Name: _____ Date: _____

How Polarized Sunglasses Tame a Shiny Lake

Circle group

Have you ever squinted at the sun's glitter on a lake? Glare can hurt your eyes. Ordinary dark sunglasses dim everything the same amount. The glare is still there, just dimmer. Polarized sunglasses are cleverer. They remove much of the glare and leave the rest of the scene bright and clear.

To see how, think of light as a wave that shakes sideways as it travels. Sunlight shakes in all directions at once. Some waves wiggle up and down. Some wiggle side to side. Others wiggle at every angle in between. This is called unpolarized light.

Light that bounces off a flat, shiny surface, like water or a wet road, changes. The reflected light is mostly waves that shake in one direction. That direction is sideways along the surface. This sideways light is the glare we feel.

A polarized lens has tiny chains of molecules lined up in one direction, like the slats of a picket fence. Waves that shake along the slats are blocked. The others pass through. The lenses are turned so that the blocked direction is sideways. That stops much of the glare. Light bouncing off leaves and rocks has mixed directions, so most of it passes through.

Polarized lenses have a small drawback. Many phone and computer screens give off polarized light. A screen may look dim or dark if you tilt your head.

Questions

1. How do ordinary dark sunglasses handle glare?

_____

_____

2. In which direction does most reflected glare shake?

_____

_____

3. What is a polarized lens compared to in the passage?

_____

_____

4. Why do polarized lenses cut glare but leave other things bright?

_____

5. Why might a phone screen look dark through polarized sunglasses?

6. Which surfaces make reflected light shake mostly in one direction?

Words to know

glare: a harsh, bright light that hurts the eyes
polarized: made to vibrate in mainly one direction
reflected: bounced back off a surface
molecules: tiny groups of atoms that make up matter
drawback: a small problem with something that is otherwise good

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: _____

How Polarized Sunglasses Tame a Shiny Lake

Triangle group

Anyone who has squinted at the sun's glittering path on a lake knows how painful glare can be. Ordinary dark sunglasses help by dimming everything equally, but the glare is still there, only dimmer, and the whole scene looks gloomy. Polarized sunglasses do something cleverer. They remove much of the glare while leaving the rest of the scene bright and clear.

To understand them, think of light as a wave that shakes sideways as it travels. Light from the sun shakes in all directions at once, like a mixture of waves wiggling up and down, side to side, and every angle between. This is called unpolarized light.

When light bounces off a flat, shiny surface such as water or a wet road, something changes. The reflected light is mostly made of waves that shake in one direction, which is sideways along the surface. That sideways light is what we experience as glare.

A polarized lens contains tiny chains of molecules lined up in the same direction, a bit like the slats of a picket fence. Waves that shake along the slats are blocked, while the rest pass through. The lenses are turned so that the blocked direction is sideways, which stops much of the reflected glare. Light that bounces off leaves and rocks keeps its mixed directions and mostly passes through.

Polarized lenses have a small drawback, however. Many phone and computer screens give off polarized light, so a screen may look dim or dark when you tilt your head while wearing them, and some people find that annoying.

Questions

1. How do ordinary dark sunglasses deal with glare?

_____

_____

2. In which direction does most reflected glare shake?

_____

_____

3. What is a polarized lens compared to in the passage?

_____

_____

4. Why do polarized lenses cut glare but leave other things bright?

_____

_____

5. Why might a phone screen look dark through polarized sunglasses?

_____

_____

6. What kind of surfaces make reflected light mostly shake in one direction?

_____

_____

Words to know

glare: a harsh, bright light that hurts the eyes
polarized: made to vibrate in mainly one direction
reflected: bounced back off a surface
molecules: tiny groups of atoms that make up matter
drawback: a small problem with something that is otherwise good

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: _____

How Polarized Sunglasses Tame a Shiny Lake

Square group

Anyone who has squinted at the sun's glittering path across a lake understands how punishing glare can be. Ordinary dark sunglasses help by dimming everything equally, but the glare itself remains, merely subdued. Polarized sunglasses accomplish something considerably more sophisticated, because they remove much of the glare while leaving the remainder of the scene bright and clear.

To understand how they work, it helps to picture light as a wave that shakes sideways as it travels. Light from the sun vibrates in every direction at once, like a mixture of waves wiggling up and down, from side to side, and at every angle in between. Light of this kind is described as unpolarized.

When light bounces off a flat, shiny surface such as a lake or a wet road, something important changes. The reflected light consists mostly of waves that vibrate in a single direction, which is sideways along the surface. That sideways light is precisely what we experience as glare.

A polarized lens contains tiny chains of molecules aligned in the same direction, rather like the slats of a picket fence. Waves that vibrate along the slats are absorbed, while the others pass through. Manufacturers turn the lenses so that the blocked direction is sideways, which eliminates much of the reflected glare. Light bouncing off leaves and rocks keeps its mixture of directions, so most of it still passes through.

Polarized lenses do have a minor drawback. Many phone and computer screens emit polarized light, so a screen can appear dim or even dark when you tilt your head while wearing them.

Questions

1. How do ordinary dark sunglasses deal with glare?

_____

_____

2. In which direction does most reflected glare vibrate?

_____

_____

3. What is a polarized lens compared to in the passage?

_____

_____

4. Why do polarized lenses reduce glare while leaving other objects bright?

_____

_____

5. Why might a phone screen look dark through polarized sunglasses?

_____

_____

6. What sort of surfaces make reflected light vibrate mostly in one direction?

_____

_____

Words to know

glare: a harsh, bright light that hurts the eyes
polarized: made to vibrate in mainly one direction
reflected: bounced back off a surface
molecules: tiny groups of atoms that make up matter
drawback: a small problem with something that is otherwise good

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: How Polarized Sunglasses Tame a Shiny Lake

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

Circle: How Polarized Sunglasses Tame a Shiny Lake

Easier · 228 words · Flesch-Kincaid grade 4.1

1. They dim everything the same, so the glare is still there.
2. Sideways along the surface.
3. The slats of a picket fence.
4. They block sideways waves, but light from leaves and rocks has mixed directions and mostly passes.
5. Screens give off polarized light, and the lens can block it at the wrong angle.
6. Flat, shiny surfaces like water or a wet road.

Triangle: How Polarized Sunglasses Tame a Shiny Lake

This passage · 259 words · Flesch-Kincaid grade 7.4

1. They dim everything equally, so the glare is still there.
2. Sideways along the surface.
3. The slats of a picket fence.
4. They block sideways waves, but light from leaves and rocks has mixed directions and mostly passes.
5. Screens give off polarized light, and the lens can block it when the angle is wrong.
6. Flat, shiny surfaces such as water or a wet road.

Square: How Polarized Sunglasses Tame a Shiny Lake

Harder · 263 words · Flesch-Kincaid grade 9.6

1. They dim everything equally, so the glare remains but is subdued.
2. Sideways along the surface.
3. The slats of a picket fence.
4. They block the sideways waves, but light from leaves and rocks has mixed directions and mostly passes through.
5. Screens emit polarized light, which the lens can block when the angle is wrong.
6. Flat, shiny surfaces such as a lake or a wet road.