Summary: Through a board game, students quiz each other on ways to save energy in a school.

## Grade Level: 5-8 (9-12)

### Subject Areas: Art,

English Language Arts, Family and Consumer Science, Mathematics, Science, Social Studies

### Setting: Classroom

### Time:

#### Preparation: 1 hour

**Activity:** one 50-minute period (more time is needed if students prepare game board and question cards)

**Vocabulary:** Conservation, Efficient, Energy conservation, Energy efficiency, Inefficient, Occupancy sensor, Recycle

### **Major Concept Areas:**

- · Quality of life
- Management of energy resource use

### **Getting Ready:**

Make a copy of the six-page *Game board* (do NOT print these pages back-to-back), *Question Cards and lcons* sheets, and *\$avings Tally Sheet* for each group that will be playing the game. Cut each sheet as indicated by dashed corners and tape the game board together.

Print out the *Question Cards and Icons* sheets back-to-back, icons should line up with corresponding question card. Each question card has the room noted on the top in case only the question cards are printed. See the *Icon Key* for a list of school areas each icon represents. Print the *\$avings Tally Sheet* back-to-back in case groups run out of space on the first side.

Review the **Team Super Savers Example**.

# **\$chool** \$avings



### **Objectives**

By the end of this activity, students will be able to list energy conservation opportunities in six different areas in a school.

#### Rationale

Identifying energy conservation opportunities in a school encourages students to appreciate they can make a difference and to understand that even small savings can add up and save the district money.

### **Materials**

- Copies of the following pages for each group of students:
  - Game board (see Getting Ready for assembly directions)
  - Set of Question Cards and Icons sheets (see Getting Ready for assembly directions)
  - \$avings Tally Sheet
  - Copies of *Playing Instructions for \$chool \$avings* for each student
- Small tokens to be used as game pieces (e.g., coins, small binder clips, or hard seeds)
- Two dice (for each group)

### Background

Reference *Classroom Energy Users* in the activity "Is Your Classroom Energy Efficient?" for more information relating to energy use and conservation in schools.

### Procedure

### Orientation

Ask students what people are currently doing or could do to help conserve energy in their school building. Notice what areas of the school they provide suggestions for. Can most students identify energy saving opportunities in the classroom only? What about the teacher's lounge, bathrooms, or school grounds?

#### Steps

- **1.** Inform students that they will play a board game that will test their knowledge of how to conserve energy in a school.
- Show students the *Game board* and discuss the different rooms found within. Ask for an example of how to conserve energy in each of the six rooms.
- **3.** Hand out copies of *Playing Instructions* for \$chool \$avings and discuss the rules.
- 4. If you would like to go through an example with your students, use the following instructions and the \$chool \$avings Office Example. If not, skip to Step 5.
  - Use the **\$chool \$avings Office Example** and cover the Question and Answer with a piece of paper so students cannot read it.
  - Place a token on the START space on the game board. Roll two dice and count the squares as you move through the door into the Office.
  - NOTE: If you do not reach the Office on your first roll, be sure to write in \$0 \$avings for Round 1 in the Player/ Team Teacher column on the sample \$avings tally sheet.
  - Uncover and read the multiple choice question on the Office Example aloud.
  - Ask students what they think the correct answer is.
  - Uncover the Answer and indicate the \$avings earned (or not earned) for answering the question correctly (or incorrectly).
  - Write in the appropriate \$avings
     (\$15 if the question was answered
     correctly, \$0 if question was answered
     incorrectly) for Round 1 (or Round 2
     if you did not enter the Office on your
     first roll) in the Player/Team Teacher
     column on the sample \$avings tally
     sheet.

- **5.** Divide the class into groups, no more than six players per game board. If the players want to work in teams, due to the size of the game board, consider having only four teams of two. One person in each group will be a \$avings keeper who will be responsible for keeping a total of \$avings earned by each team or player.
- Provide each group with a Game board, \$avings Tally Sheet, a set of Question Cards and Icons, and a pair of dice.
- **7.** Instruct groups to begin playing their games. If a group completes the game before others, have the students quiz each other with the remaining unanswered cards.

