

## Lesson 5: Savvy Savers

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**Standards and Benchmarks** (see page B-56)

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### Lesson Description

Students calculate compound interest to identify benefits of saving in interest-bearing accounts. They learn the “rule of 72” and that it applies to both investments and debt. They apply the rule of 72 to several savings scenarios. They learn that there is a relationship between the level of risk for an investment and the potential reward or return on that investment.

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### Grade Level

6-12

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### Concepts

Compound interest  
Interest  
Non-interest-bearing account  
Principal  
Risk-reward relationship  
Rule of 72  
Saving

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### Objectives

- Students will
- explain the difference between a non-interest-bearing account and an interest-bearing account,
  - calculate interest compounded semiannually,
  - explain and demonstrate the rule of 72, and
  - describe the risk-reward relationship.
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### It's Your Paycheck!

## Time Required

45 minutes

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## Materials

- Handouts 5.1, 5.2, and 5.3, one copy of each for each student
  - Handout 5.1—Answer Key, one copy for the teacher to use as a visual
  - Handout 5.2—Answer Key, one copy for the teacher to use as a visual
  - Handout 5.3—Answer Key, one copy for the teacher to use as a visual
  - One calculator for each student
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## Procedure

1. Begin by asking students the following:
  - What does it mean to be a saver? (*Answers may vary but may include purposely setting aside money to spend later, not spending all of your income, having money left after paying expenses, or having income greater than expenses.*)
  - What do you suppose it means to be a savvy saver? (*Answers may vary but may include being a smart saver, knowing about places to save one's money, or knowing about different types of savings accounts.*)
2. Explain that **saving** is not spending on current consumption or taxes. Distribute a copy of *Handout 5.1: Maria's Savings Decision* to each student. Explain that the students will likely realize the difference between a saver and a savvy saver when they examine Maria's story. Call on a student to read aloud the Introduction on Handout 5.1.
3. Explain the following:
  - A **non-interest-bearing account**, also called a zero-interest account, is one in which no interest is paid on the **principal**. Principal is the original amount of money deposited or invested, excluding any interest.
  - **Interest** is the price of using someone else's money. When people place their money in a bank, the bank uses the money to make loans to others. In return, the bank pays the account holder interest. There are various types of interest-bearing accounts that vary by the amount of interest paid and how often interest is paid.
  - **Compound interest** is interest computed on the sum of the original principal and accrued (accumulated or earned) interest. For example, an account that pays 5 percent interest "compounded semiannually" means that every six months  $\frac{1}{2}$  of 5 percent interest—that is, 2.5 percent interest—is paid on the principal and any accrued interest.

4. Show students how to calculate 5 percent interest compounded semiannually by working through numbers 1 through 3 on Handout 5.1. (Refer to *Handout 5.1: Maria's Savings Decision—Answer Key* for answers.)
5. Distribute a calculator to each student and instruct students to complete number 4 on Handout 5.1 on their own.
6. Display Handout 5.1—Answer Key and review the answers to number 4.
7. Discuss the following:
  - What could Maria have bought with the \$50.63 of interest she might have earned on her savings? (*Answers will vary.*)
  - Would Maria classify as a saver or a savvy saver? (*Saver*) Why? (*She didn't invest her money in a way that would give her a return on her investment—that is, an account that would pay her interest on her principal.*)
  - Why might Maria have kept her \$1,000 in a non-interest-bearing account rather than putting it in an interest-bearing account? (*Answers may vary but may include that she was financially lazy—not proactive—or that she may not understand the importance of compound interest.*)
  - Imagine that instead of \$1,000, Maria's grandmother had given her \$10,000. After three years, how much interest would \$10,000 have earned with an account that pays 5 percent interest compounded semiannually? (*\$1,596.93*)
  - Why is time—that is, the number of months you have your money in an interest-bearing account—a very important factor in accumulating savings? (*Answers may vary but should include that the sooner you start saving, the sooner you start earning interest—not only on your principal but also on accrued interest. Your money works for you over time.*)
8. Ask students to raise their hands if they would like their savings to double over a period of years. (*Most students will likely want their savings to double.*) Discuss the following:
  - How long would it take for Maria's \$1,000 to double if she kept the money in a non-interest-bearing account? (*It would never double.*)
  - How long do you think it will take for Maria's \$1,000 to double if she puts the money in a savings account that pays compound interest? (*Answers will vary.*)
9. Explain that the **rule of 72** is a method to estimate the number of years it will take for a financial investment (or debt) to double in value at a given annual interest rate. You divide 72 by the interest rate to determine the approximate number of years it will take the investment (or debt) to double in value.

