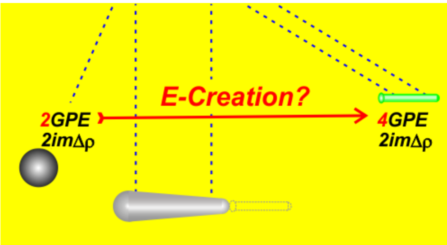
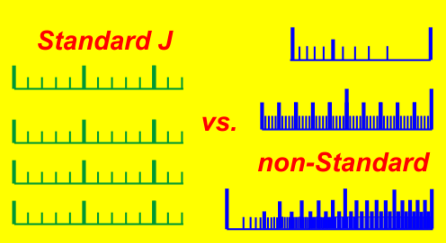
Six Duality Laws of Momentum and Energy

Guide for improving standards.

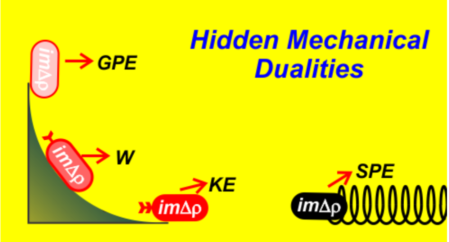
Article 4: Fourth Duality Law of Situational Energy Creation



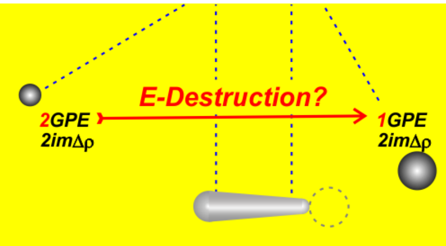
Article 3: Third Duality Law of non-Standard Energy Sizes and Varying Productivity



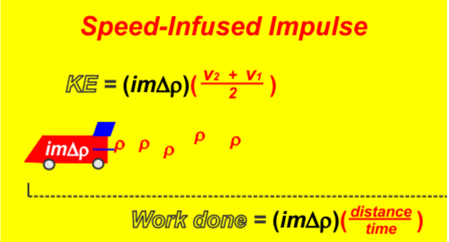
Article 1: First Duality Law of Momentum-Energy Coexistence



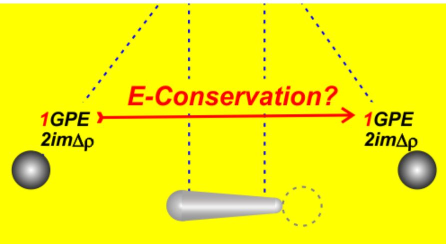
Article 5: Fifth Duality Law of Situational Energy Destruction



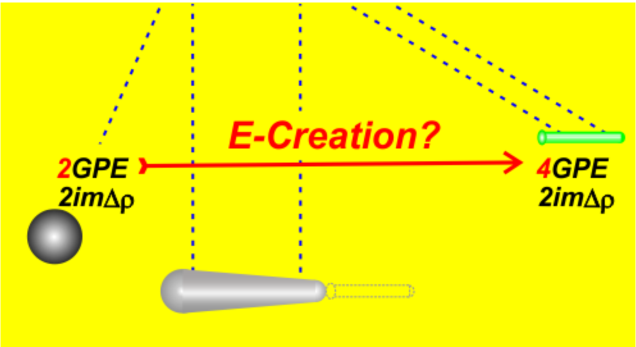
Article 2: Second Duality Law of Perceived Speedy-Impulse



Article 6: Sixth Duality Law of Situational Energy Conservation & Einstein



Six Duality Laws of
Momentum and Energy
Guide for improving standards.



4. Fourth Duality Law of Situational Energy Creation

Du-Ane Du
www.Wacky1301SCI.com, *"Looking at serious science, sideways!"*

Mathematical Duality Law #4: Energy [speedy impulse] and energy-perception are mathematically created whenever an impulse transfers momentum out of a situation with a lower joule production rate [lower speedy multiplier, J/ρ, m/s] and into a situation with a higher joule production rate. The situations can involve (1) two objects, or (2) an object and a stored/trapped state, or (3) a combination of non-standard joules and standard linearized joules [standard speedy multiplier of 0.84 J/ρ, m/s].

This is the fourth of six advanced articles on the nature of the momentum and energy duality. Energy is a perception:

According to the 2nd duality law of perceived speedy impulse, energy-work is a (reward oriented, psychological) joint perception of average speed and impulse, speed-infused effort, or speedy impulse. This fact becomes obvious when the various equations for mechanical energy are written as follows:

$$energy = (average\ speed)(effort) = \text{"}speedy\text{-}im\Delta\rho\text{"}$$
$$energy = \left(\frac{distance}{time}\right)(im\Delta\rho) = \text{"}speedy\text{-}im\Delta\rho\text{"}$$
$$energy = \left(\frac{d}{t}\right)(Ft) = \text{"}speedy\text{-}im\Delta\rho\text{"}$$

Symbols

$im\Delta\rho$ – impulse

10 ρ = 10 kgm/s

10 ρ = 10 N*s

"Because energy is a joint perception of impulse and average speed," Devil's Advocate says. "some situations will create energy-perception, some situations will destroy energy-perception, and some situations will conserve energy-perception."

Three situations that we will examine individually: Article 4 will focus on situations that create energy, while Article 5 focuses on situations that destroy energy, and Article 6 focuses on situations where energy-perception is conserved. (Additional advanced articles and simplified discussions can be found at www.Wacky1301SCI.com.)

