

Name: \_\_\_\_\_

Date: \_\_\_\_\_



## Speed and Velocity Worksheets

1. Stars can be treated as black-body radiators, so that their temperatures can be approximated from their spectra. The star Betelgeuse has a 2-800 nm. What is the temperature of Betelgeuse, in degrees Celsius?  
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2. Given that Betelgeuse has a radius of  $4.524 \times 10^8$  m, how much power is emitted from Betelgeuse?  
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3. A pool cue ball has a mass of 170 g. Assume that the position of the ball is known with an uncertainty of the width of a hydrogen atom, about 1.20 Å. What is the minimum uncertainty in its velocity?  
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4. What is the minimum temperature at which a black body can be for its to be in the visible spectrum (400-700 nm)? 9. Explain briefly, in your own words, what is meant by "the ultraviolet catastrophe."  
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5. Repeat the calculation, but this time with an electron, which has a mass of  $9.11 \times 10^{-31}$  kg. Does the uncertainty in the velocity become significant?  
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6. What is the de Broglie wavelength for the cue ball moving at a leisurely speed of 1 m/s?  
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7. What is the de Broglie wavelength of an electron moving at the not-so-leisurely speed of 100 km/s?  
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8. What is the de Broglie wavelength of a 70-kg person jogging at 2.5 m/s?  
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