The Doppler Shift Formula is:

$$\Delta\lambda/\lambda = v/c$$

$c$ = the speed of light = $3.0 \times 10^8$ m/s or 300,000 km/s.
$v$ = the radial velocity of the object (negative if toward the observer).
$\lambda$ = The rest wavelength of the spectral line at which you are looking.
$\Delta\lambda = \lambda_{\rm obs} - \lambda_{\rm rest}$, where
$\Delta\lambda$ is the (usually small) change in wavelength of the spectral feature due to motion.
($\lambda_{\rm obs}$ = the observed (shifted) wavelength, and $\lambda_{\rm rest}$ = the zero-velocity laboratory wavelength.
1 nm = $10^{-9}$ m = 10 Å.
1 Å = $10^{-10}$ m.

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Example: If a star is coming toward you at 5 km/s, what is the Doppler shift for a line in the visible (500 nm)?

Solution: First, since the object is coming toward us, there will be a blueshift, and we need a negative sign for the velocity: $v = -5$ km/s. Second, we plug into the formula.

$$\Delta\lambda/(500 \text{ nm}) = (-5 \text{ km/s})/(300000 \text{ km/s})$$

The answer cranks out as $\Delta\lambda = -0.008$ nm. ($= -0.08$Å.)

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Example: Suppose you observe a star through a spectroscope and see a line due to iron at 527.05 nm. This line is normally (in the lab) seen at 527.00 nm. How fast is this star receeding?

Solution: First, $\Delta\lambda = 0.05$ nm. Right? Right. So we plug into the formula:

$$(+0.05 \text{ nm})/(527 \text{ nm}) = (v \text{ in km/s})/(3.0 \times 10^5 \text{ km/s})$$

And we find $v = 28.5$ km/s.

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Problem: A galaxy's H$\beta$ line (normally at 486 nm) is observed to have shifted 1.62 nm redder. How fast is this galaxy receeding from us?

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Problem: An expanding spherical supernova blast wave is expanding at 2000 km/s away from the explosion center. Since the shell is transparent one can see both the side coming toward and the side going away. What are the two wavelengths between which the Oxygen line ($\lambda$5007 Å) appears?
Answer: $\Delta\lambda = 33.4$Å from the formula, so the two bracketing wavelengths are plus and minus this amount from 5007Å: 4974Å and 5040Å.