

Weekly Focus: Reading Comprehension Weekly Skill: Main Idea

Lesson Summary: This week students will read for comprehension about variation of traits, genes, and heredity. Then, students will continue reading for the main idea in a similar reading passage.

Materials Needed:

- Comprehension Reading Unit 4.6 Handout 1
- Main Idea Reading Unit 4.6 Handout 2 (6-way Paragraphs, Middle Level, #97, pages 194 195)
- Extra Work/Homework <u>Unit 4.6 Handout 3</u> (Spectrum Science, Grade 7, pages 138 139)
- Note Sheet (2 pages)

Objectives: Students will be able to...

- Read comprehension passages with vocabulary related to traits, genes, and heredity
- Practice citing evidence from the reading passages

College and Career Readiness Standards: RI, RST, WHST

ACES Skills Addressed: EC, LS, ALS, CT, SM

Notes: Please review and be familiar with classroom routine notes for: handling controversial topics (**Routine 5**), reading for fluency strategies (**Routine 2**), 6-way Paragraphs reading techniques (**Routine 3**), summarizing techniques (**Routine 4**), and self-management skills (**Routine 1**). The notes for the different activities will help with making a smooth transition to each activity.

GED 2014 Science Test Overview – For Teachers and Students

The GED Science Test will be 90 minutes long and include approximately 34 questions with a total score value of 40. The questions will have focus on three content areas: life science (~40%), physical science (~40%), and Earth and space science (~20%). Students may be asked to read, analyze, understand, and extract information from a scientific reading, a news brief, a diagram, graph, table, or other material with scientific data and concepts or ideas.

The online test may consist of multiple choice, drop down menu, and fill-in-the-blank questions. There will also be two short answer questions (suggested 10 minutes each) where students may have to summarize, find evidence (supporting details), and reason or make a conclusion from the information (data) presented.

The work students are doing in class will help them with the GED Science Test. They are also learning skills that will help in many other areas of their lives.



Activities:

Warm-Up: Journal Writing

Time: 10 - 15 minutes

Write on the board "What is the difference between dominant and recessive traits and genes?" As students arrive to the classroom, ask them to write in their journals or notebooks. As students are writing, circulate to make sure they are not stuck on this question. For newer students or students who may have been absent for the previous lessons on this topic, it may be a good opportunity for you to get copies of previous materials. If students are comfortable, encourage them to share their answers.

Activity 1: Comprehension Reading (Unit 4.6 Handout 1)

Time: 45 - 50 minutes

1) Hand out Unit 4.6 Handout 1 to students.

2) Explain to students they will read more about variations of traits and heredity. This information is important foundational knowledge for questions that may be on the 2014 GED Science module. This passage also has follow up questions that ask students to write answers based on the evidence from the reading. This is another skill needed in many areas of the 2014 GED test.

3) Discuss with students that when reading for comprehension, there are many strategies to use: read the title to predict what the reading is about; look at the words in bold and their definitions on the left side of page; if there are images, look at them to get a better understanding; while reading remember to ask "What is this all about?"

4) Have students read the first two pages of the passage independently.

5) Circulate class while they are reading to make sure they understand the information presented and see if there are any questions.

6) Review answers as a whole class. Ask students to point to the evidence from the reading passage that helped them determine the answer.

7) If there is time, students can summarize the reading or write a main idea.

Break: 10 minutes

Activity 2: Main Idea Reading (Unit 4.6 Handout 2)

1) Distribute Unit 4.6 Handout 2 to students,

2) Explain to students that the purpose of the 6-way Paragraphs reading passages is to master the essential skills needed to organize, understand, and apply information found in nonfiction texts.

3) Ask students to review the title and count the number of paragraphs in the reading passage. Ask students how they know where a paragraph begins. Explain that it is important to know how to find a paragraph quickly as some test questions may ask students to refer to a certain paragraph. If you have an overhead, point to it and/or label the indents.

4) Explain to students they should read all of the paragraphs silently in order to answer the questions that follow. To help students find the main idea of the reading passage, remind them to think "What are <u>all</u> the paragraphs about?" and "What is the point that the author is trying to make?" while reading.

5) Explain to students that they will decide which of the statements that follow the reading passage is the main idea, broad idea, or narrow idea. Use the explanations in Using 6-way Paragraphs Readings (Routine 3 handout).

