Name: _____ Mr. Gazer

Heat and Temperature Assignment:
A Hiking and Camping Adventure!

Mr. Gazer loves to hike and camp in the mountains.
He knows that understanding heat and temperature is crucial to staying safe out in the wild. In this assignment, you will apply all of the things that you've learned in this unit to explore and analyse various aspects of hiking and camping and their relationship to heat and temperature.

Do you have what it takes to survive in the mountains?

This activity has **4 parts**:

- ☐ **Part 1:** Hiking into the Mountains
- ☐ **Part 2:** Cooking in the Mountains
- ☐ **Part 3**: Relaxing in the Mountains
- ☐ **Part 4:** Sleeping in the Mountains

Part 1: Hiking into the Mountains

For our adventure, we will be hiking into and camping at **Fryatt Valley** in **Jasper National Park** here in Alberta. This hike will take us roughly **6-7 hours**, and requires hiking a **24 km** long trail up into the mountains with a gain in **elevation** of almost **2 km!**

1. **Solar Radiation (Sunlight).** The weather is **hot** and **sunny** along the way and we want to make sure that we are protected from the Sun.

List **3 things** that you could do to **protect yourself** from the powerful **solar radiation:**

- _____
- _____
- _____

Choose **one** of the above ways you listed and **explain how** it protects you from solar radiation. After writing your explanation, **draw a picture** that supports your explanation.

Picture	Explanation
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One way that we could protect ourselves from solar radiation is to **wear sunglasses**. Sunglasses have a **thin**, **shiny layer** on the outside of the lenses. The purpose of this shiny later is to:

a. Absorb sunlight

b. Conduct heat

c. Reflect sunlight

2. Sweating. Hiking is hard work, and often makes you **sweat**!

Why does our body produce sweat when we're hot or exercising a lot?

a. To warm us up

b. To make us more slippery

c. To cool us down

d. To reflect more light from the Sun

Fill in the blanks.

Sweating makes us _____ because when our warm bodies transfer heat to the sweat, the sweat _____, taking heat away with it. As a result, our skin is at a _____ temperature than before. This process is called evaporative _____.

Sometimes when Mr. Gazer is really hot while hiking, he will dunk his face in a nearby river or pour some water over his head.

Why do you think he does this? Explain and use scientific language when possible.

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Part 2: Cooking in the Mountains

1. **Cooking Over a Wood Fire.** One way to cook our dinner is to build a fire using natural materials in the forest like sticks and wood. One method of starting a fire with these natural materials is by using **friction**. Sometimes this is called a **friction fire**.

   The following image shows a friction fire being made, by rapidly spinning the end of a pointed stick on another piece of wood:

   What is happening to the speed of the wood particles' vibration as the stick is being spun? **Circle the correct answer**.

   a. The wood particles are vibrating more slowly

   b. The wood particles are vibrating the same as before

   c. The wood particles are vibrating more quickly

2. **Cooking Over a Small Stove**. Another way to cook your food is by bringing a small stove. It must be small enough to fit into your backpack and not take up too much space!

Here is what my small stove looks like:

Inside the tank is a **liquid fuel** called “isopropane”. When we let the fuel escape the tank through the top hole, it turns into a **gas**.

What is this process called? Circle the correct answer.

a. Condensation

b. Sublimation

c. Evaporation

d. Solidification (freezing)

Why do you think the fuel tank <u>feels cold</u> after we've been cooking with it for a few minutes? **Be specific and use scientific language when possible.** (*Hint: see the "Sweating" question from page 2*)

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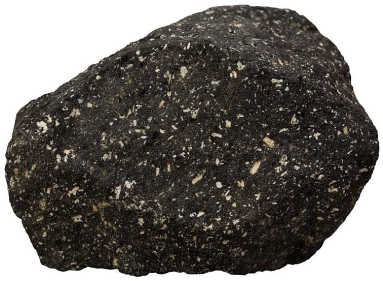
Let's **boil some water** to cook some pasta noodles. In the image below, **label** the **three types of energy transfer** that we learned about in class and **draw an arrow to where they are happening**.

Part 3: Relaxing in the Mountains

Now that we've made it to our camp, and cooked some food, it's time to sit around our campfire to relax, keep warm, and chat with our friends.

1. **Campfire Radiation.** One of our friends left some items *near* the campfire - close enough to "feel" the **radiation** from the fire, but not close enough to actually get burned.

   Which **one** of the following items do you think would be **the warmest after** sitting near the campfire? Which do you think would be the **coolest?** Explain your answer and **be specific, using scientific language.**



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2. **Fire Pits.** Typically, we build a fire inside a **fire pit** to prevent the fire from spreading**.** A **fire pit** consists of some **rocks** that are put in the shape of a circle. Since the rocks are close to the fire, they end up becoming fairly **hot**. Here is a fire pit that Mr. Gazer built this past year (he also built the bench!):

If you put your hand on a hot rock and burned yourself, it is because **heat transferred from the rock to your hand by**:

a. Convection

b. Conduction

c. Radiation

Mr. Gazer left his **axe** (for chopping wood) on the hot rocks of the fire pit. What part of the axe would be the **hottest after a few minutes**?

a. The **handle** because wood is a good **conductor** of heat

b. The **axe-head** because metal is a good **insulator** of heat

c. The **handle** because wood is a good **insulator** of heat

d. The **axe-head** because metal is a good **conductor** of heat

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Part 4: Sleeping in the Mountains

1. **Sleeping Mats and Sleeping Bags.** It gets **cold** in the mountains at **night**! Even in the summer the temperature can drop to near 0°C. Sleeping in a **tent** prevents the wind from making you cold, and the **body heat** from people sleeping in the tent warms it. Inside the tent, we sleep in a **sleeping bag** that is on a **sleeping mat**. The **sleeping mat** goes between the ground and your sleeping bag.

Why do you think we put a **sleeping mat** between us and the ground?

a. The mat is a **good insulator** and **slows the transfer of heat** from you to the cold ground, keeping you warm

b. The mat is a **good conductor** and **encourages the transfer of heat** from you to the cold ground, keeping you cold

c. The mat is **simply for extra comfort** and serves no other purpose

Sleeping <u>mats</u> are typically made of **foam** or are **inflatable** (you blow air into them). **Why** do you think sleeping mats are made of **foam** or are **inflatable**?

a. Air is a **good conductor** of heat and so the mat **prevents heat loss**

b. Air is a **good insulator** of heat and so the mat **prevents heat loss**

c. Foam and air are cheap

Sleeping <u>bags</u> can be filled with different materials to keep you warn inside. The **warmest** sleeping bags use “down feathers”, the **fine feathers found underneath the outer feathers of birds.** These feathers “puff up” a lot and trap **lots of air bubbles between them**.

Why are down feathers **so good** at **keeping you warm** in a sleeping bag? **Be specific and use scientific language when possible.**

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2. Emergency Blankets. Mr. Gazer always brings an **emergency kit** with him when he hikes and camps. In his kit, he has things like matches, some granola bars, a first-aid kit, and (among other things) an **emergency blanket**. An emergency blanket is made of a **thin, shiny material** that you wrap around yourself if you're really cold.

How does an emergency blanket keep you warm? **Be specific and use scientific language when possible.**

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