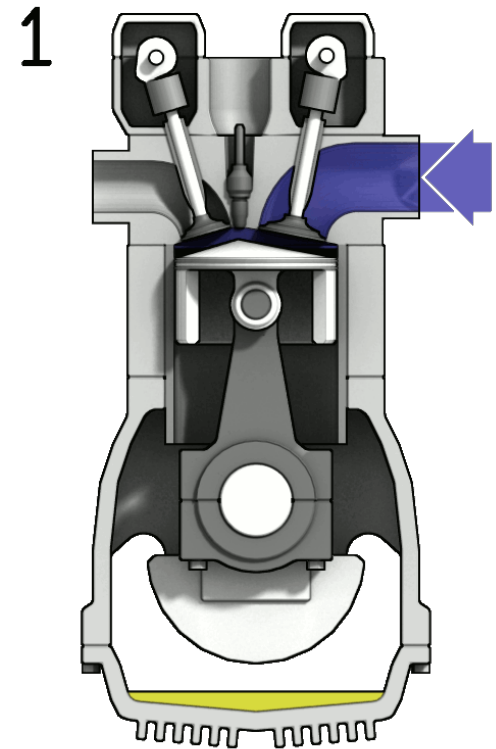


What is a Power Cycle?

A repeating chain of events that an engine performs in order to produce power

The Events

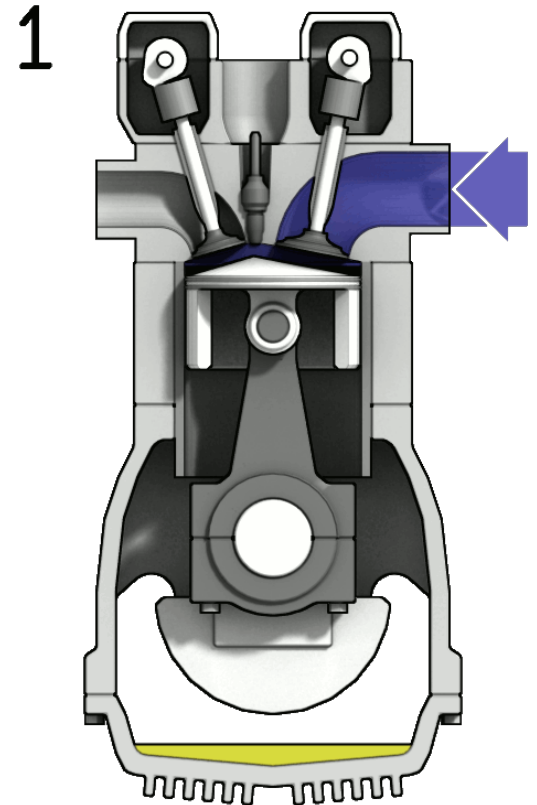
- 1 - INTAKE (*air&fuel*)
- 2 - COMPRESSION (*???why???*)
- 3 - POWER (*release the fuel's energy to do work*)
- 4 - EXHAUST (*expel the burnt gases*)



4-strokes vs. 2-strokes

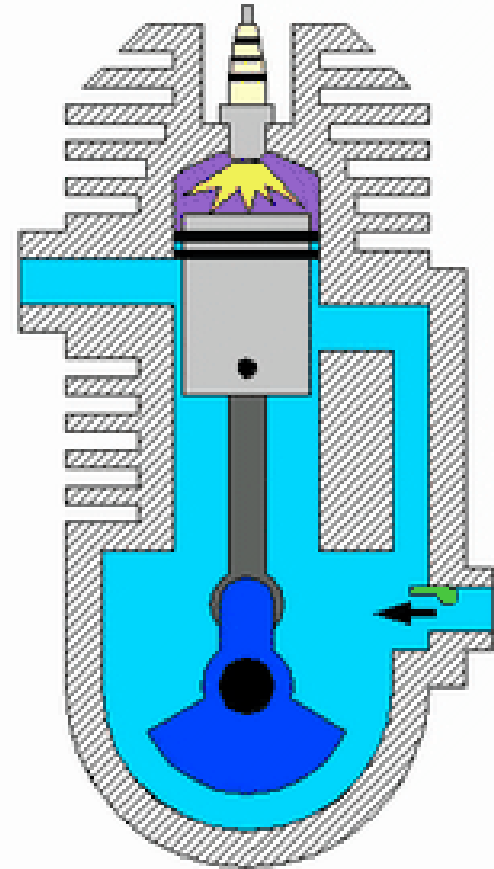
How does a 4-stroke engine get it's name?