#### Closure

When the groups have finished their games, ask a representative from each group to share their results (Who was the winner? How much did they save? How many rounds did it take to win? How much did the whole group save?).

Discuss some of the questions with the students. Can the students identify other ways to save energy in their school? Do students think that they can make a difference in the energy consumed in their school?

#### Assessment

#### Formative

- · How well did students answer the Question Cards?
- · Were students able to tally their savings correctly?
- Did students follow the rules of the game and play cooperatively?
- Were students able to identify other ways to save energy in their school?

### **Icon Key**

Computer = Computer Lab Telephone = Office Desk = Classroom Coffee Pot = Teachers' Lounge Toilet Paper Roll = Bathroom Building with Trees = School Grounds

#### Summative

- Can students describe how they can use some of the energy saving strategies discussed in the game in their homes?
- Have students assess the game and how they might make changes to it.
- If students were to present energy saving ideas to others, who would find this information meaningful? How would students go about setting up meetings with these people?

### Extensions

Although the savings identified for energy conservation actions for this game may not reflect actual cost savings, students could calculate the actual savings of specific energy conservation measures using other activities found in this guide such as "Light and Your Load" and "Cost of Computers."

Students could create a presentation for the school board, principal, facilities manager, teachers, parents, or other identified interested persons. Content could include actions that they have taken to save energy in their classroom and/or other areas of the school, actions that they are planning to implement in the near future, and the savings related to both.

# **\$avings Tally Sheet**

Example Player/Team	Player/ Team Name					
Super Savers						
Round 1: 25						
Round 2: + 15	+	+	+	+	+	+
= 40	=	=	=	=	=	=
Round 3: + 50	+	+	+	+	+	+
= 90	=	=	=	=	=	=
Round 4: + 0	+	+	+	+	+	+
= 90	=	=	=	=	=	=
Round 5: + 0	+	+	+	+	+	+
= 90	=	=	=	=	=	=
Round 6: + 30	+	+	+	+	+	+
= 120	=	=	=	=	=	=
Round 7: + 10	+	+	+	+	+	+
= 130	=	=	=	=	=	=
Round 8: + 0	+	+	+	+	+	+
= 130	=	=	=	=	=	=
Round 9: + 15	+	+	+	+	+	+
= 145	=	=	=	=	=	=
Round 10: + 0	+	+	+	+	+	+
= 145	=	=	=	=	=	=
Round 11: + 50	+	+	+	+	+	+
= 195	=	=	=	=	=	=
Round 12: + 0	+	+	+	+	+	+
= 195	=	=	=	=	=	=
Round 13: + 15	+	+	+	+	+	+
Total = \$210						

Total \$chool \$avings









6







## **Playing Instructions for \$chool \$avings**

### **Object**

Welcome to Hopeful High School. As a student who cares about the environment, carbon emissions, and the overall future of energy resources, you are here to find ways to reduce your school's energy needs. Good luck in your endeavors...the environment is counting on YOU!

### Equipment

- **Game board:** This shows six rooms found in Hopeful High School.
- Deck of Question Cards and Icons: Seven or eight cards for each of the six rooms, indicated by room icons.
- **\$avings Tally Sheet** to help keep track of energy savings.
- Player/team tokens: Selected and provided by each player/team and must fit reasonably on game board.
- · Two dice

### Setup

- Each player/team selects a token and places it on the START space nearest to them. NOTE: Only one token may start on each START space.
- Shuffle and place the Question Cards in the corresponding rooms on the spaces identified with a dashed line, side with the room icon facing up.
- Write the name of each player/team on the top of the \$avings Tally Sheet.
- **4.** The youngest player or team with the youngest player goes first.
- 5. Play then proceeds, in turn, to the first person's left.

