

7th Grade Science Lesson Plan – Trucking Industry & Energy Conversion

Objectives:

Students will be able to:

- Identify various forms of energy
- Identify the meaning of “energy conversion efficiency”
- Identify energy transfers associated with a combustion engine, traditionally used in the trucking industry
- Identify how fuel energy (fossil fuels) convert to various other forms of energy during fuel combustion
- Formulate real-world ideas on how to minimize energy loss and increase profits in the trucking industry

Standards:

SC.7.P.11.2 - Investigate and describe the transformation of energy from one form to another.

SC.7.P.11.3 - Cite evidence to explain that energy cannot be created or destroyed, only changed from one form to another.

LA.7.2.2.3 - The student will organize information to show understanding (e.g., representing main ideas within text through charting, mapping, paraphrasing, summarizing, or comparing/contrasting)

Lesson Essential Question:

How can energy be transferred from one form to another with minimal loss of useful energy?

DAY 1 Lesson -

Have students work in collaborative groups to list all various forms of energy. (See https://en.wikipedia.org/wiki/Forms_of_energy for a complete list.)

IF FULL REVIEW IS NECESSARY, view this Brainpop video

<https://www.brainpop.com/science/energy/formsenergy>

Have students classify each form of energy as either POTENTIAL or KINETIC energy.

Discuss classifications and have students defend why they classified each form as they did.

Have students read Article 1 - Law of Conservation of Energy Article - <http://factmyth.com/factoids/energy-is-neither-created-or-destroyed>

Have students work again in collaborative groups to determine the meaning behind the scientific fact that ENERGY IS NEITHER CREATED NOR DESTROYED, focusing on the fact that energy is simply transferred from one form to another.

Have students read Article 2 - Energy Loss Overview... http://energyeducation.ca/encyclopedia/Energy_loss

Give time for discussion in groups.

ASSIGN DAY 1 HOMEWORK: Describe how energy (in the form of a liquid fossil fuel) in a combustion engine is converted into other various forms of energy that we listed at the beginning of today's lesson. Be prepared to discuss your ideas with your collaborative team at the beginning of class tomorrow.

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DAY 2 Lesson -

Give students first five minutes of class to discuss ideas from last night's homework.

Have groups share information informally. Clarify misconceptions.

Have students fill out the ENERGY CONVERSION WORKSHEET (attached) to illustrate how chemical energy (in the form of liquid fossil fuel, aka gasoline) is converted to other forms of energy.

(OPTIONAL)

ASSIGN DAY 2 HOMEWORK: Have students formulate real-world ideas on how to minimize energy loss (thus increasing profits) in the trucking industry. Students will present their team ideas on Day 3 using the presentation rubric (attached). Provide a copy of the rubric to the students so that they can plan their presentations for optimal completion of the assignment.

DAY 3 Lesson -

Give students first five minutes of class to discuss ideas from yesterday's worksheet and last night's homework.

Allow collaborative teams to present their ideas on how to minimize energy loss (thus increasing profits) in the trucking industry to the rest of the class. Grade presentations according to the attached rubric.

Key vocabulary: potential, kinetic, thermal, sound Law of Conservation of Mass, Law of Conservation of Energy, conversion, thermodynamics, open system, closed system, isolated system

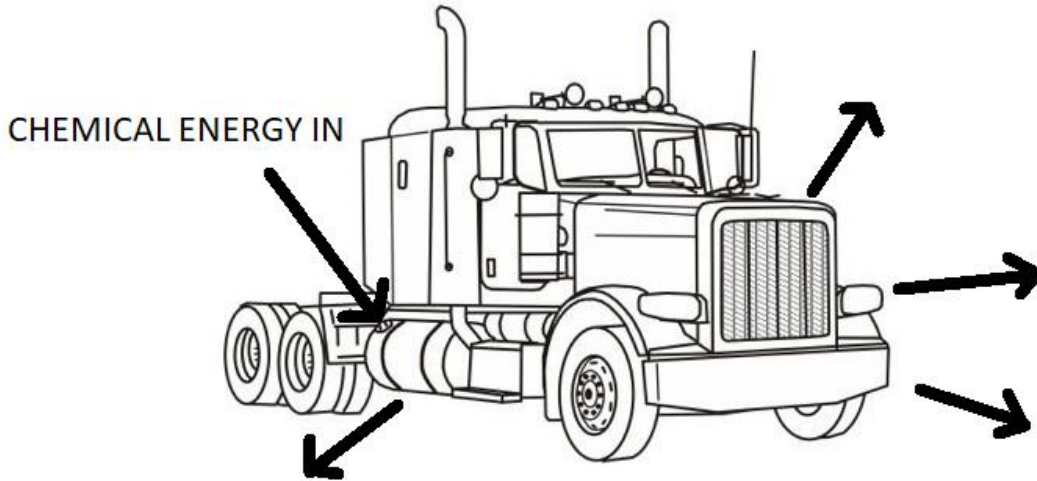
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ENERGY CONVERSION

