Grade 11

Summer Learning Packet

11th Grade Summer Learning Packet

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COMPTON UNIFIED SCHOOL DISTRICT

MESSAGE FOR PARENTS

Dear Parents and Guardians,

As summer break approaches, we would like to share with you some learning resources that we have available for our Compton USD students. From our Summer Learning Packets to our online programs, CUSD students have multiple opportunities to reinforce learning. We want our scholars to continue learning during vacation time!

Educational research consistently shows that summer learning programs help students better retain the information learned during the previous year and better prepares students for the upcoming grade level. We also know that when kids read over the summer, they are more likely to leap ahead when they return to school. This is often called the "summer leap."

Please visit our Distance Learning Platform (Parent Resources) in the Compton Unified School District website to access some of the resources that we have available for our students!

We hope that you have a restful and healthy summer break and we look forward to seeing everyone in August.

EDUCATIONAL SERVICES

PHONE:
(310) 639-3165

WEBSITE:
www.compton.k12.ca.us

SUMMER LEARNING PACKETS

Our Common-Core aligned ***Summer Learning Packets*** offer our students the opportunity to review some of the most important concepts learned throughout this academic year. These activities mainly cover the areas of literacy and mathematics. Each packet contains student work that students can complete during the summer break.

In addition, we recommend that students engage in leisure reading for a minimum of 30 minutes daily! Encourage them to take home reading books from their classroom/school library!

Please know that these instructional activities and ideas are suggested and not required. Some children may need a combination of reading independently and having someone read to them. Some children prefer reading on the iPad or computer. If your child is struggling with a math page, please let your child's next year teacher know what concepts were difficult. If your child needs to skip problems, that is fine!

Our intention is to provide academic activities for children who would like to complete them, as well as for parents that find the review beneficial for their child. We hope each child finds the activities engaging.

Other academic summer activities could include journal writing, composing emails to family and friends, writing post cards while on a trip, sending thank-you notes, card games, Sudoku, word searches, crossword puzzles, arts and crafts, gardening, putting on plays/musicals, organizing a child-friendly garage sale, cooking, having a family game/puzzle night, etc.

HAVE A WONDERFUL SUMMER!!!

SUMMER ENRICHMENT

DISTRITO ESCOLAR UNIFICADO DE COMPTON

MENSAJE PARA LOS PADRES

Queridos padres y tutores,

A medida que se acerca el descanso de verano, nos gustaría compartir con ustedes algunos recursos de aprendizaje que tenemos disponibles para nuestros estudiantes. De nuestros *Paquetes de Aprendizaje de Verano* a algunos de nuestros programas en línea, los estudiantes de CUSD tienen múltiples oportunidades para reforzar el aprendizaje. Queremos que nuestros estudiantes continúen aprendiendo durante las vacaciones

La investigación educativa muestra consistentemente que los programas de aprendizaje de verano ayudan a los estudiantes a conservar mejor la información aprendida durante el año escolar anterior y prepara mejor a los estudiantes para el próximo nivel de grado. También sabemos que cuando los niños leen mucho durante el verano, con mayor probabilidad irán por delante cuando vuelvan a la escuela. Esto a menudo se llama el "salto de verano".
Visite nuestra Plataforma de Aprendizaje a distancia (Recursos para padres) en el sitio web del Distrito Escolar Unificado de Compton para tener acceso a algunos de los recursos que tenemos disponibles para nuestros estudiantes

Esperamos que tenga un descanso de verano relajante y saludable y esperamos verlo a todos en agosto.

SERVICIOS EDUCATIVOS

TELEFONO:
(310) 639-3165

SITIO WEB:
www.compton.k12.ca.us

PAQUETES DE APRENDIZAJE DE VERANO

Nuestros paquetes de aprendizaje de verano ofrecen a nuestros estudiantes la oportunidad de revisar algunos de los conceptos más importantes aprendidos a lo largo de este año académico. Estas actividades abarcan principalmente las áreas de alfabetización y matemáticas. Cada paquete contiene el trabajo que los estudiantes pueden completar durante las vacaciones de verano.

Además, recomendamos que los estudiantes participen en lectura libre por un mínimo de 30 minutos diarios ¡Anímeles a llevar libros de lectura a casa de la biblioteca de su salón de clases/ biblioteca de la escuela!

Por favor, sepa que estas actividades e ideas son sugeridas y no requeridas. Algunos niños pueden necesitar una combinación de lectura independiente y también que alguien les lea. Algunos niños prefieren leer en el iPad o en la computadora. Si su hijo/a tiene problemas con una página de matemáticas, por favor informe a la maestra del próximo año escolar sobre qué conceptos eran difíciles para su hijo/a. Si su hijo/a necesita saltarse los problemas, no pasa nada.

Nuestra intención es proporcionar actividades académicas para los estudiantes que deseen completarlas, así como para los padres que encuentren este repaso beneficioso para su hijo/a. Esperamos que cada niño/a encuentre actividades que en las que se puedan involucrar.

Otras actividades académicas de verano podrían incluir la redacción o escritura libre, escribir correos electrónicos a familiares y amigos, la redacción de tarjetas postales durante un viaje, enviar notas de agradecimiento, juegos de cartas, Sudoku, búsquedas de palabras, crucigramas, artes y artesanías, jardinería, poner juegos/música, organizar una venta de garaje para niños, cocinar, tener una noche de juegos/rompecabezas familiar, etc. ¡Disfrute con sus hijos/as las muchas oportunidades que ofrece el verano!

¡TENGAN UN AGRADABLE VERANO!

SUMMER ENRICHMENT

Grade 11

ELA

"The Cloak"

by Nikolai Gogol

In the department of—but it is better not to mention the department. There is nothing more irritable than departments, regiments, courts of justice, and, in a word, every branch of public service. Each individual attached to them nowadays thinks all society insulted in his person. Quite recently a complaint was received from a justice of the peace, in which he plainly demonstrated that all the imperial institutions were going to the dogs, and that the Czar's sacred name was being taken in vain; and in proof he appended to the complaint a romance in which the justice of the peace is made to appear about once every ten lines, and sometimes in a drunken condition. Therefore, in order to avoid all unpleasantness, it will be better to describe the department in question only as a certain department.

