June 13, 2019

Dear Eighth Grade Families,

As we come to the close of another school year, summer reading becomes a very important topic of discussion. I need to remind you to keep reading with your children over the summer. Many times, children will make a lot of progress during the school year, but when they don't read daily over the summer, they regress and can return to school in September below grade level.

From the New York State Common Core State Standards (CCSS)

To build a foundation for college and career readiness, students must read widely and deeply from among a broad range of high-quality, increasingly challenging literary and informational texts. Through extensive reading of stories, dramas, poems, and myths from diverse cultures and different time periods, students gain literary and cultural knowledge as well as familiarity with various text structures and elements. By reading texts in history/social studies, science, and other disciplines, students build a foundation of knowledge in these fields that will also give them the background to be better readers in all content areas. Students can only gain content knowledge within and across grades. Students also acquire the habits of reading independently and closely, which are essential to their future success.

Each student entering 8th grade is required to read the following assigned novels and complete the attached assignment(s) over the summer break.

The Giver by Lois Lowry

The Absolutely True Diary of a Part-Time Indian by Sherman Alexie

While there is not an attached assignment for *The Absolutely True Diary of a Part-Time Indian*, students must complete the reading with textual annotations. In addition to the completed summer reading assignment, all students must bring the required novels to school on September 9th, 2019.

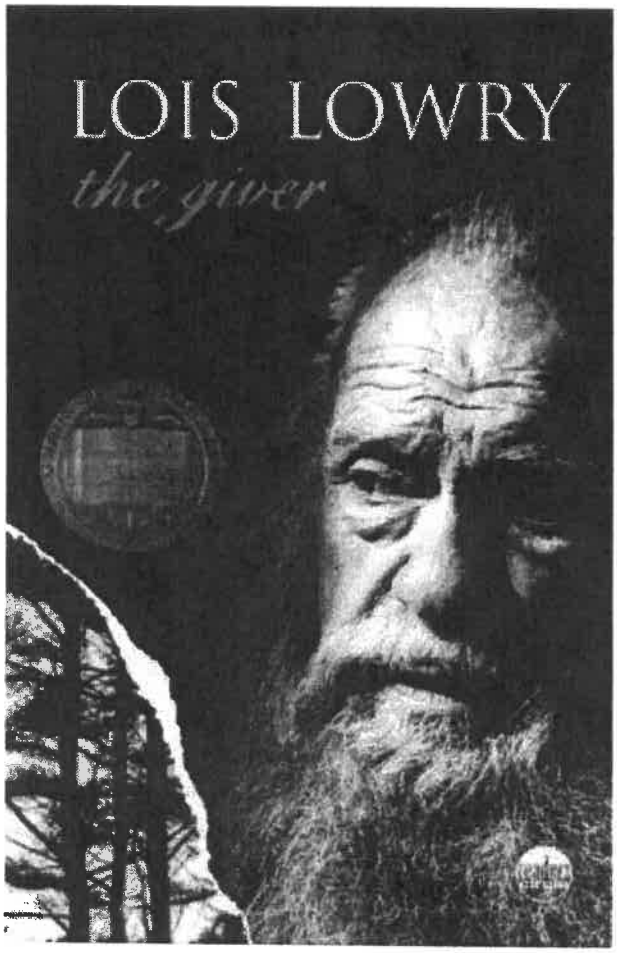
Thank you for your cooperation and have a beautiful and safe summer! I look forward to seeing you all in September.

Best,

Rachel Wortherley

Ms. Rachel Wortherley
English Language Arts, 6-8

THE GIVER
BY: LOIS LOWRY



_____'s Workbook

Class: _____

ALL ABOUT THE AUTHOR: LOIS LOWRY

Lois Lowry was born March 20, 1937 in Hawaii. Her father was an Army dentist and the family lived all over the world. She attended Brown University, but finished her degree at the University of Southern Maine. Lois Lowry fulfilled a childhood dream when she began writing in the mid-1970's.

Lois Lowry, author of over 20 novels and winner of the Newbery Medal (twice!), has become a favorite author of both children and young adults. She has tackled a number of topics in her literature including adoption, mental illness, cancer, the Holocaust and futuristic societies. Whatever the theme, Lowry portrays realistic life experiences to her audience. In her books, Lois Lowry throws her characters and readers into many thought-provoking situations about society and its imperfections.

Section 1	Section 2	Section 3	Section 4	Section 5
Chapters 1-3	Chapters 4-8	Chapters 9-13	Chapters 14-18	Chapters 19-23

PRE-READING PROJECT

Utopia (noun)- a perfect society
In other, words, a *utopia* is a place in which social, legal, and political justice and perfect harmony exist. Brainstorm:

- What are some famous *utopias*?

Now that you have brainstormed some traits and examples of *utopian* societies, you will be creating one of your own! You will be creating a brochure for your *utopia*.

DIRECTIONS FOR YOUR PAMPHLET:

1. Across the front panels: Name of your community

2. Across the front panels: Mission Statement of your community. This **paragraph** should include:

a. The purpose of your society (why was it created?)
b. Basic rules of your society
c. How people in your society spend their time
d. How your society maintains perfection
e. Any other fun facts or features of your society you may want to add

3. Left Inside Panel (page 2): Location and size of your community. Physical description of your community.

4. Middle Inside Panel (page 2): Roles and responsibilities of citizens in your community. Details about education.

5. Right Inside Panel (page 2): Briefly explain how the government is set-up and how the laws are enforced.

Pictures: *Each panel* must have a graphic (drawn or printed out) that represents the topic being described.

Before you Read:

Directions: The following is a list of true or false questions. Complete them to the best of your knowledge, *circling either "T" for true, or "F" for false. Then, write 1-2 sentences explaining your choice.* I would like to see how much prior knowledge you have about the novel The Giver, which we are about to begin reading. **Use complete sentences.**

T F 1. The perfect world is one where I don't have to make any decisions. Others make them for me.

_____

_____

T F 2. Only the government should have access to books.

_____

T F 3. Families should not be allowed to have as many children as they want.

T F 4. If the government discovered a way to control the climate, they should use it.

T F 5. It would be better if people could permanently forget bad memories that they have had.

Before you Read:

Preview: Based on the cover alone (without reading the summary on the back of the book) what do you think The Giver might be about? What clues tell you this?

"BIG IDEAS": TO BE DONE ON YOUR OWN

The Giver is composed of many "big ideas". Five of the "big ideas" have been provided for you below. Find a definition for each big idea (or define the term in your own words) and examples of each big idea as you read the book.

A. Memory- _____

1.

2.

B. Individualism- _____

1.

2.

C. Choice- _____

1.

2.

D. Feeling and Emotion- _____

1.

2.

E. "Coming of Age"- _____

1.

2.

CHARACTERS: TO BE DONE ON YOUR OWN

One of the aspects of a book that makes it exciting and fun to read is a "cast" of detailed and interesting characters. As you read the book, find four **character traits** for each main character and write them below. These must be **inner traits**.

A. Jonas

1. 3.

2. 4.

B. The Giver

1. 3.

2. 4.

C. Asher

1.

2.

3.

4.

D. Jonas' father

2.

3.

3.

4.

E. Jonas' mother

1.

2.

3.

4.

Before you Read: Vocabulary and Spelling Words
Chapters 1-3

You will receive a definition for each word. Then write a sentence for each word.

