5TH GRADE

Studying Our Scintillating Sun

DID YOU KNOW?

The Sun is a star made mostly of a gas called hydrogen and is one million times bigger than the Earth. The Sun's gigantic mass creates enormous gravity and pressure which strips hydrogen atoms of their electrons. The hydrogen atoms' protons are left and they collide with each other. As pairs of hydrogen protons bump into each other they fuse together to form a new single element known as helium. This process is called nuclear fusion and takes place in the center of the Sun's interior core.

Positioned next to the Sun's core is the radiative zone that is so densely compressed that the energy packed photons created during the nuclear fusion process have great difficulty traveling to the exterior of the Sun. Photons traveling though the radiative zone may take over a million years to reach the next layer of the Sun's interior.

Energy from the radiative zone is carried outward through the convection zone. Hot gases boil like thick soup in gigantic pans. As convection cells of boiling gases surface they cool and sink down again to gather more energy.

Sunshine viewed from the Earth is on the outermost layer of the sun and is called the photosphere. The grainy appearance of the Sun is caused by convection cells bubbling up to the surface with more energy. Never look directly at the Sun because it can cause permanent eye damage.

Sunspots sometimes appear on the Sun's surface. These dark blemishes are created when the Sun's magnetic field stops the hot gasses from bubbling and boiling. The trapped gas is cooler than the surrounding surface gas and appears as a dark spot.

Erupting loops of gas seen above the Sun's surface are known as solar prominences. These huge arches of plasma stretch thousands of miles from the surface of the Sun and may stay suspended for months.

5TH GRADE

Scintillating Suns

By Jean M. Settle

OBJECTIVE

Students will construct an edible model of the Sun denoting surface and interior features.

Question

What are the surface and interior features of the sun?

PROCEDURE/DISCUSSION

1. Attach cookie to paper plate using icing as glue.

2. Spread yellow icing over 3/4 of the cookie, leaving 1/4 pie section free of icing, between 12:00 and 9:00.

3. Place a 1.5 inch piece of brown licorice along the 12:00 and 9:00 lines of icing edges to mark 1/4 pie shaped section. This represents the interior of the Sun on the model.

4. Refer to the diagram to create the cross section of the Sun's interior:

a. Core: place a white dot of icing in interior corner

b. Radiative Zone: spread orange tube icing next to the white icing core

c. Convection Zone: spread red tube icing last, next to the ~~white icing~~ Radiative Zone