So, in a certain department there was a certain official—not a very high one, it must be allowed—short of stature, somewhat pock-marked, red-haired, and short-sighted, with a bald forehead, wrinkled cheeks, and a complexion of the kind known as sanguine. The St. Petersburg climate was responsible for this. As for his official status, he was what is called a perpetual titular councillor, over which, as is well known, some writers make merry, and crack their jokes, obeying the praiseworthy custom of attacking those who cannot bite back.

His family name was Bashmatchkin. This name is evidently derived from "bashmak" (shoe); but when, at what time, and in what manner, is not known. His father and grandfather, and all the Bashmatchkins, always wore boots, which only had new heels two or three times a year. His name was Akakiy Akakievitch. It may strike the reader as rather singular and far-fetched, but he may rest assured that it was by no means far-fetched, and that the circumstances were such that it would have been impossible to give him any other.

This is how it came about.

[5] Akakiy Akakievitch was born, if my memory fails me not, in the evening of the 23rd of March. His mother, the wife of a Government official and a very fine woman, made all due arrangements for having the child baptised. She was lying on the bed opposite the door; on her right stood the godfather, Ivan Ivanovitch Eroshkin, a most estimable man, who served as presiding officer of the senate, while the godmother, Anna Semenovna Byelobrushkova, the wife of an officer of the quarter, and a woman of rare virtues. They offered the mother her choice of three names, Mokiya, Sossiya, or that the child should be called after the martyr Khozdazat. "No," said the good woman, "all those names are poor." In order to please her they opened the calendar to another place; three more names appeared, Triphiliy, Dula, and Varakhasiy. "This is a judgment," said the old woman. "What names! I truly never heard the like. Varada or Varukh might have been borne, but not Triphiliy and Varakhasiy!" They turned to another page and found Pavsikakhiy and Vakhtisiy. "Now I see," said the old woman, "that it is plainly

fate. And since such is the case, it will be better to name him after his father. His father's name was Akakiy, so let his son's be Akakiy too." In this manner he became Akakiy Akakievitch. They christened the child, whereat he wept and made a grimace, as though he foresaw that he was to be a titular councillor.

In this manner did it all come about. We have mentioned it in order that the reader might see for himself that it was a case of necessity, and that it was utterly impossible to give him any other name. When and how he entered the department, and who appointed him, no one could remember. However much the directors and chiefs of all kinds were changed, he was always to be seen in the same place, the same attitude, the same occupation; so that it was afterwards affirmed that he had been born in undress uniform with a bald head. No respect was shown him in the department. The porter not only did not rise from his seat when he passed, but never even glanced at him, any more than if a fly had flown through the reception-room. His superiors treated him in coolly despotic fashion. Some sub-chief would thrust a paper under his nose without so much as saying, "Copy," or "Here's a nice interesting affair," or anything else agreeable, as is customary amongst well-bred officials. And he took it, looking only at the paper and not observing who handed it to him, or whether he had the right to do so; simply took it, and set about copying it.

The young officials laughed at and made fun of him, so far as their official wit permitted; told in his presence various stories concocted about him, and about his landlady, an old woman of seventy; declared that she beat him; asked when the wedding was to be; and strewed bits of paper over his head, calling them snow. But Akakiy Akakievitch answered not a word, any more than if there had been no one there besides himself. It even had no effect upon his work: amid all these annoyances he never made a single mistake in a letter. But if the joking became wholly unbearable, as when they jogged his hand and prevented his attending to his work, he would exclaim, "Leave me alone! Why do you insult me?" And there was something strange in the words and the voice in which they were uttered. There was in it something which moved to pity; so much that one young man, a new-comer, who, taking pattern by the others, had permitted himself to make sport of Akakiy, suddenly stopped short, as though all about him had undergone a transformation, and presented itself in a different aspect. Some unseen force repelled him from the comrades whose acquaintance he had made, on the supposition that they were well-bred and polite men. Long afterwards, in his gayest moments, there recurred to his mind the little official with the bald forehead, with his heart-rending words, "Leave me alone! Why do you insult me?" In these moving words, other words resounded—"I am thy brother." And the young man covered his face with his hand; and many a time afterwards, in the course of his life, shuddered at seeing how much inhumanity there is in man, how much savage coarseness is concealed beneath delicate, refined worldliness, and even, O God! in that man whom the world acknowledges as honourable and noble.

It would be difficult to find another man who lived so entirely for his duties. It is not enough to say that Akakiy laboured with zeal: no, he laboured with love. In his copying, he found a varied and agreeable employment. Enjoyment was written on his face: some letters were even favourites with him; and when

he encountered these, he smiled, winked, and worked with his lips, till it seemed as though each letter might be read in his face, as his pen traced it. If his pay had been in proportion to his zeal, he would, perhaps, to his great surprise, have been made even a councillor of state. But he worked, as his companions, the wits, put it, like a horse in a mill.

Moreover, it is impossible to say that no attention was paid to him. One director being a kindly man, and desirous of rewarding him for his long service, ordered him to be given something more important than mere copying. So he was ordered to make a report of an already concluded affair to another department: the duty consisting simply in changing the heading and altering a few words from the first to the third person. This caused him so much toil that he broke into a perspiration, rubbed his forehead, and finally said, "No, give me rather something to copy." After that they let him copy on forever.