Chapter One:

1. Intrigued - _____
Sentence- _____
_____

2. Dwelling - _____
Sentence- _____
_____

3. Apprehensive-_____
Sentence- _____
_____

Chapter Two:

1. Affectionate-_____
Sentence- _____
_____

Chapter Three:

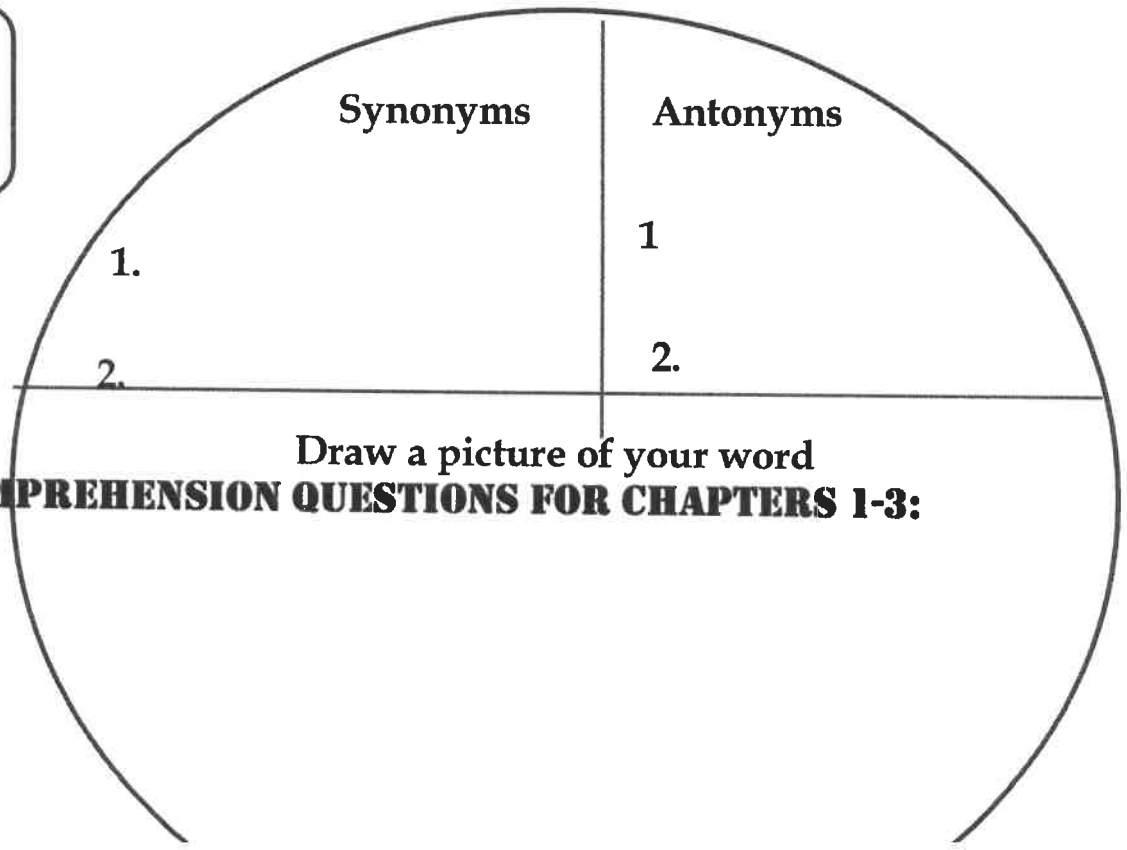
1. Chastise-_____
Sentence- _____
_____

2. Remorse-_____
Sentence- _____
_____

3. Bewildered-_____
Sentence- _____
_____

Now pick <u>one</u> vocabulary word and use it to complete the following graphic organizer:

Vocab Word:



COMPREHENSION QUESTIONS FOR CHAPTERS 1-3:

1. Why was the community so shocked about the two planes that went over them?

2. What do you think it means to be "released" from Jonas' community?

3. What does Jonas' family do at the end of every meal?

4. What is the name of Jonas' father's job? What does he do at work?

5. In this society, how are families formed (put together)?

6. What physically trait of Jonas and Gabriel is the same?

7. What is a "comfort object"? At what age are they taken away from children?

8. Describe the incident with the apple. How does Jonas feel about it?

ACTIVITY:

Pretend that you are Jonas.
Fill in the blanks as if you are answering from Jonas's point of view.

In my community, the month of December is very important because

The Ceremony of 12 is

I am concerned about the Ceremony of 12 because

I am concerned about the Ceremony of 12 for my friend, Asher, because

Before you Read: Vocabulary and Spelling Words
Chapters 4-8

You will receive a definition for each word. Then write a sentence for each word.

Chapter Six:

1. **Interdependence-** _____
   Sentence- _____
   _____

2. **Emblem-** _____
   Sentence- _____
   _____

3. **Relinquish-** _____
   Sentence- _____
   _____

4. **Transgression-** _____
   Sentence- _____
   _____

Chapter Seven:

1. **Solemn-** _____
   Sentence- _____
   _____

2. **Meticulous-** _____
   Sentence- _____
   _____

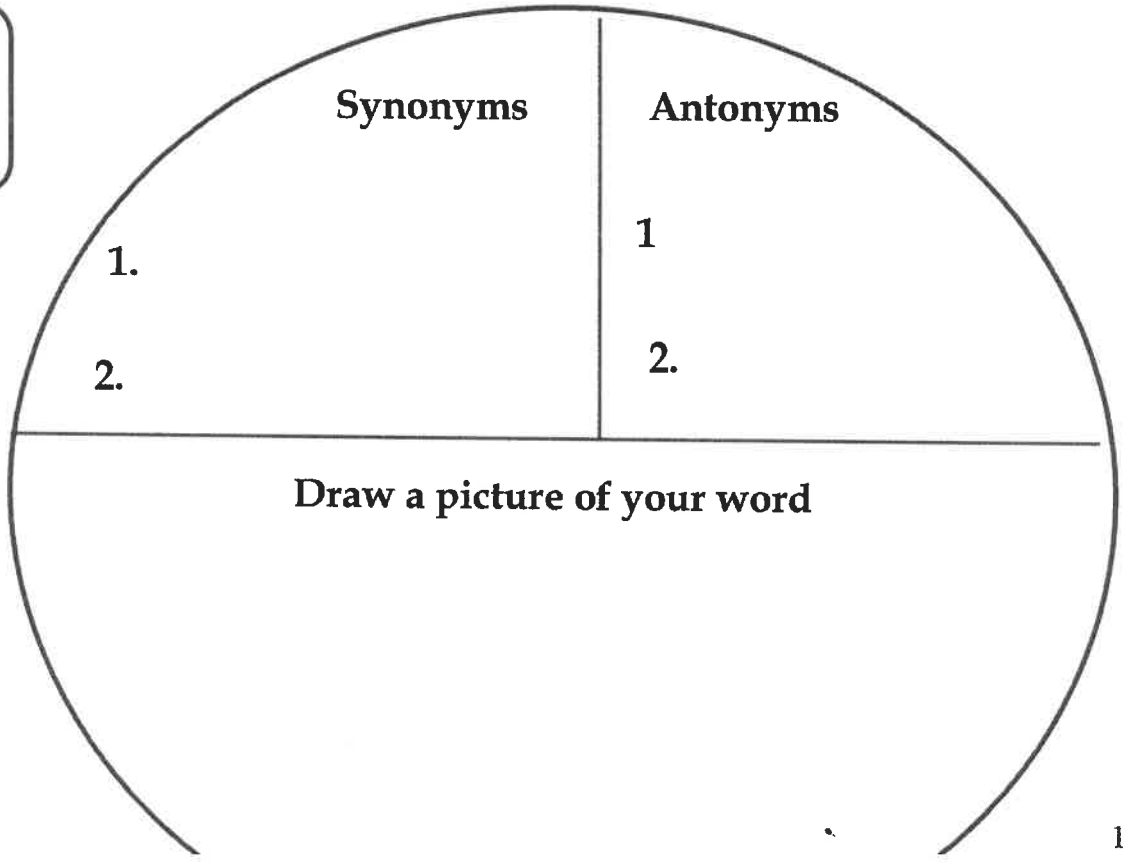
3. **Prestige-** _____
   Sentence- _____
   _____

Chapter Eight:

1. **Anguish-** _____
   Sentence- _____
   _____

Now pick <u>one</u> vocabulary word and use it to complete the following graphic organizer:

Vocab Word:

