## AIM | How does the sun heat the 6 atmosphere?

Without the sun, there would be no life on earth. Plants need the sun to help them grow. Without plants we would have no food to eat and no oxygen to breathe.

The sun also gives us warmth. The sun heats the atmosphere and all the lands and waters.

Heat moves in three ways—conduction, convection, and radiation.

CONDUCTION Heat moves through solids by conduction. In conduction, vibrating molecules pass on heat from molecule to molecule.

CONVECTION Heat moves through gases and liquids by convection. In convection, heated molecules move away from the heat. Cooler molecules take their place. Then they become heated, too.

RADIATION Conduction and convection need molecules to work. Radiation does not. Radiation is the way heat moves where there are no atoms or molecules.

Now let's trace the sun's energy.

- The sun is about 150 million kilometers (93 million miles) from earth. Most of this distance is empty space where there are almost no atoms or molecules. The sun's energy moves through this empty space by radiation.
- The sun's energy then hits the atmosphere. The air molecules become heated by convection.
- The sun's energy finally reaches the land and water on earth. The water becomes heated by convection. The land becomes heated by conduction.

Some of the heat from the land and water reflects (bounces) back into the atmosphere. This warms the atmosphere even more.

## CONDUCTION, CONVECTION, AND RADIATION

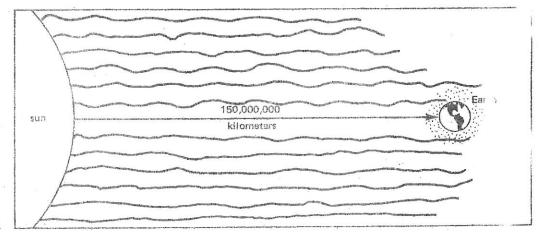


Figure A

- 1. Most of the distance between the sun and the earth is \_\_\_\_\_\_air, empty space
- 2. In outer space, there are \_\_\_\_\_\_ atoms and molecules.
- 4. Radiation \_\_\_\_\_\_ need atoms and molecules to work.

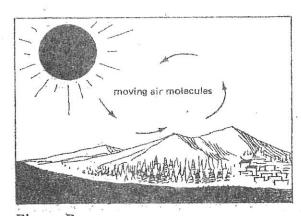


Figure B

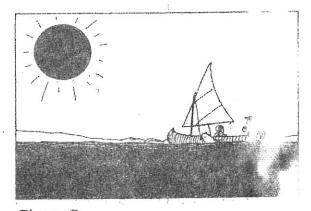


Figure C

- 6. Convection \_\_\_\_\_ need atoms and molecules to work.
- 7. What are liquids and gases made of?
- 8. Can the atoms and molecules of gases and liquids move from place to

COMPLETING Complete the sentences with the choices below. Two terms may be used twice. One term may be used three times. One term may be used four times.

	convection atmosphere radiation	MOME DESCRIPTION		atoms and molecules conduction				
1.	The three ways that heat moves from place to place are							
				divini ake e sa na jeri sa g				
2.	Heat moves through solids	by	) - agreemen					
3. Heat moves through liquids and gases by								
4. Heat moves through empty space by								
5.	In conduction and convec	tion, heat is car	rie	by				
8	In empty space, there are	hardly any						
7.	Our atmosphere is heated	by	egginnelles <b>ent</b> ermina	Commence •				
8.	Our rocks and soil are hea	ited by	verdenthis.	College (College and American American)				
9.	Our oceans, rivers, and str	reams are heate	d b	20 manusing application and a 1 (1987, 1981) of Prophysical American State (1987).				
10.	Some of the heat from the							
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	n de grande de la companya del companya de la companya del companya de la company			1 2 2				
-	MATCHING Match t		rite	e the correct letter on the line ae:				
1.	sun	,	a)	the way heat moves through emi-				
2.	conduction		<b>.</b> .					
3.	convection		b)	mixture of gases				
4.	radiation	ι.	c)	warms our entire planet				
5.	atmosphere		d)	the way heat moves through gass and liquids				
ec 200 S	× 1	9 9 %	,, Y	the reas heat moves through solid				

9.	After atoms and molecules of gases and liquids are heated, they move away from
	the heat. What takes their place?
. <b>0.</b>	What happens to some of the heat from the oceans, lakes, and streams?



Figure D

11.	Heat moves through solids by	
	conduction, convection, radiation	
12.	Conduction need atoms and molecules to work.	
13.	What are solids made of?	
14.	Can the atoms and molecules of solids move from place to place?	
15.	Explain how heat moves through solids.	
16.	What happens to some of the heat from the land?	
	C. S.	

TRUE OR Write T on the line next to the number if the sentence is true.

FALSE Write F if the sentence is false.

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1.	Heat stays in one place.	٠.							
2	Heat moves only where the	here are atoms and mole	cules.						
3,	Heat moves in three differ	rent ways,							
A. Sampler contraction of	In solids, heat moves by convection.								
The second of th	In gases and liquids, heat moves by convection.								
6.	Conduction and convection	on need atoms and mole	cules.						
7 In empty space heat moves by radiation.									
8.	8. There are many atoms and molecules in outer space.								
Tribulation of Project Community Com	APPENDENT OF THE STATE OF THE S								
10.	Heat can be reflected.	yete vil							
		dr. · ·	40-						
REACI	HING In what simple was	y can you show that the							
	OIII heat back into the	atmosphere? (You need i	no instruments to d						
	this—only your ha	<b>nd.)</b>							
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You cannot see wind. But you know it's there. You can feel it pressing against your body. You see tree branches bend when it blows. A gentle wind makes you feel fresh. A strong wind can blow you down.

What is this invisible force we call wind?

A wind is air that is moving parallel to the ground. (Air that moves up or down is not called wind.)

There are two main groups of winds. They are planetary winds and local winds.

PLANETARY WINDS move across our entire planet.

They cover very large areas.

Most of the time a planetary wind blows at the same speed and in the same direction. Some planetary winds blow high in the atmosphere. You cannot feel them on the ground.

LOCAL WINDS move across small areas. They change direction and speed very often. Local winds blow low in the atmosphere. You can always feel them on the ground.

Every wind has speed and direction.

- An anemometer [an uh MOM uh tur] measures how fast a wind blows.
- A wind vane tells us from which direction a wind blows.

Do you want to know what causes winds? You will find out in the next Aim.