[10] Outside this copying, it appeared that nothing existed for him. He gave no thought to his clothes: his undress uniform was not green, but a sort of rusty-meal colour. The collar was low, so that his neck, in spite of the fact that it was not long, seemed inordinately so as it emerged from it, like the necks of those plaster cats which wag their heads, and are carried about upon the heads of scores of image sellers. And something was always sticking to his uniform, either a bit of hay or some trifle. Moreover, he had a peculiar knack, as he walked along the street, of arriving beneath a window just as all sorts of rubbish were being flung out of it: hence he always bore about on his hat scraps of melon rinds and other such articles. Never once in his life did he give heed to what was going on every day in the street; while it is well known that his young brother officials train the range of their glances till they can see when any one's trouser straps come undone upon the opposite sidewalk, which always brings a malicious smile to their faces. But Akakiy Akakievitch saw in all things the clean, even strokes of his written lines; and only when a horse thrust his nose, from some unknown quarter, over his shoulder, and sent a whole gust of wind down his neck from his nostrils, did he observe that he was not in the middle of a page, but in the middle of the street.

On reaching home, he sat down at once at the table, supped his cabbage soup up quickly, and swallowed a bit of beef with onions, never noticing their taste, and gulping down everything with flies and anything else which the Lord happened to send at the moment. His stomach filled, he rose from the table, and copied papers which he had brought home. If there happened to be none, he took copies for himself, for his own gratification, especially if the document was noteworthy, not on account of its style, but of its being addressed to some distinguished person.

Even at the hour when the grey St. Petersburg sky had quite dispersed, and all the official world had eaten or dined, each as he could, in accordance with the salary he received and his own fancy; when all were resting from the departmental jar of pens, running to and fro from their own and other people's indispensable occupations, and from all the work that an uneasy man makes willingly for himself, rather than what is necessary; when officials hasten to dedicate to pleasure the time which is left to them, one bolder than the rest going to the theatre; another, into the street looking under all the bonnets; another

wasting his evening in compliments to some pretty girl, the star of a small official circle; another—and this is the common case of all—visiting his comrades on the fourth or third floor, in two small rooms with an ante-room or kitchen, and some pretensions to fashion, such as a lamp or some other trifle which

has cost many a sacrifice of dinner or pleasure trip; in a word, at the hour when all officials disperse among the contracted quarters of their friends, to play whist, as they sip their tea from glasses with a kopek's worth of sugar, smoke long pipes, relate at times some bits of gossip which a Russian man can never, under any circumstances, refrain from, and, when there is nothing else to talk of, repeat eternal anecdotes about the commandant to whom they had sent word that the tails of the horses on the Falconet Monument had been cut off, when all strive to divert themselves, Akakiy Akakievitch indulged in no kind of diversion. No one could ever say that he had seen him at any kind of evening party. Having written to his heart's content, he lay down to sleep, smiling at the thought of the coming day—of what God might send him to copy on the morrow.

Thus flowed on the peaceful life of the man, who, with a salary of four hundred rubles, understood how to be content with his lot; and thus it would have continued to flow on, perhaps, to extreme old age, were it not that there are various ills strewn along the path of life for titular councillors as well as for private, actual, court, and every other species of councillor, even for those who never give any advice or take any themselves.

There exists in St. Petersburg a powerful foe of all who receive a salary of four hundred rubles a year, or thereabouts. This foe is no other than the Northern cold, although it is said to be very healthy. At nine o'clock in the morning, at the very hour when the streets are filled with men bound for the various official departments, it begins to bestow such powerful and piercing nips on all noses impartially that the poor officials really do not know what to do with them. At an hour when the foreheads of even those who occupy exalted positions ache with the cold, and tears start to their eyes, the poor titular councillors are sometimes quite unprotected. Their only salvation lies in traversing as quickly as possible, in their thin little cloaks, five or six streets, and then warming their feet in the porter's room, and so thawing all their talents and qualifications for official service, which had become frozen on the way.

[15] Akakiy Akakievitch had felt for some time that his back and shoulders suffered with peculiar poignancy, in spite of the fact that he tried to traverse the distance with all possible speed. He began finally to wonder whether the fault did not lie in his cloak. He examined it thoroughly at home, and discovered that in two places, namely, on the back and shoulders, it had become thin as gauze: the cloth was worn to such a degree that he could see through it, and the lining had fallen into pieces. You must know that Akakiy Akakievitch's cloak served as an object of ridicule to the officials: they even refused it the noble name of cloak, and called it a cape. In fact, it was of singular make: its collar diminishing year by year, but serving to patch its other parts. The patching did not exhibit great skill on the part of the tailor, and was, in fact, baggy and ugly. Seeing how the matter stood, Akakiy Akakievitch

Name: _____

Date: _____

What Is Society's Responsibility to the Disadvantaged?

Directions: Use the table below to take notes about compassion and its role in society as portrayed in the video "Craig Kielburger Founds Free the Children" and the story "The Cloak." Consider how compassion is shown (or not shown) in each source and how compassion impacts the specific societies described. When you have completed the table, answer the questions that follow.

For homework, use online sources to research a social welfare organization and complete the chart by noting how members of that organization show compassion. While researching, investigate the following questions:

- What does this organization do for the disadvantaged?
- What are the organization's goals?
- How does the organization accomplish its goals?
- Why do members of the organization do the work they do?

Source	Notes about Compassion and its Role in Society
"Craig Kielburger Founds Free the Children"	
"The Cloak"	
Social welfare organization: _____	

1. What similarities and differences do you see between Gogol's Russia and today's society?

2. What similarities and differences do you see between Free the Children and the other social welfare organization you researched?

3. Think of compassion and its role in each of these societies. What is society's responsibility to the disadvantaged? Why do you think that? Be sure to cite evidence from the video, the short story, and/or your own research to support your answer.

Name _____ Date _____

1 NOUNS

A noun is the part of speech that names a person, a place, a thing, or an idea.
There are different types of nouns. See the examples below.

Common noun	class of person, place, or thing	girl, city, month
Proper noun	specific person, place, or thing	Maria, Dallas, December
Concrete noun	something you can see, touch, taste, hear, or smell	table, hat, pen
Abstract noun	something you can't perceive through your senses	loyalty, hope, freedom

Practice A Identifying Nouns

Read each sentence. Then, underline the nouns in each sentence.

Example: Our decision was to eat dinner before the movie.
Answer: Our decision was to eat dinner before the movie.

