

From Poop to Profits

The essential element is freedom.



V. 06/22

© 2014 Acton Institute - *From Poop to Profits* has been excerpted from "The Call of the Entrepreneur" and repackaged for classroom use with permission from Acton Institute.

Packaging and disc face design © 2010, 2022 izzit.org



(888) 242-0563
www.izzit.org

Video Page



From Poop to Profits Teacher's Guide

This Teacher's Guide includes the following:

- Lesson Plan
 - Key Terms and Preview Questions
 - Worksheet
 - Discussion Questions
 - Quiz
 - Enrichment Activities
 - Answer Key
 - Math Questions and Answers
 - Science Questions and Answers
-

Lesson Plan

These materials may be used in a variety of ways. For maximum benefit, we suggest the following lesson plan progression:

- Discuss the **Key Terms** and **Preview Questions**. (*We suggest reading these aloud before telling students the title of the video.*)
- Distribute copies of the **Worksheet** for students to use as a note taking-tool during the video.
- Play the video, pausing if need be to facilitate note-taking and understanding.
- Review and discuss answers to the **Worksheet**.
- Use the **Discussion Questions** to spark discussion, or assign these as homework.
- Replay the video as preparation for the **Quiz**.
- Administer the **Quiz**.
- Optional: Assign **Enrichment Activities**.

- Use the **Math** and **Science** questions and answers to enhance your math and science curriculum and to demonstrate real-life uses for math and science skills.

From Poop to Profits

Key Terms

Entrepreneur – A person who innovates and decides which projects to undertake. A successful entrepreneur’s actions will increase the value of resources and expand the size of the economic pie.

Free Market – Conditions under which entrepreneurs are left largely unimpeded by government to trade, to innovate, and to serve customers.

Incentive – Any factor, financial or non-financial, that provides a motive for a particular course of action, or counts as a reason for preferring one choice to the alternatives.

Innovation – The introduction and adoption of a new product or process; the economic application of inventions and marketing techniques.

Subsidy – A type of financial assistance to certain businesses or industries, usually from the government, which can support failing businesses.

Preview Questions

1. Can you think of reasons why people might want to start their own businesses?
2. How do new products make it to market?
3. How do innovations affect people’s lives?
4. Who are some famous entrepreneurs? What have they contributed to the world?
5. What encourages entrepreneurship in America? Is it the same in other countries?
6. What would motivate you to create a new product?
7. Can you think of three new products that have been created in the last year?

Name: _____

Date: _____

From Poop to Profits **Worksheet**

1. Brad Morgan and Kathleen Cantrell are both examples of _____.
2. In 1999, _____ prices dropped, putting Brad Morgan's business in jeopardy.
3. How much did it cost per year for Brad Morgan to dispose of the manure?
4. _____ told Brad Morgan his compost idea was unachievable.
5. Brad Morgan created a new _____ and a new marketplace.
6. How long does it take Brad Morgan to process his manure? How long was it expected to take?
7. One of the most important rules of entrepreneurship is "Do what you do best and _____ for the rest."
8. List three categories of Dairy Doo customers.
9. What did Brad Morgan refuse to accept from the government?
10. The freedom to _____ is important for customers, just as the freedom to _____ is important for entrepreneurs.

From Poop to Profits

Discussion Questions

1. What do bookstore owners and dairy farmers have in common?
2. What does innovation have to do with entrepreneurship? Are all business people entrepreneurs?
3. What are the characteristics of a good entrepreneur, according to the video?
4. What gave Brad Morgan the incentive to change his products and processes?
5. Why is it important for consumers to be able to choose between different products and services?
6. Why is it important for entrepreneurs to be able to offer new products and services?
7. Some entrepreneurs fail. Is this a bad thing? Why/why not?
8. Why do you think Brad Morgan refused to accept a subsidy?
9. Why did Brad Morgan hire someone to do soil testing and analysis instead of doing it himself? What rule of entrepreneurship does this demonstrate?
10. You probably don't like or want manure – even specially-composted manure like “Dairy Doo.” Brad Morgan probably doesn't like the same music as you do. What does this say about the things people value? How does this lead to trade/exchange?
11. Does Brad Morgan fit the image of the businessman as portrayed by the media? Explain.
12. What would the world be like without entrepreneurs?

