Snowman

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1. Introduction

This exercise was adapted from:
Jonathan Osbome, Sibel Erduran, Shirley Simon, *Ideas, Evidence & Argument in Science* (IDEAS), King's College London, 2004, pp. 50-55, https://www.stem.org.uk/elibrary/collection/3308
https://www.stem.org.uk/resources/elibrary/resource/28125/ideas-resources

It asks the students to determine which snowman - one wearing a coat or the other one not wearing a coat - will melt first, by building evidence-based argumentations. Section 2 presents the inquiry and Section 3 presents the corresponding argumentation developed with the sInvestigator system.

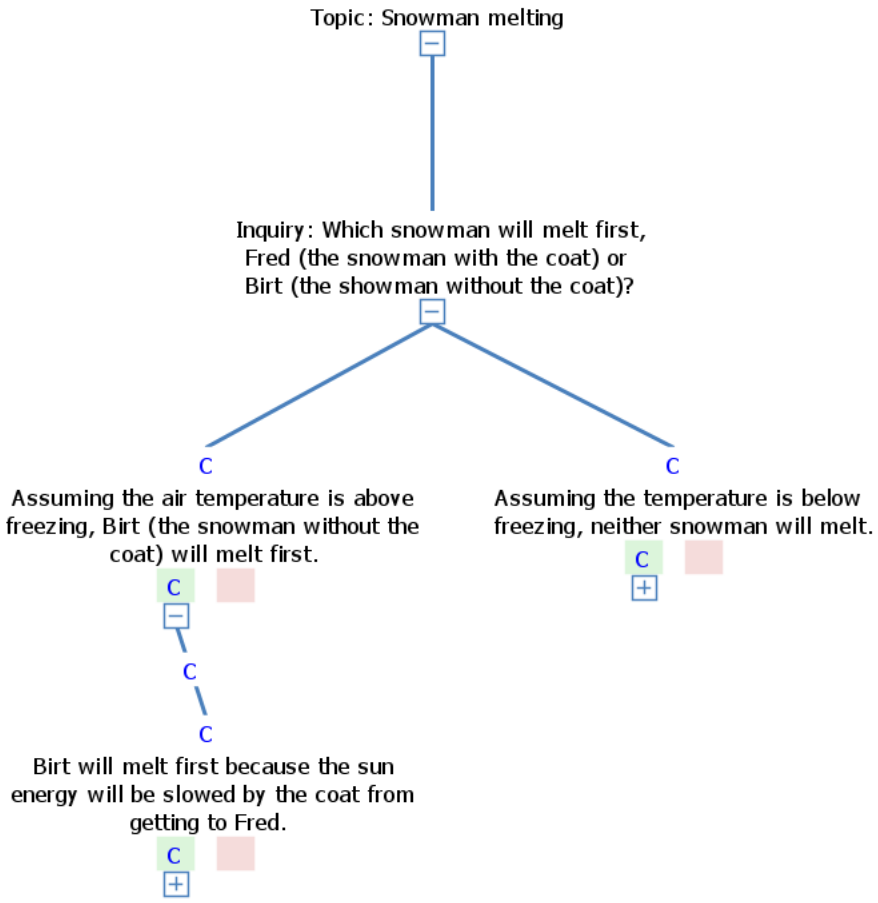
sInvestigator may be downloaded from http://lac.gmu.edu/sInvestigator/