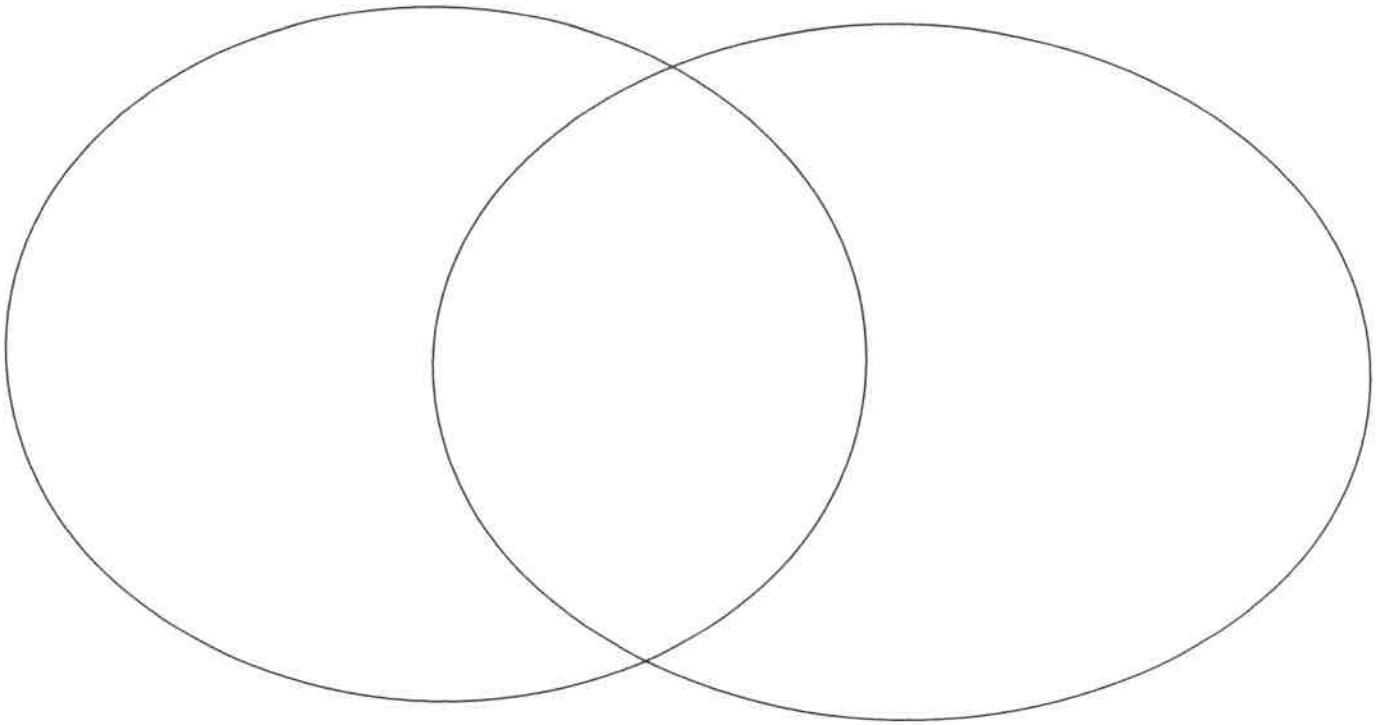


COMPREHENSION QUESTIONS FOR CHAPTERS 4-8:

1. Why doesn't Jonas ever tell Benjamin that he is impressed with him?

2. What is the "House of the Old"?

3. Compare and contrast a "Release Ceremony" to a funeral.



4. What ritual does Jonas' family do every **morning**?

5. How are people in Jonas' community treated for "Stirrings" (having romantic feelings for others)?

6. Instead of being released for not growing adequately (enough), baby Gabriel is granted another year to grow. Who makes this possible and how?

7. Why does Jonas think that Asher's family waited so long before applying for another child?

8. Explain the story of Caleb.

9. Pick one age ceremony and describe it.

10. What assignment does Asher receive? Why do you think they chose him for this assignment?

11. What happens when it is Jonas' turn to receive his assignment? How does he feel about this surprising turn of events?

12. What is Jonas selected to be? Why is this selection so rare?

13. What are the qualities that a Receiver of Memory must have that the committee saw in Jonas?

a. _____

b. _____

c. _____

d. _____

e. The Capacity to _____

14. How does Jonas feel about his selection?

15. So far, we have heard several references to "release". Give two examples of "release" from The Giver **(actual people).**

1.

2.

ACTIVITY:

As you know, in Jonas' community, a group called "The Council of Elders" chooses the profession of each and every member of the community. "Choice" is not an option when it comes to choosing a job, like it is in our society.

Visit the website:
http://tinyurl.com/kidcareertest

This website will lead you through a career test. Based on your answers to the questions, the 10-question quiz will decide what type of career would be best for you.

After you take the quiz:

1. What type of career did the quiz decide on for you?

2. Would you ever consider taking this job?

3. How would you feel if this quiz really did decide your future, and you had no say in what job you could choose?

Before you Read: Vocabulary and Spelling Words
Chapters 9-13

You will receive a definition for each word. Then write a sentence for each word.

Chapter Nine:

1. **Dismayed-** _____
   Sentence- _____
   _____

Chapter Ten:

1. **Alcove-** _____
   Sentence- _____
   _____

2. **Diminish-** _____
   Sentence- _____
   _____

Chapter Eleven:

1. **Quizzically-** _____
   Sentence- _____
   _____

Chapter Twelve:

1. **Admonition-** _____
   Sentence- _____
   _____

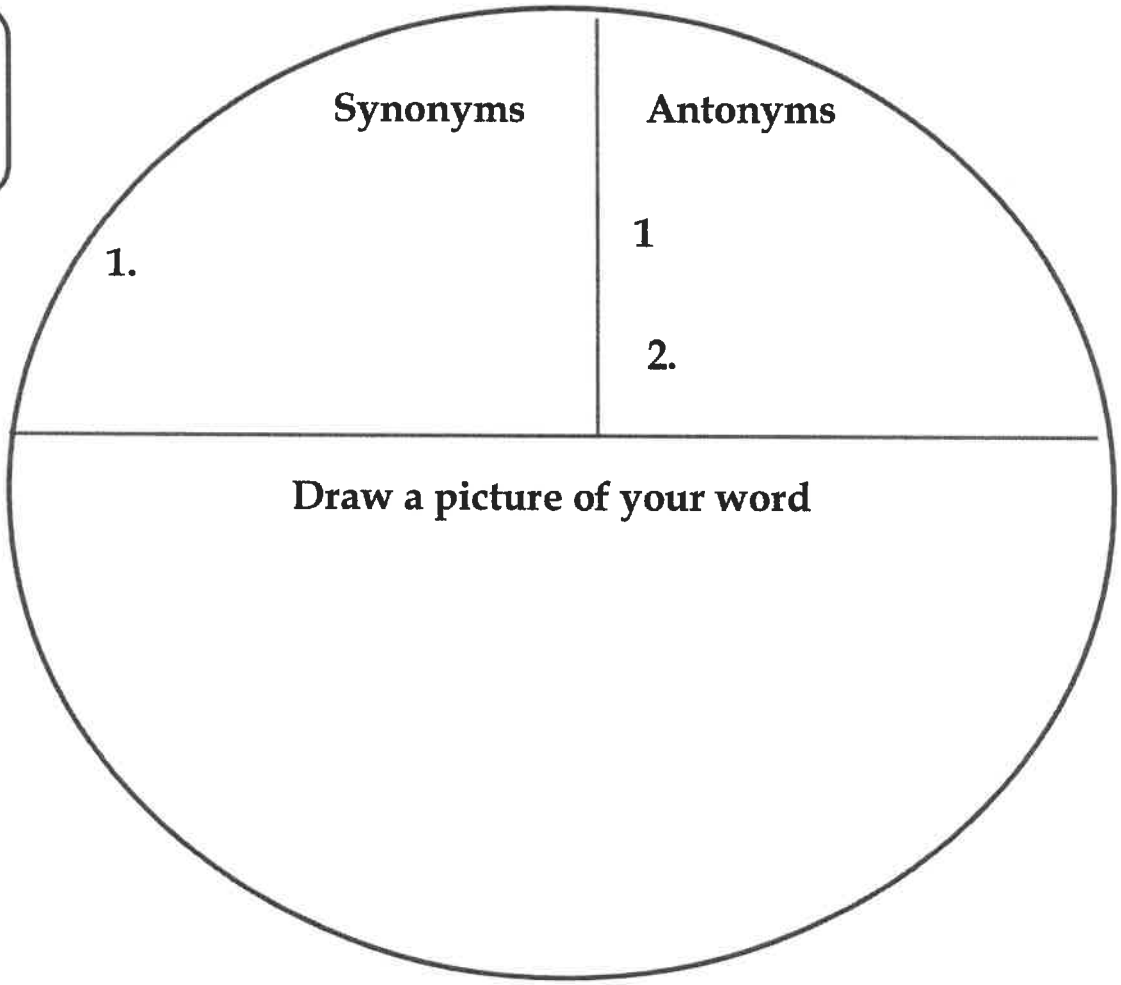
Chapter Thirteen:

1. **Irrationally-** _____
   Sentence- _____
   _____

2. **Indifferent-** _____
   Sentence- _____
   _____

Now pick <u>one</u> vocabulary word and use it to complete the following graphic organizer:

Vocab Word:



COMPREHENSION QUESTIONS FOR CHAPTERS 9-13:

1. How do Jonas' parents feel about his assignment?

2. What do we know so far about the person who was chosen to be the Receiver of Memory ten years ago?

3. Why is Jonas shocked by the directions in his folder?

4. How does the female attendant treat Jonas on his first day of training? Why do you think this happens?

5. How is The Giver's dwelling different from Jonas'?

6. How does The Giver explain his old appearance?

7. What will The Giver be transmitting (giving) to Jonas?

8. What is the first memory The Giver transfers to Jonas?

9. Why is there no longer snow or sunshine in Jonas' society?

10. Why doesn't Jonas describe his first day of training to his classmates?

11. Jonas finally discovers the mystery behind the change in the apple, the faces in the crowd at the ceremony, and Fiona's hair. What is he seeing for the first time?