4-stroke engine are named such because it takes 4 strokes of the piston to complete one power cycle.



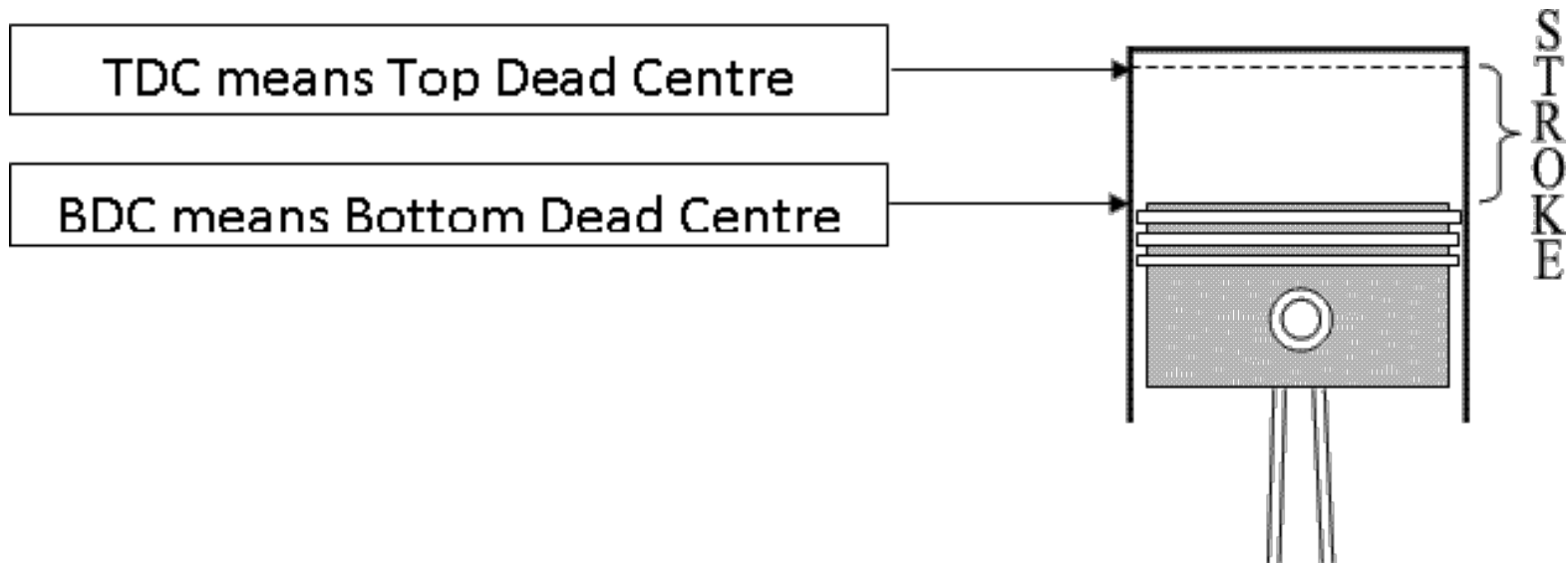
4-strokes vs. 2-strokes

Therefore it follows that in a 2-stroke type engine it must take only 2 strokes of the piston to complete one power cycle.