Name: _____

Date: _____

From Poop to Profits Quiz, Page 1

Multiple Choice

1. Brad Morgan and Kathleen Campbell are both
 - A) receiving subsidies
 - B) entrepreneurs
 - C) farmers
 - D) retired
2. Before he came up with Dairy Doo, Brad Morgan's main product was
 - A) corn
 - B) apples
 - C) books
 - D) milk
3. Which of the following would be least likely to buy Dairy Doo?
 - A) golf course
 - B) grocery store
 - C) gardener
 - D) vegetable farmer
4. What prompted Brad Morgan to start thinking about a way to make money from manure?
 - A) His dairy cows weren't very productive.
 - B) He wanted to give up farming and move to town.
 - C) People started asking him if they could buy his manure.
 - D) Milk prices dropped dramatically.
5. Which of the following is an important rule of entrepreneurship?
 - A) Do what you do best and trade for the rest.
 - B) Don't take too many risks.
 - C) Do everything yourself – you'll save money.
 - D) Don't be concerned about covering your costs.

From Poop to Profits **Quiz, Page 2**

6. Michigan State told Brad Morgan his compost idea was
 - A) brilliant
 - B) silly
 - C) unachievable
 - D) a no-brainer

7. When an entrepreneur brings a profitable new product to market,
 - A) the entrepreneur is better off but consumers are worse off.
 - B) consumers are better off but the entrepreneur is worse off.
 - C) both entrepreneur and consumer are worse off.
 - D) both entrepreneur and consumer are better off.

8. The introduction and adoption of a new product or process is called
 - A) innovation
 - B) invitation
 - C) vocation
 - D) evaluation

9. A system in which entrepreneurs are left largely unimpeded by government to trade, to innovate, and to serve customers is
 - A) socialism
 - B) fascism
 - C) the free market
 - D) democracy

10. Which of the following is not a characteristic of a good entrepreneur?
 - A) risk-averse
 - B) creative
 - C) hard-working
 - D) confident

From Poop to Profits

Enrichment Activities

1. Project: Brad Morgan found a way to create value out of a seemingly worthless byproduct. Think of ways that you could create value. Come up with a business plan for bringing your own innovative product to market. Explain how and why your product or service will be used, how it will be produced, and how it will be marketed. For more resources visit the U.S. Small Business Administration website, <https://www.sba.gov>.
2. Small group discussion: What would be different about Brad Morgan's life if he had accepted the status quo in his business? Would his dairy farm have failed? Would he have accepted subsidies? What would these things mean for the farmers, businesses, and homeowners that use his products?
3. Essay: Consider the statement "It is important to serve others well in order to profit." Explain in your own words. Do you agree or disagree? Why?

From Poop to Profits

Answer Key

Worksheet

1. Entrepreneurs
2. Milk
3. \$25,000
4. Michigan State
5. Product
6. 60 days; 2 years
7. Trade
8. *Any three of the following:* Large production agriculture, small production agriculture, farming, golf courses, homeowners, gardeners
9. Subsidies
10. Choose; innovate

Quiz

1. B) Entrepreneurs
2. D) Milk
3. B) Grocery store
4. D) Milk prices dropped
5. A) Do what you do best and trade for the rest.
6. C) Unachievable
7. D) Both entrepreneur and consumer are better off.
8. A) Innovation
9. C) The free market
10. A) Risk-averse