12. What is "Sameness"?

13. Why does Jonas feel that it is unfair that he cannot see colors regularly?

14. Why people are no longer allowed to make choices in Jonas' society?

15. What is the first disturbing memory The Giver transmits to Jonas?

16. Name two ways Jonas tries to share his new knowledge with others.

1.

2.

17. What warning does The Giver give Jonas about applying for a spouse and starting a family?

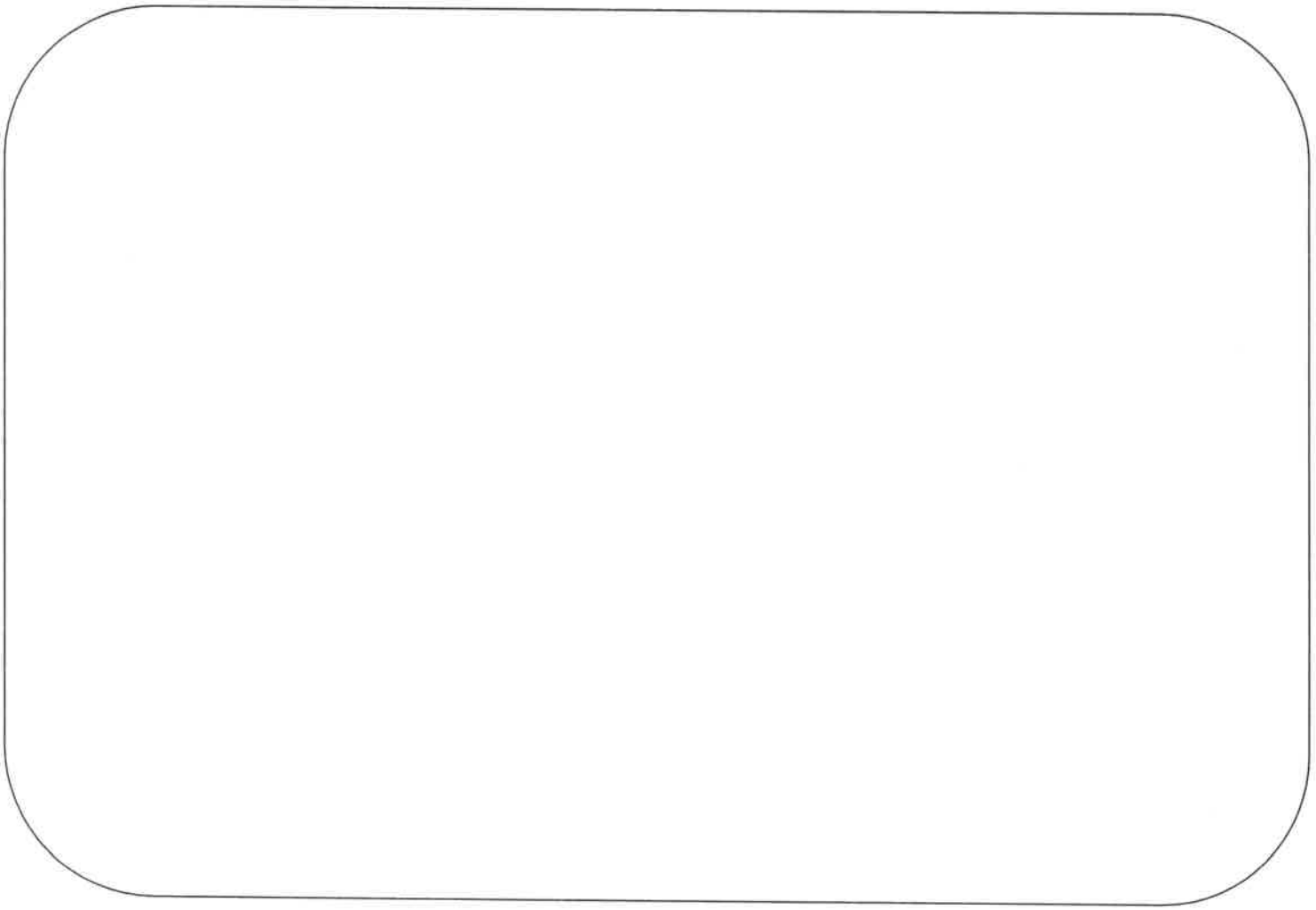
ACTIVITY:
UTOPIA DOUBLE-ENTRY JOURNAL

Compare our world with the community in the novel. Think of how they are alike and how they are different. List an example from the novel, the chapter and page #, and explain hov The Community is alike/different from our world.

Rules/Norms in the Community (The Giver)	**Chapter and Page #**	**Like *our* community? Different from *our* community?**
	Ch. Pg.	
	Ch. Pg.	
	Ch. Pg.	

ACTIVITY:

The first memory The Giver transmits to Jonas is a memory of sledding. Use the box below to draw this memory **using color**. Then, answer the question below.



How does this memory make Jonas feel?

Before you Read: Vocabulary and Spelling Words
Chapters 14-18

You will receive a definition for each word. Then write a sentence for each word.

Chapter Fourteen:

1. **Perceive-** _____
   Sentence- _____
   _____

2. **Invigorating-** _____
   Sentence- _____
   _____

Chapter Fifteen:

3. **Contorted-** _____
   Sentence- _____
   _____

Chapter Sixteen:

2. **Luxuriate-** _____
   Sentence- _____
   _____

Chapter Seventeen:

1. **Permeate-** _____
   Sentence- _____
   _____

2. **Suppress-** _____
   Sentence- _____
   _____

Chapter Eighteen:

1. **Dejected-** _____
   Sentence- _____
   _____

ACTIVITY:
UTOPIA DOUBLE-ENTRY JOURNAL II

Use this chart to record examples of how the Community attempts to function (work) as a utopia. On the left side, write a specific example from the novel that shows what the Community does to be a utopia. On the right side, explain why this example makes the community a utopia.

Example from the book	Chapter and Page #	Why this example makes the Community a utopia
	Ch. Pg.	
	Ch. Pg.	
	Ch. Pg.	

COMPREHENSION QUESTIONS FOR CHAPTERS 14-18:

1. What happened on the sleigh ride this time?

2. What does The Giver refuse to give Jonas after the sleigh accident?

3. What wisdom is gained from learning painful memories of the past (especially hunger)?

4. What happens when baby Gabriel sleeps in Jonas' room?

5. Describe the memory of war that The Giver transmits to Jonas.

6. Name three happy memories that Jonas receives after the warfare memory.

   1.

   2.