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10. Share and explain the following:

- For example, consider a savings account with a 5 percent annual interest rate:  $72 \div 5 = 14.4$ . The principal in this savings account will double in a little over 14 years.
- The rule of 72 assumes people leave their money in an account without taking away from it or adding to it. It is not an exact number, but it serves as a good estimate.

11. Distribute a copy of *Handout 5.2: The Rule of 72* to each student and instruct them to complete the handout by following the directions. When students have completed Handout 5.2, display *Handout 5.2: The Rule of 72—Answer Key* to review the answers.

12. Discuss the following:

- Does the amount of interest an account pays have much of an impact on how long it will take for your money to double? (*Yes. The higher the interest rate, the less time it will take for your money to double.*)
- Interest rates vary over time, but savings accounts are considered a safe place to save your money because for most savings accounts your principal is guaranteed—it cannot go down. Savings accounts generally pay interest annually in the 0.5 percent to 1.5 percent range, depending on current financial conditions in the economy. This reflects the risk-reward relationship.
- The **risk-reward relationship** is the idea that there is a direct relationship between risk of the loss of principal and the expected rate of return. The higher the risk of loss of principal for an investment, the greater the potential reward. Conversely, the lower the risk of loss of principal for an investment, the lower the potential reward. Therefore, savings accounts are considered very low risk; so their reward as compared with other investment options, is a relatively low yield, or interest rate.
- The rule of 72 applies not only to investments but also to debt, because it shows approximately how fast your debt will double at a given interest rate.
- What annual interest rate do credit cards charge? (*Interest rates on credit cards vary over time and under different financial conditions in the economy, but generally credit cards charge a relatively high interest rate.*) Point out that credit cards can charge high rates because credit card companies bear a risk when loaning funds to their cardholders.
- If a credit card charges an 18 percent annual interest rate, approximately how long would it take for your debt to double if you made no payment on the debt? (*4 years;  $72 \div 18 = 4$* )

## Closure

13. Review the key points of this lesson by discussing the following:
- What is a non-interest-bearing account? (*A non-interest-bearing account is one that pays no interest on the principal.*)
  - What is interest? (*Interest is the price of using someone else's money.*)
  - What is compound interest? (*Compound interest is interest computed on the original principal and accrued interest.*)
  - What interest rate would a savings account or a low-risk investment likely pay—would it be a low, medium, or high interest rate—and why? (*They would each pay a low interest rate because of the risk-reward relationship.*)
  - What does the rule of 72 estimate? (*The rule of 72 estimates the number of years it will take for a financial investment—or debt—to double in value at a given annual interest rate.*)

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## Assessment

14. Give each student a copy of *Handout 5.3: Charlie's Financial Goal* and tell them to follow the instructions on the handout. Allow time for students to complete the handout and then display *Handout 5.3: Charlie's Financial Goal—Answer Key* to review students' answers.

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## It's Your Paycheck!

### Handout 5.1: Maria’s Savings Decision (page 1 of 2)

Introduction: One year ago, Maria received \$1,000 from her grandmother with instructions to save it for college two years from now. She deposited the money in her checking account, which pays her no interest. She had considered putting the \$1,000 in a savings account that paid 5 percent interest compounded semiannually, but she never got around to it. How much money did Maria lose by leaving her \$1,000 in a non-interest-bearing account for 12 months? Follow the steps below to find the answer.

