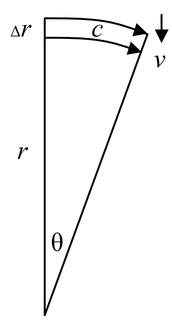
Derivations That Assume The Speed Of Light Is Not An Absolute Constant
by Eugene Preston, March 2010

1) <u>hypothesis</u> – the speed of light c_m is a measured constant even when c is not constant.
$c_m = d_m / t_m$ where m denotes a local measured value (such as near the sun as the Earth observer watches)
c_m = locally measured speed of light as a stationary observer approaches a large mass (such as the sun)
d_m = locally measured meters path length as a stationary observer approaches a large mass
t_m = locally generated clock seconds as a stationary observer approaches a large mass

If both d and t are affected in a proportion p, then $c = pd_m / pt_m = d_m / t_m = c_m$ and c_m is always the same numerical value of 3e8 m/s for the local observer making the measurements. However, the external Earth observer can see the effects of p. For example, radar echos going past the sun from Venus are delayed, suggesting to the Earth observer that the speed of light is slower near the sun. The Earth observer sees the clock of the observer near the sun running more slowly than the same type of clock used on Earth. The clock observed running more slowly near the sun might be due to either photons changing frequency in flight or to the oscillator in the clock actually running more slowly, but not both, since that would be double counting, which leads us to the next hypothesis that shows the light wave frequency is constant, once radiated.

2) <u>hypothesis</u> – wavefronts are conserved when traveling from one gravity potential to another.
On Earth the WWV time signals are sent out each second and the observer near the sun receives them some time later. The observer near the sun counts the WWV ticks and sends back a numerical value of the number of ticks to the Earthly observer. The Earthly observer sees that the number of ticks from the observer near the sun agrees with the number being sent from Earth. Both observers see that the number of ticks is the same and shows both observers that WWV ticks are conserved. Now the Earthly observer sends out a laser beam that has a fixed number of light wavefronts between each of the WWV ticks. Both observers count the number of light wavefronts between each WWV tick and arrive at the same number, thus proving that light wavefronts are conserved. They conclude that photons do not change frequency while in transit. This means that when the Earthly observer sees a clock slowing down for the observer near the sun, it also means that the local oscillator in that clock is running at a lower frequency. The Earth observer sees a red shift due to $p < 1$ for all the oscillator(s) close to the sun, when viewed from Earth. The red shifted frequencies the Earth observer sees are actually the frequencies at their original sources.

3) <u>hypothesis</u> – a gradient in the speed of light c can result in an acceleration a.



arc distance = $r\,\theta = c\,t$
$\theta = (c\,t) / r$
$(r + \Delta r)\,\theta = (c + \Delta c)\,t$
$(r + \Delta r)\,(c\,t) / r = (c + \Delta c)\,t$
$c / r = \Delta c / \Delta r$
r = speed of light ÷ speed of light gradient
v = the velocity component in the direction of the c gradient
$v = c \sin(\theta) = c\,\theta$ for a very small angle
$v = c\;(c\,t) / r$ but $r = c / (\Delta c / \Delta r)$
$v = (c\,t) / \;[\,1/(\Delta c / \Delta r)\,]$
$v = (c)(\Delta c / \Delta r)\,t = a\,t$
$a = (c)(\Delta c / \Delta r)$ = speed of light times the gradient in speed of light