

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
-

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

2.2

- a continuous spectrum
-

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

☐

A red

B blue

C green

D infrared

3.2 A hotter star appears more

[1]

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.

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]

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(a) State which star is hotter.

[1]

(a)

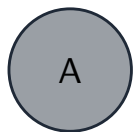
- star B (blue-white)

Exercise 3.3 (b)

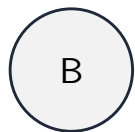
3.3 Star A glows red and star B glows blue-white.

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

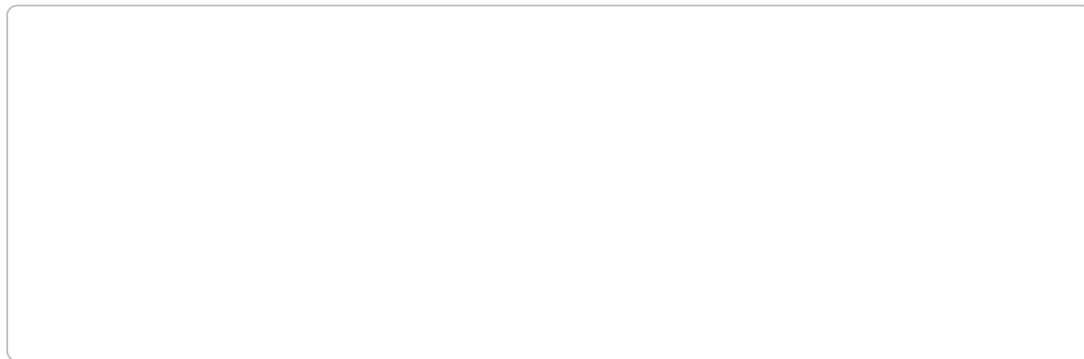
[2]



red



blue-white

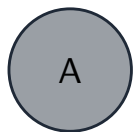
A large, empty rectangular box with a thin gray border, intended for the student to write their explanation.

Exercise 3.3 (b)

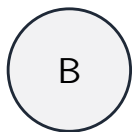
3.3 Star A glows red and star B glows blue-white.

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

[2]



red



blue-white

(b)

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