Name: _____ Date: _____

Egg-Shaped Lobes That Time an Engine's Breathing

Circle group

A gasoline engine has to breathe. Air and fuel must go into each cylinder at just the right moment. The burned gases must go out at another moment. Small metal doors called valves open and close the paths. If a valve opened a little too early or too late, the engine would run badly or not at all. The part that sets the timing is a turning rod called the camshaft.

A camshaft looks like a long bar with bumps on it. Each bump is shaped a bit like an egg. A bump is called a lobe. As the camshaft turns, the round side of a lobe slides past a valve and does not move it. Then the pointed side comes around. It pushes the valve down and opens the path. When the lobe turns away, a strong spring pushes the valve shut. A taller lobe opens the valve farther. A longer lobe keeps it open longer.

The camshaft does not turn by itself. A belt or a chain links it to the crankshaft. The crankshaft spins as the pistons go up and down. In a common four-stroke engine, each valve needs to open only once for every two turns of the crankshaft. So the gears or sprockets are sized to make the camshaft turn at half the speed of the crankshaft.

Engineers can change how an engine acts by changing the lobes. Tall, wide lobes let in more air and give high power at high speed. Lower, narrower lobes suit a smooth engine that saves fuel. The bumps look plain, but each one is planned with care.

Questions

1. What do the valves in an engine do?

_____

_____

2. What is a lobe?

_____

_____

3. What shuts a valve after the lobe turns away?

_____

_____

4. How fast does the camshaft turn compared with the crankshaft?

_____

_____

5. Why would a valve that opens too early or too late cause trouble?

_____

_____

6. Why do engineers change the lobes on a camshaft?

_____

_____

Words to know

cylinder: the tube in an engine where the piston moves
camshaft: a rod with bumps that opens an engine's valves
lobe: a rounded bump that sticks out
crankshaft: the shaft that the pistons turn as they move

Talk together (every group has these)

1. Find one fact that every group read. How did your sheet say it?
2. What did your sheet tell you that you think another group's did not? Ask them.
3. What is one question about this topic that none of the sheets answered?

Name: _____ Date: _____

Egg-Shaped Lobes That Time an Engine's Breathing

Triangle group

A gasoline engine has to breathe, which means that air and fuel must flow into each cylinder at precisely the right moment and the burned gases must flow out at another moment. Small metal doors called valves open and close the passages, and if a valve opened a little too early or too late, the engine would run poorly or not at all. The component that sets the timing is a rotating rod known as the camshaft.

A camshaft resembles a long bar with a series of bumps, each shaped a bit like an egg, and each bump is called a lobe. As the camshaft turns, the round part of a lobe slides past a valve without moving it, but when the pointed part arrives, it pushes the valve down and opens the passage. As the lobe turns away, a strong spring pushes the valve closed again. The height of the lobe controls how far the valve opens, while the length of the lobe controls how long it stays open.

The camshaft does not turn by itself. A belt or a chain connects it to the crankshaft, which spins as the pistons move up and down. In a common four-stroke engine, each valve needs to open only once for every two turns of the crankshaft, so the gears or sprockets are sized to make the camshaft rotate at half the speed of the crankshaft.

Engineers can change an engine's personality simply by changing the lobes. Tall, wide lobes admit more air and favor high power at high speed, whereas lower, narrower lobes suit a smooth, economical engine. The shapes may look like ordinary bumps, but each one is carefully calculated.

Questions

1. What do the valves in an engine do?

_____

_____

2. What is a lobe?

_____

_____

3. What closes a valve after the lobe turns away?

_____

_____

4. How fast does the camshaft turn compared with the crankshaft?

_____

_____

5. Why would a valve opening too early or too late cause trouble?

_____

_____

6. Why do engineers change the lobes on a camshaft?

_____

_____

Words to know

cylinder: the tube in an engine where the piston moves
camshaft: a rod with bumps that opens an engine's valves
lobe: a rounded bump that sticks out
crankshaft: the shaft that the pistons turn as they move
economical: using little fuel or money

Talk together (every group has these)

1. Find one fact that every group read. How did your sheet say it?
2. What did your sheet tell you that you think another group's did not? Ask them.
3. What is one question about this topic that none of the sheets answered?