1. The present is on the table.
2. Please take Sally to the dentist.
3. My brother slept through the movie.
4. Call the office after the package arrives.
5. The weather in Chicago is cold in January.
6. The firefighter received a medal for her bravery.
7. Her family moved to the United States from China.
8. Gymnastics requires balance and strength.
9. Our choir visited the White House in Washington, D.C.
10. The friendship between Rich and Tom has lasted for years.

Practice B Labeling Nouns

Read each sentence. Then, on the line provided, identify whether each underlined noun is (1) common or proper and (2) concrete or abstract.

Example: Did you give your pencil to Paul?
Answer: pencil—common, concrete; Paul—proper, concrete

1. Your friendship is important to me. _____
2. Aunt Mary visited my family yesterday. _____
3. Please pass the potatoes. _____
4. My uncle lives in Florida. _____
5. A puppy needs a lot of attention. _____
6. Can I use the telephone to call Grandpa? _____
7. Our deepest hope is for freedom. _____
8. Have you read *Tom Sawyer* by Mark Twain? _____
9. My frustration grew over time. _____
10. No other bridge is as beautiful as the Brooklyn Bridge. _____

Writing and Speaking Application

Write a two-sentence description of your classroom, using at least six nouns. Circle the nouns. Then, take turns reading your sentences with a partner. Your partner should listen for and name the nouns in your sentences. Then, switch roles with your partner.

Name _____ Date _____

2 PRONOUNS

Pronouns are words that stand for nouns or for words that take the place of nouns.

Pronouns get their meaning from the words they stand for. These words are called *antecedents*. Reciprocal pronouns *each other* and *one another* refer to a plural antecedent. They express a mutual action or relationship.

Show that you can use and understand the function of pronouns by completing the following exercises.

Practice A Identifying Antecedents

Read each sentence below. Then, draw an arrow that points from the underlined pronoun to its antecedent.

Example: Michael loves his school.

Answer: Michael loves his school.

1. Mary did the job herself.
2. Jamal works hard at his job.
3. Successful students do their homework.
4. Rachel took her daughter to the park.
5. Andrew likes work. He spends a lot of time there.
6. Roderick wrote his mom a letter.
7. If Jessie does the chores, she will get an allowance.
8. Dennis is very kind to his employees.
9. When Kate exercises, she feels better.
10. If Cameron does the work, he will succeed.

Practice B Identifying Reciprocal Pronouns

Read each sentence below and underline the reciprocal pronouns.

Example: They always help each other.
Answer: They always help each other.

1. At Christmas, we give each other gifts.
2. Good people are kind to one another.
3. The men shook hands with each other.
4. It is obvious that they are fond of one another.
5. The children cooperate with one another.

Writing and Speaking Application

Write five sentences that include pronouns. Circle the pronouns and draw an arrow to their antecedents. Read your sentences to a partner, who will identify the pronouns and their antecedents. Then, switch roles with your partner.

Name _____ Date _____

3 ACTION VERBS AND LINKING VERBS

A verb is a word or group of words that expresses time while showing an action, a condition, or the fact that something exists.

There are different types of verbs. See the examples below.

Action verb	tells what action someone or something is performing	go: is going, went run: is running, ran fly: is flying, flew learn: is learning, learned
Linking verb	connects its subject with a noun, a pronoun, or an adjective that identifies or describes the subject	be: is, am, was, were, could be, would be, has been feel: is feeling, felt become: is becoming, became

Practice A Identifying Action Verbs

Read each sentence. Underline the action verb.

Example: Susan ran around the track.
Answer: Susan ran around the track.

1. Tyrell plays the guitar.
2. Robert works at the factory.
3. Sarah drank the juice.
4. Connie helps a lot of people.
5. Albin cooks delicious food.
6. Heidi swam to shore.

Practice B Identifying Linking Verbs

Read each sentence. Underline the linking verb.

Example: Cathy feels sick.
Answer: Cathy feels sick.

1. Richard is a soldier.
2. Tamara's voice sounds wonderful.
3. Her son became a doctor.
4. He felt better after we talked.
5. Jason appeared upset.

Practice C Distinguishing Between Action Verbs and Linking Verbs

Underline the verbs in the following sentences. Then, write whether the verb is an action verb or a linking verb.

Example: He flies jets for a living.
Answer: He flies jets for a living. action verb

1. After dinner, she became sick. _____
2. We played the best game ever! _____
3. Ashley was so happy about the puppy. _____
4. Jared is my best friend. _____
5. The children argued about television shows. _____

Writing and Speaking Application

Write five sentences, some that use an action verb and some that use a linking verb. Read the sentences to a partner. Your partner should listen for and name the verb and tell whether it is an action verb or a linking verb. Then, switch roles with your partner.

Name _____ Date _____

4 TRANSITIVE AND INTRANSITIVE VERBS

A transitive verb directs action toward someone or something named in the sentence.
An intransitive verb does not direct action toward anyone or anything named in the sentence.

The word that receives the action of a transitive verb is called the object of the verb. You can determine whether a verb has an object by asking *whom* or *what* after the verb.

Transitive: The boy lost his jacket. (Lost what? his jacket)
Intransitive: The baby cried loudly. (Cried what? [no answer])

Practice A Identifying Transitive Verbs and Their Objects

Read each sentence. Then, underline the verb and circle the object of the verb.

Example: Mom baked a delicious cake.
Answer: Mom baked a delicious (cake.)

1. Tim sold hot chocolate at the game.
2. Kelly wore glasses.
3. Mom and Dad ate all of the pie.
4. The kitten scratched my hand.
5. I pictured success in my mind.
6. Chris took the garbage to the curb.
7. Michael forgot his backpack.
8. Belle asked several questions.
9. The dog ate the leftovers.
10. The doctor washed his hands.

Practice B Distinguishing Between Transitive Verbs and Intransitive Verbs

Read each sentence. Then, write the action verb and label it transitive *or* intransitive.