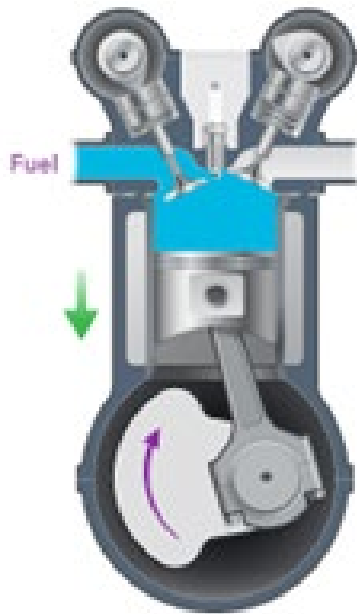
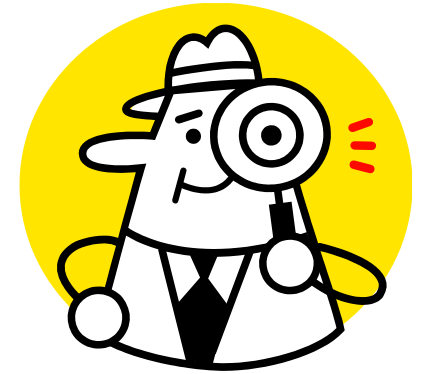


So what's a stroke?

A stroke, in an engine, is the distance the piston travels between its two most extreme points, TDC and BDC.



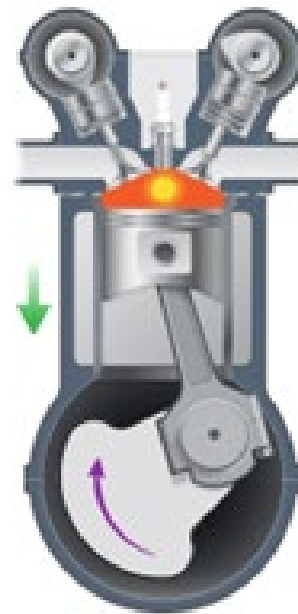
Let's take a closer look at each of the events in a 4-stroke engine



