Stockton Unified School District
Since 1852

Physics
3-30 thru 4-3
2020

Physics Daily Lesson Log

Week of 3/30/2020 - 4/3/2020

Each day

1. Check out the lesson for the day
2. Complete the activities listed
3. Complete a learning log entry for the day. The learning log must be completed each day (even if you don't finish all the work, still state what you learned), make sure to write the date and activities completed, and what you learned from them.

Lesson #	Materials	Due @ the end of the lesson - check each item off as you complete it!
6 (Monday 3-30)	❏ Read Intro to Energy	❏ Read Intro to Energy ❏ Do problems ❏ Learning Log
7 (Tuesday 3-31)	❏ Energy problems	❏ Read section on Energy and do problems ❏ Learning Log
8 (Wednesday 4-1)	❏ Conservation of Energy	❏ Read and Complete problems ❏ Learning Log
9 (Thursday 4-2)	❏ More Conservation of Energy	❏ Complete problems ❏ Learning Log
10 (Friday 4-3)	❏ Read Perpetual Motion Machines and Science Explained about Perpetual Motion Machines ❏ Complete Perpetual Motion Machines Reading Assignment	❏ Read and mark text of the two articles on perpetual motion ❏ Complete Perpetual Motion Machines assignment ❏ Learning Log

Below are some video resources that you may find helpful. They aren't required, but you may find them useful!

Name: Period:

Physics Learning Log - Complete one row EVERY DAY

Date: What did you do today? (Bullet points okay)	What did you learn from these activities? (3 - 5 sentences) **I learned that…**
Date: What did you do today? (Bullet points okay)	What did you learn from these activities? (3 - 5 sentences) **I learned that…**
Date: What did you do today? (Bullet points okay)	What did you learn from these activities? (3 - 5 sentences) **I learned that…**
Date: What did you do today? (Bullet points okay)	What did you learn from these activities? (3 - 5 sentences) I **learned that…**
Date: What did you do today? (Bullet points okay)	What did you learn from these activities? (3 - 5 sentences) **I learned that…**

Name: Period:

Learning Log

Date: What did you do today? (Bullet points okay)	What did you learn from these activities? (3 - 5 sentences) I learned that...
Date: What did you do today? (Bullet points okay)	What did you learn from these activities? (3 - 5 sentences) I learned that...
Date: What did you do today? (Bullet points okay)	What did you learn from these activities? (3 - 5 sentences) I learned that...
Date: What did you do today? (Bullet points okay)	What did you learn from these activities? (3 - 5 sentences) I learned that...
Date: What did you do today? (Bullet points okay)	What did you learn from these activities? (3 - 5 sentences) I learned that...

Intro to Energy **Name:** ______________________________

Energy

1. Read each of the following statements and identify them as having to do with kinetic energy (KE), potential energy (PE) or both (B).

KE, PE or B?	Statement:
_________	a. Depends upon object mass and object height.
_________	b. If an object is at rest, it certainly does NOT possess this form of energy
_________	c. The energy stored in an object due to its position (or height).
_________	d. The energy an object possesses due to its motion.
_________	e. Depends upon object mass and object speed.
_________	f. The amount depends upon the arbitrarily assigned *zero level*.
_________	g. If an object is at rest on the ground (zero height), it certainly does NOT possess this form of energy.
_________	h. The amount is expressed using the unit joule (abbreviated J).

2. A toy car is moving along with 0.20 joules of kinetic energy. If its speed is doubled, then its new kinetic energy will be _______.
a. 0.05 J b. 0.10 J c. 0.80 J d. 0.40 J e. still 0.20 J

3. A young boy's glider is soaring through the air, possessing 0.40 joules of gravitational potential energy. If its speed is doubled and its height is doubled, then the new gravitational potential energy will be _______.
a. 0.10 J b. 0.20 J c. 1.60 J d. 0.80 J e. still 0.40 J

4. Which would ALWAYS be true of an object possessing a gravitational potential energy of 0 joules?
a. It is on the ground. b. It is at rest. c. It is moving on the ground
d. It is moving. e. It is accelerating. f. It is at rest above ground level
g. It is above the ground. h. It is moving above ground level.

