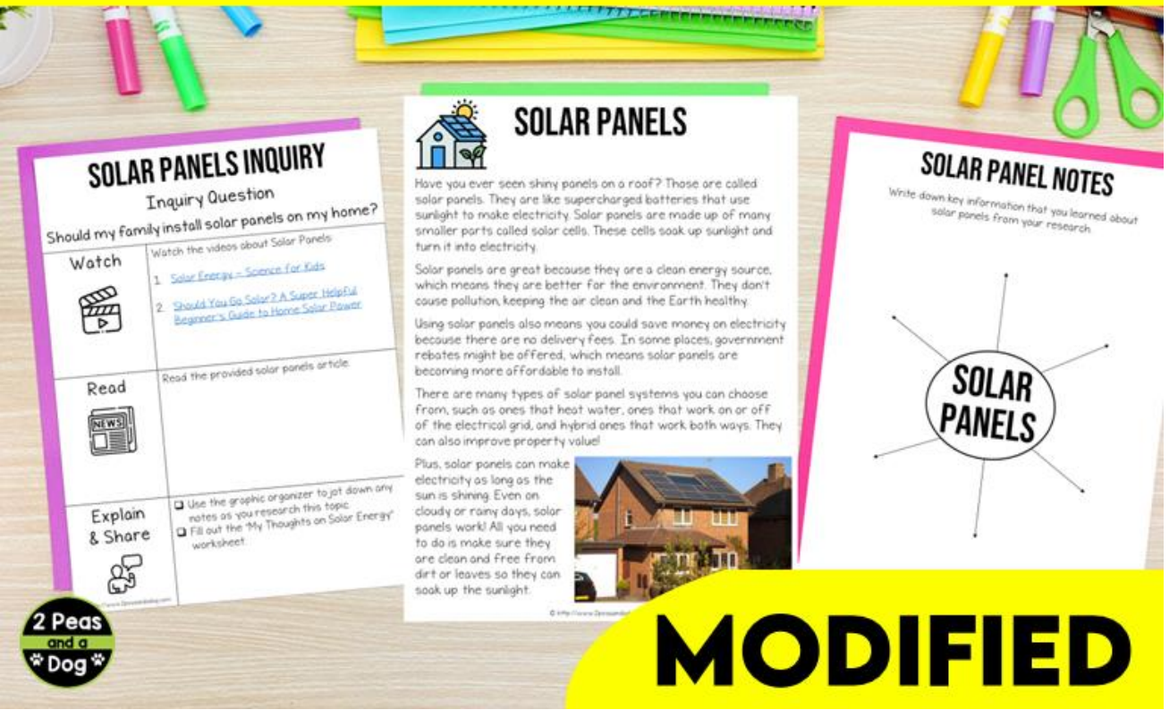
GRADE 7 SCIENCE
HEAT IN THE ENVIRONMENT
PDF & DIGITAL FORMATS



2 Peas and a Dog
Middle School Teaching Resources

RESOURCE INCLUDES

- ✓ 17 Detailed Lesson Plans
- ✓ Modified Lesson Content
- ✓ MP3 Audio Files of Articles
- ✓ Self-Marking Google Forms™
- ✓ Answer Keys
- ✓ Video Links
- ✓ Lesson Variety: Cut & Match, Fill in the Blanks, Guided Inquiry, Assignments, Graphic Organizers
- ✓ PDF & Google Slides™ Formats

WHAT'S INSIDE?

- **Introduction & Lesson #1** (Class Discussion, QR Codes) – Safety Rules & Unit Vocabulary
- **Lesson #2** (Brainstorm Activity) – Introduction to Heat
- **Lesson #3** (Whole Class Reading, Video, Matching Activity) – Heat Production
- **Lesson #4** (Whole Class Reading, Video, Multiple Choice Questions, Quiz) – Heat and Temperature
- **Lesson #5** (Whole Class Reading, Video, Fill in the Blank, Quiz) –The Particle Theory
- **Lesson #6** (Whole Class Reading, Video, Activity) – Heat and Volume
- **Lesson #7** (Whole Class Reading, Video, Activity, Quiz) – Conduction, Convection, and Radiation

WHAT'S INSIDE?