### Gameplay

#### Moving your token

To start your turn, move your token by rolling the dice. On each turn, try to reach a different room in the school. If you do not enter a room on your turn, the \$avings keeper should write \$0 on the **\$avings Tally Sheet** for you/your team's \$avings for that round.

### Rolling

Roll the dice and move your token the number of spaces you rolled.

- You may move forward, backward, horizontally or vertically, but not diagonally.
- You may not enter or land on a space that is already occupied by another token.
- You are allowed only one roll per turn.

#### Leaving and Entering a Room

You may leave or enter a room by rolling the dice and moving through a door.

- A door is the opening in the wall, not the space in front of the doorway. When you pass through a door, do not count the doorway itself as a space.
- If an opponent's token is blocking a door, you may not enter or leave via that door.
- Stop moving when you enter a room, even if you roll a number higher than you need to enter.
- You may not leave and re-enter the same room on a single turn.
- If an opponent blocks any and all doors to a room you are in, you must wait for someone to move and unblock a door so you can leave.
- Do not enter a room where there are no *Question Cards* available. Consider the room CLOSED which can not be used as a shortcut.

#### **Question Cards**

Once you are in a room, you can answer a *Question Card*. Each room will have specific *Question Cards* that ask about energy conservation opportunities commonly found in that particular room.

- The player/team to your left will draw the *Question Card* and read the question aloud.
- · There are two types of questions
  - True or false
  - Multiple choice
- There is a 'Wild Card' *Question Card* for each room. These questions are not necessarily about energy conservation opportunities in that particular room but could be about something found somewhere else in the school.
- You/your team may discuss the question.
- You/your team must give your answer within two minutes after hearing the question.

- The person reading the **Question Card** will read the correct answer (located at the bottom of the card for True or False questions and in bold for Multiple Choice questions). They will also read any further explanation found on the question card for everyone's knowledge.
- If you/your team answered correctly, add the \$avings listed on the bottom of the question card to you/your team's column on the *\$avings Tally Sheet*. Your turn is over and play continues with the player/team to your left.
- If you answered incorrectly, your/your team's turn is over and play continues with the player/team to your left.
- You must head towards a different room on your next turn. You may reenter a room you visited earlier after you visit a different room first.
- Once a room has run out of **Question Cards**, consider it CLOSED.
- Discard Question Cards in the middle of the Game board. These Question Cards are out of play for the rest of the game.

### Scoring

The **\$avings Tally Sheet** will aid in keeping track of the money each player/team saves the school.

- Select a player to act as \$avings keeper.
- \$avings keeper will fill out the top portion of the \$avings Tally Sheet (date and name of each player/team).
- If a player/team answers a question correctly, they receive the \$avings indicated on the bottom of the question card. Their turn is over.
- If a player/team answers a question incorrectly, they receive no \$avings and an amount of \$0 is entered on the *\$avings Tally Sheet* for that round. Their turn is over.
- After each round, total the \$avings earned by each player/team and report to all players.

### Winning

Once a player/team reaches \$200 in \$avings, the game is over and that player/team is declared the "winner."

### Extension

Add up the total \$avings earned by all teams and write in Total \$chool \$avings box on **\$avings Tally Sheet**. If appropriate, compare your group's Total \$chool \$avings to other groups.