Devil's Advocate says, "An open and active imagination stimulates endorphins, exciting the pleasure centers of the brain—as you read, keep an open mind, reach for the impossible, and enjoy the newness of a vision you've never considered before."

Energy creation during a complete momentum transfer:

We will begin by deriving some mathematical relationships.

Our first situation focuses on two objects that begin or end at rest. When all of the momentum from a heavy giving object (M_G) is transferred into a lighter receiving object (m_R), the impulse/momentum-transfer can be expressed as:

$$im\Delta\rho = mv_2 - mv_1$$
$$M_{Give} > \boldsymbol{m_{Receive}}$$

$$im\Delta\rho_{Given} \rightarrow im\Delta\rho_{Recieved}$$
$$0 - M_G v_G \rightarrow \boldsymbol{m_R v_R} - 0$$
$$M_G v_G = \boldsymbol{m_R V_R}$$

Next, because the objects are beginning or ending at rest, the receiving object's velocity can be expressed as a mass-ratio multiple of the giving object's velocity, by dividing, as follows:

$$\boldsymbol{\frac{M_G}{m_R} v_G = V_R}$$

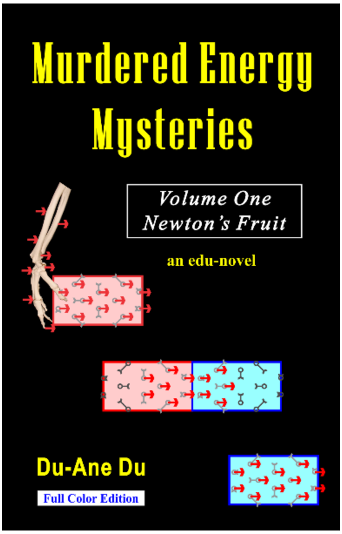
Similarly, the mass of the lighter receiving object can be expressed as a mass-ratio multiple of the heavier giving mass, thusly:

$$\frac{m_R}{M_G} M_G = m_R$$

When the beginning or ending velocity is zero, the mechanical energy [speedy impulse] transferred can be found using the kinetic energy equation:

$$KE_{\text{"given"}} \rightarrow KE_{\text{"received"}}$$
$$0 - \frac{1}{2} M_G v_G^2 \rightarrow \frac{1}{2} m_R V_R^2 - 0$$

Next, the momentum relationship equations can be substituted into the mechanical kinetic energy equation, producing:



Examine or purchase at Amazon.com

$$\frac{1}{2} M_G v_G^2 \rightarrow \frac{1}{2} \left(\frac{m_R}{M_G} M_G\right) \left(\frac{M_G}{m_R} v_G\right)^2$$

Now the square can be distributed, and the mass ratios can be moved to the front, to produce:

$$KE_{\text{"given"}} \rightarrow KE_{\text{"received"}}$$
$$\frac{1}{2} M_G v_G^2 \rightarrow \frac{1}{2} \left(\frac{m_R}{M_G} M_G\right) \left(\frac{M_G}{m_R}\right)^2 (v_G^2)$$

$$\frac{1}{2}M_G v_G^2 \;\rightarrow\; \frac{m_R}{M_G}\left(\frac{M_G}{m_R}\right)^2 \left(\frac{1}{2}M_G v_G^2\right)$$
$$\frac{1}{2}M_G v_G^2 \;\rightarrow\; \frac{M_G}{m_R}\left(\frac{1}{2}M_G v_G^2\right)$$
$$KE_{"given"} \;\rightarrow\; \frac{M_G}{m_R}\left(KE_{"given"}\right)$$

“According to this new equation,” Devil’s Advocate says. “When all of the momentum is transferred from a heavier giving object to a lighter receiving object at rest, the mathematical creation of mechanical kinetic energy [speedy impulse] is always a give-receive mass ratio of the giving object’s kinetic energy.”

Excellent! Because the giving mass has been defined as heavier, the top of the fraction will always be larger than the bottom. Therefore:

$$KE_{"received"} = \frac{M_G}{m_R}\left(KE_{"given"}\right)$$
$$KE_{"recceived"} > KE_{"given"}$$

“Definitive,” Devil’s Advocate says, “The creation of mechanical energy [speedy impulse] is an undeniable fact of the equations themselves. Kinetic energy is created whenever momentum moves from a heavy giving object to a lighter receiving object.”

This situational energy creation initially appears to be function of the difference in masses. However, recall that M_G is defined as larger than m_R and $\frac{M_G}{m_R}v_G = V_R$. This means that when the momentum moved from the greater mass to the lesser mass:

$$v_{Give} < V_{Receive}$$

And

$$0 - v_G < V_R - 0$$

$$\frac{v_G + 0}{2} < \frac{V_R + 0}{2}$$

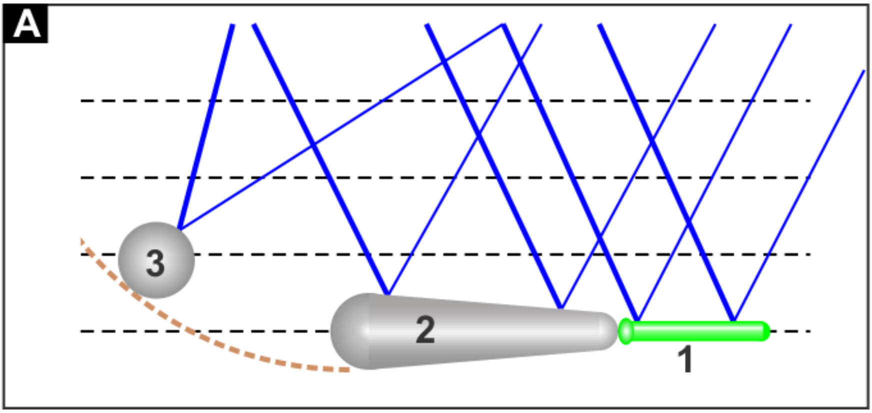
$$Giving\ average\ velocity < Receiving\ average\ velocity$$