Example: The baby cried for her bottle.
Answer: cried—intransitive

1. Miette walked to the store. _____
2. James did his homework. _____
3. Ethan played his guitar all morning. _____
4. The grass grew quickly. _____
5. The plane holds over a hundred people. _____
6. Chloe sprained her ankle. _____
7. Benjamin runs faster than anybody else. _____
8. Mr. Young wants a new dog. _____
9. Steve forgot the party. _____
10. His mom washed the dishes. _____

Writing and Speaking Application

Write four sentences, two with transitive verbs and two with intransitive verbs. Read your sentences to a partner. Your partner should listen for each verb and name it *transitive* or *intransitive*. Then, switch roles with your partner.

Immigration to the United States

These photos at Ellis Island show immigrants to the United States.

Fast Facts

- About 12 percent of the people who live in the United States were born in other countries.
- More immigrants come to the United States from Mexico than from any other country.
- About 1.5 percent of U.S. citizens today are American Indians.

A Land of Immigrants

Immigrants are people who leave their home country to live in a new country. Except for American Indians, every[23] U.S. citizen has a family member who was once an immigrant to the United States. Some families have lived in this country[45] for hundreds of years and do not think of themselves as immigrants. Others may be either immigrants themselves or the children of immigrants.[68]

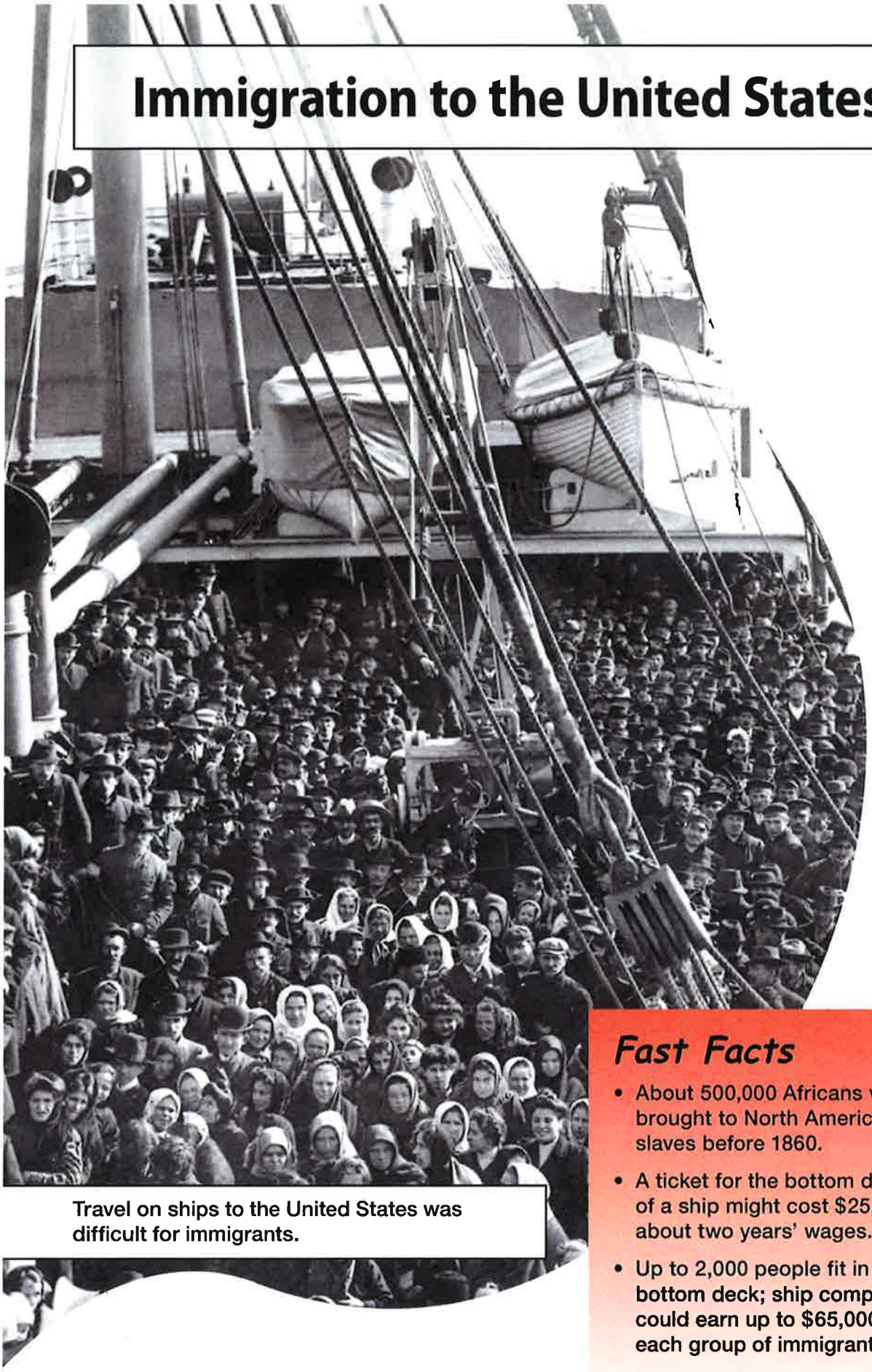
People come to the United States from many countries. Many immigrants come looking for new opportunities.[84] While some seek better jobs, others seek opportunities to live their lives as they wish. Living as they wish is an opportunity that people may not have in other countries.[114]

KEY NOTES

A Land of Immigrants

Why do immigrants come to the United States?

Immigration to the United States



Travel on ships to the United States was difficult for immigrants.

Fast Facts

- About 500,000 Africans were brought to North America as slaves before 1860.
- A ticket for the bottom deck of a ship might cost $25, about two years' wages.
- Up to 2,000 people fit in the bottom deck; ship companies could earn up to $65,000 for each group of immigrants.