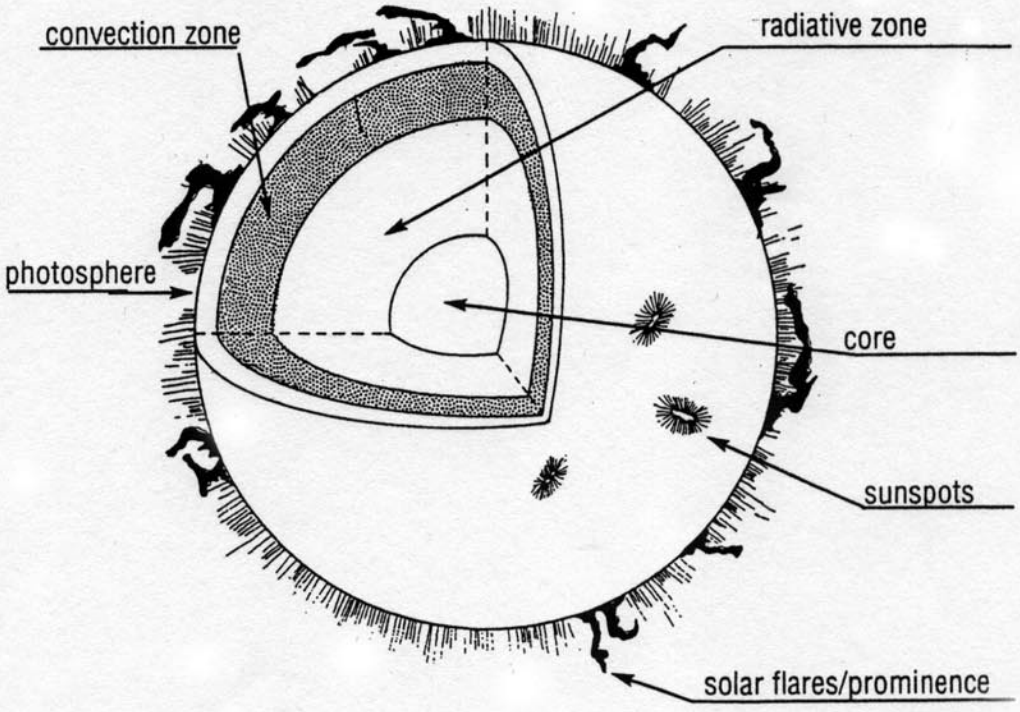
MATERIALS

Per class:

- Tub of yellow icing
- White, orange and red tubes of icing
- Shakers of red and orange sprinkles

Per student:

- 3" diameter circular cookie
- Small paper plate
- 5-8 redhots
- 2-3 strips of red licorice
- 2 1.5" strips of brown licorice
- 3" square of wax paper
- Craft stick



Scintillating Suns *(continued)*

5. Refer to the diagram to create the Sun's surface features:

a. Granular appearance of the photosphere: Shake red and orange sprinkles over remaining 3/4 of the cookie that is covered with yellow icing.

b. Sunspots: place redhots over surface

c. Solar Prominences: arrange single strips of red string licorice protruding from the outer edge of the cookie.

EXTENSION

1. Encourage students to research current and past NASA missions to the Sun. What were the names of the spacecraft and each mission's objectives and results? (SOHO: Solar and Heliospheric Observatory has taken numerous pictures of the Sun; ACE: Advanced Composition Explorer is a satellite that collects sample particles streaming from the Sun; POLAR: is a satellite that observes the Sun's auroras.)

2. Encourage students to investigate the reason the Sun appears yellow. See activities from NASA's Space Based Astronomy. (The Sun is actually white but as the light travels through the Earth's atmosphere it scatters. That is why the sky appears blue and the Sun yellow.)