“Mechanical kinetic energy is speedy-impulse, or (impulse)(average speed),” Devil’s Advocate says, “Therefore this situational creation of energy is actually a function of the change in average speed, and the fact that the lesser mass has a higher speedy multiplier!”

Good, this brings us to the second part of Mathematical Duality Law #4: Energy [speedy impulse] and energy-perception are mathematically created whenever an impulse transfers momentum out of a situation with a lower joule production rate [lower speedy multiplier, J/ρ, m/s] and into a situation with a higher joule production rate.

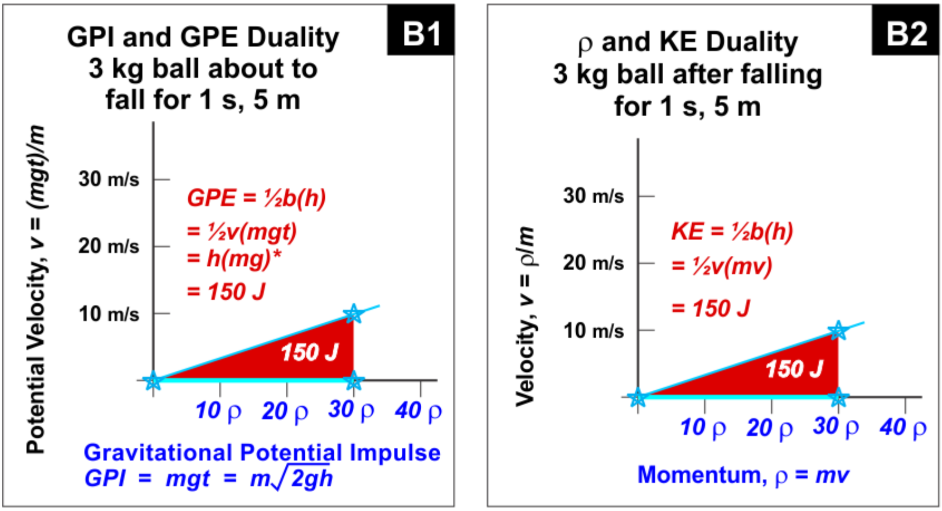
Graphic example

While partial transfer of momentum from a heavy giving object to a lighter receiving object is very common, the mathematics is complicated to model. Fortunately, one can produce a nearly complete momentum transfer in a lab, using a modified Newton’s cradle:

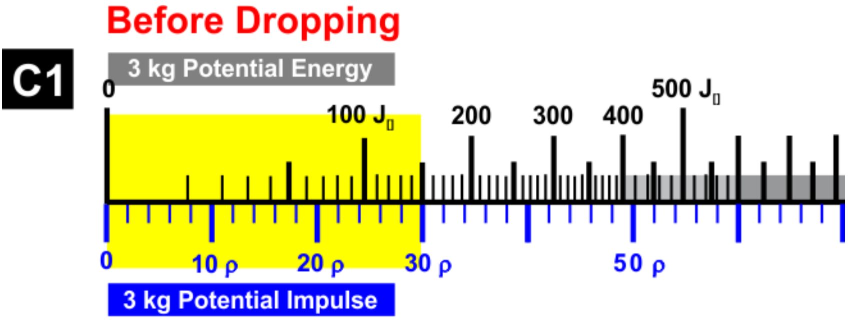


To keep the numbers simple, this imaginary momentum-transfer apparatus is around 200 m tall, Ball-3 has a mass of 3 kg, the transfer cone-2 has a mass of around 15 kg, and the receiving Cylinder-1 has a mass of 1 kg. Receiving Cylinder-1 is significantly longer than the diameter of Ball-3. (This example can be replicated on a smaller scale. The length of the receiving cylinder is critical, see *Murdered Energy Mysteries*, Chapter 207.)

Ball-3 is lifted to a height of 5 m, such that its potential impulse, potential energy, final momentum, and final kinetic energy are consistent with the following graphs:



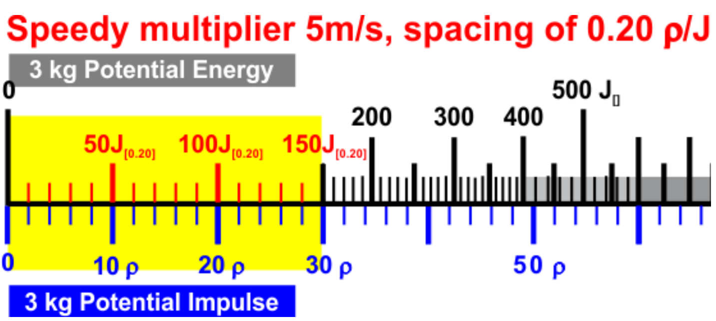
At the bottom of the swing, Ball-3 has a velocity of 10 m/s, and a momentum of 30 ρ, and an energy of… A better understanding of the energy implications can be seen by converting the impulse-velocity graphs into line graphs. Using the impulse and energy equations a joint line graph for the energy levels of a 3 kg object can be made, as in Illustration C1:



The yellow box indicates the first second of fall, and the bottom ticks indicate the momentum levels that the 3 kg ball is achieving as it falls. Notice that the ticks on the top energy graph are accelerating, just as the ball is accelerating. This indicates that the ball's impulse producing energy-perception at a faster and faster rate.

