Name: _____ Date: _____

Your Thumb Can Measure the Stars

Circle group

Hold your thumb out. Close one eye. Now switch eyes. Your thumb seems to jump sideways. Switch again, and it jumps back. This is called parallax. Astronomers use it to find how far away stars are.

Each eye looks from a different spot. That is why the thumb jumps. Close things jump a lot between the two views. Far things hardly jump at all. Bring your thumb closer to your face, and it jumps even more.

Your two eyes are too close together to show a shift in a star. So astronomers use two views taken half a year apart. At one time of year, Earth is on one side of its path around the sun. Six months later, it is on the other side. A near star seems to move a tiny bit against the stars behind it. A small shift means the star is far away.

The shifts are very small. Astronomers need strong telescopes. But the idea is the same as your thumb trick.

Questions

1. What does your thumb seem to do when you switch eyes?

_____

_____

2. What is this shift called?

_____

_____

3. Which jumps more, a close thing or a far thing?

_____

_____

4. Why do astronomers use two views half a year apart?

_____

_____

5. What does a small shift tell astronomers about a star?

_____

_____

6. What happens when your thumb is closer to your face?

_____

_____

Words to know

parallax: the way something seems to move when you look at it from two places
astronomers: scientists who study space and the stars
telescopes: tools that make faraway things look closer

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: _____

Your Thumb Can Measure the Stars

Triangle group

Hold your thumb out at arm's length and close one eye. Now switch eyes. Your thumb seems to jump sideways against the room behind it. Switch again, and it jumps back. This shift is called parallax, and astronomers use it to find out how far away the stars are.

The trick works because each eye looks from a slightly different spot. Things that are close to you shift a lot between the two views. Things that are far away hardly shift at all. If you bring your thumb nearer to your face, it jumps even more.

Your two eyes sit too close together to show any shift in a star. So astronomers use two views taken half a year apart. At one time of year, Earth is on one side of its path around the sun. Six months later, Earth is on the opposite side. A nearby star seems to move a tiny bit against the faraway stars behind it. The smaller the shift, the farther away the star must be.

The shifts are so small that astronomers need strong telescopes and careful measuring. Still, the idea is the same as the thumb trick, which you can try in just a minute.

Questions

1. What happens when you switch eyes while holding up your thumb?

_____

_____

2. What is this shift in position called?

_____

_____

3. Which shifts more between two views, a close object or a far one?

_____

_____

4. Why do astronomers take two views half a year apart?

_____

_____

5. What does a very small shift tell an astronomer about a star?

_____

_____

6. What happens if you bring your thumb nearer to your face?

_____

_____

Words to know

parallax: the way something seems to move when you look at it from two places
astronomers: scientists who study space and the stars
opposite: on the other side
telescopes: tools that make faraway things look closer
measuring: finding out how big, long, or far something is

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: _____

Your Thumb Can Measure the Stars

Square group

Extend your thumb at arm's length and close one eye. Now switch eyes. Your thumb appears to leap sideways against the furniture behind it, and when you switch back, it leaps again. This apparent shift is called parallax, and astronomers rely on it to calculate how far away the stars are.

The trick works because each eye observes the world from a slightly different position. Objects that are close to you shift dramatically between the two views, whereas distant objects barely shift at all. If you bring your thumb nearer to your face, the jump becomes even more obvious.

Your eyes sit far too close together to reveal any shift in a star, so astronomers compare two views taken half a year apart. At one point in the year, Earth lies on one side of its enormous path around the sun. Six months later, it has traveled to the opposite side. A nearby star appears to move a tiny amount against the faraway stars behind it, and the smaller that shift is, the more distant the star must be.

These shifts are so minute that astronomers must use powerful telescopes and extremely careful measurements. Nevertheless, the principle is identical to the thumb trick that you can try in a single minute.

Questions

1. What happens to your thumb when you switch eyes?

_____

_____

2. What is this apparent shift in position called?

_____

_____

3. Which shifts more between two views, a nearby object or a distant one?

_____

_____

4. Why do astronomers compare views taken half a year apart?

_____

_____

5. What does a very small shift reveal about a star?

_____

_____

6. What happens when you bring your thumb nearer to your face?

_____

_____

Words to know

parallax: the way something seems to move when you look at it from two places
astronomers: scientists who study space and the stars
opposite: on the other side
telescopes: tools that make faraway things look closer

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: Your Thumb Can Measure the Stars

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

Circle: Your Thumb Can Measure the Stars

Easier · 167 words · Flesch-Kincaid grade 1.9

1. It seems to jump sideways.
2. Parallax.
3. A close thing.
4. Our two eyes are too close together to show a shift in a star, but Earth moves far in six months.
5. The star is far away.
6. It jumps even more.

Triangle: Your Thumb Can Measure the Stars

This passage · 202 words · Flesch-Kincaid grade 3.8

1. Your thumb seems to jump sideways against the background.
2. Parallax.
3. A close object.
4. Two eyes sit too close together to show a shift in a star, but Earth moves far across its path in six months.
5. The star is very far away.
6. It jumps even more.

Square: Your Thumb Can Measure the Stars

Harder · 211 words · Flesch-Kincaid grade 7.8

1. It appears to leap sideways against the background.
2. Parallax.
3. A nearby object.
4. Our eyes are too close together to reveal a shift in a star, but Earth travels across its path in six months.
5. The star is very distant.
6. The jump becomes even more obvious.