5. Which would ALWAYS be true of an object possessing a kinetic energy of 0 joules?
a. It is on the ground. b. It is at rest. c. It is moving on the ground
d. It is moving. e. It is accelerating. f. It is at rest above ground level
g. It is above the ground. h. It is moving above ground level.

6. Calculate the kinetic energy of a 2.5 kg object moving at 4.2 m/s. **PSYW**

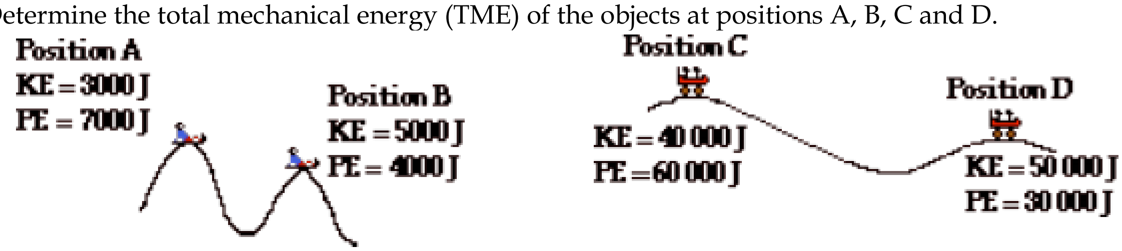
7. Calculate the gravitational potential energy of a 2.5 kg object positioned 8.5 m above the ground. **PSYW**

8. Calculate the speed of a 2.5 kg object that possesses 21.6 J of kinetic energy. **PSYW**

9. The total mechanical energy of an object is the ______.
   a. KE minus the PE of the object
   b. PE minus the KE of the object
   c. final amount of KE and PE minus the initial amount of KE and PE
   d. the initial KE plus the initial PE of the object
   e. KE plus the PE of the object at any instant during its motion

10. If an object moves in such a manner as to conserve its total mechanical energy, then ______.
   a. the amount of kinetic energy remains the same throughout its motion
   b. the amount of potential energy remains the same throughout its motion
   c. the sum of the kinetic energy and the potential energy remains the same throughout its motion
   d. the amount of both the kinetic and the potential energy remains the same throughout its motion

11. Determine the total mechanical energy (TME) of the objects at positions A, B, C and D.



A: ______________ B: ______________ C: ______________ D: ______________

12. Calculate the total mechanical energy (TME) of a 1.2 kg object moving at 7.1 m/s and located 5.1 m above the ground. **PSYW**

13. Read the following descriptions and indicate whether the objects' KE, PE and TME increases, decreases or remains the same (=). If it is impossible to tell, then answer ???.

   a. A marble begins at an elevated position on top of an inclined ruler and rolls down to the bottom of the ruler.
   KE: ↑ ↓ = ??? **PE:** ↑ ↓ = ??? **TME:** ↑ ↓ = ???

   b. A child on a swing is pulled back and released from rest from the highest point in her swing and swings to its lowest point.
   KE: ↑ ↓ = ??? **PE:** ↑ ↓ = ??? **TME:** ↑ ↓ = ???

   c. A cart is pulled from the bottom of an incline to the top of the incline at a constant speed.
   KE: ↑ ↓ = ??? **PE:** ↑ ↓ = ??? **TME:** ↑ ↓ = ???

   d. A physics student runs up a staircase at a constant speed.
   KE: ↑ ↓ = ??? **PE:** ↑ ↓ = ??? **TME:** ↑ ↓ = ???

   e. A force is applied to a root beer mug to accelerate it from rest across a level countertop.
   KE: ↑ ↓ = ??? **PE:** ↑ ↓ = ??? **TME:** ↑ ↓ = ???

   f. A marble is rolling along a level table when it hits a note card and slides to a stop.
   KE: ↑ ↓ = ??? **PE:** ↑ ↓ = ??? **TME:** ↑ ↓ = ???

   g. A car skids from a high speed to a stopping position along a level highway.
   KE: ↑ ↓ = ??? **PE:** ↑ ↓ = ??? **TME:** ↑ ↓ = ???

Worksheet: Energy ______________________

1. What is the KE of a baseball having a mass of 0.14 kg that is thrown with a velocity of 18 m/s?

   If the baseball above was initially at rest, how much work was done on it to give this kinetic energy?