"This graph can be partially linearized," Devil's Advocate says, "Simply average the joule tick-size for the desired portion of the graph. In this case, we divide the 30 ρ of potential impulse by the 150 J of potential energy. This produces an average tick width, or impulse coefficient, of 0.20, as seen in Illustration C2:"

C2



The impulse coefficient indicates a tick size of [0.20 ρ/J], the average joule involves 0.20 ρ of impulse, a speedy multiplier of $\frac{1}{0.20}$ = 5 m/s, and an average joule production rate of 5 J/ρ. This is consistent with the information in Graphs B1 and B2, and all of it reinforces the idea that energy is speedy impulse.

Returning to the experiment. Ball-3 is raised to the indicate height, and released.

When Ball-3 contacts transfer Cone-2, the momentum enters the cone as a compression wave, and is transmitted to Cylinder-1. Cylinder-1 receives the 30 ρ of momentum, and begins to move forward with a velocity of 30 m/s. (This experiment works because Cylinder-1 is significantly longer than the compression wave, and thus can contain the entire wave of momentum/impulse.)

According to our earlier derivation, the transfer of mechanical energy [speedy impulse] from a heavier object to a lighter object will obey the equation:

$$KE_{"received"} = \frac{M_G}{m_R}(KE_{"given"})$$

And in this case:

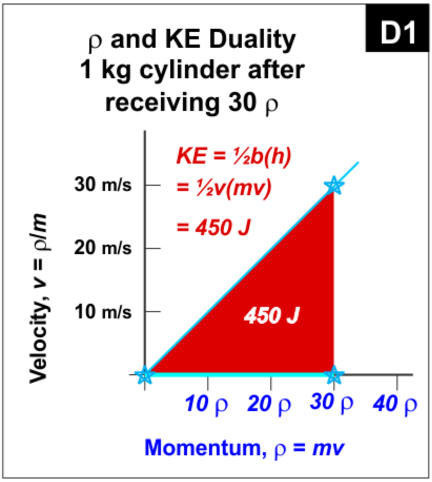
$$KE_{"given"} = 150 J_{[0.20]}$$
$$M_G = 3\ kg$$
$$M_R = 1\ kg$$

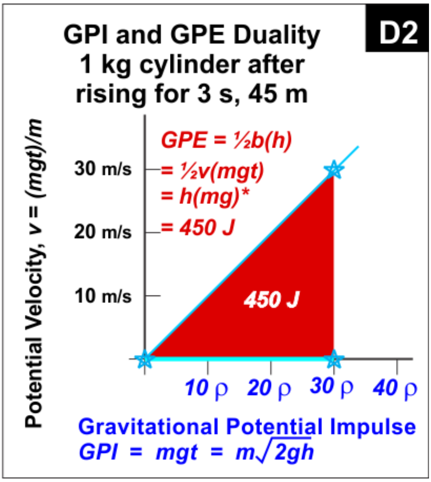
$$KE_{"received"} = \frac{3\ kg}{1\ kg}(150\ J_{[0.20]})$$
$$KE_{"received"} = 450\ J_{[0.067]}$$

**** Note, the first impulse coefficient indicates a joule tick-size of [0.20 ρ/J] meaning 1 $J_{[0.20]}$ involves 0.2 ρ of impulse, a speedy multiplier of $\frac{1}{[0.20]}$ = 5 m/s, and a joule production rate of $\frac{1}{[0.20\ \rho/J]}$ = 5 J/ρ. Similarly, the second impulse coefficient indicates a joule tick-size of [0.067 ρ/J] meaning 1 $J_{[0.067]}$ involves 0.067 ρ of impulse, a speedy multiplier of***

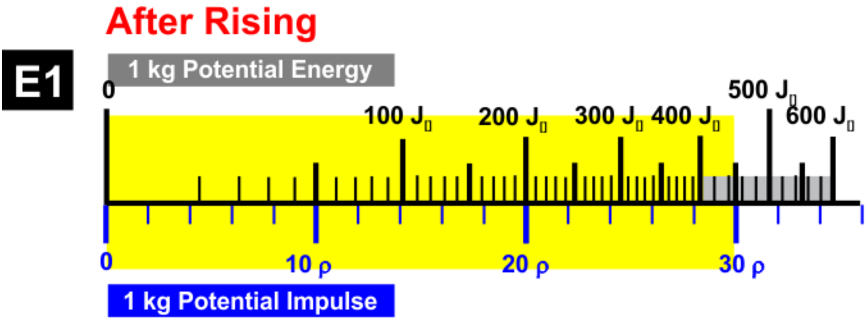
$\frac{1}{[0.067]}$ ***= 15 m/s, and a joule production rate of*** $\frac{1}{[0.067\ \rho/J]}$ ***=***
15 J/ρ.