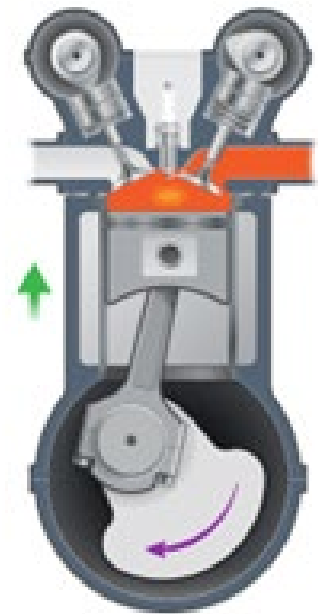
1
Intake



2
Compression

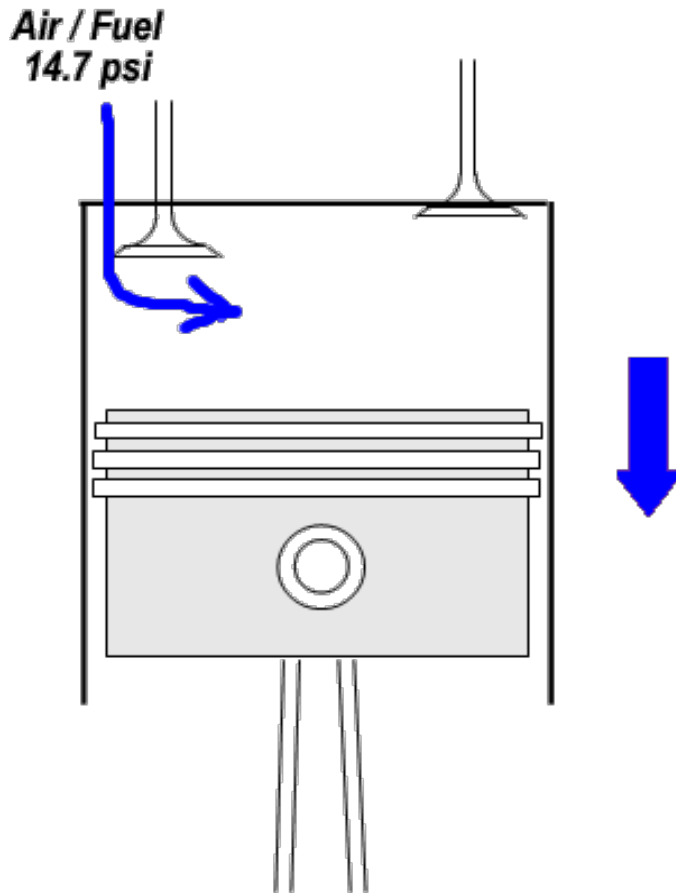


3
Combustion



4
Exhaust

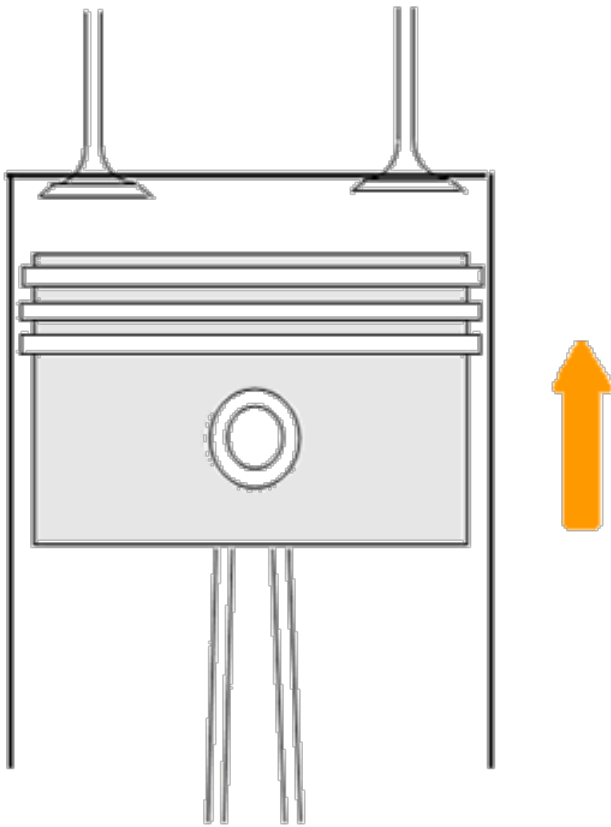
Intake (Stroke 1)



Sequence of Events:

1. Intake Valve Opens
2. Piston Moves Down
3. Air/fuel mixture is “drawn” into the cylinder.

Compression (Stroke 2)



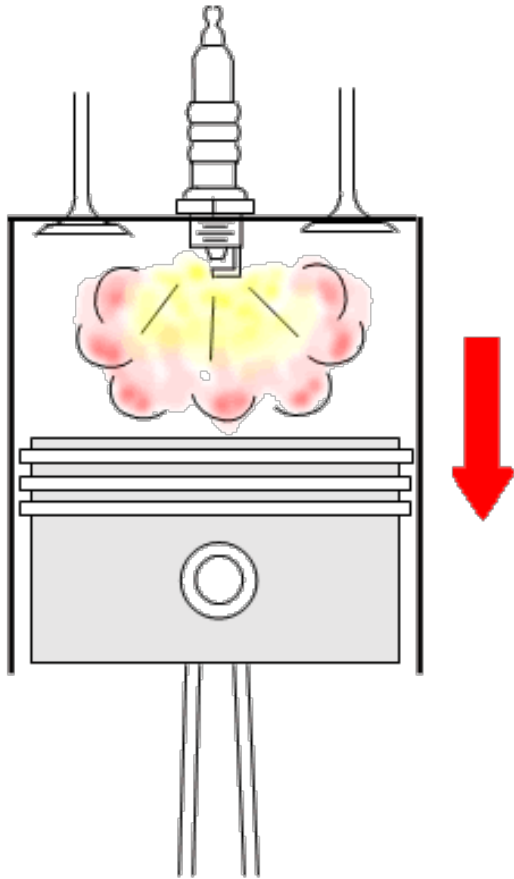
Sequence of Events:

1. Intake valve closes
2. Piston moves upwards.
3. Mixture is squeezed into smaller space.

Result:

