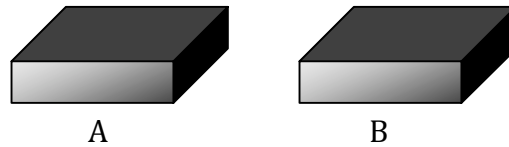


## The Black Blocks Problem

The figure below shows two black blocks, A and B. These blocks look the same but Block A is made of metal and Block B is made of plastic. If you put a piece of ice on a both blocks at the same time the ice on block A melts much faster. Try it and see!



This observation raises an interesting question: ***Why does ice melt faster on block A?*** Here are three possible answers...

**Explanation #1:** The ice melts faster on Block A because metal absorbs cold. Block A absorbs cold from the ice which causes the ice to get warmer and melt. This is why Block A feels colder than block B; it absorbs and holds more cold energy.

**Explanation #2:** The ice melts faster on Block A because block A is a good conductor of heat. Although both blocks are the same temperature, heat energy transfers into the ice from Block A faster than it does from Block B. As a result, the ice on Block A melts faster.

**Explanation #3:** The ice melts faster on block A because block A is a good conductor. Although block A is colder than block B it is still warmer than the ice. As cold moves into block A the ice warms up and melts. The ice on block A melts faster because the cold moves from the ice into this block faster.

With your group, determine which explanation provides the best answer to the research question. You can use as any of the supplies available to you to test your ideas. Make sure that you generate the evidence you will need to support your explanation as you work. You can record any observation you make in the space below.

1. *What is your argument?* In the space below, use appropriate evidence and reasoning to support the explanation that you think is the most valid or acceptable.

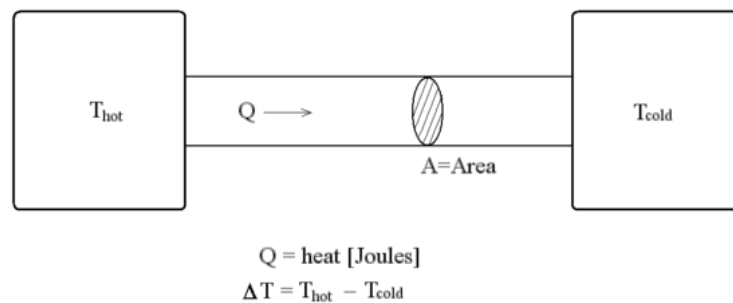
2. *What is your counter-argument?* In the space below generate a scientific argument that includes appropriate evidence and reasoning to challenge the validity of the other two explanations.

## Some potentially relevant information about this problem

The **molecular-kinetic theory of matter** indicates that all matter is made up of submicroscopic particles called atoms. This theory states:

- Atoms are constantly in motion so they have **kinetic energy**.
- The more kinetic energy an atom has the faster it vibrates or moves.
- **Temperature** is a measurement of the **average kinetic energy** of all the particles in an object.
- The motion of the particles that make up an object increases when the temperature of the object goes up.
- The motion of the particles that make up an object decreases when the temperature of an object goes down.
- **Heat** is the **total kinetic energy** of all the particles in an object *or* the **transfer of kinetic energy** from the particles in one object to another.

**Heat conduction** or **thermal conduction** is the transfer of thermal energy through matter from a region of higher temperature to a region of lower temperature. This process acts to equalize temperature differences.



Some objects are able to conduct heat better than others. This is called the thermal conductivity of a material. A table of the conductivity values of some different materials is provided below:

Material	Thermal conductivity (W/m·K)
Cement	0.29
Air	0.025
Water (liquid)	0.6
Glass	1.1
Aluminum	200
Gold	318
Copper	380
Plastic	0.16