2. A racecar has a mass of 1500 kg. What is its KE in joules if it has a speed of 110 km/hr?

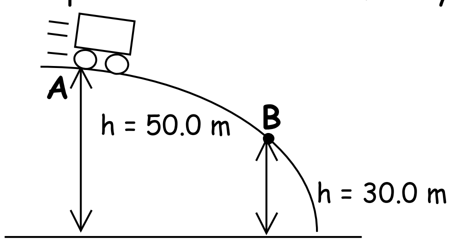
3. Relative to the floor, what potential energy does a 2.5 kg package have that sits on a shelf 2.2 m high?

   What work was done to give it this PE?

Hint: Use law of conservation of mechanical energy to solve remaining problems.

4. A 500.0 kg pig is standing at the top of a muddy hill on a rainy day. The hill is 100.0 m long with a vertical drop of 30.0 m. The pig slips and begins to slide down the hill. What is the pig's speed at the bottom of the hill?

5. Frank, a San Francisco hot dog vendor, has fallen asleep on the job. When an earthquake strikes, his 3.00×10^2 kg hot dog cart rolls down Nob Hill and reaches point A at a speed of 8.00 m/s. How fast is the hot dog cart going at point B when Frank finally wakes up and starts to run after it?



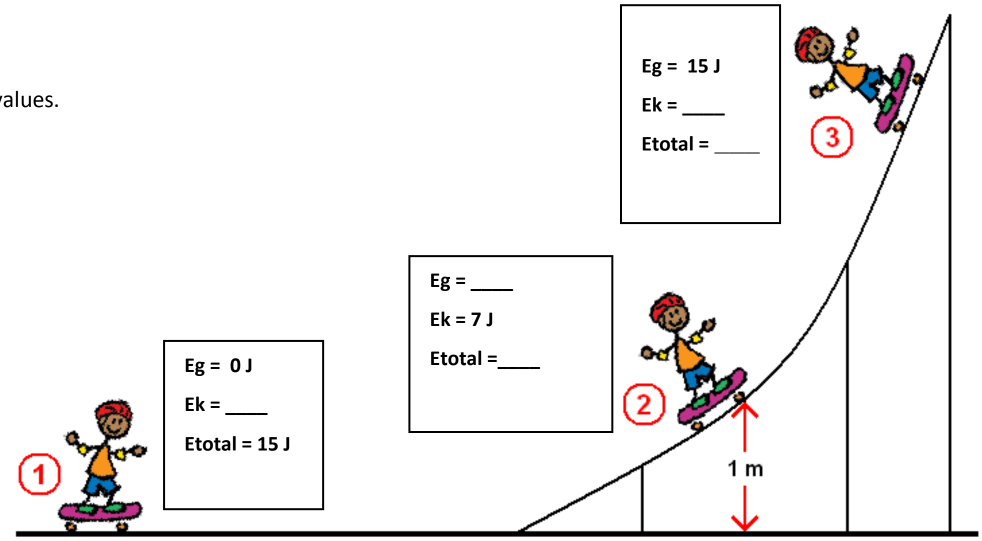
6. While on the moon, the Apollo astronauts enjoyed the effects of a small gravity. If Neil Armstrong jumped up on the moon with an initial speed of 1.51 m/s to a height of 0.700 m, what amount of gravitational acceleration did he experience?

7. In a wild shot, Bo flings a pool ball of mass *m* off a 0.68 m high pool table, and the ball hits the floor with a speed of 6.0 m/s. How fast was the ball moving when it left the table?