- a) Increase in temperature
- b) Spring effect to start next stroke

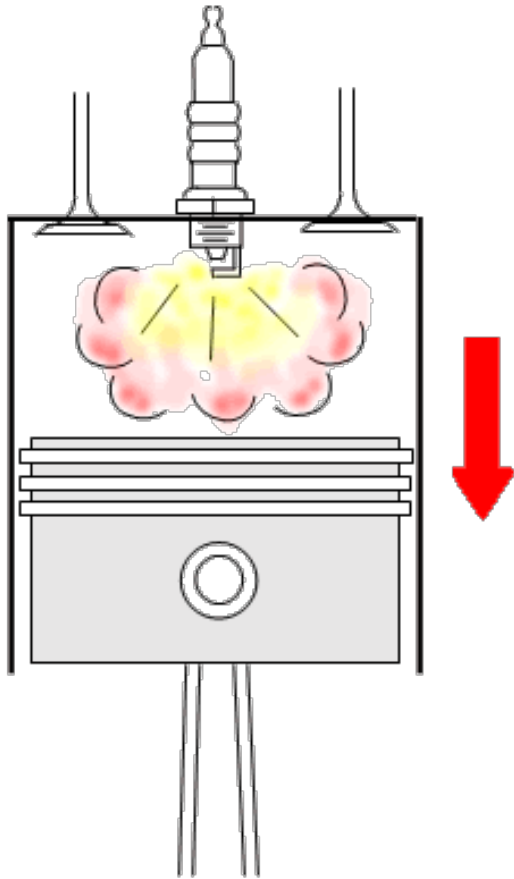
Power (Stroke 3)



Sequence of Events:

1. Spark ignites compressed mixture
2. Rapid increase in heat results in expansion of gases and an increase in pressure.
3. Piston forced downwards!

Power cont'd.



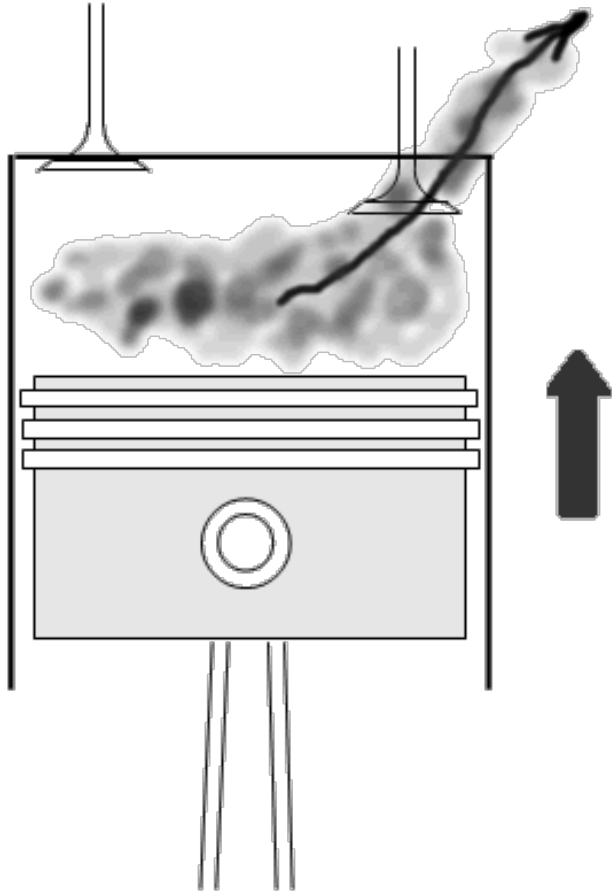
Important Point

Many people mistakenly think that explosions happen in the cylinder.

Actually, the fuel is burned much like in a wood stove.

This builds heat and in turn pressure that pushes on the piston.