6) While students are reading, circulate and discuss with students that when reading for

H. Turngren, Minnesota Literacy Council, 2014

p.2

GED Science Curriculum

Time: 40 - 45 minutes

Time: 5 minutes

Time: 30 minutes outside of class



Lesson 4.6: Life Science – Heredity

comprehension, there are many strategies to use: <u>read the title</u> to predict what the reading is about; while reading remember to ask "<u>What is this all about</u>?"

7) Review answers as a whole class. Ask students to point out the evidence (proof) from the reading that led them to the answer. If there is extra time or to challenge and differentiate instruction for students, some can write a 3 – 5 sentence summary of all of the material presented, use Routine 4 Summarizing Techniques Handout.

8) Remind students that they need to have a good foundational knowledge of cells in order to answer some questions that may be on the GED 2014 test.

9) If there is extra time, have students read the passage in pairs to promote reading fluency. Students who finish early should try to paraphrase the main idea of the passage for extra practice.

Wrap-Up: Summarize

Have students turn to a partner (or write in their journals) about what they have learned today about heredity and genetics. Ask them to tell a partner one thing they learned today in one or two sentences. Note: Use Routine 4 Handout

Extra Work/Homework: Unit 4.6 handout 3

Students can continue work with another reading passage on the background of sequencing DNA. (2 pages total) This is an excellent opportunity for students to review pervious material in an independent manner. It can also help some students who may have missed class or arrived late to gain information on today's lesson.

<u>Note:</u> There is also a 2 page student-created "cheat sheet" on Mendelian inheritance and information about genetics and heredity. It may be of interest for new students or returning students.

| Differentiated Instruction/ELL Accommodation Suggestions | Activity |
|------------------------------------------------------------------------------------------|------------|
| If some students finish early, they can turn their paper over and summarize the reading | Activity 1 |
| passage. | and |
| | Activity 2 |
| Teachers should be aware that ELLs could have some difficulty with some of the | Activity 1 |
| vocabulary encountered in the handouts for Activity 1 & 2. Encourage them to look for | & 2 |
| context clues in the reading that will help them with interpreting the main idea of each | |
| reading passage. | |

Online Resources:

If students have Internet connection, they can take a virtual tour of basic genetics.

http://learn.genetics.utah.edu/content/basics/

Suggested Teacher Readings:

• GED Testing Service – GED Science Item Sample (to get an idea of what the test may be like)

http://www.gedtestingservice.com/itemsamplerscience/

• Assessment Guide for Educators: A guide to the 2014 assessment content from GED Testing Service:

http://www.riaepdc.org/Documents/ALALBAASSESSMENT%20GUIDE%20CHAPTER%203.pdf

• Minnesota is getting ready for the 2014 GED test! – website with updated information on the professional development in Minnesota regarding the 2014 GED.

http://abe.mpls.k12.mn.us/ged_2014_2

• Essential Education's 2014 GED Test Curriculum Blueprint (PDF)

http://www.passged.com/media/pdf/educators/curriculum-blueprint.pdf



Unit 4.6 Handout 1 (4 pages total)

ReadWorks

Variation of Traits

Variation of Traits



When two organisms create a third organism through reproduction, a number of variables come into play. It's a sort of complex lottery in which the third organism—the offspring of the first two—inherits a combination of the parent organisms' genetic material. The possible variations inherent in recombining the parents' DNA are very, very broad and infinitely larger than the pool of entries in the state lotto jackpot! That's why we get so much variation even within the population of a particular sexually reproducing species.

Each new organism receives two of each chromosome, and within those chromosomes, two versions of each parents' set of genes. These genes contain instructions for protein production within the body of the offspring, and the way those proteins are prescribed determines the traits of the offspring. So, although your unique collection of traits, the combination of characteristics, physical and otherwise, that make you uniquely yourself are originally the product of chance, there are machinations going on behind the scenes to which every freckle, hair and character trait can be traced.

ReadWorks.org THE SOLUTION TO READING COMPREHENSION © 2013 ReadWorks⁹, Inc. Al nights reserved.