Returning to the experiment, once Cylinder-1 receives the 30 *ρ* of momentum, Cylinder-1 swings up until the momentum "becomes" Gravitational Potential Impulse. As seen in the final graphs:



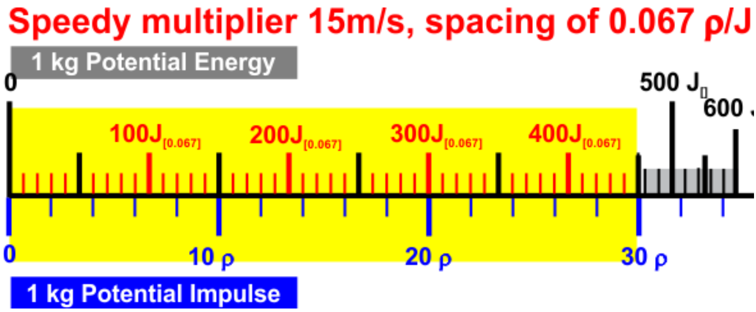


The data in these graphs can also be presented on a number line, as in Illustration E1:



Notice that this curve is both elongated and compressed, as compared to the energy-impulse graph for the 3 kg ball. Once again, the relevant portion of the graph can be averaged and linearized by dividing the 30 ρ of impulse by 450 J to determine the average tick width, or impulse coefficient, of [0.067]:

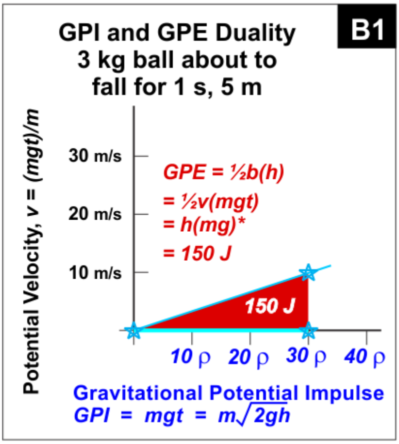
E2

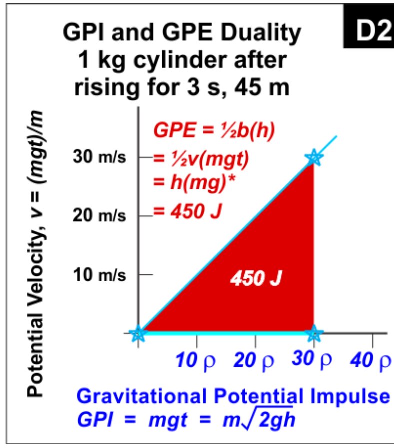


The impulse coefficient of [0.067 ρ/J] indicates that the average joule involves 0.067 ρ impulse, a speedy multiplier of $\frac{1}{0.067}$ = 15 m/s, a tick width of 0.067 ρ/J, and a joule production rate of $\frac{1}{0.067}$ = 15 J/ρ. This is consistent with the information in Graphs D1 and D2, and it once again reinforces the idea that energy is speed infused impulse.

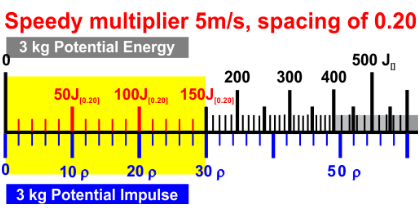
"When I compare graphs B1 and D2 (below)," Devil's Advocate says, "I see the amount of Gravitational Potential Impulse at the end of the experiment was the same as the beginning, 30 ρ and 30 ρ. I see the same thing happening in graphs C2 and E2. Momentum was never created or destroyed."

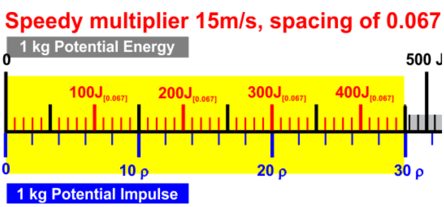
BEFORE **AFTER**





BEFORE **AFTER**





Gravitational Potential Energy [potential speedy impulse] was mathematically created when the momentum moved into the lighter ball. The 3 kg ball had a speedy multiplier of $\frac{1}{0.20}$ = 5, producing 150 $J_{[0.20]}$ with 0.2 ρ of impulse per joule, whereas the 1 kg ball had a speedy multiplier of $\frac{1}{0.067}$ = 15, producing 450 $J_{[0.067]}$ with 0.067 ρ of impulse per joule. The energy [speedy impulse] was created by the second ball's higher joule production rate [speedy multiplier].

Next, to find out how much energy has been mathematically created, the energy values must be subtracted, and that affects the impulse coefficients.

"The impulse coefficient indicates the average width of the ticks on a joules ruler," Devil's Advocate says. "If two measurements have the same impulse coefficient, then the measurements can be added or subtracted—like adding or subtracting two logarithms with the same base."