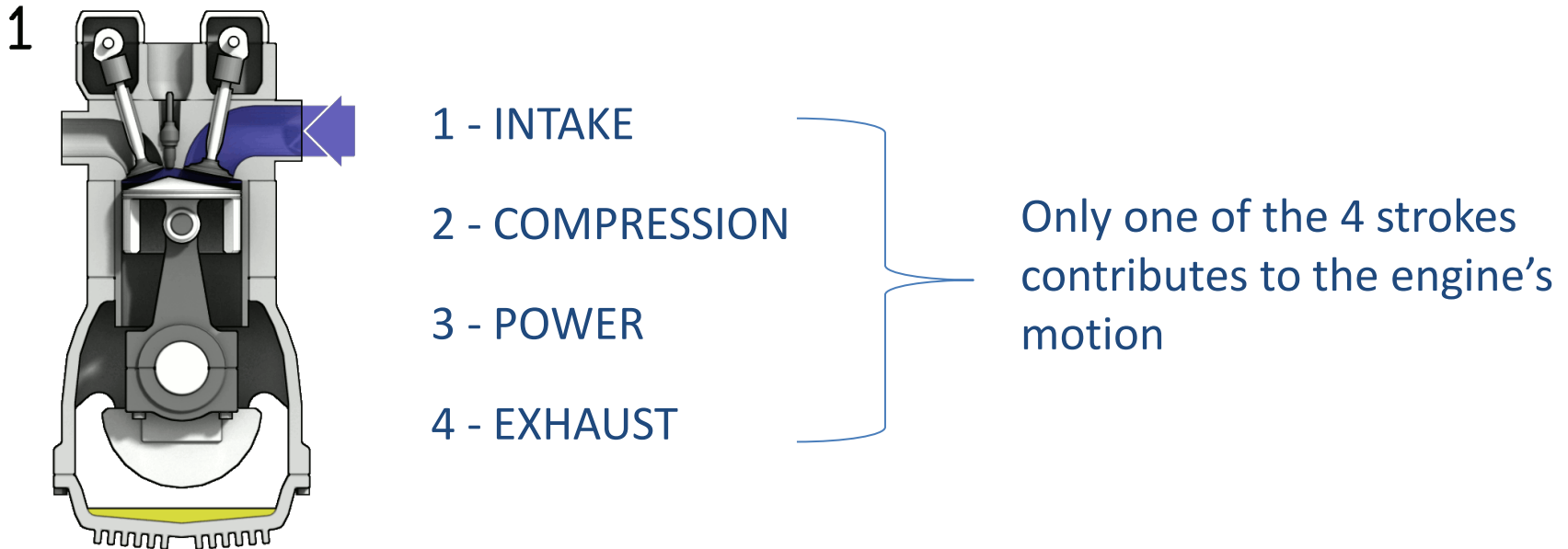
Exhaust (Stroke 4)



Sequence of Events:

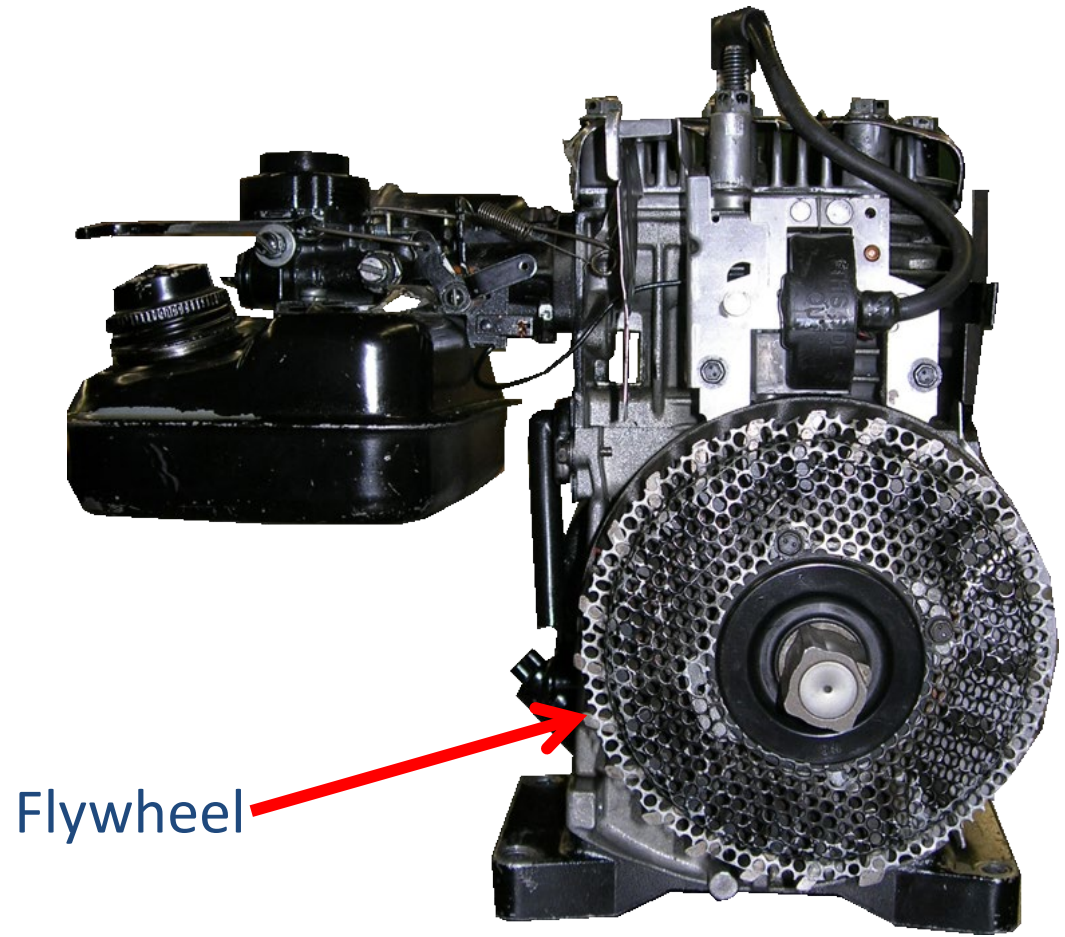
1. Exhaust valve opens
2. Piston moves upward
3. Burnt gases pushed out exhaust port by the piston