# **\$chool \$avings Office Example**



True or False (Classroom)	True or False (Classroom)	True or False (Classroom)	
<b>Q:</b> You should cover the vent on the classroom door with a poster of Albert Einstein.	<b>Q:</b> The classroom unit ventilator is a good place to lay books and jackets.	<b>Q:</b> You can efficiently use window shades to help control classroom temperatures in the winter.	
<b>A: False</b> (the vent should never be obstructed).	<b>A: False</b> (the unit should be free of clutter).	<b>A: True</b> (open them during the day, close them at night).	
\$avings = \$10	\$avings = \$15	\$avings = \$30	
True or False (Classroom)	True or False (Computers)	True or False (Classroom)	
<b>Q:</b> Sharing school recreational facilities with the community saves energy.	<b>Q:</b> It is better to leave computers on constantly than to turn them off when you're not using them.	Q: A SMART Board® /Projector unit uses electricity when it is off yet plugged in.	
A: True (multiple spaces do not need to be maintained).	<b>A: False</b> (computers not in use should be shut down).	A: True (the unit still uses electricity in standby power mode if left plugged in).	
\$avings = \$15	\$avings = \$25	\$avings = \$30	
Multiple Choice (Classroom)	Multiple Choice (Computers)	Multiple Choice (Lounge)	
<b>Q:</b> If your classroom aquarium pump was left running for one month with nothing in the tank, you would waste	<b>Q:</b> How much would it cost if one lab with 30 computers was left in sleep mode over the entire summer?	Q: Compact Fluorescent Light bulbs (CFLs) use% of the amount of electricity required for incandescent bulbs.	
<ul> <li>a) approximately \$0.50</li> <li>b) approximately \$5</li> <li>c) approximately \$10</li> </ul>	<ul><li>a) approximately \$3.50</li><li>b) approximately \$35</li><li>c) approximately \$350</li></ul>	a) 25% b) 50% c) 75%	
\$avings = \$10	\$avings = \$50	\$avings = \$50	
Multiple Choice (Computers)	Multiple Choice (Classroom)	Multiple Choice (Grounds)	
<b>Q:</b> What does the letters LED stand for?	<b>Q:</b> Which of the following appliances or equipment generally uses the largest wattage?	<b>Q:</b> Which type of tree should be planted on the south side of buildings?	
<ul> <li>a) Light Emitting Diode</li> <li>b) Light Energy Diode</li> <li>c) Lighting Electrical Devices</li> </ul>	<ul><li>a) Television</li><li>b) Window fan</li><li>c) LCD projector</li></ul>	<ul><li>a) Coniferous</li><li>b) Deciduous</li><li>c) Cactus</li></ul>	
\$avings = \$50	\$avings = \$50	\$avings = \$15	
True or False (Classroom)	True or False (Office)	True or False (Classroom)	
<b>Q:</b> Your class would waste energy if you left a device charging station turned off but plugged in on every weekend for the whole school year.	<b>Q:</b> A battery charger left plugged in uses electricity even when it is not charging anything.	<b>Q:</b> Occupancy sensors save energy by automatically turning off lights when no one is around.	
A: True (Even if no devices are connected, the charging station itself draws power)	A: True (chargers not in use should be unplugged).	A: True (sensors can be sound or motion activated).	
\$avings = \$10	\$avings = \$10	\$avings = \$25	