From Poop to Profits

Math Questions

1. The County Extension Agent told Brad Morgan that he needed his cows to produce 20,000 pounds of milk per cow. At that time, Brad's cows were producing 14,000 pounds of milk per cow. At what percentage of the goal was he?
2. Brad Morgan has 250 cows. Initially, how many total pounds of milk were being produced annually? What was his overall goal for milk production for all cows?
3. Milk weighs about 8.6 pounds per gallon. How many gallons of milk were produced annually, assuming each cow produced 20,000 pounds? Round to the nearest gallon. Show your answer in standard notation and scientific notation.
4. Today a gallon of milk costs about \$3.50 per gallon. What is the value of milk produced by one cow annually? What is the value of milk produced by the herd per year? Assume all cows produce milk at a rate of 20,000 pounds per year.
5. In 1999 the price of milk was \$2.51 per gallon. Then the price dropped 3.4%. What was the new price?
6. Morgan Compost produces 10,000 cubic yards of compost every 60 days. How many cubic feet is that? How much compost is produced in a year? Give answers in cubic feet and cubic yards.
7. The compost is shaped into a windrow to assist in aeration. The windrow is 6 feet wide, 4 feet high and 100 yards long. What would be the volume - in feet - of a box with those dimensions?
8. Dairy Doo has a product line of eight items. If you were going to buy three of them, how many combinations are there for you to purchase?
9. Brad Morgan's original goal was to sell \$30,000 of compost per year. Today's goal is \$1.5 million. What is the percentage increase?
10. It may cost a dairy farm \$200 per year to manage the manure from one cow. In 1996 Brad Morgan spent \$25,000 on waste management. How many cows did he have at that time?

From Poop to Profits
Math — Answer Guide, Page 1

1. There are several correct ways to find the answer for this question.

a.

$$\frac{20000 - 14000}{20000} \times 100 = 30\%$$

He has 30% to go reach goal, so he was at 70%.

b.

$$\frac{14000}{20000} \times 100 = 70\%$$

2. Initial production: $250 \times 14000 = 3,500,000$

Goal production: $250 \times 20000 = 5,000,000$

3. $\frac{250 \times 20000}{8.6} = 581,395.35$ gallons

581,395 gallons or 5.814×10^5 gallons

From Poop to Profits
Math — Answer Guide, Page 2

4. Value of milk produced by one cow:

$$\frac{20000 \times 3.50}{8.6} = \$8,139.53$$

Value of milk produced by the herd:

$$\frac{20000 \times 250 \times 3.50}{8.6} = \$2,034,883.72$$

5. $\$2.51 - (.034 \times 2.51) = \2.43

6. 27 cubic feet in one cubic yard, so 10,000 cubic yards is 270,000 cubic feet

$$10,000 \times 27 = 270,000 \text{ cubic feet}$$

Annually:

$$\frac{365}{60} \times 270,000 = 1,642,500 \text{ cubic feet per year}$$

$$\frac{365}{60} \times 10,000 = 60,833 \text{ cubic yards per year}$$

From Poop to Profits
Math — Answer Guide, Page 3

7. Volume = length * width * height (Remember to convert the 100 yards to feet)

$$6 \times 4 \times 100 \times 3 = 7,200 \text{ cubic feet}$$

8. This is a combination problem since order doesn't matter. You can use the combinations formula if your standards require the children to use the counting principle. You can also make manipulatives with cards and have the kids figure it out by rearranging the cards.

$$\frac{8!}{(3! 5!)} = 56 \text{ combinations}$$

9.
$$\frac{1,500,000 - 30,000}{30,000} \times 100 = 4900\%$$

10.
$$\frac{25,000}{200} = 125 \text{ cows}$$

From Poop to Profits

Science

1. To successfully compost you need a mixture of *browns* and *greens*. *Browns* are materials that are dead and dry. *Greens* are materials that are fresh and moist – and often more nitrogen rich. What did Brad Morgan use as his *browns*? What were his *greens*?
2. If compost smells rotten, the anaerobic microbes have taken over. What does Brad do to his compost to make sure that the aerobic microbes can do their work? (Hint: What does the word *aerobic* mean?)
3. A good environment for microbes is a moist environment – one that allows microbes to disperse throughout the pile. Hypothesize what would happen to compost that has too much water. What would happen to one with too little water?
4. Brad lives in a cold climate – Michigan. Do you think he can prevent his compost from going dormant during the winter? Why or why not?
5. Is the composting reaction endothermic or exothermic? How do you know?
6. What causes a composting pile to be hot?
7. How does compost help soil?
8. If you were going to make a compost pile in your yard, which kitchen waste would you want to put in your pile? Which would you NOT want in your pile? Why?
9. Worm composting is also called vermicomposting. Vermicomposting can be done indoors in a small amount of space. You should provide a cool moist bedding (usually moist brown compost ingredient but can include shredded newspaper) mixed with kitchen wastes. Bacteria and fungi decompose the compost ingredients, and the worms feed on these microbes as well as the bedding. As the worms eat the bacteria and bedding materials they turn it into worm casings (worm poop) which are an excellent fertilizer.