1. Interest compounded semiannually is added to the principal in an account every six months. Follow the steps to calculate interest compounded semiannually, and write the answers in the chart below:
  - Step 1:** Convert the annual interest rate to a decimal. In this case, 5 percent becomes 0.05.
  - Step 2:** Divide the annual interest rate (as a decimal) by 2 to determine the interest paid every six months. In this case,  $(0.05 \div 2) = 0.025$ . (So, for this scenario, every six months the saver would receive 0.025 percent interest on the principal and on any accumulated interest.)
  - Step 3:** Multiply the principal (plus any accrued interest) by the interest rate to get the amount paid in dollars. Round to the nearest hundredth (for example,  $\$25.625 = \$25.63$ ). (Note that the principal will change each time interest accrues.)
  - Step 4:** Add principal and interest to get the new principal.
  - Step 5:** Repeat steps 2 and 3 to calculate interest and principal for each six-month time period.

Months	Principal (p)	Interest rate (i)	p + i
6	\$1,000.00		
12			

**Handout 5.1: Maria’s Savings Decision (page 2 of 2)**

2. Fill in the following chart for Maria’s two savings options.

Type of account	Original principal	Interest after 12 months	Total principal and interest after 12 months
Zero-interest checking account	\$1,000.00		
Savings account with 5% interest compounded semiannually	\$1,000.00		

3. Maria lost \$\_\_\_\_\_ by keeping her money in a non-interest-bearing account rather than putting it in an account that paid a 5 percent interest rate compounded semiannually.
4. Complete the chart by using the information from question 1 for months 6 and 12 and then calculate the interest paid at 18 months, 2 years, and 3 years for an account that pays a 5 percent interest rate compounded semiannually. Round to the nearest hundredth. Remember that the principal will change each time interest accrues.

Months	Principal (p)	Interest rate (i)	p + i
6	\$1,000.00	\$	\$
12	\$	\$25.63	\$
18	\$	\$	\$
24 (2 years)	\$1,076.90	\$	\$
30	\$	\$27.60	\$
36 (3 years)	\$	\$	\$

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### Handout 5.1: Maria’s Savings Decision—Answer Key (page 1 of 2)

Introduction: One year ago, Maria received \$1,000 from her grandmother with instructions to save it for college two years from now. She deposited the money in her checking account, which pays her no interest. She had considered putting the \$1,000 in a savings account that paid 5 percent interest compounded semiannually, but she never got around to it. How much money did Maria lose by leaving her \$1,000 in a non-interest-bearing account for 12 months? Follow the steps below to find the answer.

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  - Step 3:** Multiply the principal (plus any accrued interest) by the interest rate to get the amount paid in dollars. Round to the nearest hundredth (for example,  $\$25.625 = \$25.63$ ). (Note that the principal will change each time interest accrues.)
  - Step 4:** Add principal and interest to get the new principal.
  - Step 5:** Repeat steps 2 and 3 to calculate interest and principal for each six-month time period.

Months	Principal (p)	Interest rate (i)	p + i
6	\$1,000.00	\$25.00	\$1,025.00
12	\$1,025.00	\$25.63	\$1,050.63



**Handout 5.1: Maria's Savings Decision—Answer Key (page 1 of 2)**

2. Fill in the following chart for Maria's two savings options.

Type of account	Original principal	Interest after 12 months	Total principal and interest after 12 months
Zero-interest checking account	\$1,000.00	\$0	\$1,000.00
Savings account with 5% interest compounded semiannually	\$1,000.00	\$50.63	\$1,050.63

3. Maria lost \$ \$50.63 by keeping her money in a non-interest-bearing account rather than putting it in an account that paid a 5 percent interest rate compounded semiannually.
4. Complete the chart by using the information from question 1 for months 6 and 12 and then calculate the interest paid at 18 months, 2 years, and 3 years for an account that pays a 5 percent interest rate compounded semiannually. Round to the nearest hundredth. Remember that the principal will change each time interest accrues.

Months	Principal (p)	Interest rate (i)	p + i
6	\$1,000.00	\$25.00	\$1,025.00
12	\$1,025.00	\$25.63	\$1,050.63
18	\$1,050.63	\$26.27	\$1,076.90
24 (2 years)	\$1,076.90	\$26.92	\$1,103.82
30	\$1,103.82	\$27.60	\$1,131.42
36 (3 years)	\$1,131.42	\$28.29	\$1,159.71