However, if the impulse coefficients are different, subtraction requires adjustment of the impulse coefficient (See Article 3). The equations for finding the impulse coefficient is similar to finding a weighted average:

Subtracting joules such as, **2 $J_{[IC]}$** – **1 $J_{[IC]}$**:

$$new\ [IC] = \frac{[IC]_2 J_2 - [IC]_1 J_1}{J_2 - J_1}$$

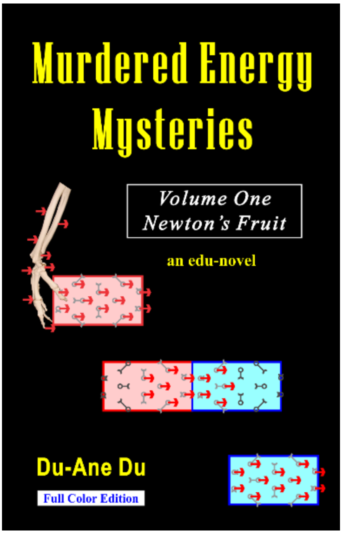
Therefore, in this situation, **450 $J_{[0.067]}$** – **150 $J_{[0.20]}$** :

$$new\ [IC] = \frac{(0.067)(450) - (0.20)(150)}{450 - 150}$$

$$new\ [IC] = \frac{30\ \rho - 30\ \rho}{450\ J - 150\ J} = \frac{0}{300\ J} = [0.0]$$

$$energy\ created = 300\ J_{[0.0]}$$

Note that the impulse coefficient of [0.0] means the tick width is infinitely small, such that 1 $J_{[0.0]}$ involves 0.0 ρ of impulse, with a speedy multiplier of $\frac{1}{0.0} = \infty$ m/s, and a joule production rate of $\frac{1}{[0.0\ \rho/J]} = \infty$ J/ρ. And according to this premise, 0 x ∞ = 300!



[Examine or purchase at Amazon.com](#)

"A speed of infinity is physically impossible," Devil's Advocate says, "a joule production rate of infinity is impossible, and it is mathematically impossible to have mechanical energy without impulse/momentum."

By definition, mechanical energy-work is the anti-derivative of momentum. Mechanical energy is a mathematical phenomenon and a psychological phenomenon, not a physical phenomenon. Gravitational Potential Energy and other forms of mechanical energy are mathematically created any time momentum is transferred from a heavier object to a lighter object.

Finally, the important differences between non-standard mechanical energy and standardized joules is significantly reinforced by converting the before-and-after energy measurements into standard joules using the equation,

$$standard\ J = \frac{(joules)[IC]}{1.185}$$

In the above example, the before and after values become:

$$before\ standard\ J = \frac{(150)[0.20]}{1.185}$$

$$\boldsymbol{before\ standard\ J = 25.32\ J_{[1.185]}}$$

$$after\ standard\ J = \frac{(450)[0.067]}{1.185}$$

$$\boldsymbol{after\ standard\ J = 25.32\ J_{[1.185]}}$$

The values are the same, therefore standardized joules have not been created. The fourth duality law of situational energy creation only applies to non-standardized mechanical energy, such as KE, WE, GPE, and SPE.

Furthermore, this points to the idea that the equations for standardized mechanical energy should be:

$$Standardized\ W = \frac{Ft}{1.185}$$

$$Standardized\ KE = \frac{mv}{1.185}$$

$$Standardized\ GPE = \frac{m\sqrt{2gh}}{1.185}$$

Note on standard linearized joules

It is important to reiterate that the situational creation of energy is exclusive to mechanical energy.

The conclusion to Article 3 “Third Duality Law of non-Standard Energy Sizes and Varying Productivity” states: As the result of Joule’s original definitions and experiments, the international treaty for units and measurements contains an unclarified assumption that energy and work are always measured at a fixed speed of 1 ft/s [English] and a fixed productivity of 0.84 J/ρ.

Inconsistent adherence to that unclarified assumption has resulted in measurements that may be (1) standard linearized, with an impulse coefficient [IC] = 1.18, or (2) multiple-linear, resulting in a wide variety of non-standard joule sizes, or (3) multi-parabolic, resulting in an infinite variety of continually changing non-standard joule sizes. (Addition or subtraction of non-standard joule sizes can produce answers that violate the law of conservation for momentum.)

The situational creation of mechanical energy is occurring because mechanical energy is multi-parabolic, and ME involves an infinite variety of changing joule sizes.

"Standardized joules involve *linearized* energy," Devil's Advocate says. "Linearized joules are an exact multiple of momentum, and this joule-momentum cannot be created or destroyed. Electric-joules cannot be created or destroyed, light-joules cannot be created or destroyed, and calorie-joules cannot be created or destroyed. (See Article 3) Situational creation of energy only occurs with the many forms of non-standardized mechanical energy.

Moment-by-Moment Joule Creation

The graphic example used earlier looked at total momentum transfer. However, because of its multi-parabolic nature, mechanical energy is being created and destroyed on a moment-by-moment basis.

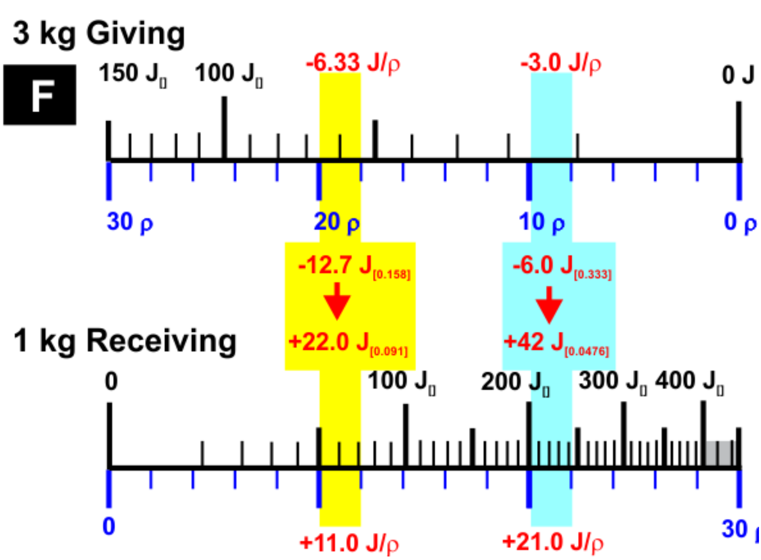
Consider now a double pendulum collision experiment where a 3 kg magnet swings downward and bounces against a

1 kg magnet, which then swings upward. Basically, the same scenario as before, only this time there is no transfer cone, so the 3 kg magnet's momentum goes directly into the 1 kg magnet.