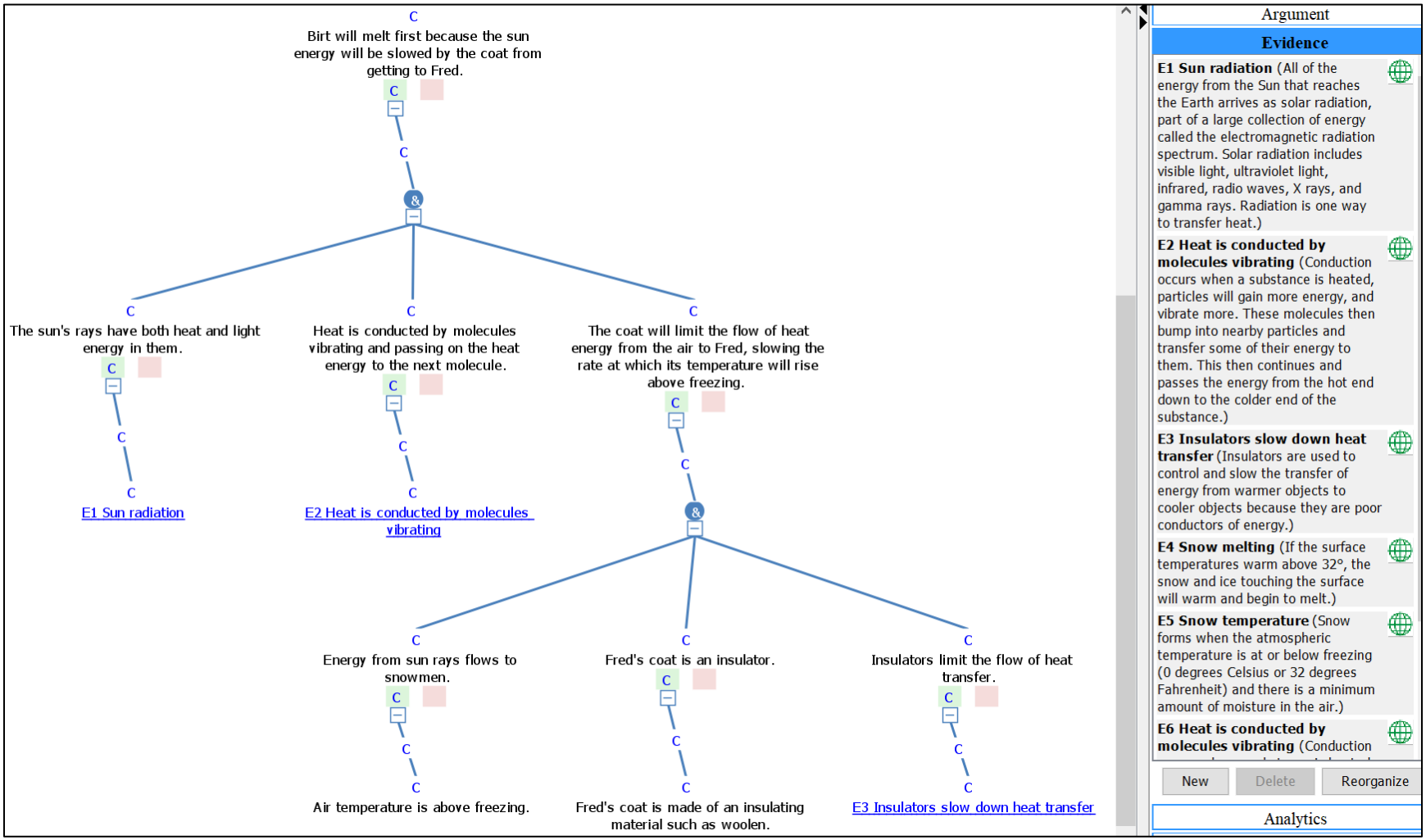
The knowledge base containing the argumentation may be downloaded from http://lac.gmu.edu/sInvestigator/CaseStudies.html

2. Inquiry

Which snowman will melt first, Fred (the snowman with the coat) or Birt (the showman without the coat)?

3. Analysis


Topic: Snowman melting
Inquiry: Which snowman will melt first, Fred (the snowman with the coat) or Birt (the showman without the coat)?
C
Assuming the air temperature is above freezing, Birt (the snowman without the coat) will melt first.
C
C
Birt will melt first because the sun energy will be slowed by the coat from getting to Fred.
C
C
Assuming the temperature is below freezing, neither snowman will melt.
C



Argument

Evidence

E1 Sun radiation (All of the energy from the Sun that reaches the Earth arrives as solar radiation, part of a large collection of energy called the electromagnetic radiation spectrum. Solar radiation includes visible light, ultraviolet light, infrared, radio waves, X rays, and gamma rays. Radiation is one way to transfer heat.)

E2 Heat is conducted by molecules vibrating (Conduction occurs when a substance is heated, particles will gain more energy, and vibrate more. These molecules then bump into nearby particles and transfer some of their energy to them. This then continues and passes the energy from the hot end down to the colder end of the substance.)

E3 Insulators slow down heat transfer (Insulators are used to control and slow the transfer of energy from warmer objects to cooler objects because they are poor conductors of energy.)