Personality traits are another story altogether. When we think about how our personalities are formed, we can certainly think about genes we acquired from our parents—but we also have to think about other complexly intertwined factors like environment and upbringing. For now, we'll simplify things by just focusing on the physical aspect of inherited traits. For example, if both parents exhibit the trait of red hair, their offspring have a greater chance of acquiring the genes that code for red hair. Certain traits are characteristically dominant or recessive, depending on the makeup of their alleles. This can make predicting traits tricky, but it is still very possible to estimate the likelihood, even the mathematic probability, that certain traits will manifest in the offspring of partners who exhibit those traits.

Red hair happens to be a kind of gene called incomplete dominant, which means it will blend with other genes, rather than dominate or be dominated. Since this is the case, the likeliest candidate to be coded for red hair is offspring with two red-headed parents.

It would be very, very unlikely for two parents with identically coded chromosomes to sexually reproduce. Even in the case of intrafamilial (or consanguine) pairings, which are discouraged in our society, the chromosome pairings would never be perfectly identical—that's a good thing for us as a civilization! As you will see, the absolute worst thing for our survival is for like to be paired with likes. It's in the best interests of our population that lots of different genes get mixed together in an evolutionary soup, so that many new variations on living organisms can be exposed to the environment, develop new adaptations to changing conditions, and promote the survival of the species.

Another variable that lets organism populations adapt to changing environments is mutation in genes. Sometimes, unpredictable changes in genetic code will appear within a new generation, not traceable back to a parental source.

Creators of superheroes like the X-Men and Teenage Mutant Ninja Turtles have used the idea of extreme mutation as a narrative device to invent colorful characters, bizarre scenarios, and literary metaphors. Mutant and mutation have exciting, exotic connotations to us, but actually, mutation is simply a necessary part of a species' evolution. Mutation can be something as mundane as two parents with brown eyes giving birth to a child with hazel eyes; or a type of moth whose wings are a different color from all the other moths in that species. Mutations are where new adaptations to existing or dynamic conditions are field tested in competition to whatever has worked for a population in the past. If a mutation pops up that happens to be advantageous for a particular organism within a population, that organism is more likely to survive, and therefore, more likely to procreate. Eventually, that chance mutation is reflected more widely in the community, and is passed on further to later generations. Once new challenges appear in the environment, new adaptations are likely to crop up for a fortunate few.



This is not to say that mutations are always helpful. Sometimes they are simply inconvenient, odd or unsupportable. They can even be indicative of a disruption in the environment.

Human interference in genetic coding is a pretty common practice these days. By deliberately engineering mutations in plants, most often food crops, humans can create larger, more resilient food sources. Since these "superfoods" are synthetically equipped with attributes that make them disproportionately competitive in the ecosystem they share with naturally grown food crops, they pose a threat to those populations. This is a controversial practice many food activists are working to curb.

Whether the mutation occurs naturally or is forced upon a population by biogenetic scientists, mutations are essential to the system by which ecosystems change and grow.

Comprehension Questions

1. What determines the traits of offspring?

- A. food sources that have been genetically engineered
- B. literary metaphors and exciting connotations
- C. the pool of entries in the state lotto jackpot
- D. genes received from the offspring's parents

2. Mutation in the genes of an organism is a cause. What is a possible effect?

- A. The organism is less likely to be studied by scientists.
- B. The organism is more likely to find a sexual partner identical to it.
- C. The organism is more likely to resemble its parents.
- **D.** The organism is more likely to survive and procreate.

3. Reproduction is "a sort of complex lottery in which the third organism—the offspring of the first two—inherits a combination of the parent organisms' genetic material." What evidence from the passage supports this statement?

- A. "The likeliest candidate to be coded for red hair is offspring with two redheaded parents."
- **B.** "It would be very, very unlikely for two parents with identically coded chromosomes to sexually reproduce."
- **C.** "Mutant and mutation have exciting, exotic connotations to us, but actually, mutation is simply a necessary part of a species' evolution."
- D. "Human interference in genetic coding is a pretty common practice these days."