- **Lesson #8** (Video, True or False) – Bill Nye
- **Lesson #9** (Video Lab) – Boiling Water in a Paper Cup
- **Lesson #10** (Lab, Video) – How to Melt Ice Cubes the Fastest
- **Lesson #11** (Whole Class Reading, Videos, Activity) – Global Warming
- **Lesson #12** (Whole Class Reading, Video, Inquiry) – Benefits of Technologies With Heat
- **Lesson #13** (Whole Class Reading, Videos, Inquiry) – Energy Types
- **Lesson #14A** (Whole Class Readings, Videos & Activity) – Solar Panels: Investigation
- **Lesson #14B** (Lab, Video) – Creating a Solar Oven Lab
- **Lesson #15** (Unit Test) – Heat Unit Test

WHAT'S INSIDE?

LESSON #2

Introduction to Heat

Lesson Overview:
Students will brainstorm ideas on what they know about heat.

Materials Needed:
- ❑ Photocopy or use the provided digital version of:
  - Heat Brainstorm activity

LESSON PLANS

Tea
1. E … ne
t … ded
t
2. A … s to share their answers. Use a rule where you don't allow repeat words; otherwise, the discussion will be ineffective.

QR CODE VOCABULARY

Your Task: Scan each QR code and match it with the word and meaning by cut and paste.

QR CODE	WORD and MEANING
1.	
2.	
3.	
4.	
5.	
6.	

INTERACTIVE LESSONS

QR CODE CUT AND PASTE

Your Task: Cut out each word and its meaning. Then, paste the word and meaning to the QR Code Vocabulary page.

Heat
Hot energy that is moved from one object to another.

Radiation
The transfer of heat by waves, like in a

…that

Gases that are trapped on and warm the earth. These gases are mostly carbon dioxide and methane.

Convection
Heat transfer between liquids and gases.

Temperature
Measures how much heat is in an object.

WHAT'S INSIDE?

ANSWER KEY

Heat Type	Examples of Heat Being Produced
Sunlight	
Friction	
Electrici	
Physical Activity	

GREEN ROOFS SAMPLE ANSWERS

What is a green roof?
A green roof, also known as a living roof or eco-roof, is a building feature with plants, such as grasses, wildflowers, shrubs, or even trees.

POSITIVES	NEGATIVES
• Helps the environment. The alive and thriving • Look of the green roof • You might hear less noise when you have a green roof because of the extra protection	• It can be expensive to install • It can be difficult to maintain. For example, cutting or trimming the grass or plants • The structure of the building might not be strong enough to sustain the weight of a green roof

ANSWER KEYS

THE PARTICLE THEORY

Matter is anything that has a ma
Particle Theory of Matter states
small particles. These tiny partic

Here are the main ideas behind

1. Particles have spaces betwe

Particles of a solid are so tightly
hardly move. Liquid particles hav
gas particles are really far apar

2. Particles are always moving.

Particles of matter are always
vibrate
they ha
and in a

3. Part

Particle
togethe
particles have the least attracti

4. Particles move faster when

If you apply heat, particles of m
differently. As they heat up, the
bump into each other, creating
eventually, they change state.

THE PARTICLE THEORY

Your Task: After reading The Particle Theory article, fill in the blanks with the correct words from the Word Bank below.

Word Bank				
atoms	solid	matter	gas	liquid

1. All _____ is made up of particles.
2. These tiny particles of matter are called
3. in all
4. Particles that form a rigid shape are in the form of a _____.
5. _____ particles have some space between them and less attraction.

MODIFIED LESSON CONTENT

SAMPLE LESSON OVERVIEW

LESSON #14A

Solar Panels Investigation

Lesson Overview:
Students will complete an inquiry on solar panels.

Materials Needed:
- ❑ Reliable technology (internet, computer, and projector)
- ❑ Photocopy or use the provided digital version:
  - Solar Panels Inquiry worksheet
  - Solar Panels reading
  - Solar Panel Notes graphic organizer
  - Solar Panels Information Sheet (optional)
  - My Thoughts on Solar Panels worksheet

Teacher Instructions:
1. Hand out the Solar Panels Inquiry worksheet, reading, graphic organizer, and My Thoughts on Solar Panels worksheet. Optional: depending on each student, you may also want to give them the provided Information Sheet to help with their research.
2. Tell students to follow the instructions on the inquiry sheet and use the provided graphic organizer to keep track of their ideas and research. The Information Sheet could be used here to help students organizetheir ideas on the graphic organizer.
3. My Thoughts on Solar Panels should be completed last and can be used to have a class discussion.
4. Use the provided rubric to help assess this project.