Name: _____ Date: _____

Egg-Shaped Lobes That Time an Engine's Breathing

Square group

A gasoline engine has to breathe, which means that air and fuel must flow into each cylinder at precisely the right moment, and the burned gases must flow out again at another carefully chosen moment. Small metal doors called valves open and close the passages, and if a valve opened even slightly too early or too late, the engine would run poorly or fail to run at all. The component that sets this timing is a rotating rod known as the camshaft.

A camshaft resembles a long bar studded with a series of bumps, each shaped somewhat like an egg, and each bump is called a lobe. As the camshaft turns, the round part of a lobe slides past a valve without moving it, but when the pointed part arrives, it pushes the valve down and opens the passage. As the lobe rotates away, a strong spring pushes the valve closed again. The height of the lobe controls how far the valve opens, while the length of the lobe controls how long it remains open.

The camshaft does not turn by itself. A belt or a chain connects it to the crankshaft, which spins as the pistons move up and down. In a common four-stroke engine, each valve needs to open only once for every two turns of the crankshaft, so the gears or sprockets are sized to make the camshaft rotate at exactly half the speed of the crankshaft.

Engineers can alter an engine's personality simply by changing the lobes. Tall, wide lobes admit more air and favor high power at high speed, whereas lower, narrower lobes suit a smooth, economical engine. The shapes may resemble ordinary bumps, but each one is the product of careful calculation.

Questions

1. What do the valves in an engine do?

_____

_____

2. What is a lobe?

_____

_____

3. What closes a valve again after the lobe rotates away?

_____

_____

4. How fast does the camshaft rotate compared with the crankshaft?

_____

_____

5. Why would a valve opening slightly too early or too late cause trouble?

_____

_____

6. Why do engineers alter the lobes on a camshaft?

_____

_____

Words to know

cylinder: the tube in an engine where the piston moves
camshaft: a rod with bumps that opens an engine's valves
lobe: a rounded bump that sticks out
crankshaft: the shaft that the pistons turn as they move
economical: using little fuel or money

Talk together (every group has these)

1. Find one fact that every group read. How did your sheet say it?
2. What did your sheet tell you that you think another group's did not? Ask them.
3. What is one question about this topic that none of the sheets answered?

For the teacher: Egg-Shaped Lobes That Time an Engine's Breathing

Each student sheet carries a shape, not a level. The same topic and facts, written three ways.

Circle: Egg-Shaped Lobes That Time an Engine's Breathing

Easier · 269 words · Flesch-Kincaid grade 3.3

1. They open and close the paths for air, fuel and burned gases.
2. An egg-shaped bump on the camshaft.
3. A strong spring.
4. At half the speed.
5. The engine needs air, fuel and exhaust to move at exact times, or it runs badly.
6. Different lobe heights and widths change how the engine acts, such as more power or saving fuel.

Triangle: Egg-Shaped Lobes That Time an Engine's Breathing

This passage · 281 words · Flesch-Kincaid grade 8.7

1. They open and close the passages for air, fuel, and burned gases.
2. An egg-shaped bump on the camshaft.
3. A strong spring.
4. At half the speed.
5. The engine needs air, fuel, and exhaust to move at exact moments, or it runs poorly.
6. Different lobe heights and widths give the engine a different character, such as more power or better economy.

Square: Egg-Shaped Lobes That Time an Engine's Breathing

Harder · 289 words · Flesch-Kincaid grade 9.5

1. They open and close the passages for air, fuel, and burned gases.
2. An egg-shaped bump on the camshaft.
3. A strong spring.
4. At exactly half the speed.
5. The engine needs air, fuel, and exhaust to move at exact moments, or it runs poorly.
6. Different lobe heights and widths give the engine a different character, such as high power or economy.