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| **NAME:** | Click here to enter name. |

**A115 – Birth & Death of the Universe**

**Exploration 4: Temperature**

**Due by 11:59 PM on Friday, Feb. 8. Late assignments one point.**

**Enter your answers on this form and submit it via the Canvas assignment tool**

**Learning Goals:** Students should be able to:

* Describe how an object's thermal emission spectrum depends on temperature.
* Explain how temperature can be measured using the color of an astronomical source.
* Explain now astronomers can determine the temperature of astronomical objects using Wien's Law.

**What to Submit**:

* Submit this worksheet online using the Canvas assignment.  Be sure to answer all questions in Parts 1, 2, and 3.

**Getting Started***:* Review section 5.1 in the text and watch the video in Unit 2 about infrared light.

**Part 1 – Thermal Spectra**

* 1. How does the total energy emitted (the area under the curve) change with temperature?

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* 1. How does the wavelength at which the most light is emitted change with temperature?

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**Part 2 – The Star Cluster Messier 47**

* 1. Examine the dozen or so brightest stars in the cluster. What range of color do you see?

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* 1. Compare the colors of Star A and Star B. Based on their color, which star is hotter, and why?

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**Part 3: Estimating Temperature from Peak Wavelengths**

The Sun is the brightest in green light, about 500 nanometers. Use Wien’s Law to estimate the temperature of the Sun’s outer layers. Describe how you calculate the temperature.

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* 1. A microwave telescope “sees” microwave light coming from all directions in the sky. This microwave signal is fairly strong, accounting for about 1% of the “noise” detected by a television antenna set “off channel.” The microwave emission is brightest at a wavelength of 1 x 106 nanometers.  From Wien’s law, estimate the temperature of the source of the microwave emission.

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