"Momentum cannot be created or destroyed," Devil's Advocate says, "so the two magnets will experience momentum transfers that are the same, but opposite in direction. The masses are different, so the accelerations will not match, and the velocities will change at different rates."

Good points. More importantly, there will be no coordination in the average velocities from moment to moment. (There is no law of conservation for average speed!)

The following graph displays the energy levels that occur in each magnet during the momentum transfer:



The key to understanding the two events lies in the joule production rates. Recall that energy, in this case kinetic energy, is speedy impulse:

$$KE = \frac{1}{2}m_G v_2^2 - \frac{1}{2}m_G v_1^2$$
$$KE = \frac{1}{2}(v_2 + v_1)(m_G v_2 - m_G v_1)$$
$$KE = \left(\frac{v_2 + v_1}{2}\right)(im\Delta\rho)$$

Note that the impulse, or momentum transfer, is being multiplied by the average speed. The average speed is the same thing as the joule production rate:

$$J\ production = \frac{J}{\rho} = \frac{kg(\frac{m}{s})(\frac{m}{s})}{kg(m/s)} = m/s$$

In the yellow part of Illustration F, 2 ρ of momentum are transferred between the two magnets. The 3 kg magnet has an average speed of -6.33 m/s, and a joule production rate of -6.33 J/ρ. This results in the "loss" of -12.7 $J_{[0.158]}$ of kinetic energy.

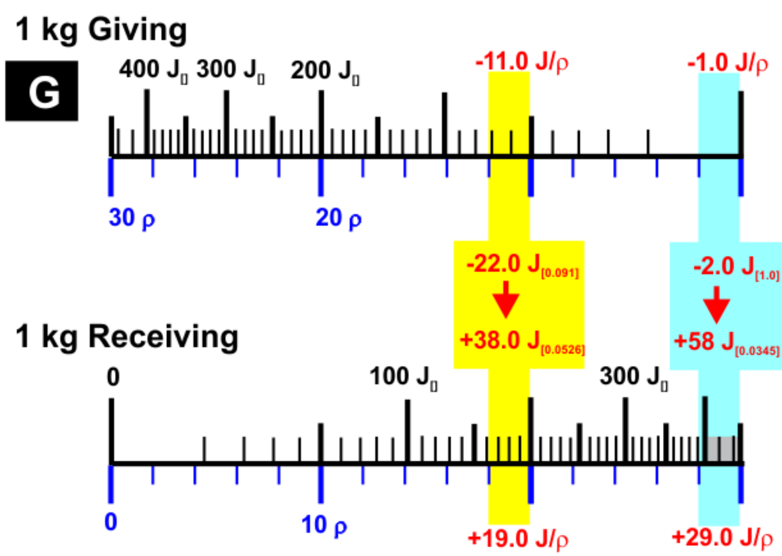
At the same time, the 1 kg magnet has an average speed of +11 m/s, and a joule production rate of +11 J/ρ. This causes the "gain" of +22 $J_{[0.091]}$ of kinetic energy. According to traditional notation, this is a momentary creation of 9.3 joules!

Turning to the blue highlight, once again 2 ρ of momentum are transferred between the two magnets, but the average speeds are different. Now the 3 kg magnet has an average speed of -3.0 m/s, and a joule production rate of -3.0 J/ρ. This results in the "loss" of -6 $J_{[0.333]}$ of kinetic energy.

At the same time, the 1 kg magnet has an average speed of +21 m/s, and a joule production rate of +21 J/ρ. This causes the "creation" of +42 $J_{[0.0476]}$ of kinetic energy. According to traditional notation, this is a creation of 36 joules.

"Obviously," Devil's Advocate says, "once again this confirms the fact that energy is created whenever an impulse moves momentum from a situation with a lower joule production rate and to a situation with a higher joule production rate."

As a final example, consider the pendulum collision between two 1 kg magnets:

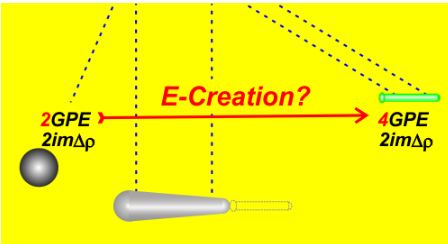


In the yellow section of Illustration G, 2 ρ of momentum are transferred between the two magnets. The giving magnet has an average speed of -11 m/s, and a joule production rate of -11 J/ρ. This results in the "loss" of -22 $J_{[0.091]}$ of kinetic energy.

At the same time, the receiving magnet has an average speed of +19 m/s, and a joule production rate of +19 J/ρ. This causes the "gain" of +38 $J_{[0.0526]}$ of kinetic energy. According to traditional notation, this is a net creation of 16 joules!

Turning to the blue section of the graphs, once again 2 ρ of momentum is transferring between the two magnets, but the joule production rates are different. Now the giving magnet has an average speed of -1.0 m/s, and a joule production rate of -1.0 J/ρ. This results in the "destruction" of -2 $J_{[1.0]}$ of kinetic energy.