LESSON PLAN

SOLAR PANELS

Have you ever seen shiny panels on a roof? Those are called solar panels. They are like supercharged batteries that use sunlight to make electricity. Solar panels are made up of many smaller parts called solar cells. These cells soak up sunlight and turn it into electricity.

Solar panels are great because they are a clean energy source, which means they are better for the environment. They don't cause pollution, keeping the air clean and the Earth healthy.

Using solar panels also means you could save money on electricity because
rebates
becomin

There ar
from, su
of the e
can also

Plus, sol
electricit
sun is sh
cloudy o
panels w
to do is
are clea
dirt or le
soak up

SOLAR PANELS INQUIRY

Inquiry Question

Should my family install solar panels on my home?

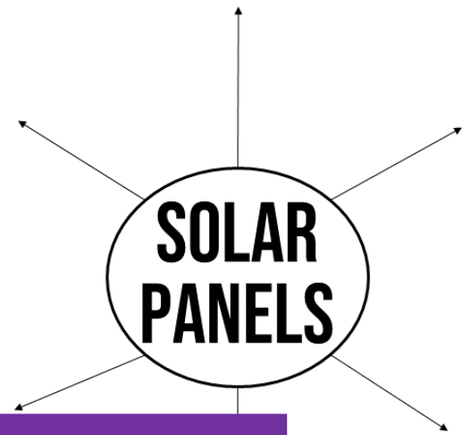
Watch	Watch the videos about Solar Panels: 1. Solar Energy – Science for Kids 2. Should You Go Solar? A Super Helpful Beginner's Guide to Home Solar Power
Read	Read the provided solar panels article.
Explain & Share	❑ Use the notes a ❑ Fill out workshe

SOLAR PANELS INFORMATION SHEET

Better for the environment
Could save money
Becoming more affordable to install
Many t
Gover

SOLAR PANEL NOTES

Write down key information that you learned about solar panels from your research.



GUIDED INQUIRY ACTIVITY

INTRODUCTION & LESSON 1

SCIENCE SAFETY RULES

1. LISTEN
- ✓ To ALL the teacher's ins
- ✓ Know the location of the

2. ATTIRE
- ✓ Wear safety goggles ar
- ✓ Tie up any loose items (
- ✓ W

3. RE
- ✓ Ar
  sy
- ✓ Th

4. TO
- ✓ Ha
- ✓ In
  there is a spill.
- ✓ Do not taste test any ite

5. CLEAN-UP
- ✓ Thoroughly wash all usec
- ✓ Wash hands with soap a

SAFETY RULES QUIZ

Name: _____

Complete the following true/false questions on safety:

1.	When you clean up, wash your hands with water.	T	F
2.	Before you begin, you must listen to ALL the teacher's	T	F
		T	F
		T	F
		T	F
		T	F
		T	F
7.	Handle all tools with care, especially sharp objects.	T	F
8.	Wear open-toe shoes and use gloves/goggles as needed.	T	F
9.	Read labels on chemicals used carefully (e.g. WHMIS symbols).	T	F
10.	Do not tell the teacher if there is a spill or if an item is broken/faulty.	T	F

QR CODE CUT AND PASTE

Your Task: Cut out each word and its meaning. Then, paste the word and meaning to the QR Code Vocabulary page.

Heat
d from one object
er.

on
y waves, like in a
r the sun.

ion
two objects that

ion
liquids and gases.

ture
eat is in an object.

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QR CODE VOCABULARY

Your Task: Scan each QR code and match it with the word and meaning by cut and paste.

QR CODE	WORD and MEANING
1.	
2.	
3.	
4.	
5.	
6.	