Getting to the United States

Until about 50 years ago, most immigrants came to the United States in ships. The conditions on these early ship[25] voyages were difficult, especially for the people who were brought from Africa as slaves. Even for immigrants who chose[44] to come to the United States, though, these voyages could be hard.[56]

Between 1900 and 1920, 13 million immigrants arrived in ships from Europe. Many of these people, especially the poor,[75] traveled in very difficult conditions. Many immigrants could only pay to travel on the bottom decks of ships, which were[95] often crowded and windowless. Today, however, most immigrants to the United States arrive by plane.[110]

KEY NOTES

Getting to the United States What was life like for immigrants who traveled to the United States between 1900 and 1920?

Immigration to the United States

Immigrants cheer as their ship comes into New York Harbor, about 1900.

Fast Facts

- From 1892 to 1954, about 12 million immigrants landed at Ellis Island.
- Almost half of all Americans can trace their roots to someone who landed at Ellis Island.
- From 1910 to 1940, about 175,000 Chinese immigrants landed at Angel Island.

Ellis and Angel Islands

After 1886, the Statue of Liberty greeted ships arriving in New York. Immigrants often cheered when they saw the[23] Statue of Liberty. Many of these immigrants passed through Ellis Island.[34]

First, immigrants were given medical checks to be sure they were well. Some people who were ill were sent back to[55] their home country. People who passed their medical check were questioned about their background. Finally, immigrants were told if they could stay in the United States.[81]

Immigrants who arrived on the West Coast were checked at Angel Island in California. Most of these immigrants came[100] from China. Some were kept at Angel Island for as long as two years.[114]

KEY NOTES

Ellis and Angel Islands What was the first thing that happened to immigrants on Ellis and Angel Islands?

Immigration to the United States

Immigrants study English to pass a test to become a U.S. citizen.

Fast Facts

- More than 450,000 people become U.S citizens each year.
- One question on the citizenship test has been, "What are the colors of our flag?"
- American Indians did not become U.S. citizens until 1924.

Becoming a U.S. Citizen

Most Americans become citizens by being born in the United States. However, every year more than 700,000[21] immigrants come to this country. Many come because they want to become U.S. citizens.[35]

Before 1906, people were not required to know English to become U.S. citizens. Since then, laws were changed to require[55] those who want to become citizens to speak, read, and write English. This requirement means that many new citizens speak[75] more than one language. People who want to become citizens also must pass a test about the history and laws of the United[98] States. Today, only people who know English and pass this test can become U.S. citizens.[113]

KEY NOTES

Becoming a U.S. Citizen

What must immigrants know to become U.S. citizens?

Immigration to the United States

A Land of Immigrants

1. The main idea of "A Land of Immigrants" is that _____

a. everyone who lives in a country is an immigrant.
b. all children in the United States are immigrants.
c. visitors to the United States are immigrants.
d. someone in most U.S. families was an immigrant.

2. What is an immigrant?

_____

_____

_____

3. What are two kinds of opportunity people seek when they come to the United States?

_____

_____

_____

Getting to the United States

1. "Getting to the United States" is MAINLY about _____

a. how much immigrants had to pay to get to the United States.
b. how difficult it is to get to the United States today.
c. how immigrants came to the United States years ago and today.
d. rules for getting to the United States on airplanes.

2. Compare how most immigrants came to the United States about 50 years ago with how they come today.

_____

_____

_____

3. Why were conditions on the ships difficult for many immigrants from Africa and from Europe?

_____

_____

_____

Ellis and Angel Islands

1. Another good name for "Ellis and Angel Islands" is _____

a. "The Statue of Liberty."
b. "Why Immigrants Came to the United States."
c. "Living at Ellis Island."
d. "Arriving in the United States."

2. Immigrants were checked to be sure _____

a. they could speak English.
b. they were not ill.
c. they had enough money.
d. they were U.S. citizens.

3. What happened at Ellis and Angel Islands?

_____

_____

_____

Becoming a U.S. Citizen

1. Many immigrants to the United States want to _____

a. become U.S. citizens.
b. go to Ellis Island.
c. visit the United States.
d. learn how to be immigrants.

2. In 1906, how did laws change that allowed immigrants to become U.S. citizens?

a. Fewer people were allowed to become citizens.
b. Immigrants had to know English.
c. More people had to become citizens.
d. Immigrants had to become citizens.

3. What are two things immigrants need to do today to become citizens?

_____

_____

_____

immigrants	**opportunity**	**conditions**	**voyages**
statue	**liberty**	**citizens**	**require**

