Time is the ability of an object to travel at a velocity, so that it can mantain a velocity unless acted upon by a force, in the same way an object can travel through space, so that it can maintain it's velocity unless acted upon by a force. An object in motion will remain in motion unless acted upon by a force. When an object is in constant motion without any force's acting upon it, the velocity of the object can be determined by the equation:

1) $v = d / t$

Now consider an object traveling with a constant velocity. The distance the object has traveled in respect to time is:

2) $d = v t$

This object then projects a beam of light perpendicular to it's direction of motion. The speed of light is a constant (c) relative to an observer traveling with a velocity. An analysis of the Michelson-Morely experiment can show that a beam of light traveling away from an object in motion will travel in a straight line away from the object along with it's direction of motion so that an object traveling with a velocity may assume it is at rest, and a beam of light comeing from that object will arrive at a destination that will show that the beam had traveled in a straight line. Therefore, an object projecting a beam of light perpendicular to it's direction of motion with a velocity will observe the beam to travel a distance from it's own frame of reference:

3) $d = c t$

In order for an observer traveling at a relative velocity to a Michelson-Morely experiment to obtain the same results, the observer traveling at a relative velocity to the experiment would have to measure the beam of light traveling the same distance away from it's source at every instant of time during the beams travel. If the observer assums that he is at rest and the Michelson-Morely experiment is traveling at a velocity, the observer will notice, that in order for the beam of light to travel in a straight line away from the projector in the experiment, the beam of light would have to travel at an angle away from the projector so that the beam will stay in a straight line perpendicular from it's direction of motion. The observer will also notice that the beam of light has traveled at the same speed, and the distance traveled by the beam of light would be the same distance given in equation 3. Therefore, an object traveling a distance ($v t$) will observe light to travel a distance ($c t$) perpendicular to it's direction of motion while an observer at rest observers the beam to travel a distance of ($c t$) at an angle, so that the distance the beam of light has traveled relative to the observer at rest perpendicular to the objects direction of motion is the same with every passing instant. With these three distance's you can then form a right triangle using Pythagorean's Theorem.

4) $(v t)^2 + (c t)^2 = (c t)^2$

Notice that the distance of one of the sides is the same as the distance of the hypotenuse. This in turn creates a triangle that is zero in all of it's dimensions, but the object in question has traveled a real distance and the distance light has traveled is also a distance that is non-zero. The distance light has traveled perpendicular to it's direction of motion would be the same every instant in order for the Michelson-Morely experiment to obtain the same results for an observer traveling at a relative velocity, so the amount of time that has passed for each observer every instant would have to have a different value in order for both observers to measure the same speed for light as it has traveled a certain distance for both observers at a certain instance. Note, the speed of light can not be a changed variable and the distance light has traveled is determined by the amount of time that has passed for each observer. Therefore, an object traveling at a speed relative to an observer at rest will measure the distance traveled of a beam of light to be a certain distance, since an observer at rest will use their normal time to measure the objects velocity and the speed of light.

5) $d' = c t'$

Then by substituting the distance an observer traveling at a constent velocity measures the speed of light into equation 4, because it is in fact the distance the observer at rest measures the object traveling at a relative velocity to measure the speed of light, you get equation 6.

6) $(v t)^2 + (c t')^2 = (c t)^2$

Bring $(v t)^2$ to the other side of the equation,

7) $(c t')^2 = (c t)^2 - (v t)^2$

Distribute the square's to each value,

8) $c^2 t'^2 = c^2 t^2 - v^2 t^2$

Factor t^2 from $c^2 t^2 - v^2 t^2$,

9) $c^2 t'^2 = t^2 (c^2 - v^2)$

Factor out c^2 from $(c^2 - v^2)$,

10) $c^2 t'^2 = c^2 t^2 (1 - v^2 / c^2)$

Divide both sides by c^2,

11) $t'^2 = t^2 (1 - v^2 / c^2)$

Take the square root of both sides,

12) $+/- t' = +/- t (1 - v^2 / c^2)^{1/2}$

Since both values of time are positive in order to measure a positive amount of distance,

13) $t' = t (1 - v^2 / c^2)^{1/2}$

Note that the amount of time experienced by an observer at rest relative to the amount of time observered to pass for an object traveling at a velocity for every instant is equation 13 and not:

14) $t' = t / (1 - v^2 / c^2)^{1/2}$, that was in Einsteins 1905 paper.