INTRODUCTION: SCIENCE SAFETY RULES

UNIT VOCABULARY

LESSON 2 & 3

LESSON #2

Introduction to Heat

Lesson Overview:
Students will brainstorm ideas

Materials Needed:
- ❑ Photocopy or use the provid
  - Heat Brainstorm activity

Teacher Instructions:
1. Explain the Heat Brainstorm top of the activity sheet. Tw to help students get starte
2. At the end, please take up t share words

HEAT BRAINSTORM ACTIVITY

What do you think of when the word "Heat" is said?
Brainstorm your ideas below.

sun

oven

INTRODUCTION TO HEAT

HEAT PRODUCTION

get heat from the sun and
produced in many ways,
and physical activities.

nd light for living things. It
ssible on the planet. Plants
d animals need plants for food
od. Without sunlight, there

reates heat
ut your hands
notice that

l particles come together and
eates electricity and heat at
mple of heat from electricity.
turning it on for a few
m.

fitness, or walking can also
, your muscles begin to work
uscles work, the more heat is
and moves it to all of your
body will have the same

HEAT PRODUCTION EXAMPLES

Your task: Draw lines to match the examples to each heat type.

Heat Type	Examples of Heat Being Produced
Sunlight	
Friction	Playing Sports
Electricity	Clothes Drying Outside
Physical Activity	Rubbing Your Hands Together

HEAT PRODUCTION

LESSON 4 & 5

HEAT VS. TEMPERATURE

Heat

Heat is thermal energy that is t
another. Heat is measured in jou

Temperature

Temperature measures the am
measu
the wo
Fahren

Did you
-
-
slower.

Important Temperatures:

- Room Temperature: 18°
- Water's Freezing Point: 0
- Water's Boiling Point: 10
- Average Body Temperat

HEAT & TEMPERATURE QUIZ

/4

Name: _____

Your Task: Read each statement. Then, circle whether the statement is true or false.

Sunlight is not an example of heat.	True/False
	False
100°C is the boiling point of water.	True/False
0°C is the freezing point of water.	True/False

HEAT AND TEMPERATURE

THE PARTICLE THEORY

nd takes up space. The
t all matter is made up of
f matter are called atoms.

particle theory:

hem.

ked together that they can
me space between them, and
m each other.

ng. Even particles of a solid
move around each other since
ve freely

stick
d gas
es.

r and behave
ove faster and faster and
space between them, and

THE PARTICLE THEORY

Your Task: After reading The Particle Theory article, fill in the blanks with the correct words from the Word Bank below.

Word Bank				
atoms	solid	matter	gas	liquid

1. All _____ is made up of particles.
2. These tiny particles of matter are called _____
3. _____ directions because th
4. Particles that form _____
5. _____ particles have some space between them and less attraction.

THE PARTICLE THEORY

LESSON 6 & 7

EFFECTS OF HEAT ON VOLUME

Heat affects the volume of dif
Thermal expansion is when the
when heated. Each object has it
expansion, depending on whethe

Volume of Solids

When a s
spaces b
the solid
temperat
even fas

Volume o

When a li
As liquid particles expand, their
reaches its **boiling point** (the te
gas), it turns into a liquid, which i

Volume of Gases

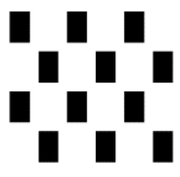
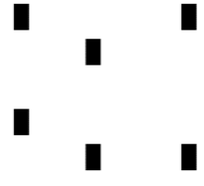
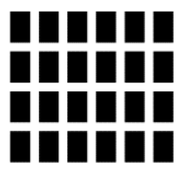
Gas particles move very fast a
them. When a gas is heated, its
which increases the volume of
However, if they are placed in c
will not expand, but they will inc

CUT AND PASTE NOTES

Your Task: Cut out the notes below and paste them under the correct state of matter on the Heat and Volume page.

• as their particles expand, their pressure and temperature.	• at melting point, it into a liquid.	• large spaces between particles, move further apart as heat is added, volume is greater.
	point it o a gas.	• becomes wider, so volume increases.

These are optional. You can use the images below or draw your own in the boxes on the Heat and Volume page.

HEAT AND VOLUME

CONDUCTION, CONVECTION, AND RADIATION

Heat is the transfer of energy from a hotter object to a colder object. The particles of objects with higher temperatures move faster than objects with lower temperatures. So, heat always flows from hotter items towards the colder items. Heat can be transferred in many ways, including conduction, convection, and radiation.

CONDUCTION, CONVECTION, AND RADIATION

Your Task: Label each diagram with the correct type of heat transfer.