At the same time, the receiving magnet has an average speed of +29 m/s, and a joule production rate of +29 J/ρ. This causes the "creation" of +58 $J_{[0.0476]}$ of kinetic energy. According to traditional notation, this is a net creation of 56 joules!

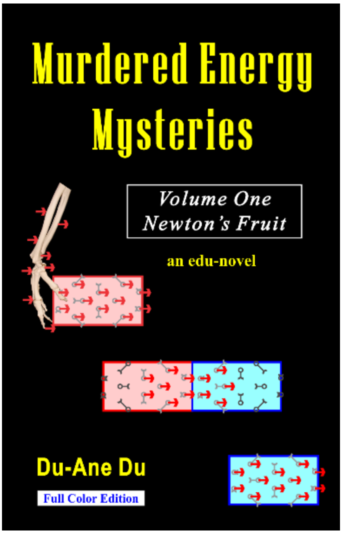


CONCLUSION 1:
Fourth Duality Law of Situational Energy Creation: Energy [speedy impulse] and energy-perception are mathematically created whenever an impulse transfers momentum out of a situation with a lower joule production rate [lower speedy multiplier, J/ρ, m/s] and into a situation with a higher joule production rate. The situations can involve (1) two objects, or (2) an object and a stored/trapped state, or (3)

a combination of non-standard joules and standard linearized joules [standard speedy multiplier of 0.84 J/ρ, m/s]

CONCLUSION 2: The alleged theory of "universal conservation of kinetic energy" is mathematically untenable and false. Energy [speedy impulse] is mathematically created whenever momentum moves from an object with a lower joule production rate and into an object with a higher joule production rate.

Note that the situational creation of kinetic energy does affect the kinetic theory of heat, and the *Impulse Theory of Heat*, which is a topic for another article. (See *Murdered Energy Mysteries*, Part 3, as well as www.Wacky1301SCI.com/heat)



Examine or purchase at Amazon.com

CONCLUSION 3: More research needs to be done into the relationship between mechanical energy and other theoretical forms of energy. Many common beliefs may actually be philosophical myths.

Murdered Energy Mysteries is an edu-novel that seeks to increase understanding of the various forms of momentum and momentum transfer, as well as the various forms of energy and energy transfer. The lack of understanding on the part of the scientific community is substantial, and more research needs to be done.

—Du-Ane Du, author of the edu-novel *Murdered Energy Mysteries* (Amazon, Kindle, e-book 2018, paperback 2021.)

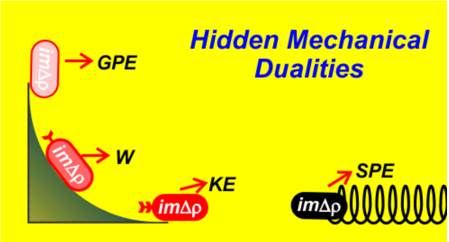
For more information, see:

Murdered Energy Mysteries, as well as:

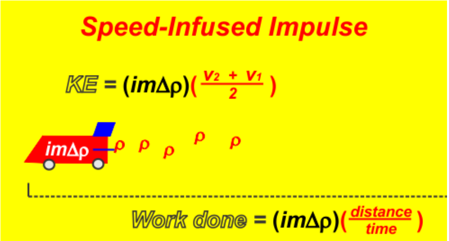
Six Duality Laws of Momentum and Energy

Guide for improving standards.

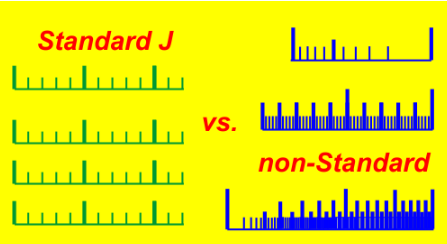
Article 1: First Duality Law of Momentum-Energy Coexistence



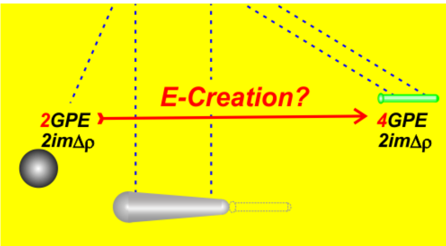
Article 2: Second Duality Law of Perceived Speedy-Impulse



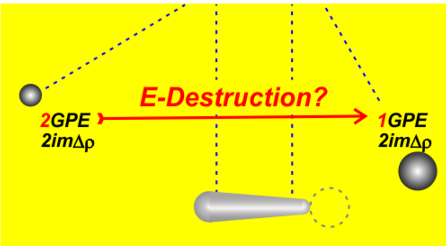
Article 3: Third Duality Law of non-Standard Energy Sizes and Varying Productivity



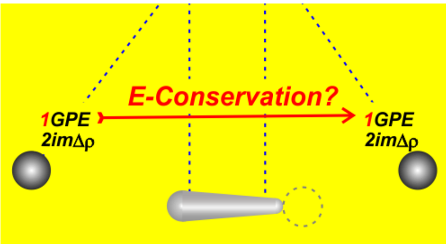
Article 4: Fourth Duality Law of Situational Energy Creation



Article 5: Fifth Duality Law of Situational Energy Destruction



Article 6: Sixth Duality Law of Situational Energy Conservation & Einstein



These advanced articles and less complex discussions of these topics are available at: www.Wacky1301SCI.com