The two types of earthworm best suited to worm composting are the red worms: *Eisenia foetida* (commonly known as red wiggler, brandling, or manure worm) and *Lumbricus rubellus*. These worms can survive in temperatures as low as 50 degrees Fahrenheit or as high as 90 degrees Fahrenheit, but they thrive in more moderate temperatures.

What is the benefit of vermicomposting? Of traditional composting?

10. Make your own classroom compost – either traditional or vermicomposting – and send us pictures!

From Poop to Profits

Science – Answer Guide, Page 1

1. In this case, brown and green do not refer to colors. The green ingredient was manure (moist, fresh and nitrogen-rich). Brad's brown ingredient was straw (dried and dead).
2. The word *aerobic* means requiring the presence of oxygen. Brad aerated his compost by turning it every two days. This ensured that the aerobic microbes had the oxygen needed to do the job.
3. With too much water the ingredients would be too heavy and stick together – thus making it difficult for the pile to be properly aerated. This may lead to a rotting garbage smell. With too little water, the microbes will have difficulty dispersing and the composting will slow down dramatically.
4. Although compost continues in temperatures as low as 50 degrees Fahrenheit, composting microbes may go dormant in winter. They will return to being active when the temperature rises. Anything that Brad can do to protect the compost against a temperature drop will help the compost microbes stay active, including surrounding the compost with bales of hay or covering them with plastic (but not so tightly that it becomes an anaerobic environment).
5. A compost reaction is exothermic. Exothermic means the reaction is giving off heat. Without feeling the compost, we can see the steam rising off the compost pile, thus leading us to believe that the compost is warm to the touch.
6. The heat generated by a compost pile is due to the body heat billions of microbes who are happily digesting the materials in the pile. Hotter piles means there are more microbes eating and digesting and giving off body heat. Hotter piles decompose quicker than cooler ones.
7. Composting helps the soil in many ways. First, it adds organic material and nutrients to the soils. These materials not only feed plants growing in them, it allows water to interact better with the soil. Second, it delivers healthy and helpful microbes (bacteria, fungi) to the soil. These microbes extract nutrients from the soil and pass it on to the plants. Third, compost can help minimize the ill-effects of marginal soils. For example, in sandy soil, the compost helps retain water needed for plant growth. In clay-like soil it helps the water drain more quickly so the plants are not waterlogged.

From Poop to Profits
Science – Answer Guide, Page 2

8. You may want to add coffee grinds, egg shells, vegetable peelings, fruit waste, and tea bags. You should NOT add meat scraps, fatty food wastes, dairy products and bones. These items are very attractive to pests and can give you unwanted visitors.
9. Answers will vary.
 - a. Vermicomposting can be done in areas with limited space (like a classroom), does not generate heat, and tends to not give off an odor. Works well in mild, consistent climate (indoors).
 - b. Traditional composting does not require the purchase of worms. It can be scaled up to much larger sizes, and has a faster turn-around time (from ingredients to fertilizing compost). Microbes can survive extreme temperatures, unlike with vermicomposting. When the worms die, they need to be replaced and an additional cost is incurred. The microbes go dormant to survive the extreme cold and they thrive in the heat.

Thanks for choosing izzit.org materials! We'd love to hear from you! If you have any comments, questions, or feedback, please email Ask@izzit.org or call us at the number below. We can't serve you well if we don't know what you need!



**Check out more free educational resources
at izzit.org, including:**

- Current Events Lessons
- Teachable Moments videos
- Learning Modules
- Online Quizzes
- So much more!