Equation 14 can be obtained useing the same method by assuming that the distance traveled by the object is v t', and an observer at rest will measure light to travel at an angle a distance c t'. Then compared to an object measureing light traveling a straight distance perpendicular to it's direction of motion a distance of c t.

Now I will compare how an increase in velocity will affect the amount of time that has passed for for an object traveling at a relative speed using equation 13. For a velocity between zero and the speed of light,(v^2 / c^2) will be less than one. One minus a number that is less than one gives a value that is less than one. The square root of a number less than one will also be less than one. Any number multiplied by a number that is less than one will produce a value that is less than that number. Therefore, as the velocity of the object increase's the amount of time experienced by that object decrease's as the object approuchs the speed of light relative to an observer at rest according to equation 13.

At a velocity of (c) the speed of light, (v^2 / c^2) becomes one. One minus one equals zero. The square root of zero is zero. Any number multiplied by zero is zero. Therefore, the amount of time experienced by an object traveling at the speed of light is zero, according to equation 13.

At a velocity greater than (c) the speed of light, (v^2 / c^2) becomes greater than one. One minus a number greater than one is less than zero. The square root of a negative number is imaginary. Any number multiplied by an imaginary number is also imaginary. Therefore, an object traveling faster than the speed of light will experience an imaginary amount of time, according to equation 13.

Now we will consider the distance light has traveled relative to an object traveling with a velocity relative to an observer at rest. Then the amount of time dialation of the object traveling relative to the observer at rest would be subsituted into equation 5.

15) $d' = c\ t\ (1 - v^2 / c^2)^{1/2}$

from equation 3 we know that c t is equal to d

16) $d' = d\ (1 - v^2 / c^2)^{1/2}$

This is the same as the length contraction equation in the direction of motion of an object traveling at a relative velocity but is the distance an observer at rest would measure a beam of light to travel perpendicular to it's direction of motion. Since the object at rest would observe the beam of light to travel at an angle, this is the same amount of distance an observer at rest would measure light to travel away from the object a distance c t. Consider equation 6. For a value of t and t' the distance traveled perpendicular to the objects direction of motion is the same for both frames of references, equation 5. Therefore, there isn't any length contraction in the direction perpendicular to the object traveling with a velocity, since the observer at rest measures the beam of light to be at the same position from observeing the beam to travel at an angle from it's direction of motion.

17) $\tan (\theta) = ((c\ t')^2 / (v\ t)^2)$

18) $\sin (\theta) = ((c\ t')^2 / (c\ t)^2)$

19) $\cos (\theta) = ((v\ t)^2 / (c\ t)^2)$

Now that we have found out how much time dialation an object traveling with a velocity must experience in order to measure the same speed for light and the distance the object would travel in that amount of time, we can then calculate a new velocity replaceing equation 1.

20) $v' = d' / t'$

This is the velocity of an object measured by a frame of reference traveling at a relative speed. Then putting in equation 13 for time and equation 16 for distance, to convert the velocities measured by a frame of reference in motion to the observed velocity of an object that is at rest given by equation 1.

21) $v' = ((d (1 - v^2 / c^2)^{1/2}) / ((t (1 - v^2 / c^2)^{1/2})$

$(1 - v^2 / c^2)^{1/2}$ cancels and produce's

22) $v' = d / t$

then substituting d / t with v from equation 1

23) $v' = v$

Therefore, velocity itself is a constant in both frames of reference's. They will measure the same velocity for every object traveling at a relative speed. Then the following is true, "Time is the ability of an object to travel at a velocity, so that it can mantain a velocity unless acted upon by a force, in the same way an object can travel through space, so that it can maintain it's velocity unless acted upon by a force. An object in motion will remain in motion unless acted upon by a force". By the amount of time being dialated by the same amount that the length in the direction of motion is contracted Newtons Law of Motion still holds to be true, even when considering an object measureing the same speed for light as it travels at a relative speed.