Microwave Oven	Rubbing hands together	Ocean currents
		
_____	_____	_____
Pot cooking on stovetop		
		
_____		
Hot cup of coffee		
		
_____	_____	_____

CONDUCTION, CONVECTION, AND RADIATION

LESSON 8 & 9

LESSON #8

Bill Nye Video

Lesson Overview:
Students will review heat conce

Materials Needed:
- ❑ Reliable technology: compute
- ❑ Video: Bill Nye – Heat
  - Bill Nye the Science Guy
  - Bill Nye, The Science Guy
- ❑ Photocopy or use the provid
  - Bill Nye Heat True or Fal

NOTE: T
video st

Teacher
1. Sele
2. Hand
3. Watch the video as a class a
   worksheet answers as they
4. After the video, discuss the
   sheet.
5. At the end, take up the ans
   provided answer sheet to m
   concepts correctly.

© https://w

BILL NYE VIDEO

BILL NYE TRUE OR FALSE

Your Task: Read each statement. Then, circle whether the statement is true or false.

	True/False
	True/False
The more molecules, the more heat energy present.	True/False
Convection is when hot air rises and cooler air takes its place.	True/False
Cold objects do not have any heat.	True/False

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LESSON #9

Video Lab: Boiling Water in a Paper Cup

w heat is transferred to an
and radiation.

projector, speakers

a Paper Cup?
r Cup
per cup (You may need to read

zer (Optional to
discussion)

cup if placed

transfer
ner is used
he movement of water and
s used).
th water did not burn (e.g. the
per cup cannot burn as it did
predictions correct? Discuss.

do this in your classroom.

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BOILING WATER IN A PAPER CUP

VIDEO LAB: BOILING WATER IN A PAPER CUP

Your Task: Read and answ

What do you think will happen to a paper cup if it is put over a heat source without water inside the cup?	
What do you think will happen to a paper cup if it is put over a heat source with water inside the cup?	

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LESSON 10 & 11

LESSON #10

Lab: How To Melt An Ice Cube The Fastest

Teacher Instructions:

1. Students will need direct su
2. Hand out the Science Lab gr
   double-sided.
3. Describe each part students
   experiment will work. You m
   demonstration that student
   materials to each pair/indivi
   their own. Each container wi
   measure of each: salt, sugar
   used
   Boilin
4. Use
   that
   it pla
5. Make
   expe
   they
6. You
   minu
   boilin
7. Afte
   back
   discuss the results and sho
   time.

SCIENCE LAB

Hypothesis What will make the ice cube melt the fastest?	❑ Salt ❑ Sugar ❑ Boiling Water

Salt

r

Boiling Water

VIDEO LAB: HOW TO MELT ICE CUBES THE FASTEST

GOOD OR BAD?

Your Task: Label each diagram with the words **GOOD** or **BAD** to show bad or good actions that help our planet fight global warming.

Tree cutting _____	Turning off lights _____	Ocean currents change _____
Fossil fuels/Factories _____	Walking ins _____	 _____
Using wind energy _____	Farming _____	Planting trees _____

GLOBAL WARMING

n heat from the sun.
rface, and at night, it
nt heater for our planet.

un's rays are reflected or
. When **reflected**, they bounce
now, oceans, roofs, and other
, they stay and warm up the

le on Earth, but the heat does
cks, rivers, and sea heat up,
ng the
sed, it will

m the sun.

f sunlight from Earth to

aked up by the Earth, like

GLOBAL WARMING

LESSON 12 & 13

GREEN ROOFS

A green roof, also known as a living roof or eco-roof, is a building feature with plants, such as grasses, wildflowers, shrubs, or even trees. This vegetation (plants) can be on any building, including a house.

Having this vegetation helps th
soaks up extra carbon dioxide
supports wildlife that can thri
temperatures within the hous

Rain or snow keeps the roof a
green r
difficult
or plant

Dependi
less nois
protecti
structure of the building migh
the weight of a green roof.

Positives of Green Roofs
✓ They help the environmen
✓ They support wildlife.
✓ They improve the temperature of the building.
✓ They look nice.
✓ They provide extra protection against noise.

GREEN ROOFS INQUIRY

Your Task: For this assignment, you will create a slideshow describing the negatives and positives of green roofs.

help you stay organized and on task.
o help you form your slideshow.