True or False (Lounge)	True or False (Lounge)	True or False (Grounds)
<b>Q:</b> It is more energy efficient to use one large refrigerator versus several mini refrigerators.	<b>Q:</b> A standard incandescent exit light will save more energy than a Light Emitting Diode (LED) sign.	<b>Q:</b> Incorporating native vegetation on school grounds will minimize water needs.
A: True.	<b>A: False</b> (LED exit lights can save \$20/year/fixture).	<b>A: True</b> (native plants are adapted to thrive in local rainfall conditions).
\$avings = \$20	\$avings = \$20	\$avings = \$10
Multiple Choice (Lounge)	Multiple Choice (Grounds)	Multiple Choice (Grounds)
<b>Q:</b> Vending Misers are installed on vending machines to	<b>Q:</b> A geothermal system uses to help heat or cool a building.	<b>Q:</b> Which of the following energy sources is not renewable?
<ul> <li>a) advertise product</li> <li>b) turn machine off when no one is around</li> <li>c) lock machine so students can't use it.</li> </ul>	<ul><li>a) ground temperature</li><li>b) the sun</li><li>c) the wind</li></ul>	<ul><li>a) the sun</li><li>b) the wind</li><li>c) natural gas</li></ul>
\$avings = \$30	\$avings = \$25	\$avings = \$20
True or False (Grounds)	True or False (Grounds-wild)	True or False (Grounds)
<b>Q:</b> There is no benefit of leaving some areas natural on school grounds.	<b>Q:</b> Solar photovoltaic systems that generate electricity can only be used on residential homes.	<b>Q:</b> Wisconsin is one of the top twenty five states for potential wind energy.
A: False (natural areas improve air quality and offer many educational experiences)	<b>A: False</b> (these systems can be used anywhere)	A: True (Wisconsin is ranked #22 as of 2015)
\$avings = \$25	\$avings = \$20	\$avings = \$20
True or False (Office)	True or False (Office)	True or False (Classroom)
<b>Q:</b> An older refrigerator uses nearly twice as much energy as a new ENERGY STAR® refrigerator.	<b>Q:</b> ENERGY STAR <sup>®</sup> printers can achieve an electric savings of 30% compared to standard models.	<b>Q:</b> Turning on the classroom lights during the day is an example of daylighting.
A: True	A: True	A: False
\$avings = \$25	\$avings = \$40	\$avings = \$20
Multiple Choice (Bathroom)	Multiple Choice (Bathroom)	Multiple Choice (Bathroom-wild)
<b>Q:</b> A high efficiency toilet usesgallons of water or less for each flush.	<b>Q:</b> How many watts does a typical hair dryer on high heat use?	<b>Q:</b> A swimming pool cover can save% in energy costs.
<ul><li>a) 0.3 gallons</li><li>b) 1.3 gallons</li><li>c) 2.3 gallons</li></ul>	<ul> <li>a) 150 watts</li> <li>b) 500 watts</li> <li>c) 1500 watts</li> </ul>	<ul> <li>a) 50-70%</li> <li>b) 25-50%</li> <li>c) 5-7%</li> </ul>
\$avings = \$15	\$avings = \$10	\$avings = \$50



\$avings = \$125	\$avings = \$25	\$avings = \$15	
<ul><li>a) finitiway</li><li>b) office</li><li>c) machine shop</li></ul>	<ul> <li>a) incandescent builds</li> <li>b) fluorescent tubes</li> <li>c) light emitting diodes (LED)</li> </ul>	<ul> <li>a) 3.5 gallons</li> <li>b) 35 gallons</li> <li>c) 350 gallons</li> </ul>	
<b>Q:</b> Which of the following rooms would typically require the highest lighting levels?	<b>Q:</b> Which of the following lights are the most efficient option for your classroom?	<b>Q:</b> One steady drip from a leaky faucet can waste up to gallons of water a week.	
Multiple Choice (Office)	Multiple Choice (Lounge-wild)	Multiple Choice (Bathroom)	
\$avings = \$15	\$avings = \$20	\$avings = \$25	
<ul> <li>a) 5%</li> <li>b) 20%</li> <li>c) 35%</li> </ul>	<ul> <li>a) paper and paperboard</li> <li>b) food</li> <li>c) yard trimmings</li> </ul>	a) 47% b) 57% c) 67%	
<b>Q:</b> Laser printers typically use% of their printing power when in 'standby.'	<b>Q:</b> In 2015, was the largest contributor of organic material to U.S. municipal solid waste.	<b>Q:</b> In 2016, <u>%</u> of paper was recycled in the United States.	
Multiple Choice (Office)	Multiple Choice (Lounge)	Multiple Choice (Bathroom)	
\$avings = \$15	\$avings = \$20	\$avings = \$50	
A: False (a new school can be inefficient or an old school can be inefficient)	A: False (school buildings should not be ventilated, heated, and lighted when no one is there)	A: True (schools save money when using electricity during off-peak times)	
<b>Q:</b> A new school is always more energy efficient than an older school.	<b>Q:</b> A school building should operate 365 days/year as if students were always there.	<b>Q:</b> Nights and weekends are the best times to fire a kiln.	
True or False (Office-wild)	True or False (Computers-wild)	True or False (Classroom–wild)	
\$avings = \$10	\$avings = \$50	\$avings = \$35	
A: True	<b>A: False</b> (that feature must be turned on first)	A: False (in the northern hemisphere windows should face south)	
<b>Q:</b> Activating "sleep settings" can save up to \$35 per computer annually.	<b>Q:</b> New computers automatically go into standby mode when not being used.	<b>Q:</b> Windows should face north for the best natural daylighting.	
True or False (Computers)	True or False (Computers)	True or False (Office)	
\$avings = \$20	\$avings = \$50	\$avings = \$30	
<b>a)</b> 7 <b>b) 17</b> <b>c)</b> 170	<ul> <li>a) computers</li> <li>b) cafeteria equipment</li> <li>c) lighting</li> </ul>	a) month b) year c) 6 months	
<b>Q:</b> If your school recycled 2000 pounds of paper, you would save trees.	<b>Q:</b> Which of the following represents a typical school's largest electricity user?	<b>Q:</b> Your school buildings and grounds manager should change the air filters every	
Multiple Choice (Lounge)	Multiple Choice (Computers)	Multiple Choice (Grounds)	