1. Choose the word from the word box above that best matches each definition. Write the word on the line below.

A. _____ being free

B. _____ a chance to do something new

C. _____ a figure of a person or animal

D. _____ the way things are

E. _____ people who move to a new country to make a new home

F. _____ need to have or do something

G. _____ trips

H. _____ people who are members of a country

2. Fill in the blanks in the sentences below. Choose the word from the word box that completes each sentence.

A. My town put up a _____ of the person who started the town.

B. My parents came to the United States to become _____.

C. It was cold, so the _____ for swimming were not good.

D. The school will _____ new students to pass a test to move to the next grade.

E. If you are free, you have the _____ to do what you want.

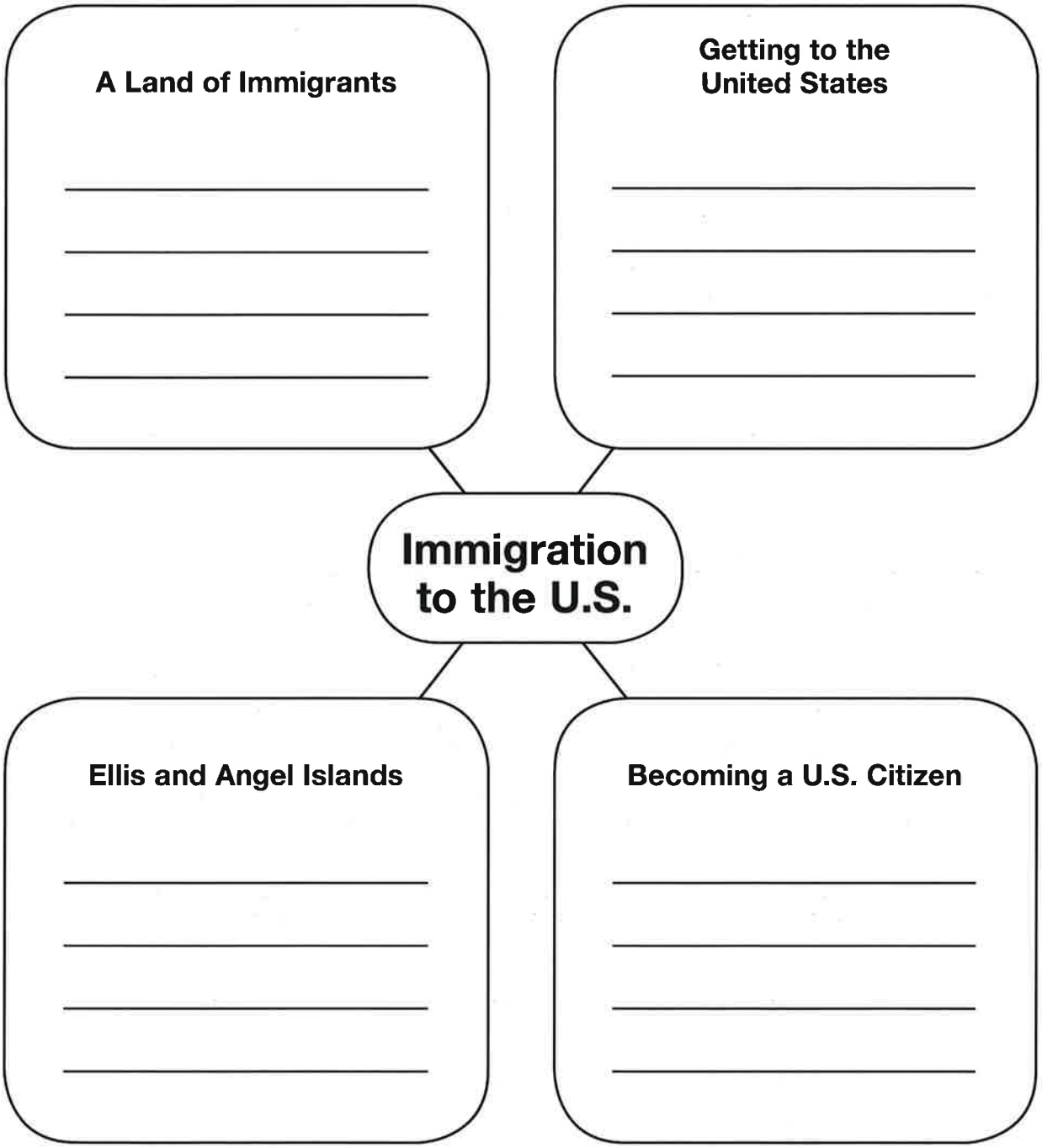
F. The United States is sometimes called the land of _____ because people can do many things here.

G. More _____ come to a country when more jobs are available.

H. I like _____ by sea because I have always loved boats.

Immigration to the United States

1. Use the idea web to help you remember what you read. In each box, write the main idea of that reading.



2. How do you think immigrants changed the United States?

3. What are three things immigrants might have to do differently in a new country?

4. Why do you think immigrants come to the United States today?

Name _____ Date _____

5 VERB PHRASES

A verb phrase consists of a main verb and one or more helping verbs.
One or more helping verbs may precede the main verb in a verb phrase. For example, in the sentence, "I will be arriving at school on time," *will* and *be* are helping verbs, and *arriving* is the main verb. Common helping verbs are shown in the table below.

be	do	have	shall	can
is	does	has	should	could
was	did	had	will	may
were			would	might
(all forms of be)				must

Practice A Recognizing Verb Phrases

Read each sentence. Then, write the verb phrase on the line provided.

Example: I will be taking science first period.
Answer: will be taking

1. You should have finished the paper before watching TV. _____
2. My family is leaving next week. _____
3. Truong is painting his house. _____
4. My dog was not expecting two shots today. _____
5. That car does use a lot of gas. _____
6. I have seen this movie four times. _____
7. Nicole will be working tomorrow. _____
8. Chad has been posting updates from his trip. _____
9. Cathy is raising five kids. _____
10. He is planning a trip to Japan. _____

Practice B Identifying Helping Verbs and Main Verbs

Read each sentence. Then, underline the helping verbs and circle the main verbs.

Example: She is using her mom's computer.
Answer: She is (using) her mom's computer.

1. They are adopting a child next month.
2. Mr. Rose should be making dinner by now.
3. Temperatures are climbing.
4. You do want dessert, right?
5. I might go to community college for my first year.
6. Grandma might learn karate.
7. I have seen snow in Telluride in July.
8. Antal will play guitar in a concert tonight.
9. Dad was praising the dog.
10. I am getting a job next semester.

Writing and Speaking Application

Write three sentences that use verb phrases, and underline the helping verbs. Then, read your sentences to a partner. Your partner should identify the main verbs. Switch roles with your partner and repeat the exercise.

Name _____ Date _____

6 ADJECTIVES

An adjective is a word used to describe a noun or pronoun or to give it a more specific meaning.

An adjective answers one of four questions about a noun or pronoun: *What kind? Which one? How many? How much?* See the examples in the table below.

beautiful gardens	What kind of gardens?
that lesson	Which lesson?
sixty-seven years	How many years?
boundless energy	How much energy?

Practice A Identifying Adjectives

Read the sentences below. Then, underline the adjective or adjectives in each sentence. Remember that articles are adjectives, too!

Example: The tall, handsome boy goes to college.
Answer: The tall, handsome boy goes to college.

1. That game went on forever!
2. I am listening to classical music.
3. Cesar loves putt-putt golf.
4. Some people spend long hours at work.
5. Allen wants a red suit.
6. The broken window lets in the cold.
7. She enjoys making complicated recipes.
8. The old, slow computer has to go.
9. Modern art speaks to my soul.
10. Reading is my favorite activity.

