Name: _____ **Date:** _____

Frozen 2: Elsa's Kingdom Heat Transfer Quest for 2nd Grade

Molecular movement, insulation design, and energy flow — high-level synthesis challenges requiring students to predict and create solutions for thermal energy problems.

---

1. You are building a winter coat for a penguin. Which material would be the BEST choice to keep the penguin's body heat from escaping into the cold air?

A. A thin sheet of flat aluminum foil
B. Thick, fluffy wool with lots of trapped air
C. Wet sand from the bottom of the ocean
D. Smooth, heavy purple rocks

2. Imagine you have two cups of cocoa. Cup A is very hot, and Cup B is lukewarm. If you pour them into one big bowl, the thermal energy will move from ____.

A. The cold bowl into the hot cocoa
B. The lukewarm cocoa into the hot cocoa
C. The hot cocoa into the lukewarm cocoa
D. Nowhere, because they are both liquids

3. True or False: If you leave a metal slide in the sun, it gets hotter than a plastic slide because metal lets heat travel through it more easily.

A. True
B. False

4. If you hold a cold ice cube in your hand, your hand starts to feel very cold. What is actually happening to the energy?

A. Coldness is moving from the ice into your skin
B. Heat energy is leaving your hand and moving into the ice
C. The ice is creating new energy to freeze your thumb
D. Nothing is moving, your hand is just imagining it

5. You are designing a 'Cool Box' for a picnic. To keep the drinks cold for the longest time, the inside of the box should be lined with ____.

A. Styrofoam or thick foam
B. Metal copper plating
C. Clear glass windows
D. A layer of warm water

6. True or False: Rubbing your hands together very fast creates heat because the friction makes the tiny particles in your skin move faster.

A. True

B. False

7. A scientist finds a way to make the particles in a block of wood stop moving completely. What would the temperature of that wood be?

A. Boiling hot
B. Exactly room temperature
C. As cold as it can possibly be
D. Zero degrees Fahrenheit

8. On a sunny day, why does a black t-shirt feel much hotter than a white t-shirt? It is because the black color ____.

A. Reflects the sun's light away
B. Absorbs more light energy and turns it into heat
C. Makes the wind blow harder
D. Is much heavier than the white shirt

9. You see steam rising from a puddle of water on a hot sidewalk. What is happening to the energy in this system?

A. The sidewalk is taking energy from the steam
B. The water is losing energy and turning into ice
C. Heat from the sidewalk is moving into the water particles
D. Energy is being destroyed and disappearing

10. True or False: If you put a hot potato in a cold room, the potato will eventually become the exact same temperature as the air in the room.

A. True
B. False