H. Turngren, Minnesota Literacy Council, 2014 p.7 GED Science Curriculum



- 4. What is a difference between physical traits and personality traits?
 - **A.** Physical traits are mainly determined by a person's environment; personality traits are determined by both a person's genes and environment.
 - **B.** Physical traits are mainly determined by a person's genes; personality traits are determined by both a person's genes and environment.
 - **C.** Physical traits are mainly determined by a person's genes and environment; personality traits not determined by either a person's genes or environment.
 - **D.** Physical traits are mainly determined by a person's genes; personality traits are determined by genetically engineered food that a person eats.
- 5. What is this passage mostly about?
 - A. genes B. ecosystems C. the lottery D. personality traits

6. Read these sentences: "Red hair happens to be a kind of gene called incomplete dominant, which means it will blend with other genes, rather than **dominate** or be dominated. Since this is the case, the likeliest candidate to be coded for red hair is offspring with two red-headed parents."

What does the word "dominate" mean?

- A. protect or defend something from attack B. consume or eat a large amount
- C. overpower or be in control D. give up or be in the control of another
- 7. Choose the answer that best completes the sentence below.

A mutation may be passed down from one generation to the next, _____ when the mutation is advantageous.

A. before B. never C. particularly D. on the contrary

8. Define "mutation."

9. What can people create by engineering mutations in food crops?

10. Why might genetically engineered "superfoods" be a threat to naturally grown food?

Support your answer with information from the passage.



Unit 4.6 handout 1

TEACHER ANSWER KEY

| Ι. | D |
|----|---|
| 2. | D |
| 3. | А |
| 4. | В |
| 5. | А |
| 6. | С |
| | |

7. C

8. Answer will vary. Suggested answer: A mutation is an unpredictable genetic change in an organism that cannot be traced to the organism's parents.

9. Answer will vary. Suggested answer: People can create larger, more resilient food sources.

10. Answer will vary, as long as they are supported by the evidence from the passage.



Unit 4.6 handout 2

TEACHER ANSWER KEY

- 1. a. M (main idea)
 - b. **B** (broad idea)
 - c. **N** (narrow idea)
- 2. **b**
- 3. **b**
- 4. **a**
- 5. **c**
- 6. **d**



Unit 4.6 Handout 3

TEACHER ANSWER KEY

- 1. b
- 2. Possible answer: DNA is a molecule that plays a role in reproduction, so scientists need to know about both biology and chemistry to study DNA.
- 3. They showed the men that DNA has a double-helix shape
- 4. Answers may vary. Suggested answer: It can do both. Competition might motivate scientists to work harder in order to be the first discoverer or inventor of something. [However,], competition might also cause a scientist to withhold research, and sharing research is a vital part of scientific progress.



GREGOR MENDEL

Big Picture

Gregor Mendel is famous today for his ground-breaking investigations and discoveries in the field of genetics. His pea plant experiments in the 19th century explained concepts such as dominant alleles and recessive alleles. Mendel concluded his experiments with two laws: the law of segregation and the law of independent assortment.

cK-12 Study Guides MADE BY STUDENTS!

Figure: Gregor Mendel Image Credit: The History of Biology, Erik Nordenskiöld, Public Domain



Key Terms

Heredity: The passing of characteristics from parents to offspring.

Genetics: The science of heredity.

Hybrid: The resulting offspring from a cross between two different types of parents.

Gene: Segment of DNA that codes for a single protein or RNA. Controls what characteristics are expressed. Alleles: Variants of a specific gene.

Dominant Allele: The allele that is expressed as long as a dominant allele is present.

Recessive Allele: The allele that is expressed as long as no dominant alleles are present.

Law of Segregation: Mendel's first law of inheritance. The law states that there are two factors controlling a given characteristic in which one dominates the other. These factors separate during reproduction and go to different gametes, or a mature reproductive cell that eventually unites with another gamete to reproduce.

Law of Independent Assortment: Mendel's second law of inheritance. The factors controlling the different characteristics are inherited separately and therefore are not related.

Mendel's Pea Plant Experiments

Blending Inheritance

Before Gregor Mendel's discoveries, the blending inheritance was a widely popular theory to explain heredity.

- · The blending inheritance is a model where the offspring would have a mix of characteristics that the parents have. This model did not explain some of Mendel's observations.
- · Example: According to blending inheritance, a tall plant and a short plant would produce an offspring of medium height. If this were true, by now all humans would be of the same height!

