Exercise walk-through

# 15.4
# Blackbody Radiation

AP Physics 2

# You must be able to

- describe the continuous spectrum emitted by a hot **blackbody**
- state that the peak wavelength shifts shorter as temperature rises (**Wien's law** )
- explain how blackbody radiation motivated the idea of **energy quantization**

# 1 The method

# Method — A blackbody

A hot object emits a **continuous** spectrum of all wavelengths, with a peak that depends on temperature.

# Exercises 2.1·2.3

**2.1** State what happens to the peak wavelength of a blackbody as it gets hotter. [1]

**2.2** State the type of spectrum emitted by a hot solid. [1]

**2.3** State why blackbody radiation was historically important. [1]

# Exercises 2.1·2.3

**2.1** State what happens to the peak wavelength of a blackbody as it gets hotter. [1]

**2.1**

- it gets shorter

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**2.2** State the type of spectrum emitted by a hot solid. [1]

**2.2**

- a continuous spectrum

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**2.3** State why blackbody radiation was historically important. [1]

**2.3**

- it could not be explained by classical physics and led to the idea of energy quanta

# Exercises 3.1·3.2

**3.1** As a blackbody gets hotter, its peak wavelength [1]

- ☐ **A** increases
- **B** decreases
- **C** stays the same
- **D** disappears

**3.2** A hotter star appears more [1]

- ☐ **A** red
- **B** blue
- **C** green
- **D** infrared

# Exercises 3.1·3.2

**3.1** As a blackbody gets hotter, its peak wavelength [1]

- ☐ **A** increases
- **B** decreases
- **C** stays the same
- **D** disappears

**3.1 B**

- decreases.

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**3.2** A hotter star appears more [1]

- ☐ **A** red
- **B** blue
- **C** green
- **D** infrared

**3.2 B**

- blue.

# Exercise 3.3 (a)

**3.3** Star A glows red and star B glows blue-white.

(a) State which star is hotter. [1]

# Exercise 3.3 (a)

**3.3** Star A glows red and star B glows blue-white.

(a) State which star is hotter. [1]

(a)

- star B (blue-white)

# Exercise 3.3 (b)

**3.3** Star A glows red and star B glows blue-white.

(b) Explain your answer using the idea of peak wavelength. [2]

# Exercise 3.3 (b)

**3.3** Star A glows red and star B glows blue-white.

(b) Explain your answer using the idea of peak wavelength. [2]

(b)

- a shorter peak wavelength (bluer) means a higher temperature, by Wien's law