E4 Snow melting (If the surface temperatures warm above 32°, the snow and ice touching the surface will warm and begin to melt.)

E5 Snow temperature (Snow forms when the atmospheric temperature is at or below freezing (0 degrees Celsius or 32 degrees Fahrenheit) and there is a minimum amount of moisture in the air.)

E6 Heat is conducted by molecules vibrating (Conduction

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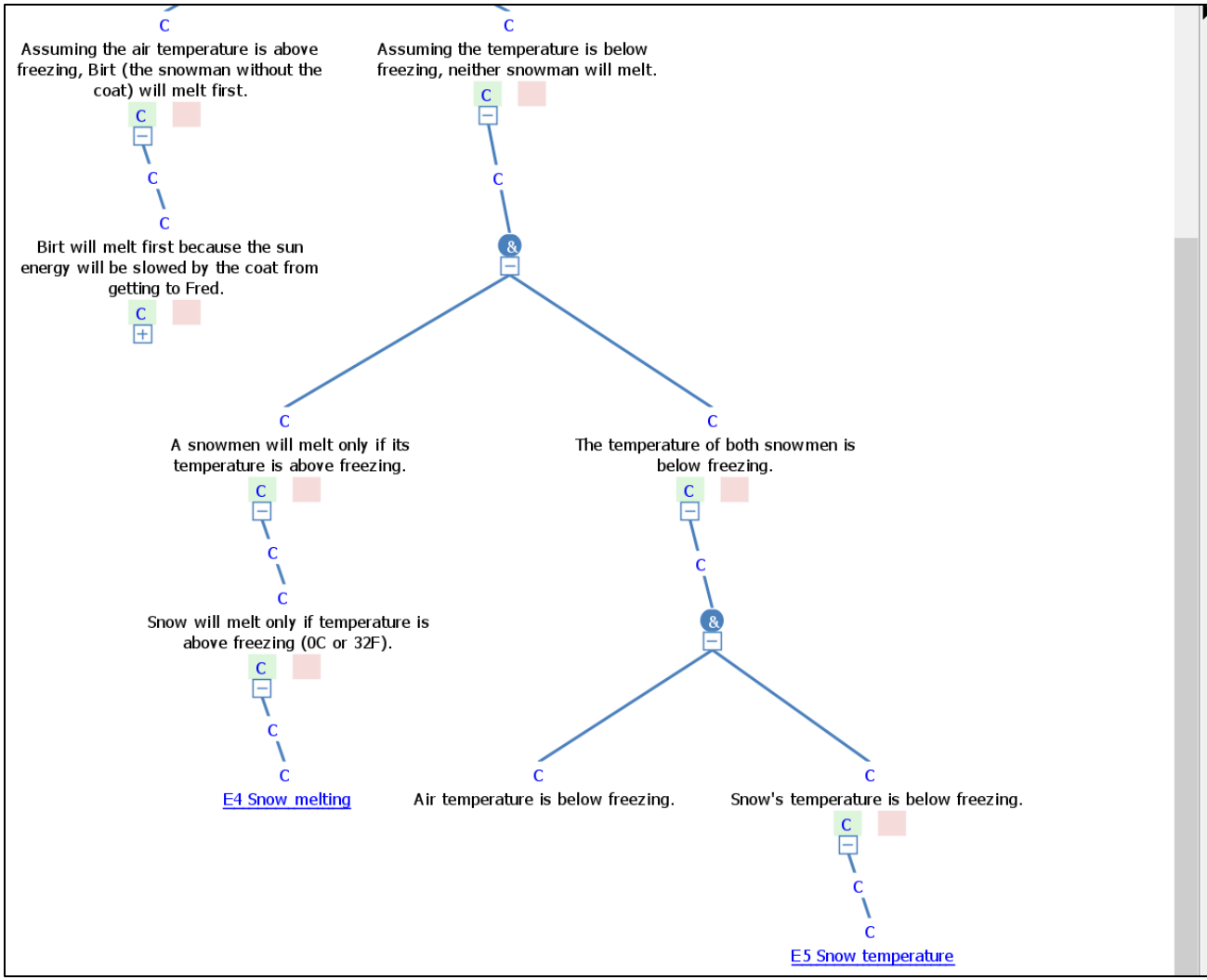
Analytics



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Analytics