## **Team Super Savers Example**

(from \$avings Tally Sheet)

Team Super Saver placed their token on the start space between the Office and the Bathroom. During **Round 1** they rolled a '10' and moved into the Office. They answered their question correctly and received \$25 in savings.

During **Round 2**, they rolled an '8' and entered the Classroom. Again, they answered their question correctly and received \$15 in savings. Their subtotal after the first two rounds is \$40.

During **Round 3**, they rolled another '10' and entered the Teacher's Lounge where they answered their question correctly and received \$50 (new subtotal = \$90).

During **Round 4**, they rolled a '3' and headed in the direction of the Computer Lab but did not make it through a doorway. Since they did not have an opportunity to answer a question, they received \$0 for Round 4 (subtotal = \$90).

During **Round 5**, they rolled a '7' and entered the Computer Lab. Unfortunately, they did not answer their question correctly and received \$0 for Round 5 (subtotal = \$90).

During **Round 6**, they rolled a '9' and entered the School Grounds. They answered their question correctly and received 330 (new subtotal = 120).

During **Round 7**, they rolled a '12' and entered the Bathroom. They answered their question correctly and received 10 (new subtotal = 130).

During **Round 8**, they rolled a '4' but unfortunately there was another team's token blocking the only doorway to the Bathroom and had to stay where they were until that doorway was clear. They received 0 (subtotal = 130).

During **Round 9**, the Bathroom doorway opened up and they rolled an '8'. They entered the Office once again, answered their question correctly and received \$15 (new subtotal = \$145).

During **Round 10**, they rolled a '9' and returned to the Bathroom. Unfortunately, they did not answer their question correctly and received 0 (subtotal = 145).

During **Round 11**, they rolled a '10' and returned to the School Grounds where they answered a Wild Card question correctly and received 50 (new subtotal = \$195).

They were close to winning, but they needed \$200 in savings to end the game. Their opponents realized this and blocked both doorways to the School Grounds, forcing Team Super Savers to skip a turn, taking \$0 for **Round 12** (subtotal = \$195).

During **Round 13**, a doorway opened up and they rolled an '11'. They entered the Computer Lab and answered their question correctly this time. They received \$15 and brought their Team Total to \$210 in savings, thus winning the game.



# **Excerpt from**

# Energy & Your School Activity Guide at <u>keepprogram.org</u>

© 2019 Wisconsin Center for Environmental Education

The Wisconsin K-12 Energy Education Program is supported through funding from



Wisconsin K-12 Energy Education Program (KEEP) College of Natural Resources **University of Wisconsin-Stevens Point** 