Characteristics of Pea Plants

To understand his observations, Mendel experimented with pea plants. The pea plants were good experimental subjects because they grow quickly, are easy to raise, and have several visible characteristics that exit in two different forms. For example, the flower color may be either white or purple. The seven characteristics that Mendel studied are shown in the diagram below.

In Mendel's pea plant experiments, Mendel needed to control pollination, the fertilization step in the sexual reproduction of plants.

- · Pea plants have both the male flower part (anther) and the female flower part (stigma). They naturally self-pollinate (a flower fertilizes itself).
- · In order to study the offspring of two different parent plants, Mendel prevented self-pollination by removing the anthers of some pea plants.
- · Mendel cross-pollinated by dusting the stigma with the pollen from the anther of a different pea plant.
- The resulting offspring is a hybrid.

| | Seed | | Flower | Pod | | Stem | |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|-----------|--------|-------------|--------|------------------|----------|
| | Form | Cotyledon | Color | Form | Color | Place | Size |
| | ٢ | 0 | Ð | Ĭ | ý | Jer. | - Jule - |
| Figure: Diagram showing | Grey & Round | Yellow | White | Full | Green | Axial pods | Tall |
| observed by Mendel | 5.67 | õ | | 1 | - | and a second | - toter |
| Image Credit: CK-12 Foundation, CC-BY-NC-SA 3.0 | White & Wrinkled | Green | Violet | Constricted | Yellow | Terminal pods | Short |
| Display This guide was created by Maxine Tsang and Jin Yu. To learn more about the student authors, visit http://www.ck12.org/about/about/about/us/beam/interns. Page 1 of 2 vi.i.il.2012 | | | | | | | |



Biology

GREGOR MENDEL CONT.

Mendel's First Set of Experiments

In his first set of experiments, Mendel experimented with just one characteristic (such as flower color) at a time.

Experimental Steps

- Mendel allowed each variety of pea plants to self-pollinate for several generations. He wanted to ensure that the offspring of each variety would display the same characteristics.
 - Example: a pea plant with purple flowers will only produce plants with purple flowers
 - These pea plants formed the P generation.
- Mendel cross-pollinated two P generation plants with different characteristics.
 - Example: a pea plant with purple flowers and a pea plant with white flowers
 - The offspring formed the F₁ generation.
- The plants of the F₁ generation were allowed to self-pollinate.
 The offspring formed the F₂ generation.
- Results
- All the F, generation plants were alike.
- When plants in the F₁ generation are self-pollinated, the plants in the F₂ generation are no longer the same (exhibit two different characteristics).
- Furthermore, the F₂ generation plants displayed the two different characteristics in a consistent ratio (3:1).
- Example: on average, there were three purple-flowered plants to one white-flowered plant

Mendel's Second Set of Experiments

In his second set of experiments, Mendel experimented with two characteristics at a time, such as a yellow round seeds with green wrinkled seeds. He wanted to know if different characteristics are inherited together. For example, were yellow seeds always round and green seeds always wrinkled? The experimental steps were the same as the ones in the first set of experiments.

See biology study guide Mendelian Inheritance to learn how to predict an offspring's characteristic.

Mendel's Conclusions

Mendel's conclusions form the basis of modern genetics:

- Some factor, known today as a gene, controls what characteristics are observed.
- A pair of genes controls each characteristic. Each parent contributes one copy of the gene.
- There are different versions of a gene, known today as an **allele**, that controls each characteristic.
- When an organism inherits two different alleles, only the dominant allele is expressed (the recessive allele is not expressed).

Page 2 of 2





P generation stands for parental generation.
 F generation stands for filial generation (filial means "of a son or daughter").

Results

- All the plants in the F₁ generation were the same.
- When plants in the ${\sf F}_1$ generation were self-pollinated, the ${\sf F}_2$ generation plants showed all possible combinations of the two characteristics.
- The F₂ generation plants displayed all possible combinations in a consistent ratio (9:3:3:1).

The Law of Segregation

The **law of segregation**: When reproductive cells form, the pair of alleles separates, or segregates. Each reproductive cell, or gamete, receives one allele. During fertilization, two gametes combine, giving the offspring two alleles. The inherited alleles can be the same or different.

The Law of Independent Assortment

The **law of independent assortment**: The genes controlling different characteristics are inherited separately and therefore are not related.