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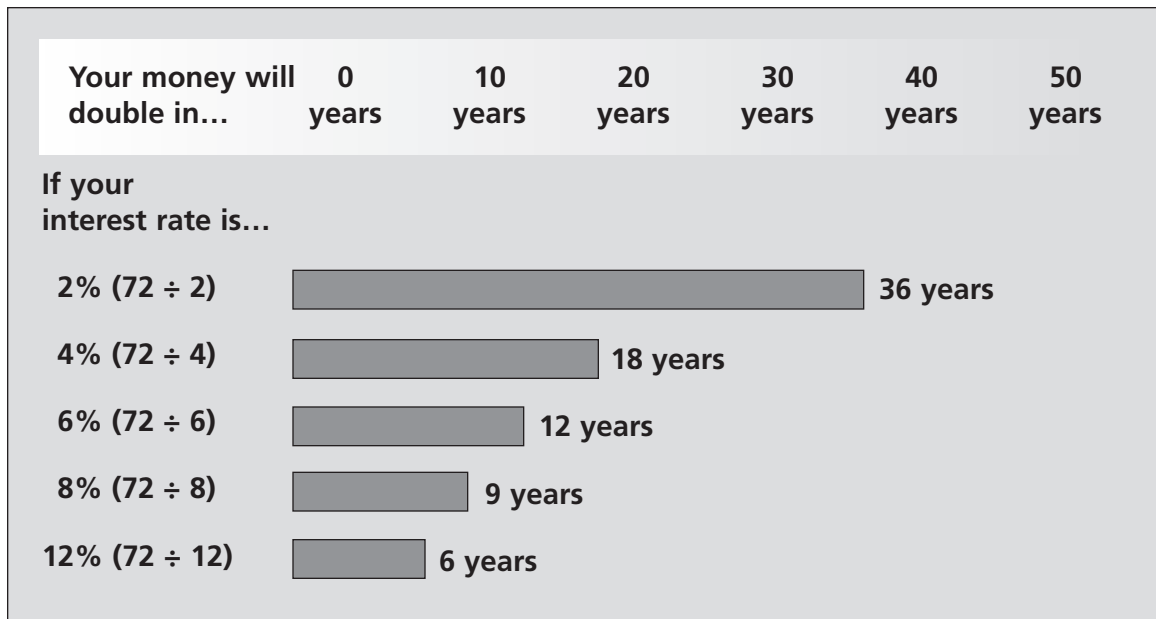
### Handout 5.2: The Rule of 72

Directions: The rule of 72 is a method to estimate the number of years it will take for a financial investment, including savings, to double in value at a given annual interest rate. You divide 72 by the interest rate to determine the approximate number of years it will take the investment to double in value. For each bar below, begin at 0 years and shade in the bar horizontally to indicate the number of years it would take for money to double at the noted annual interest rate. Please use a pencil.

Your money will double in...	0 years	10 years	20 years	30 years	40 years	50 years
<b>If your interest rate is...</b>						
2% (72 ÷ 2)	<input type="text"/>					
4% (72 ÷ 4)	<input type="text"/>					
6% (72 ÷ 6)	<input type="text"/>					
8% (72 ÷ 8)	<input type="text"/>					
12% (72 ÷ 12)	<input type="text"/>					

## Handout 5.2: The Rule of 72—Answer Key

Directions: The rule of 72 is a method to estimate the number of years it will take for a financial investment, including savings, to double in value at a given annual interest rate. You divide 72 by the interest rate to determine the approximate number of years it will take the investment to double in value. For each bar below, begin at 0 years and shade in the bar horizontally to indicate the number of years it would take for money to double at the noted annual interest rate. Please use a pencil.



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**Handout 5.3: Charlie’s Financial Goal**

- Charlie is saving to buy a car a year and a half from today. He has \$12,000 in a savings account with a 2 percent interest rate compounded quarterly. How much will Charlie have in his savings account after 18 months? Calculate his balance in the chart below. Round to the nearest hundredth.

Months	Principal (p)	Interest rate (i)	p + i
3	\$12,000.00		
6			
9			
12			
15			
18			

- How long will it take Charlie’s money to double with a 2 percent interest rate compounded quarterly? \_\_\_\_\_
- Charlie wants to explain the risk-reward relationship to his nephew, who is a sophomore in high school. If you were Charlie, how would you explain this relationship?