NAME: _____

DATE: _____ PERIOD: _____

1. Complete the illustration below by showing how gasoline (a chemical energy in the form of a liquid fossil fuel) is converted to other forms of energy.



ADD ADDITIONAL ARROWS IF NECESSARY

2. Of all the energies that gasoline (chemical fuel) is converted to, identify the ONLY type of energy that a member of the truck-driving industry WANTS for his trucking rig: _____

(All other forms of energy that the original fuel was converted from is LOST to usefulness.)

3. Discuss the information from Article 2 (Energy Loss Overview) with your collaborative team. Write a paragraph on how energy in a combustion engine is never created or destroyed and how this fact relates to energy loss.

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PRESENTATION RUBRIC

	<u>EXEMPLARY</u> <i>(4 POINTS)</i>	<u>PROFICIENT</u> <i>(3 POINTS)</i>	<u>BASIC</u> <i>(2 POINTS)</i>	<u>UNSATISFACTORY</u> <i>(1 POINT)</i>
<u>CONTENT</u>	<ul style="list-style-type: none"> ▸ Excellent evidence of background work and critical thinking. ▸ All facts accurately stated. ▸ All major concepts and ideas explained in depth. 	<ul style="list-style-type: none"> ▸ Good evidence of background work and critical thinking. ▸ Most facts accurately stated. ▸ Most major concepts and ideas explained in depth. 	<ul style="list-style-type: none"> ▸ Some evidence of background work and critical thinking. ▸ Some facts accurately stated. ▸ Some major concepts and ideas explained in depth. 	<ul style="list-style-type: none"> ▸ Little evidence of background work and critical thinking. ▸ Few facts accurately stated. ▸ Few major concepts and ideas explained in depth.
<u>ORGANIZATION</u>	<ul style="list-style-type: none"> ▸ Presentation is very well organized and logically sequenced. ▸ Presentation makes excellent transitions and connections. 	<ul style="list-style-type: none"> ▸ Presentation is mostly well organized and logically sequenced. ▸ Presentation makes appropriate transitions and connections. 	<ul style="list-style-type: none"> ▸ Presentation lacks some organization and logically sequenced. ▸ Presentation makes weak transitions and connections. 	<ul style="list-style-type: none"> ▸ Presentation has little organization or logically sequenced. ▸ Presentation lacks appropriate transitions and connections.
<u>DELIVERY</u>	Keeps the audience completely engaged through the use of effective public speaking strategies such as eye contact, hand gestures, and vocal projection & inflection.	Keeps the audience mostly engaged through the use of effective public speaking strategies such as eye contact, hand gestures, and vocal projection & inflection.	Keeps the audience somewhat engaged through the use of effective public speaking strategies such as eye contact, hand gestures, and vocal projection & inflection.	Audience left largely disengaged as few public speaking strategies are used.
<u>PARTICIPATION & INVOLVEMENT</u>	Presentation tasks are well distributed among group members with all group members contributing strongly.	Presentation tasks are fairly well distributed among group members with all group members contributing.	Distribution of presentation tasks is unbalanced but all team members contribute something.	Distribution of presentation tasks is unbalanced with one or more team members not contributing.
<u>PROFESSIONALISM</u>	All group members are respectful when listening to another group's presentation AND members contribute to Q&A session.	All group members are respectful when listening to another group's presentation AND at least one member contributes to Q&A session.	All group members are respectful when listening to another group's presentation but members do not contribute to Q&A session.	Group members are not respectful when listening to another group's presentation.
POINTS EARNED PER COLUMN				
			TOTAL SUM POINTS	