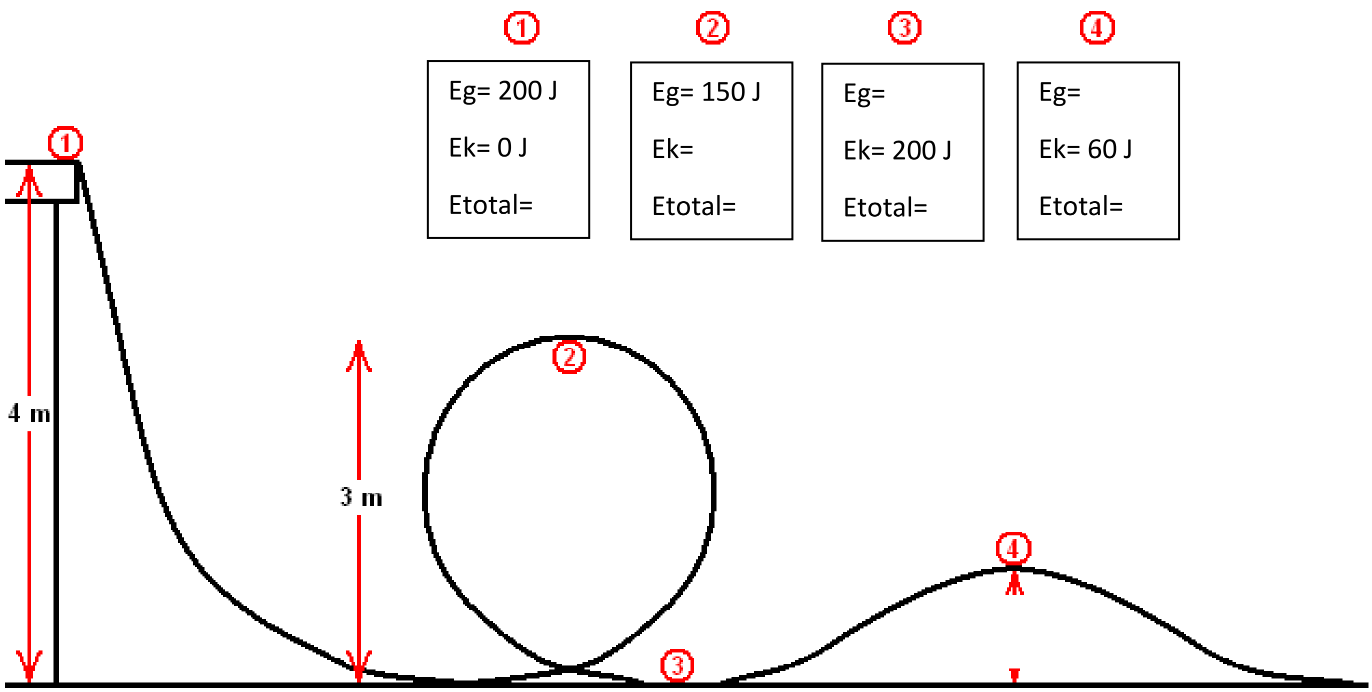
Name ____ Date _____________________________ Class _________

CONSERVATION OF ENERGY WORKSHEET [Unless otherwise stated , assume there is no air resistance and that all surfaces are frictionless]

1. Fill in the missing values.



2. Fill in the missing values.



3. An electric motor is used to hoist building supplies from the ground to the roof of a buidling.

    A. How much work can the motor do in 12 seconds if its power output is 1.5 kW (1,500 W)?

    B. How high can it lift a 131 kg bundle of shingles in that time?

4. A 1.8 kg book has been dropped from the top of the football stadium. Its speed is 4.8 m/s when it is 2.9 meters above the ground.
   A. What is its total mechanical energy? (mechanical energy includes kinetic, gravitational potential, and elastic potential but not internal forms of energy such as thermal or chemical)
   B. What was the total mechanical energy of the book at the instant it was released?
   C. How high is the stadium?

5. A 28 kg child on a swing is traveling at 4.2 m/s and has 315 J of total mechanical energy. What is his gravitational potential energy? How high is he above the ground?

6. A 3.2 kg ball that is moving straight upward has 17 J of kinetic energy and its total mechanical energy is 25 J.
   a. Find the gravitational potential energy of the ball.
   b. What is its height above the ground?
   c. What is the speed of the ball?
   d. What will be its gravitational energy when it is at its highest point above the ground?
   e. What is its maximum height above the ground?
   f. What will be its speed just before it lands on the ground?

Name ____ Date _________________________________
Class _________

CONSERVATION OF ENERGY WORKSHEET [Unless otherwise stated , assume there is no air resistance and that all surfaces are frictionless]

values.