**Handout 5.3: Charlie's Financial Goal—Answer Key**

1. Charlie is saving to buy a car a year and a half from today. He has \$12,000 in a savings account with a 2 percent interest rate compounded quarterly. How much will Charlie have in his savings account after 18 months? Calculate his balance in the chart below. Round to the nearest hundredth.

Months	Principal (p)	Interest rate (i)	p + i
3	\$12,000.00	\$60.00	\$12,060.00
6	\$12,060.00	\$60.30	\$12,120.30
9	\$12,120.30	\$60.60	\$12,180.90
12	\$12,180.90	\$60.90	\$12,241.80
15	\$12,241.80	\$61.21	\$12,303.01
18	\$12,303.01	\$61.52	\$12,264.53

2. How long will it take Charlie's money to double with a 2 percent interest rate compounded quarterly? (36 years)
3. Charlie wants to explain the risk-reward relationship to his nephew, who is a sophomore in high school. If you were Charlie, how would you explain this relationship? (*When you invest your money, the higher the risk of loss of principal for an investment, the higher the potential reward. So, relatively safe places to put your money—in a savings account at a bank, for example—yield a relatively low reward because the risk of losing your principal is very low.*)

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## Standards and Benchmarks

### National Standards in Economics

**Standard 12:** Interest rates, adjusted for inflation, rise and fall to balance the amount saved with the amount borrowed, which affects the allocation of scarce resources between present and future uses.

- **Benchmark 1, Grade 8:** An interest rate is a price of money that is borrowed or saved.

### National Standards in Personal Finance

**Saving and Investing Overall Competency:** Implement a diversified investment strategy that is compatible with personal goals.

**Standard 1:** Discuss how saving contributes to financial well-being.

- **Expectation 2, 12th Grade:** Identify and compare saving strategies, including “paying yourself first,” using payroll deduction, and comparison shopping to spend less.

**Standard 3:** Evaluate investment alternatives.

- **Expectation 2, 12th Grade:** Compare the risks and returns of various investments.

### Common Core Standards: Reading Standards for Literacy in History/Social Studies, Science, and Technical Subjects, Grades 6-12

#### History and Social Studies

- **Key Ideas and Details**

CCSS.ELA-Literacy.RH.6-8.3: Identify key steps in a text’s description of a process related to history/social studies (e.g., how a bill becomes law, how interest rates are raised or lowered).

- **Craft and Structure**

CCSS.ELA-Literacy.RH.6-8.4: Determine the meaning of words and phrases as they are used in a text, including vocabulary specific to domains related to history/social studies.

CCSS.ELA-Literacy.RH.9-10.4: Determine the meaning of words and phrases as they are used in a text, including vocabulary describing political, social, or economic aspects of history/social science.

CCSS.ELA-Literacy.RH.11-12.4: Determine the meaning of words and phrases as they are used in a text, including analyzing how an author uses and refines the meaning of a key term over the course of a text (e.g., how Madison defines *faction* in *Federalist* No. 10).

- **Integration of Knowledge and Ideas**

CCSS.ELA-Literacy.RH.6-8.7: Integrate visual information (e.g., in charts, graphs, photographs, videos, or maps) with other information in print and digital texts.

CCSS.ELA-Literacy.RH.9-10.7: Integrate quantitative or technical analysis (e.g., charts, research data) with qualitative analysis in print or digital text.

CCSS.ELA-Literacy.RH.11-12.7: Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., visually, quantitatively, as well as in words) in order to address a question or solve a problem.

## Writing

- **Text Types and Purposes**

CCSS.ELA-Literacy.WHST.6-8.1: Write arguments focused on *discipline-specific content*.

CCSS.ELA-Literacy.WHST.6-8.1B. Support claim(s) with logical reasoning and relevant, accurate data and evidence that demonstrate an understanding of the topic or text, using credible sources.

CCSS.ELA-Literacy.WHST.6-8.1C. Use words, phrases, and clauses to create cohesion and clarify the relationships among claim(s), counterclaims, reasons, and evidence.

CCSS.ELA-Literacy.WHST.6-8.1E. Provide a concluding statement or section that follows from and supports the argument presented.

CCSS.ELA-Literacy.WHST.6-8.2: Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes.