	Slide 2: ❑ Title: Positives of Green Roofs ❑ List 2 or 3 positive things that green roofs can do for the environment. ❑ Include at least one image that shows one of the positive things you listed.
Slide 3: ❑ Title: Negatives of Green Roofs ❑ List 1 or 2 negative things about green roofs. ❑ Include at least one image that shows one of the negative things you listed.	Slide 4: ❑ Title: My Thoughts on Green Roofs ❑ In one or two sentences, describe whether you think green roofs are a good idea or bad idea. ❑ Feel free to add more photos of green roofs if you would like.

Slideshow "Green Roofs - Positives and Negatives"
❑ Add your name.
❑ Choose photos of green roofs. You can use Google search images to help you find pictures to use.

GLOBAL WARMING

NUCLEAR ENERGY INQUIRY

Inquiry Questions

1. What is nuclear energy?
2. What are some positives and negatives of nuclear
s a good thing or bad thing?

ps about Nuclear Energy:
rgy – Science for Kids
rgy Pro's and Con's
rgy Explained: Risk or

ear

er on Nuclear
the cut-and-paste answers
ar Energy Notes sheet.
My Thoughts on Nuclear Energy"

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MY THOUGHTS ON NUCLEAR ENERGY

After all your research, what do you think about nuclear energy?

Is it a good thing or a bad thing? Explain in 1 or 2 sentences.

Check one answer only. Use the lines below to explain why you chose that answer.

❑ GOOD THIN

❑ BAD THING

I chose this

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

BENEFITS OF TECHNOLOGIES WITH HEAT

LESSON 14A & 14B

SOLAR PANELS

Have you ever seen shiny panels on a roof? Those are called solar panels. They are like supercharged batteries that use sunlight to make electricity. So
smaller parts called solar cells
turn it into electricity.

Solar panels are great becaus
which means they are better
cause pollution, keeping the air

Using solar panels also means
because there are no delivery
rebates might be offered, wh
becoming more affordable to

There
from
of the
can al

Plus, s
electricity as long as the sun is shining. Even on cloudy or rainy days, solar panels work! All you need to do is make sure they are clean and free from dirt or leaves so they can soak up the sunlight.

SOLAR PANELS INQUIRY

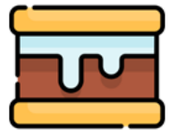
Inquiry Question

Should my family install solar panels on my home?

Watch	Watch the videos about Solar Panels: 1. Solar Energy – Science for Kids 2. Should You Go Solar? A Super Helpful Solar Power
	s article.
Explain & Share	❑ Use the graphic organizer to jot down any notes as you research this topic. ❑ Fill out the "My Thoughts on Solar Energy" worksheet.

SOLAR PANELS: INVESTIGATION

SCIENCE LAB: CREATING A SOLAR OVEN



r oven to cook s'mores.

out the first page of your Solar

wed by your teacher, you may
xperiment.
e sure you follow the procedure.
ow long it took for your s'mores
dling!
sults section, please answer the

the s'more?

not.
Explain.
the data
Be sure to

e due date.

zza box, Amazon box, cereal box,

c wrap, mirror, take-out tin

s, paper, glue, etc.
hermometer, stop-watch, etc.

SOLAR OVEN LAB

Hypothesis What do you think will happen in your lab?	
Materials: List all of the materials that you used to create your solar oven.	
Procedure List all of the steps that you will take to complete this lab.	

CREATING A SOLAR OVEN LAB

LESSON 15

UNIT TEST /10

Name: _____ Class: _____

Multiple Choice: Select the correct answer among the given options.

1. Which unit of measurement is used to measure heat?
a) Celsius
b) Fahrenheit
c) Joules
d) Watts

2. Temperature measures _____.
a) The amount of heat of an object's particles.
b) The amount of heat that is transferred.
c) The amount of thermal energy that is diluted.
d) The amount of matter in a particle.

HEAT UNIT TEST

c) 37.5°C
d) 100°C

4. Which state of matter has the most space in between its particles?
a) Solid
b) Liquid
c) Gas
d) Plasma

5. Movement from a hotter area to a colder area is known as:
a) Insulator
b) Convection
c) Radiation
d) Conduction

LESSON FORMATS

PDF

✓ Individual & Whole Unit

DIGITAL

✓ Google Slides

RESOURCE CAN BE USED IN-PERSON OR ONLINE