Ek =

____

1. Fill in the missing values.

2. Fill in the missing

3. An electric motor is used to hoist building supplies from the ground to the roof of a buidling.

A. How much work can the motor do in 12 seconds if its power output is 1.5 kW (1,500 W)?

B. How high can it lift a 131 kg bundle of shingles in that time?

Eg=
200 J

Ek= 0
J

Etotal
=

**Eg = 0
J**

**Ek =
____**

**Etotal =
15 J**

=
Eg
=

Ek=
200 J
Ek=
200 J

Etotal
=
Etotal
=

Eg
=
Eg
=
Eg
=

Ek= 60
J
Ek= 60
J
Ek= 60
J

Etotal
=
Etotal
=
Etotal
=

Eg=
150 J

Ek
=

Etotal
=

**Eg =
____**

**Etotal
=____**

Eg

**Ek = 7
J**

Eg = 15 J

Etotal = ___

4. A 1.8 kg book has been dropped from the top of the football stadium. Its speed is 4.8 m/s when it is 2.9 meters above the ground. A. What is its total mechanical energy? (mechanical energy includes kinetic, gravitational potential, and elastic potential but not internal forms of energy such as thermal or chemical)
B. What was the total mechanical energy of the book at the instant it was released? C. How high is the stadium?

5. A 28 kg child on a swing is traveling at 4.2 m/s and has 315 J of total mechanical energy. What is his gravitational potential energy? How high is he above the ground?

6. A 3.2 kg ball that is moving straight upward has 17 J of kinetic energy and its total mechanical energy is 25 J.

a. Find the gravitational potential energy of the ball.

b. What is its height above the ground?

c. What is the speed of the ball?

d. What will be its gravitational energy when it is at its highest point above the ground?

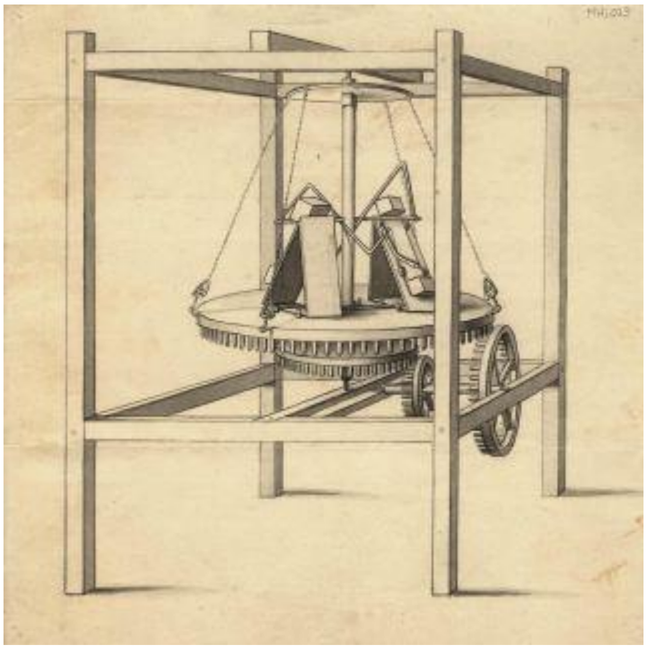
e. What is its maximum height above the

ground?

f. What will be its speed just before it lands on the ground?

Perpetual Motion Machines: Working Against Physical Laws

By Jessie Szalay August 31, 2016

- 

A diagram of Charles Redheffer's machine
(Image: © Public domain)

Almost as soon as humans created machines, they attempted to make "perpetual motion machines" that work on their own and that work forever. However, the devices never have and likely never will work as their inventors hoped.

"In short, perpetual motion is impossible because of what we know about the geometry of the universe," said Donald Simanek, a former physics professor at Lock Haven University of Pennsylvania and creator of The Museum of Unworkable Devices. "Nature provides no examples of perpetual motion above the atomic level."

Laws of thermodynamics

To the best of our knowledge, perpetual motion machines would violate the first and second laws of thermodynamics, Simanek told Live Science. Simply put, the First Law of Thermodynamics states that energy cannot be created or destroyed, only transformed from one form to another. A perpetual motion machine would have to produce work without energy input. The Second Law of Thermodynamics states that that an isolated system will move toward a state of disorder. Additionally, the more energy is transformed, the more of it is wasted. A perpetual motion machine would have to have energy that was never wasted and never moved toward a disordered state.

Still, the inviolability of the laws of physics has not stopped the curious from ignoring them or trying to break them. According to Simanek's online museum, the first documented perpetual motion machines included a wheel created by Indian author Bhaskara in the 12th century. It supposedly kept spinning due to an imbalance created by containers of mercury around its rim. Other attempts include a 16th-century windmill, 17th-century siphons, and several water mills.