CCSS.ELA-Literacy.WHST.6-8.2B. Develop the topic with relevant, well-chosen facts, definitions, concrete details, quotations, or other information and examples.

CCSS.ELA-Literacy.WHST.6-8.2C. Use appropriate and varied transitions to create cohesion and clarify the relationships among ideas and concepts.

CCSS.ELA-Literacy.WHST.6-8.2D. Use precise language and domain-specific vocabulary to inform about or explain the topic.

CCSS.ELA-Literacy.WHST.6-8.2F. Provide a concluding statement or section that follows from and supports the information or explanation presented.

CCSS.ELA-Literacy.WHST.9-10.1: Write arguments focused on *discipline-specific content*.

CCSS.ELA-Literacy.WHST.9-10.1A: Introduce precise claim(s), distinguish the claim(s) from alternate or opposing claims, and create an organization that establishes clear relationships among the claim(s), counterclaims, reasons, and evidence.

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CCSS.ELA-Literacy.WHST.9-10.1C: Use words, phrases, and clauses to link the major sections of the text, create cohesion, and clarify the relationships between claim(s) and reasons, between reasons and evidence, and between claim(s) and counterclaims.

CCSS.ELA-Literacy.WHST.9-10.1E: Provide a concluding statement or section that follows from or supports the argument presented.

CCSS.ELA-Literacy.WHST.9-10.2: Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes.

CCSS.ELA-Literacy.WHST.9-10.2B: Develop the topic with well-chosen, relevant, and sufficient facts, extended definitions, concrete details, quotations, or other information and examples appropriate to the audience's knowledge of the topic.

CCSS.ELA-Literacy.WHST.9-10.2C: Use varied transitions and sentence structures to link the major sections of the text, create cohesion, and clarify the relationships among ideas and concepts.

CCSS.ELA-Literacy.WHST.9-10.2D: Use precise language and domain-specific vocabulary to manage the complexity of the topic and convey a style appropriate to the discipline and context as well as to the expertise of likely readers.

CCSS.ELA-Literacy.WHST.9-10.2F: Provide a concluding statement or section that follows from and supports the information or explanation presented (e.g., articulating implications or the significance of the topic).

CCSS.ELA-Literacy.WHST.11-12.1: Write arguments focused on *discipline-specific content*.

CCSS.ELA-Literacy.WHST.11-12.1B: Develop claim(s) and counterclaims fairly and thoroughly, supplying the most relevant data and evidence for each while pointing out the strengths and limitations of both claim(s) and counterclaims in a discipline-appropriate form that anticipates the audience's knowledge level, concerns, values, and possible biases.

CCSS.ELA-Literacy.WHST.11-12.1C: Use words, phrases, and clauses as well as varied syntax to link the major sections of the text, create cohesion, and clarify the relationships between claim(s) and reasons, between reasons and evidence, and between claim(s) and counterclaims.

CCSS.ELA-Literacy.WHST.11-12.1E: Provide a concluding statement or section that follows from or supports the argument presented.

CCSS.ELA-Literacy.WHST.11-12.2: Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes.

CCSS.ELA-Literacy.WHST.11-12.2B: Develop the topic thoroughly by selecting the most significant and relevant facts, extended definitions, concrete details, quotations, or other information and examples appropriate to the audience's knowledge of the topic.



CCSS.ELA-Literacy.WHST.11-12.2C: Use varied transitions and sentence structures to link the major sections of the text, create cohesion, and clarify the relationships among complex ideas and concepts.

CCSS.ELA-Literacy.WHST.11-12.2D: Use precise language, domain-specific vocabulary and techniques such as metaphor, simile, and analogy to manage the complexity of the topic; convey a knowledgeable stance in a style that responds to the discipline and context as well as to the expertise of likely readers.

CCSS.ELA-Literacy.WHST.11-12.2E: Provide a concluding statement or section that follows from and supports the information or explanation provided (e.g., articulating implications or the significance of the topic).

- **Production and Distribution of Writing**

CCSS.ELA-Literacy.WHST.6-8.4: Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.

CCSS.ELA-Literacy.WHST.9-10.4: Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.

CCSS.ELA-Literacy.WHST.11-12.4: Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.