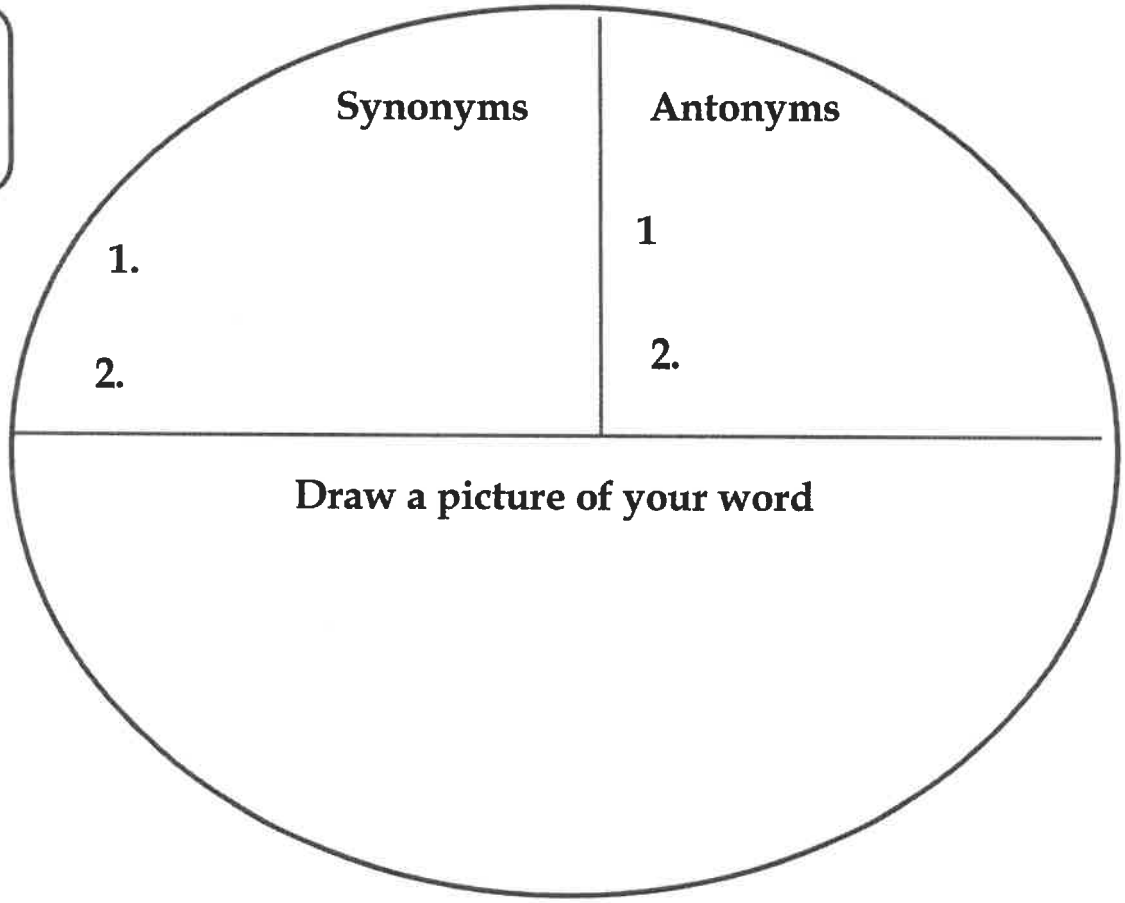
   3.

2. **Rueful-** _____
   Sentence- _____
   _____

3. **Imploringly-** _____
   Sentence- _____
   _____

Now pick <u>one</u> vocabulary word and use it to complete the following graphic organizer:

Vocab Word:



13. What happened between Jonas and Asher after the war game?

14. What is the name of the Receiver-in-Training before Jonas? What happened to her?

15. What happened to Rosemary's feelings and memories after she applied for release?

16. Even though Jonas is a stellar swimmer, what warning does The Giver give Jonas?

7. Describe The Giver's favorite memory.

8. What does Jonas learn from The Giver's favorite memory?

9. What does Jonas ask his parents when he gets home that night? How do they respond?

10. What surprise do the citizens of the community receive at the start of the chapter?

11. After months of receiving memories, how does Jonas' perception of the world around him change?

12. What does Jonas realize after seeing kids playing "good guys and bad guys"?

Chapter Twenty-Two:

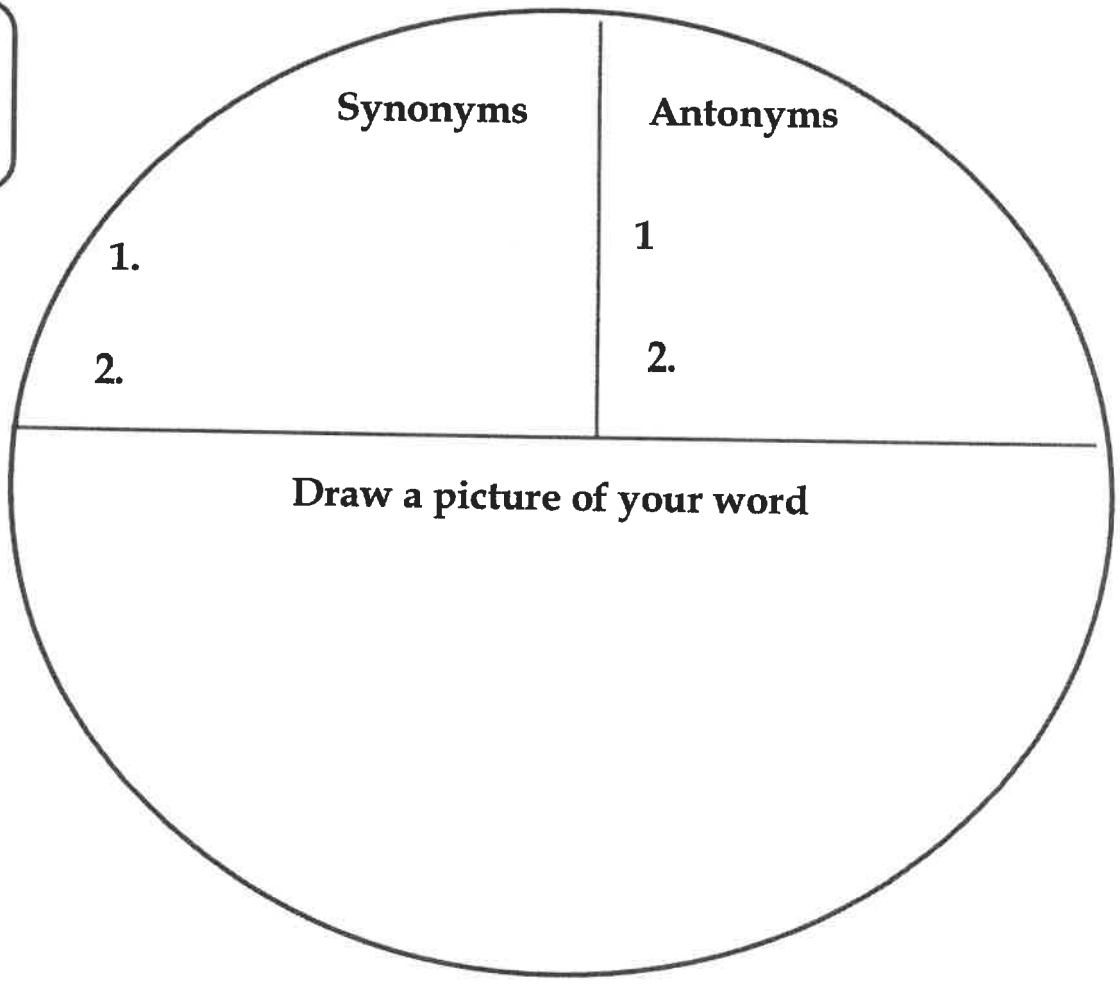
1. **Exquisite-** _____
   Sentence- _____
   _____

Chapter Twenty-three:

1. **Lethargy-** _____
   Sentence- _____
   _____

Now pick <u>one</u> vocabulary word and use it to complete the following graphic organizer:

Vocab Word:



Before you Read: Vocabulary and Spelling Words
Chapters 19-23

You will receive a definition for each word. Then write a sentence for each word.

Chapter Nineteen:

1. **Astonished-** _____
   Sentence- _____
   _____

2. **Wince-** _____
   Sentence- _____
   _____

Chapter Twenty:

1. **Solace-** _____
   Sentence- _____
   _____

Chapter Twenty-One:

1. **Customary-** _____
   Sentence- _____
   _____

2. **Condemned-** _____
   Sentence- _____
   _____

3. **Languid-** _____
   Sentence- _____

7. Why doesn't Jonas allow The Giver to transit the memory of music to him?

8. Why is Jonas nervous about the plan? What memories does The Giver plan on transmitting to Jonas to help him with his fear?