While most perpetual motion attempts have been in the spirit of scientific inquiry, others have aimed to deceive and make money. The most famous perpetual motion hoax was devised by Charles Redheffer in 1812.

An age of wonders and mischief

Redheffer's perpetual motion machine enthralled the Philadelphia and New York communities and brought in thousands of dollars. It was debunked twice by engineers, which ultimately led to Redheffer being run out of town, according to "Perpetual Motion: The History of an Obsession" (Adventures Unlimited, 2015) by Arthur W.J.D. Ord-Hume.

Nineteenth-century America was a prime time for hoaxes. According to Kimbrew McLeod, author of "Pranksters: Making Mischief in the Modern World" (NYU Press, 2014), the Age of Enlightenment's focus on science, learning and gaining knowledge through personal experience and observation led increasing numbers of people to seek out phenomena that they could judge for themselves. Additionally, increasing literacy rates meant that more people were familiar with concepts like perpetual motion and were eager to see a machine that achieved it.

But, as Barbara Franco wrote in "The Cardiff Giant: A Hundred Year Old Hoax," "people were interested in the new sciences without really understanding them … The nineteenth century public often failed to make a distinction between popular and serious studies of subjects. They heard lectures, attended theaters, went to curiosity museums, the circus and revival meetings with much the same enthusiasm."

Amy Reading, author of "The Mark Inside: A Big Swindle, a Cunning Revenge, and a Small History of the Big Con" (Vintage, 2013), notes a peculiar characteristic in the American sense of fun. People seem to enjoy being taken in by a story that they know might be untrue, falling for it anyway and then being surprised upon learning they were duped. That Redheffer was actually run out of town suggests that early 1800s audiences perhaps hadn't yet fully embraced that form of entertainment, though they would in subsequent decades.

Perpetual motion stirs Philadelphia

Historians do not know Redheffer's background prior to the hoax, according to Ord-Hume. He appeared on the scene in 1812 when he opened a house near the Schuylkill River for public viewing. Inside was a machine he claimed could keep moving forever without ever being touched or otherwise aided.

Redheffer's machine was based on an "assumed 'principle' of perpetual motion that assumes continual downward force on an inclined plane can produce a continual horizontal force component," said Simanek. The machine had a gravity-driven pendulum with a large horizontal gear on the bottom, according to Ord-Hume. Another, smaller gear interlocked with the larger one. Both the large gear and the shaft were able to rotate separately. Placed on the gear were two ramps, and on the ramps were weights. The weights were supposed to push the large gear away from the shaft, and the friction would cause the shaft and gear to spin. The spinning gear would, in turn, power the interlocked smaller gear. If the weights were removed, the machine stopped.

According to the Visual Education Project, sources differ on the amount Redheffer charged unsuspecting Philadelphians to see his machine. Some say he charged $5, others say he charged $1, and others say women were let in free or for $1. Regardless, the price did not deter the fascinated public, and the machine became a sensation. Bets up to $10,000 were placed on its authenticity.
Redheffer was so pleased with his machine and its reception that he lobbied the state of Pennsylvania for funds to build a larger one. On January 21, 1813, the state sent inspectors to investigate before doling out the money. It was then that Redheffer's scheme fell apart.

The first debunking

According to Ord-Hume, upon arrival, the inspectors saw that the machine was in a room with a locked door and missing key. They could only view it through a window. One of the inspectors, Nathan Sellers, had brought along his son, Coleman. Young Coleman noticed that the gears in the machine were not working the way Redheffer claimed they did. The cogs in the gears were worn on the wrong side. This meant that weights, shaft, and gear were not powering the smaller gear to the side; the smaller gear was powering the larger device.

Nathan Sellers believed his son and determined that the machine was a hoax. Rather than confront Redheffer, however, he hired Isaiah Lukens, a local engineer, to build his own perpetual motion machine, which would look and "work" the same way Redheffer's did, according to Ord-Hume. Lukens constructed a machine that looked like Redheffer's but had a seemingly solid baseboard and a square piece of glass at the top. Four wooden finials, supposedly decorative, were on top of the glass and attached to the wooden posts. Lukens placed a clockwork motor in the baseboard. One of the finials was, in fact, a winder. It could be wound and power the motor all day. The motor would turn the shaft, which would power the gears.