All of this is great in theory, but you may have noticed a problem.



How does the engine keep moving through the three 'parasitic strokes' to get back to the power stroke?

The answer is it uses what is called a 'Flywheel'.



Flywheels are essentially a heavy mass that is attached to the crankshaft.



Mass has a property known as **inertia.**

- Inertia is the tendency for a mass at rest to want to remain at rest and equally for a mass in motion to want to stay in motion.

The more mass an object has the more inertia it has.

- Once the heavy flywheel is started in motion it tends to want to stay in motion, carrying the engine through the parasitic strokes and back to the power stroke.



Movie time: 4-strokes in action

Secrets of the 4-stroke Engine



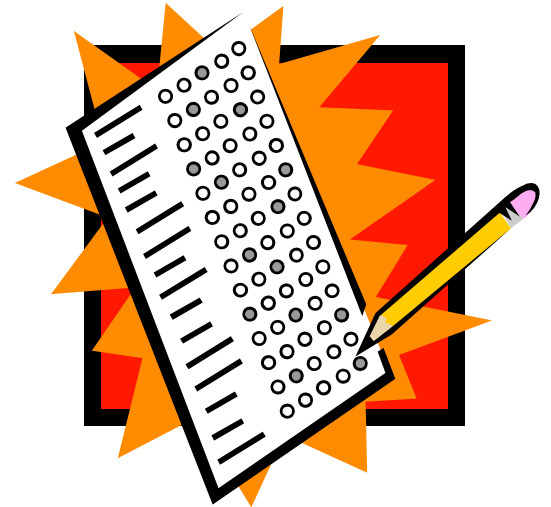
4 – stroke Engine Operation

<https://www.youtube.com/watch?v=xflY5uS-nnw>

Quiz Time

It's time to test what you know...

1. Take a few minutes to look over your notes
2. Take out a piece of paper and put your name and today's date on it



1. All internal combustion engines produce power by going through what is known as a ...

Power Cycle

2. In order, list the four events that internal combustion engines move through in order to produce power.

1. **Intake** _____
2. **Compression** _____
3. **Power** _____
4. **Exhaust** _____

3. In an engine, a stroke is...

a) a movement of the piston

b) a crankshaft movement

c) TDC to BDC

d) When a piston travels down and then up again

4. The intake stroke is initiated by...

a) Piston movement

b) Valve movement

5. The power stroke is initiated by ...

a) Piston movement

b) Valve movement

c) A spark

6. The name of the component that carries the engine through the three parasitic strokes to get back to the power stroke is the ...

Flywheel

7. Which best describes what happens inside an engine's cylinder?

a) explosions

b) controlled burn