9. Who was The Giver's daughter?

10. What decision has been made at the Nurturing Center regarding Gabriel?

11. What does Jonas decide to do once he has learned of Gabriel's fate?

12. Why is Jonas afraid of the planes?

COMPREHENSION QUESTIONS FOR CHAPTERS 19-23:

1. When Jonas keeps asking The Giver about release, what does he say Jonas is permitted to do to find out more?

2. What exactly is release?

3. What happened to Rosemary after she applied for release?

4. How does Jonas react after he finds out exactly what release is?

5. What plan do The Giver and Jonas come up with? Why?

6. Jonas' first insight was color. What was The Giver's?

13. How does Jonas avoid the body-heat sensors on the planes finding Gabriel and himself?

14. Why are some of Jonas' memories becoming dimmer and harder to recall?

15. How does the landscape change as the days go by (***list*** *at least three ways*)?

1.

2.

3.

16. Why does Jonas begin to regret his decision to leave the Community? What makes him then change his mind again?

17. How does Jonas warm Gabe and himself up once it begins to snow?

18. What kinds of memories help Jonas move on once he is utterly exhausted, weak, and trudging up the hill?

19. Jonas hears music very close by, and realizes that they have finally reached "Elsewhere". Why do you think Jonas thinks that he hears music coming from the Community he left behind as well? What could this be *symbolic* of?

Grade 8

Mathematics

Summer Packet

Name:_____

NAME _____ DATE _____ PERIOD _____

Grade 8 Summer Packet pg.1

Powers and Exponents

Write each expression using exponents.

1. $2 \cdot 2 \cdot 2 \cdot 2$

2. $9 \cdot 9$

3. $7 \cdot 7 \cdot 5 \cdot 5 \cdot 5 \cdot 5$

4. $\frac{3}{8} \cdot \frac{3}{8} \cdot \frac{3}{8}$

5. $c \cdot \frac{1}{4} \cdot c \cdot \frac{1}{4} \cdot \frac{1}{4}$

6. $s \cdot 6 \cdot s \cdot s \cdot 6 \cdot 6 \cdot s$

7. $8 \cdot x \cdot 2 \cdot 2 \cdot 2 \cdot x \cdot 8$

8. $a \cdot (-4) \cdot b \cdot a \cdot b \cdot (-4) \cdot (-4)$

9. $\frac{1}{3} \cdot n \cdot 4 \cdot n \cdot \frac{1}{3} \cdot n \cdot 4 \cdot 4$

10. $9 \cdot 9 \cdot x \cdot w \cdot x \cdot y \cdot w \cdot 9 \cdot y$

Evaluate each expression.

11. 4^3

12. 2^5

13. $(-8)^3$

14. $\left(\frac{3}{5}\right)^4$

15. $2^8 - 3^2$

16. $2^3 \cdot 5^2$

17. $3^4 - (-4)^2$

18. $6 + 2^6$

19. $(-3)^3 \div 3^2$

ALGEBRA Evaluate each expression if $g = 2$ and $h = -3$.

20. g^4

21. $(g + h)^3$

22. $h^4 - h^3$

23. $g^3 + h^2$

24. $(g - h)^2 + h^2$

25. $h^4 - (h - g)^3$

NAME _____ DATE _____ PERIOD _____

Grade 8 Summer Packet pg.2

Multiply and Divide Monomials

Simplify. Express using exponents.

1. $5^9 \cdot 5^3$
2. $3^8 \cdot 3$
3. $c \cdot c^6$
4. $m^5 \cdot m^2$
5. $3x \cdot 4x^4$
6. $(2h^7)(7h)$
7. $-5d^6(8d^6)$
8. $(6k^5)(-k^4)$
9. $(-w)(-10w^3)$
10. $-7z^4(-3z^8)$
11. $bc^3(b^2c)$
12. $3a^4 \cdot 6a^2$
13. $3m^3n^2(8mn^3)$
14. $7t^5(-6t^5)$
15. $(3ab^2)(a^2c^5)$
16. $(9p^4)(-8p^2)$
17. $\frac{2^9}{2^3}$
18. $\frac{3^8}{3^4}$
19. $\frac{5^9}{5^2}$
20. $\frac{8^7}{8}$
21. $\frac{b^{12}}{b^5}$
22. $\frac{12n^5}{4n^2}$
23. $\frac{14m^3}{7m^2}$
24. $\frac{9r^8}{3r^4}$
25. $\frac{24t^9}{6t^3}$
26. $\frac{18y^6}{2y}$
27. $\frac{a^4c^6}{a^2c}$
28. $\frac{5^{10}}{5^2}$

Simplify.

29. $\frac{4^8 \cdot 5^3 \cdot 7^6}{4^6 \cdot 5^2 \cdot 7^5}$.
30. $\frac{(-2)^9 \cdot (-3)^7 \cdot 4^3}{(-2)^5 \cdot (-3)^5 \cdot 4^1}$.
31. $\frac{3^{10} \cdot (-6)^5}{3^7 \cdot (-6)^2}$.
32. $\frac{9^8 \cdot 10^{12}}{9^6 \cdot 10^6}$.

NAME _____ DATE _____ PERIOD _____

Grade 8 Summer Packet pg. 3

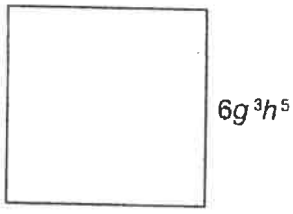
Powers of Monomials

Simplify.

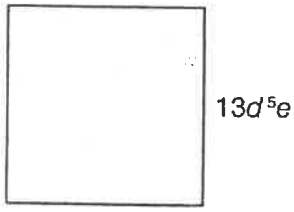
1. $(7^2)^3$
2. $(3^2)^6$
3. $(8^3)^2$
4. $(9^4)^2$
5. $(d^7)^6$
6. $(m^5)^5$
7. $(h^6)^3$
8. $(z^7)^3$
9. $[(4^3)^2]^2$
10. $(-5a^2b^7)^7$
11. $(2m^5g^{11})^6$
12. $[(2^3)^3]^2$
13. $(7a^5b^6)^4$
14. $(7m^3n^{11})^5$
15. $(-3w^3z^8)^5$
16. $(-7r^4s^{10})^4$

GEOMETRY Express the area of each square below as a monomial.

17.

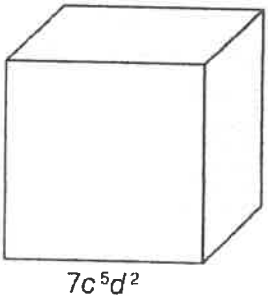


18.

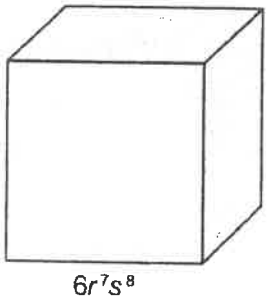


GEOMETRY Express the volume of each cube below as a monomial.

19.



20.



NAME _____ DATE _____ PERIOD _____

Grade 8 Summer Packet pg. 4

Negative Exponents

Write each expression using a positive exponent.

1. 4^{-5}
2. 5^{-7}
3. m^{-9}
4. s^{-6}
5. f^{-3}
6. $(-2)^{-6}$
7. $(-4)^{-3}$
8. w^{-12}

Evaluate each expression.

9. $(-5)^{-5}$
10. 3^{-2}
11. 8^{-3}
12. $(-9)^{-4}$

Write each fraction as an expression using a negative exponent.

13. $\frac{1}{12^3}$
14. $\frac{1}{81}$
15. $\frac{1}{t^6}$
16. $\frac{1}{8^8}$

Simplify. Express using positive exponents.

17. $2^{-6} \cdot 2^3$
18. $s^{-5} \cdot s^7$
19. $\frac{m^8}{m^{-4}}$
20. $\frac{10^8}{10^9}$
21. $y^{-3} \cdot y^3$
22. $s^{-5} \cdot s^7$
23. $\frac{x^6}{x^{-3}}$
24. $\frac{6^{-4}}{6^8}$
25. $\frac{3^5}{3^{-3}}$
26. $\frac{e^{-3}}{e^{-2}}$
27. $\frac{n^{-6}}{n^4}$
28. $\frac{j^{-2}}{j^{-2}}$

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Scientific Notation

Write each number in standard form.