Sellers and Lukens showed their machine to Redheffer, who was overcome at seeing his fake machine seemingly work for real, according to the University of Houston's website The Engines of Our Ingenuity. He offered them money to know how it was done. Sellers and Lukens did not denounce him on the spot but rather let news of the hoax spread throughout the Philadelphia.

Perpetual motion moves to New York

Though Philadelphia was on to Redheffer, the era's slow communication speeds meant that New York was still a target. Redheffer set up his machine again. Again, he drew large crowds. Among the onlookers was Robert Fulton, an engineer best known for developing the first successful commercial steamboat. Ord-Hume writes that when Fulton saw the machine, he exclaimed, "Why, this is a crank motion!"

Fulton had noticed that the speed of the machine and the sound it made were uneven, as would be the case if it were being cranked by hand. Some reports state that the machine also wobbled slightly. According to Ord-Hume, Fulton accused Redheffer, who blustered and proclaimed that his machine was real.

Fulton made an offer: Redheffer would let him try to expose the real source of the machine's energy, and if he could not, he would pay for any damage caused in the attempt. Redheffer agreed — likely under pressure from the crowd of visitors — and Fulton began prying off boards from the wall next to the machine, revealing a catgut cord. The cord ran through the wall to the upper floor. Fulton hurried upstairs, where he found an old man sitting on a chair, turning a crank with one hand and eating a crust of bread with the other.

Realizing they had been duped, the crowd of spectators destroyed the machine on the spot. Redheffer fled the city immediately.

Little is known about Redheffer post-hoax. According to "Citizen Spectator: Art, Illusion, and Visual Perception in Early National America" (University of North Carolina Press, 2011) by Wendy Bellion, he constructed another machine in 1816 but did not let anyone see it. He was granted a patent for it in 1820, but nothing is known about the device or what became of Redheffer. The patent itself was lost in a fire.

The "impossibility" of perpetual motion

Redheffer's hoax is history's most famous perpetual motion attempt but it is far from the only one. Most, however, were not designed to swindle the public out of their money.

Why do people continue to attempt perpetual motion machines when all laws of physics suggest they are impossible?

"My hunch is that they are motivated by their incomplete understanding of physics," Simanek told Live Science. "The perpetual motion machine inventors' view of physics is a collection of unrelated equations for specific purposes. They fail to grasp the greatest strength of physics — its logical unity.

"For example, the laws of thermodynamics do not arise by fiat. They are derivable from Newton's laws and the kinetic model of gases and have been well-tested experimentally … You can't simply discard one law you 'don't like' without bringing the whole logical structure of physics crashing down."

Simanek noted that most perpetual motion machine inventors do not believe their machines violate the laws of physics. "Some suppose that certain specific laws do not apply, usually conservation of energy and the laws of thermodynamics."

"Could there be some place where the geometry (and the physics) are different?" Simanek said. "Maybe, but we have no clue where to find that place, and one might wonder whether we could even go there, or exploit it for our purposes … That's armchair speculation, and science-fiction, not science."

If a perpetual motion machine did work, it would need to have certain traits. It would be "frictionless and perfectly silent in operation. It would give off no heat due to its operation, and would not emit any radiation of any kind, for that would be a loss of energy," said Simanek. Even so, such a machine would not run forever because "due to its rotation, its parts would be continually accelerating, and we know that matter is made up of charged particles, and accelerating charges radiate away energy." This would cause changes to the machine, making it eventually slow or stop.

Still, "if a machine could spin a wheel at constant speed for a very long time, with no measurable diminution of speed, and with absolutely no input energy, we could consider it, for all practical purposes, to be perpetual motion … But it would be only a useless curiosity, for if we tried to extract work from it, it would soon slow to a stop," Simanek said.

Most inventors of perpetual motion machines have a different goal in mind. "They want 'over-unity' performance — a machine that puts out more useful work than its energy input," said Simanek. Then, you would have energy left over for use.

Other than swindling the public, this might have been Redheffer's ultimate goal. Even after the hoax was revealed, Philadelphia newspapers speculated that the city had missed its chance to operate water pumps for free, according to The Engines of Our Ingenuity. And Redheffer's 1820 patent was for "machinery for the purpose of gaining power," according to the Visual Education Project. But those were wishes rather than realities.