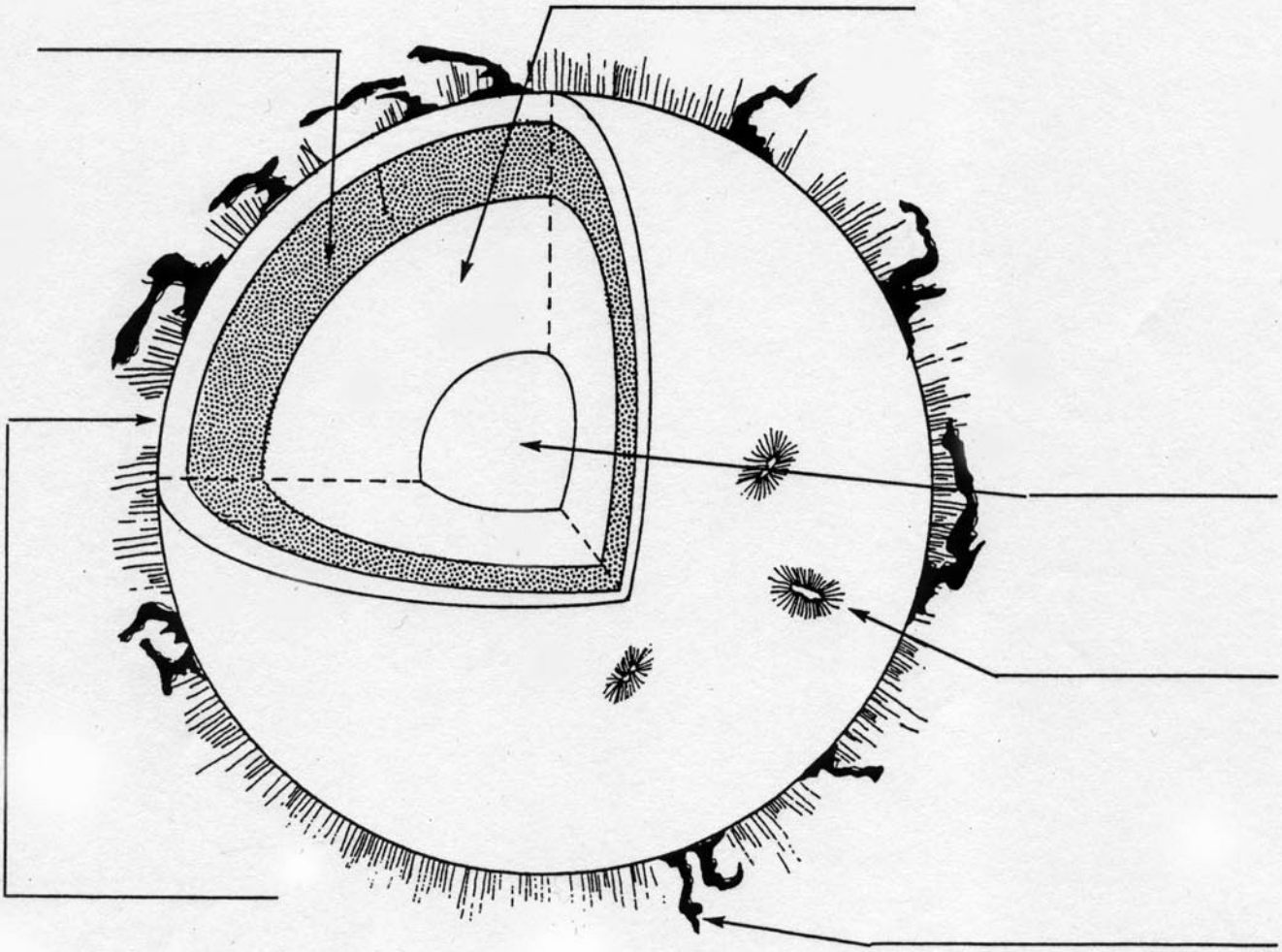
3. View sunspots safely through a telescope with an experienced astronomer! NEVER LOOK DIRECTLY AT THE SUN AS PERMANENT EYE DAMAGE CAN OCCUR!

4. Invite students to examine why Jupiter, made of mostly hydrogen and helium like the Sun, is not a star. (Jupiter has less mass than the Sun and therefore less gravity and pressure so that nuclear fusion does not occur.)

Studying Our Scintillating Sun

LABEL THE DIAGRAM:

convection zone	core
photosphere	radiative zone
solar flares/prominence	sunspots



Studying Our Scintillating Sun *(continued)*

FILL IN THE BLANK:

1. Photons traveling through the radiative zone may travel over a million years through this layer of the Sun's interior.
2. Hot gases boil like bubbling soup in the convection zone.
3. The photosphere is the outermost layer of the Sun that is viewed from the Earth.
4. Hydrogen is the primary gas the Sun is made of.
5. During the process of nuclear fusion two hydrogen protons combine to make helium.
6. Nuclear fusion occurs in the core of the Sun.
7. Earth's light and heat are provided by the Sun.
8. Loops of gas erupting from the Sun's surface are known as solar prominences.
9. Sunspots are dark areas of cooler gas on the Sun's surface.
10. The surface of the Sun appears grainy.

Studying Our Scintillating Sun

FILL IN THE BLANK:

convection zone	core	grainy
heat	hydrogen	light
photosphere	prominences	radiative zone
sunspots		

1. Photons traveling through the _____ _____ may travel over a million years through this layer of the Sun's interior.
2. Hot gases boil like bubbling soup in the _____ _____.
3. The _____ is the outermost layer of the Sun that is viewed from the Earth.
4. _____ is the primary gas the Sun is made of.
5. During the process of _____ _____ two hydrogen protons combine to make helium.
6. Nuclear fusion occurs in the _____ of the Sun.
7. Earth's _____ and _____ are provided by the Sun.
8. Loops of gas erupting from the Sun's surface are known as solar _____.
9. _____ are dark areas of cooler gas on the Sun's surface.
10. The surface of the Sun appears _____.