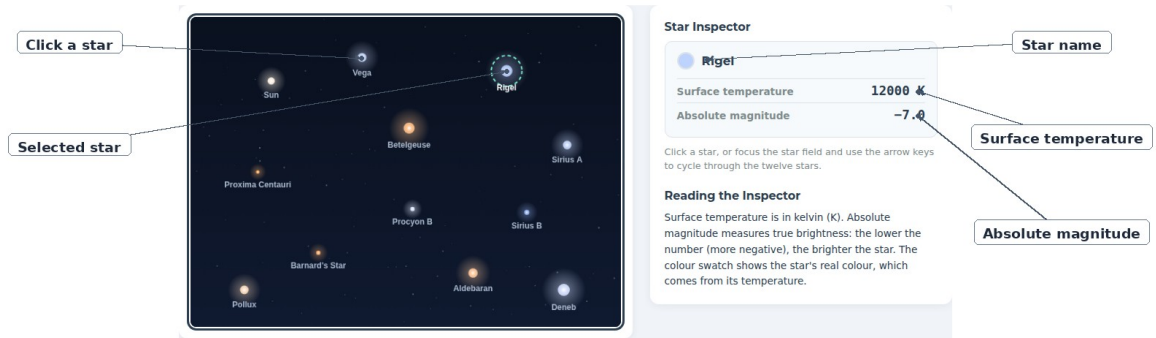


Investigating the Hertzsprung–Russell Diagram

Star Temperature and Brightness

Aim:

You are investigating whether hotter stars are always brighter.



Method:

1. Click a star in the star field (or focus the star field and use the arrow keys) to select it.
2. Read its Surface temperature and Absolute magnitude from the Star Inspector, and record them, with the star's name, in your results table.
3. Select a new star and repeat, until all twelve stars are recorded.

Prediction:

Before you plot your diagram, do you predict that every hot star will be brighter (have a lower magnitude) than every cool star?

Now plot your diagram to test your prediction.

Results:

Star	Surface temperature (K)	Absolute magnitude

Analysis:

On graph paper, plot each star as a labelled point with surface temperature on the horizontal axis (highest temperature on the left) and absolute magnitude on the vertical axis (lowest, i.e. brightest, magnitude at the top). Do the twelve points scatter at random, or do they gather into distinct groups?

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How many groups can you see, and which stars belong to each one? Does the largest group form a line or band across your diagram?

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Pick out one star that is hot but dim, and one that is cool but bright. What does each of them do to the claim that hotter stars are always brighter?

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Explaining why:

Sirius A and Sirius B orbit each other, so they are the same distance from us — yet their absolute magnitudes are enormously different. What must be different about the two stars themselves?

Betelgeuse and Proxima Centauri have similar temperatures but sit at opposite ends of your brightness axis. What does that suggest about their sizes?

Which group on your diagram does the Sun belong to? Using what you know about the life cycle of a star like the Sun, mark on your diagram roughly where it may sit in the far future.

Write one sentence answering the aim: are hotter stars always brighter? Quote two stars from your diagram as evidence.
