Name: _____ Date: _____

Why Astronauts Must Work Out Every Day

Circle group

On Earth, your body works against gravity all day. Your legs hold you up. Your back keeps you straight. Your bones carry your weight. Even simple walking is a small workout. It keeps muscles and bones strong.

On the International Space Station, everything floats. Astronauts are in a state called microgravity. Their bodies do not carry any weight. That sounds like fun, and it is. But it causes a problem. Muscles and bones that are not used begin to weaken. They can lose strength much faster than on Earth.

To fight this, astronauts exercise on most days. Each workout is about two hours. A normal treadmill would not work, because the runner would float off it. So the station has special equipment. On the treadmill, a harness and straps hold the astronaut down. A stationary bike is bolted in place. For lifting, a machine uses vacuum cylinders, not heavy weights. Weights would be pointless when nothing has weight.

The exercise helps, but it is not perfect. After a long mission, astronauts often feel weak and wobbly. They may need help to walk at first. With rest, healthy food and training, they get better.

The lesson is that our bodies need gravity more than we know.

Questions

1. Why is walking on Earth a small workout?

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_____

2. What is the floating state on the space station called?

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3. What happens to muscles and bones that are not used?

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_____

4. How long do astronauts exercise each day?

_____

5. Why does a treadmill in space need a harness and straps?

6. Why does the lifting machine use vacuum cylinders, not heavy weights?

Words to know

microgravity: a condition where things seem to have almost no weight
weaken: to become less strong
harness: a set of straps that holds someone in place
equipment: tools and machines made for a job
treadmill: a machine with a moving belt for walking or running

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: _____

Why Astronauts Must Work Out Every Day

Triangle group

On Earth, your body works against gravity all day long. Your legs hold you up, your back keeps you straight, and your bones carry your weight. Even simple walking is a small workout, and it keeps muscles and bones strong.

Aboard the International Space Station, everything floats. Astronauts are in a state called microgravity, so their bodies no longer carry any weight. That sounds like fun, and it is, but it causes a problem. When muscles and bones are not used, they begin to weaken. Muscles can shrink, and bones can lose some of their strength, much faster than they would on Earth.

To fight this, astronauts follow a plan of exercise on most days of the week. The workouts last a long time, about two hours each day. Of course, a regular treadmill would not work if the runner floated up off it, so special equipment is used. On the treadmill, a harness and straps hold the astronaut down against the belt. A stationary bike is bolted into place. For lifting, a machine uses vacuum cylinders instead of heavy weights, because weights would be pointless when nothing has any weight.

The exercise helps, but it is not perfect. After a long mission, astronauts often feel weak and wobbly when they return. They may need help walking at first. With rest, healthy food and training, they recover.

The lesson is that our bodies depend on gravity more than we realize.

Questions

1. Why is walking on Earth a small workout?

_____

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2. What is the floating state aboard the space station called?

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3. What happens to muscles and bones that are not used?

_____

_____

4. How long do astronauts exercise each day?

_____

_____

5. Why does a treadmill in space need a harness and straps?

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_____

6. Why does the lifting machine use vacuum cylinders instead of heavy weights?

_____

_____

Words to know

microgravity: a condition where things seem to have almost no weight
weaken: to become less strong
harness: a set of straps that holds someone in place
equipment: tools and machines made for a job
treadmill: a machine with a moving belt for walking or running

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: _____

Why Astronauts Must Work Out Every Day

Square group

On Earth, your body works against gravity throughout the entire day. Your legs hold you upright, your back keeps you straight, and your bones bear your weight. Even ordinary walking amounts to a modest workout, and it keeps muscles and bones strong.

Aboard the International Space Station, everything drifts and floats. Astronauts live in a state known as microgravity, so their bodies no longer bear any weight. That sounds delightful, and in many ways it is, but it creates a genuine problem. When muscles and bones are left unused, they begin to weaken. Muscles can shrink, and bones can lose some of their strength, far more rapidly than they would on Earth.

To counteract this, astronauts follow a demanding plan of exercise on most days of the week. Each session lasts about two hours. Naturally, an ordinary treadmill would be useless if the runner floated up off it, so the station relies on specialized equipment. On the treadmill, a harness and straps hold the astronaut firmly against the belt. A stationary bike is bolted securely into place. For lifting, a machine uses vacuum cylinders rather than heavy weights, since weights would be pointless when nothing has any weight.

The exercise is beneficial, but it is not flawless. After a long mission, astronauts frequently feel weak and wobbly upon their return, and they may need assistance walking at first. With rest, nourishing food and careful training, they recover.

The lesson is that our bodies depend on gravity far more than we realize.

Questions

1. Why is ordinary walking on Earth a modest workout?

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2. What is the state of floating aboard the space station called?

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_____

3. What happens to muscles and bones that are left unused?

_____

_____

4. How long does each exercise session last?

_____

_____

5. Why does a treadmill in space require a harness and straps?

_____

_____

6. Why does the lifting machine use vacuum cylinders rather than heavy weights?

_____

_____

Words to know

microgravity: a condition where things seem to have almost no weight
weaken: to become less strong
harness: a set of straps that holds someone in place
equipment: tools and machines made for a job
treadmill: a machine with a moving belt for walking or running

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: Why Astronauts Must Work Out Every Day

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

Circle: Why Astronauts Must Work Out Every Day

Easier · 205 words · Flesch-Kincaid grade 3.9

1. Your muscles and bones work against gravity to carry your weight.
2. Microgravity.
3. They begin to weaken.
4. About two hours.
5. Without them the runner would float off the belt.
6. Weights would be pointless when nothing has weight.

Triangle: Why Astronauts Must Work Out Every Day

This passage · 240 words · Flesch-Kincaid grade 5.7

1. Your muscles and bones work against gravity to carry your weight.
2. Microgravity.
3. They begin to weaken.
4. About two hours.
5. Without them the runner would float up off the belt.
6. Weights would be pointless when nothing has any weight.

Square: Why Astronauts Must Work Out Every Day

Harder · 251 words · Flesch-Kincaid grade 7.8

1. Your muscles and bones work against gravity to bear your weight.
2. Microgravity.
3. They begin to weaken.
4. About two hours.
5. Without them the runner would float up off the belt.
6. Weights would be pointless when nothing has any weight.