Additional resources

- The Museum of Unworkable Devices
- Visual Education Project

MORE ABOUT...

Science Explained: The Physics of Perpetual Motion Machines

Could we ever make a device that operates with absolutely no energy loss?

JOLENE CREIGHTONMARCH 16TH 2016

What is Perpetual Motion?

A perpetual motion machine is (as the name implies) a machine that moves perpetually; it never stops. Ever. So if you created one today and set it going, it would keep on going until the Big Freeze. Calling that "a long time" is an understatement of epic proportions.

If you aren't aware, the Big Freeze is the theoretical end of, well, everything. It is the point at which the universe has expanded so much that it reaches a state of zero thermodynamic free energy. In other words, it is the point at which the cosmos, as a whole, will be unable to sustain motion. All of spacetime will be at absolute zero (the coldest known temperature, where all movement stops).

In short, the Big Freeze is essentially a time of eternal, unending, utterly still darkness. Fortunately, it's not set to happen for another 100 trillion years or so.

In any case, the important thing to remember is that a true perpetual motion machine would be able to run at least that long.

There are many designs on the internet that claim to be working designs for perpetual motion machines. If you look at those designs, it's not *too* farfetched to think that some of those machines could (if engineered correctly) move without stopping. And if we could do this, the implications would be staggering. We would essentially have an eternal source of energy. More than that, it would be *free* energy.

Unfortunately, thanks to the fundamental physics of our universe, perpetual motion machines are impossible.

Now, I know that there are probably a lot of people who are saying, “You should never say ‘never’ in science.” And fair enough. I admit that new knowledge could come along; however, in order for perpetual motion machines to be possible, this new knowledge would have to break physics as we know it. We’d be wrong about simply everything, and nearly none of our observations would make any sense.

If this isn’t “impossible,” it is about as close as you can get in science. So let’s breakdown perpetual motion machines and why we’ll never be able to make one.

The Physics of Perpetual Motion

The first law of thermodynamics is the law of conservation of energy. It states that energy is always conserved. It means that energy can be neither created nor destroyed. Instead, it simply changes from one form to another. To keep a machine moving, the energy applied should stay with the machine without any losses. Because of this fact alone, it is impossible to build perpetual motion machines.

Why? To build a perpetual motion machine we must accomplish many things:

1.) The machine should not have any “rubbing” parts: Any moving part must not touch other parts. This is because of friction that would be created between the two. This friction will ultimately cause the machine to lose its energy to heat. Making the surfaces smooth is not enough, as there is no perfectly smooth object. Heat will always be generated when two parts rub on each other (and that generation of heat is energy transference i.e, the motion machine *losing* energy).

2.) The machine must be operated inside a vacuum (no air): The reason for this has to do with the reason listed in number one. Operating the machine anywhere will cause the machine to lose energy due to the friction between the moving parts and air. Although the energy lost due to air friction is very small, remember, we are talking about perpetual motion machines here, if there is a loss mechanism, eventually, the machine will still lose its energy and run down (even if it takes a long, long time).

3.) The machine should not produce any sound: Sound is also a form of energy; if the machine is making any sound, that means that it is also losing energy.

For the sake of argument, let’s just say that somehow, we are able to build a perpetual motion machine. Will we be able to get energy from it? Yes, but only up to the energy that is used as an input to start the movement. A perpetual motion machine in real life will just be an energy storage. We must remember that the energy cannot be created; it always has to come from something.

So, if you happen to be able to build one, you will need energy to start the motion. This is the only energy that you will be able to harvest, since, as stated previously, energy cannot be created. Kind of a pointless device, really.

PERPETUAL MOTION MACHINES READING ASSIGNMENT

1. Read each of the articles in this folder. Take notes on each article in the notes section below:

Notes on: Science Explained: The Physics of Perpetual Motion Machines:

Notes on: **Perpetual Motion Machines: Working Against Physical Laws**

2. Using information from each article and your text book readings (HMH workbook) construct an CER paragraph supporting the claim:

Perpetual motion machines violate the laws of physics.

____

____

____

____

____

____

____

____

____

____

____

____