1. 6.7×10^{1}

2. 6.1×10^{4}

3. 1.6×10^{3}

4. 3.46×10^{2}

5. 2.91×10^{5}

6. 8.651×10^{7}

7. 3.35×10^{-1}

8. 7.3×10^{-6}

9. 1.49×10^{-7}

10. 4.0027×10^{-4}

11. 5.2277×10^{-3}

12. 8.50284×10^{-2}

Write each number in scientific notation.

13. 34

14. 273

15. 79,700

16. 6,590

17. 4,733,800

18. 2,204,000,000

19. 0.00916

20. 0.29

21. 0.00000571

22. 0.0008331

23. 0.0121

24. 0.00000018

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Compute with Scientific Notation

Evaluate each expression. Express the result in scientific notation.

1. $(5.8 \times 10^5)(6.4 \times 10^2)$

2. $(3.92 \times 10^6)(2.2 \times 10^4)$

3. $\frac{2.952 \times 10^6}{3.6 \times 10^3}$

4. $\frac{2.052 \times 10^7}{5.4 \times 10^4}$

5. $(6.9 \times 10^7) + (2.12 \times 10^5)$

6. $(1.78 \times 10^4) + (5.35 \times 10^3)$

7. $(8.4 \times 10^7) - (6.3 \times 10^6)$

8. $(9.62 \times 10^5) - (2.58 \times 10^3)$

9. $\frac{6.256 \times 10^8}{6.8 \times 10^4}$

10. $\frac{2.888 \times 10^5}{7.22 \times 10^2}$

11. $(3.68 \times 10^3)(2.4 \times 10^6)$

12. $(7.2 \times 10^7)(1.82 \times 10^2)$

13. $(6.78 \times 10^4) - (4.13 \times 10^2)$

14. $\frac{3.024 \times 10^6}{4.8 \times 10^2}$

15. $(5.9 \times 10^8) + (2.6 \times 10^6)$

16. $(3.45 \times 10^7)(1.68 \times 10^4)$

17. $(8.33 \times 10^3) + (4.1 \times 10^5)$

18. $(6.82 \times 10^5) - (3.11 \times 10^4)$

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Roots

Find each square root or cube root.

1. $\sqrt{16}$
2. $-\sqrt{9}$
3. $\sqrt{36}$
4. $\sqrt[3]{2{,}744}$
5. $\sqrt[3]{1{,}331}$
6. $\sqrt[3]{729}$
7. $-\sqrt{0.04}$
8. $\sqrt{-289}$
9. $\pm\sqrt{0.81}$
10. $-\sqrt{400}$
11. $\sqrt{\frac{16}{49}}$
12. $\sqrt{\frac{49}{100}}$

ALGEBRA Solve each equation. Check your solution(s).

13. $s^2 = 81$
14. $t^2 = 36$
15. $x^2 = 49$
16. $256 = z^2$
17. $900 = y^2$
18. $1024 = h^2$
19. $c^2 = \frac{49}{64}$
20. $a^2 = \frac{25}{121}$
21. $\frac{1}{100} = d^2$
22. $\frac{144}{169} = r^2$

Find each cube root.

23. $\sqrt[3]{64}$
24. $\sqrt[3]{-512}$

Grade 8

Mathematics

Summer Packet

Resources

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Powers and Exponents

The product of repeated factors can be expressed as a **power**. A power consists of a **base** and an **exponent**. The exponent tells how many times the base is used as a factor.

Example 1
Write each expression using exponents.

a. $7 \cdot 7 \cdot 7 \cdot 7$

$7 \cdot 7 \cdot 7 \cdot 7 = 7^4$ The number 7 is a factor 4 times. So, 7 is the base and 4 is the exponent.

b. $y \cdot y \cdot x \cdot y \cdot x$

$y \cdot y \cdot x \cdot y \cdot x = y \cdot y \cdot y \cdot x \cdot x$ Commutative Property

$= (y \cdot y \cdot y) \cdot (x \cdot x)$ Associative Property

$= y^3 \cdot x^2$ Definition of exponents

To evaluate a power, perform the repeated multiplication to find the product.

Example 2
Evaluate (-6^4).

$(-6)^4 = (-6) \cdot (-6) \cdot (-6) \cdot (-6)$ Write the power as a product.

$= 1{,}296$ Multiply.

The order of operations states that exponents are evaluated before multiplication, division, addition, and subtraction.

Example 3
Evaluate $m^2 + (n - m)^3$ if $m = -3$ and $n = 2$.

$m^2 + (n - m)^3 = (-3)^2 + (2 - (-3))^3$ Replace m with -3 and n with 2.

$= (-3)^2 + (5)^3$ Perform operations inside parentheses.

$= (-3 \cdot -3) + (5 \cdot 5 \cdot 5)$ Write the powers as products.

$= 9 + 125$ or 134 Add.

Exercises
Write each expression using exponents.

1. $8 \cdot 8 \cdot 8 \cdot 8 \cdot 8$
2. $a \cdot a \cdot a \cdot a \cdot a \cdot a$
3. $5 \cdot 5 \cdot 9 \cdot 9 \cdot 5 \cdot 9 \cdot 5 \cdot 5$

Evaluate each expression.

4. 2^4
5. $(-3)^5$
6. $\left(\frac{3}{4}\right)^3$

ALGEBRA Evaluate each expression if $a = 5$ and $b = -4$.

7. $a^2 + b^2$
8. $(a + b)^2$
9. $a + b^2$

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Multiply and Divide Monomials

The **Product of Powers** rule states that to multiply powers with the same base, add their exponents.

Example 1

Simplify. Express using exponents.

a. $2^3 \cdot 2^2$

$2^3 \cdot 2^2 = 2^{3+2}$ The common base is 2.

$= 2^5$ Add the exponents.

b. $2s^6(7s^7)$

$2s^6(7s^7) = (2 \cdot 7)(s^6 \cdot s^7)$ Commutative and Associative Properties

$= 14(s^{6+7})$ The common base is *s*.

$= 14s^{13}$ Add the exponents.

The **Quotient of Powers** rule states that to divide powers with the same base, subtract their exponents.

Example 2

Simplify $\frac{k^8}{k}$. Express using exponents.

$\frac{k^8}{k^1} = k^{8-1}$ The common base is *k*.

$= k^7$ Subtract the exponents.

Example 3

Simplify $\frac{(-2)^{10} \cdot 5^6 \cdot 6^8}{(-2)^6 \cdot 5^8 \cdot 6^2}$.

$\frac{(-2)^{10} \cdot 5^6 \cdot 6^8}{(-2)^6 \cdot 5^8 \cdot 6^2} = \left(\frac{(-2)^{10}}{(-2)^6}\right) \cdot \left(\frac{5^6}{5^3}\right) \cdot \left(\frac{6^3}{6^2}\right)$ Group by common base.

$= (-2)^4 \cdot 5^3 \cdot 6^1$ Subtract the exponents.

$= 16 \cdot 125 \cdot 6$ or $12{,}000$ Simplify.

Exercises

Simplify. Express using exponents.

1. $5^2 \cdot 5^6$

2. $e^2 \cdot e^7$

3. $2a^5 \cdot 6a$

4. $4x^2 \cdot (-5x^6)$

5. $\frac{7^9}{7^3}$

6. $\frac{v^{14}}{v^6}$

7. $\frac{15w^7}{5w^2}$

8. $\frac{10m^8}{2m}$

9. $\frac{2^5 \cdot 3^7 \cdot 4^3}{2^1 \cdot 3^5 \cdot 4}$

10. $\frac{4^{15} \cdot (-5)^6}{4^{12} \cdot (-5)^4}$

11. $\frac{6^7 \cdot 7^6 \cdot 8^5}{6^5 \cdot 7^5 \cdot 8^4}$

12. $\frac{(-3)^6 \cdot 10^5}{(-3)^4 \cdot 10^3}$

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Powers of Monomials

Power of a Power: To find the power of a power, multiply the exponents.

Power of a Product: To find the power of a product, find the power of each factor and multiply.

Example 1

Simplify $(5^3)^6$.

$(5^3)^6 = 5^{3 \cdot 6}$ Power of a power

$= 5^{18}$ Simplify.

Example 2

Simplify $(-3m^2n^4)^8$.

