Name: _____ Date: _____

A Squeezed Liquid Lifts a Whole Car

Circle group

A garage worker can lift a car with a small tool. It is called a hydraulic jack. The secret is a liquid, often oil. Oil cannot be squeezed into a smaller space.

A hydraulic jack has two cylinders joined by a tube. One cylinder is narrow. The other is wide. Each has a piston, a plug that slides up and down. Oil fills the space between them.

The worker pumps a handle. The narrow piston pushes down on the oil. The oil cannot be squashed. So the push goes through the oil and presses up on the wide piston. A scientist named Blaise Pascal explained this long ago. Pressure in a closed liquid spreads out the same in every direction.

Here is why the jack is strong. The wide piston has more surface for the pressure to push on. A small force on the narrow piston becomes a big force on the wide one. That big force can raise a heavy car.

There is a trade. The narrow piston must move many times to lift the wide piston a little. So the worker pumps again and again, and the car rises slowly. Hydraulic machines also help dig, lift, and brake.

Questions

1. What liquid is often used in a hydraulic jack?

_____

_____

2. What joins the two cylinders of a jack?

_____

_____

3. What is a piston?

_____

_____

4. Who explained that pressure spreads the same in a closed liquid?

_____

_____

5. Why does a small push on the narrow piston lift a heavy car?

_____

_____

6. Why must the worker pump the handle many times?

_____

_____

Words to know

hydraulic: worked by a liquid that is under pressure
piston: a plug that slides inside a cylinder
pressure: a pushing force spread over a surface
squash: to press something flat or smaller
surface: the outside area of something

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: _____

A Squeezed Liquid Lifts a Whole Car

Triangle group

Lifting a car by hand sounds impossible, yet a garage worker can do it with a small tool called a hydraulic jack. The secret is a liquid, usually oil, that cannot be squeezed into a smaller space.

A hydraulic jack has two cylinders joined by a tube. One cylinder is narrow, and the other is wide. Each has a piston, which is a plug that slides up and down. The oil fills the space between the pistons.

When the worker pumps a handle, the narrow piston pushes down on the oil. Because the oil cannot be squashed, the push travels through the liquid and presses up on the wide piston. A scientist named Blaise Pascal explained this idea long ago. Pressure in a closed liquid spreads out equally in every direction.

Here is why the jack is so strong. The wide piston has much more surface for the pressure to push against. A small force on the narrow piston becomes a large force on the wide one. That large force is strong enough to raise a heavy car.

There is a trade, as with many machines. The narrow piston must move down many times to lift the wide piston a small amount. The worker pumps the handle again and again, and the car rises slowly. Hydraulic machines also help dig, lift, and brake.

Questions

1. What liquid is usually used inside a hydraulic jack?

_____

_____

2. How are the two cylinders of a jack connected?

_____

_____

3. What is a piston?

_____

_____

4. Who explained that pressure spreads equally in a closed liquid?

_____

5. Why does a small push on the narrow piston lift a heavy car?

6. Why does the worker have to pump the handle many times?

Words to know

hydraulic: worked by a liquid that is under pressure
piston: a plug that slides inside a cylinder
pressure: a pushing force spread over a surface
squash: to press something flat or smaller
surface: the outside area of something

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: _____

A Squeezed Liquid Lifts a Whole Car

Square group

Lifting a car by hand sounds utterly impossible, yet a garage worker can accomplish it with a modest tool called a hydraulic jack. The secret is a liquid, usually oil, which cannot be squeezed into a smaller space.

A hydraulic jack consists of two cylinders connected by a tube. One cylinder is narrow, while the other is wide. Each contains a piston, which is a plug that slides up and down, and oil fills the space between the two pistons.

When the worker pumps a handle, the narrow piston presses down on the oil. Because the oil cannot be compressed, the push travels through the liquid and presses upward on the wide piston. A scientist named Blaise Pascal explained this principle long ago: pressure in a closed liquid spreads out equally in every direction.

Here is why the jack is so powerful. The wide piston offers far more surface for the pressure to push against. A small force on the narrow piston is therefore transformed into a large force on the wide one, and that large force is strong enough to raise a heavy car.

As with many machines, there is a trade. The narrow piston must travel downward many times to lift the wide piston by a small amount. The worker pumps the handle again and again, and the car rises gradually. Hydraulic machines also assist with digging, lifting, and braking.

Questions

1. What liquid is usually found inside a hydraulic jack?

_____

_____

2. What connects the two cylinders of a jack?

_____

_____

3. What is a piston?

_____

_____

4. Who explained that pressure spreads equally in a closed liquid?

_____

_____

5. Why does a small push on the narrow piston lift a heavy car?

_____

_____

6. Why does the worker need to pump the handle so many times?

_____

_____

Words to know

hydraulic: worked by a liquid that is under pressure
piston: a plug that slides inside a cylinder
pressure: a pushing force spread over a surface
surface: the outside area of something

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: A Squeezed Liquid Lifts a Whole Car

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

Circle: A Squeezed Liquid Lifts a Whole Car

Easier · 200 words · Flesch-Kincaid grade 3.1

1. Oil.
2. A tube.
3. A plug that slides up and down in a cylinder.
4. Blaise Pascal.
5. The pressure pushes on the wide piston's bigger surface and makes a bigger force.
6. Each push moves the wide piston only a little.

Triangle: A Squeezed Liquid Lifts a Whole Car

This passage · 223 words · Flesch-Kincaid grade 5.2

1. Oil.
2. By a tube.
3. A plug that slides up and down inside a cylinder.
4. Blaise Pascal.
5. The pressure pushes on the wide piston's larger surface, which makes a bigger force.
6. Each stroke moves the wide piston only a small amount.

Square: A Squeezed Liquid Lifts a Whole Car

Harder · 232 words · Flesch-Kincaid grade 7.5

1. Oil.
2. A tube.
3. A plug that slides up and down inside a cylinder.
4. Blaise Pascal.
5. The pressure acts on the wide piston's larger surface, which produces a bigger force.
6. Each stroke moves the wide piston only a small amount.