$(-3m^2n^4)^3 = (-3)^3 \cdot m^{2 \cdot 3} \cdot n^{4 \cdot 3}$ Power of a product

$= -27m^6n^{12}$ Simplify.

Exercises

Simplify.

1. $(4^3)^5$

2. $(4^2)^7$

3. $(9^2)^4$

4. $(k^4)^2$

5. $[(6^2)^2]^2$

6. $[(3^2)^2]^3$

7. $(5q^4r^2)^5$

8. $(3y^2z^2)^6$

9. $(7a^4b^3c^7)^2$

10. $(-4d^3e^5)^2$

11. $(-5g^4h^9)^7$

12. $(0.2k^8)^2$

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Negative Exponents

Any nonzero number to the zero power is 1. Any nonzero number to the negative *n* power is the multiplicative inverse of the number to the *n*th power.

Example 1
Write each expression using a positive exponent.

a. 7^{-3}

$7^{-3} = \frac{1}{7^3}$ Definition of negative exponent

b. a^{-4}

$a^{-4} = \frac{1}{a^3}$ Definition of negative exponent

Example 2
Evaluate each expression.

a. 5^{-4}

$5^{-4} = \frac{1}{5^4}$ Definition of negative exponent

$= \frac{1}{625}$ $5^4 = 5 \cdot 5 \cdot 5 \cdot 5$

b. $(-3)^{-5}$

$(-3)^{-5} = \frac{1}{(-3)^5}$ Definition of negative exponent

$= \frac{1}{-243}$ $(-3)^5 = (-3) \cdot (-3) \cdot (-3) \cdot (-3) \cdot (-3)$

Example 3
Write $\frac{1}{6^5}$ as an expression using a negative exponent.

$\frac{1}{6^5} = 6^{-5}$ Definition of negative exponent

Example 4
Simplify. Express using positive exponents.

a. $x^{-3} \cdot x^5$

$x^{-3} \cdot x^5 = x^{(-3)+5}$ Product of Powers

$= x^2$ Add the exponents.

b. $\frac{w^{-5}}{w^{-7}}$

$\frac{w^{-5}}{w^{-7}} = w^{-5-(-7)}$ Quotient of Powers

$= w^2$ Subtract the exponents.

Exercises
Write each expression using a positive exponent.

1. a^{-8}
2. 6^{-3}
3. n^{-4}

Evaluate each expression.

4. 7^{-2}
5. 9^{-3}
6. $(-2)^{-5}$

Write each fraction as an expression using a negative exponent.

7. $\frac{1}{5^7}$
8. $\frac{1}{3^6}$
9. $\frac{1}{x^8}$

Simplify. Express using positive exponents.

10. $4^{-2} \cdot 4^{-4}$
11. $r^{-3} \cdot r^5$
12. $\frac{h^{-2}}{h^4}$

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Scientific Notation

A number in scientific notation is written as the product of a factor that is at least one but less than ten and a power of ten.

Example 1
Write 8.65×10^7 in standard form.

$8.65 \times 10^7 = 8.65 \times 10{,}000{,}000$ $10^7 = 10 \cdot 10 \cdot 10 \cdot 10 \cdot 10 \cdot 10 \cdot 10$ or 10,000,000

$= 86{,}500{,}000$ The decimal point moves 7 places to the right.

Example 2
Write 9.2×10^{-3} in standard form.

$9.2 \times 10^{-3} = 9.2 \times 0.001$ The decimal point moves 3 places to the left.

$= 0.0092$

Example 3
Write 76,250 in scientific notation.

$76{,}250 = 7.625 \times 10{,}000$ The decimal point moves 4 places.

$= 7.625 \times 10^4$ Since 76,250 is >1, the exponent is positive.

Example 4
Write 0.00157 in scientific notation.

$0.00157 = 1.57 \times 0.001$ The decimal point moves 3 places.

$= 1.57 \times 10^{-3}$ Since 0.00157 is <1, the exponent is negative.

Exercises
Write each number in standard form.

1. 5.3×10^1

2. 9.4×10^3

3. 7.07×10^5

4. 2.6×10^{-3}

5. 8.651×10^{-2}

6. 6.7×10^{-6}

Write each number in scientific notation.

7. 561

8. 14

9. 56,400,000

10. 0.752

11. 0.0064

12. 0.000581

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Compute with Scientific Notation

You can use the Product of Powers and Quotient of Powers properties to multiply and divide numbers written in scientific notation.

Example 1

Evaluate $(3.4 \times 10^5)(2.3 \times 10^3)$. Express the result in scientific notation.

$(3.4 \times 10^5)(2.3 \times 10^3) = (3.4 \times 2.3)(105 \times 10^3)$ Commutative and Associative Properties

$= (7.82)(10^5 \times 10^3)$ Multiply 3.4 by 2.3.

$= 7.82 \times 10^{5+3}$ Product of Powers

$= 7.82 \times 10^8$ Add the exponents.

Example 2

Evaluate $\frac{2.325 \times 10^4}{3.1 \times 10^4}$. Express the result in scientific notation.

$\frac{2.325 \times 10^4}{3.1 \times 10^4} = \left(\frac{2.325}{3.1}\right)\left(\frac{10^4}{10^2}\right)$ Associative Property

$= (0.75)\left(\frac{10^4}{10^2}\right)$ Divide 2.325 by 3.1.

$= 0.75 \times 10^{4-2}$ Quotient of Powers

$= 0.75 \times 10^2$ Subtract the exponents.

$= 0.75 \times 10^2$ Write 0.75×10^2 in scientific notation.

$= 7.5 \times 10$ Since the decimal point moved 1 place to the right, subtract 1 from the exponent.

Example 3

Evaluate $(5.24 \times 10^5) + (8.65 \times 10^6)$. Express the result in scientific notation.

$(5.24 \times 10^5) + (8.65 \times 10^6) = (5.24 \times 10^5) + (86.5 \times 10^5)$ Write 8.65×10^6 as 86.5×10^5.

$= (5.24 + 86.5) \times 10^5$ Distributive Property

$= 91.74 \times 10^5$ Add 5.24 and 86.5.

$= 9.174 \times 10^6$ Write 91.74×10^5 in scientific notation.

Exercises

Evaluate each expression. Express the result in scientific notation.

1. $(6.7 \times 10^4)(2.9 \times 10^5)$

2. $(4.3 \times 10^4) + (5.21 \times 10^5)$

3. $\frac{5.46 \times 10^5}{8.4 \times 10^3}$

4. $(9.6 \times 10^5) - (3.7 \times 10^3)$

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Roots

A square root of a number is one of its two equal factors. A radical sign, $\sqrt{\ }$ is used to indicate a positive square root. Every positive number has both a negative and positive square root.

Examples

Find each square root.

1. $\sqrt{1}$ Find the positive square root of 1; $1^2 = 1$, so $\sqrt{1} = 1$.
2. $-\sqrt{16}$ Find the negative square root of 16; $(-4)^2 = 16$, so $-\sqrt{16} = -4$.
3. $\pm\sqrt{0.25}$ Find both square roots of 0.25; $0.5^2 = 0.25$, so $\pm\sqrt{0.25} = \pm 0.5$.
4. $\sqrt{-49}$ There is no real square root because no number times itself is equal to –49.

Example 5

Solve $a^2 = \frac{4}{9}$. Check your solution(s).

$a^2 = \frac{4}{9}$ Write the equation.

$a = \pm\sqrt{\frac{4}{9}}$ Definition of square root

$a = \frac{2}{3}$ or $-\frac{2}{3}$ Check $\frac{2}{3} \cdot \frac{2}{3} = \frac{4}{9}$ and $\left(-\frac{2}{3}\right)\left(-\frac{2}{3}\right) = \frac{4}{9}$.

The equation has two solutions, $\frac{2}{3}$ and $-\frac{2}{3}$.

Exercises

Find each square root.

1. $\sqrt{4}$
2. $\sqrt{9}$
3. $-\sqrt{49}$
4. $-\sqrt{25}$
5. $\pm\sqrt{0.01}$
6. $-\sqrt{0.64}$
7. $\sqrt{\frac{9}{16}}$
8. $\sqrt{\frac{-1}{25}}$

ALGEBRA Solve each equation. Check your solution(s).

9. $x^2 = 121$
10. $a^2 = 3{,}600$
11. $p^2 = \frac{81}{100}$
12. $t^2 = \frac{121}{196}$