Practice B Identifying Nouns Used as Adjectives

Read each sentence. Then, write the noun that is used as an adjective in each sentence.

Example: She went to the work meeting.
Answer: work

1. It is time to wash the dinner dishes. _____
2. Did you bring a winter coat? _____
3. I missed band practice all week. _____
4. Nguyen is a basketball player. _____
5. Camilla has a smoothie habit. _____
6. That office building should be torn down. _____
7. The earthquake plan is very detailed. _____
8. Miss Stenberg has fruit salad for lunch. _____
9. He works at an airplane factory. _____
10. She is hoping for an adventure vacation. _____

Writing and Speaking Application

Write a three-sentence description of your family, using at least one adjective in every sentence. Circle the adjectives. Find a partner and take turns reading your sentences. Your partner should listen for and name the adjective or adjectives in each sentence. Then, switch roles with your partner.

Name _____ Date _____

7 ADVERBS

An adverb is a word that modifies a verb, an adjective, or another adverb.
When an adverb modifies a verb, it will answer one of the following questions: *Where? When? In what way? To what extent?* See the examples below.

Where?	The book was here.
When?	He never walked the dog.
In what way?	Thomas gently corrected her.
To what extent?	They completely lost track of time.

Practice A Recognizing Adverbs

Read each sentence. Then, write the adverb in each sentence.

Example: She ran quickly to the car.
Answer: quickly

1. He yelled loudly when he broke his rib. _____
2. That child can sleep anywhere. _____
3. I want to travel abroad. _____
4. Moles live underground. _____
5. He accidentally spilled his milk. _____
6. Shane always flosses his teeth. _____
7. I finally finished that letter. _____
8. I will see you soon. _____
9. The package will come tomorrow. _____
10. Leila smiled cheerfully. _____

Practice B Identifying Adverbs and the Words They Modify

Read each sentence. Then, write the adverb and the word or words it modifies.

Example: I will arrive eventually.
Answer: eventually—will arrive

1. Juan is utterly wonderful. _____
2. That bell seldom rings. _____
3. Young professionals are upwardly mobile. _____
4. I sometimes appreciate cold weather. _____
5. He usually arrives about this time. _____
6. Miss Graski practices her cello often. _____
7. The hawk dropped swiftly from the sky. _____
8. She practices medicine thoughtfully. _____
9. Ava will move to Chicago soon. _____
10. He was mortally wounded. _____

Writing and Speaking Application

Write a three-sentence description of how to do something, using at least three adverbs. Circle the adverbs. Then, take turns reading your sentences with a partner. Your partner should listen for and name the adverbs in your sentences. Then, switch roles with your partner.

Name _____ Date _____

8 PREPOSITIONS AND PREPOSITIONAL PHRASES

A preposition relates the noun or pronoun that appears with it to another word in the sentence. A prepositional phrase is a group of words that includes a preposition and a noun or pronoun.

Prepositions show relationships that involve location, direction, time, cause, or possession—for example, *above*, *toward*, *since*, and *of*. Prepositions come at the beginning of prepositional phrases; the phrases include the preposition and a noun or pronoun that is called the object of the preposition.

Practice A Identifying Prepositions and Prepositional Phrases

Read each sentence. Then, write the prepositional phrase in each sentence, and underline the preposition.

Example: Most kids in that school do well.
Answer: in that school

1. Put the book on the table. _____
2. That son of Tricia's is still small. _____
3. Be here in the morning. _____
4. There was a competition between the two brothers. _____
5. Henry puts the dishes in the sink. _____
6. Lola lives in San Diego. _____
7. I found the shoe under the bed. _____
8. Juanita studied into the night. _____
9. Don't leave without your hat. _____
10. I found a ring on the beach. _____

Practice B Identifying Prepositions and Their Objects

Read each sentence. Then, underline the preposition and circle the object of the preposition.

Example: The bridge goes over the river.
Answer: The bridge goes over the (river.)

1. The children return at sunset.
2. The flight was delayed because of an equipment problem.
3. The family had a party in the park.
4. I want to live near the ocean.
5. The whale is moving toward the shore.
6. The new suit should last for years.
7. Ted is the son of a musician.
8. Liz is walking to work.
9. She says she concentrates better with music.
10. I use the bus for transportation.

Writing and Speaking Application

Write four sentences with a prepositional phrase in each. Underline the prepositions. Then, find a partner. Your partner should listen for and name the prepositional phrases. Together, identify the objects of the prepositions. Then, switch roles with your partner.

Name _____ Date _____

Writing: News Story

Practice

A **news story** presents facts about events that have occurred. News stories answer the questions *Who? What? When? Where? Why?* and *How?* The opening sentence or paragraph of a news story should make the reader want to read more.

A Read the news story. Then, complete the following activities.

Early Tuesday morning, the Carpenter family was saved from a possible tragedy by their family dog, Tommy. A spark from the fireplace had landed unnoticed on the carpet. After the family went to bed, the spark started a fire. The alert Tommy woke the family by barking and scratching at the bedroom doors. The Carpenters escaped and called firefighters, who quickly put out the fire. The family was safe, and their home suffered very little fire damage, thanks to Tommy. Mr. Carpenter said that Tommy has been a member of the family for nearly ten years and that he had always been protective of family members.

Write the answers to each of the following questions using the news story:

Who? _____

What? _____

When? _____

Where? _____

Why? _____

How? _____

B Explain how the first sentence makes the reader want to read more.

_____

_____

_____

_____

Name _____ Date _____

Writing: News Story

Assess

A Think of a recent event that has occurred in your school or community. Based on the event, write an answer to each of the following questions.

Who? _____

What? _____

When? _____

Where? _____

Why? _____

How? _____

B Use your answers to the questions in Exercise A to write a news story about the event. Include an opening sentence that makes the reader want to continue reading the story.

Name _____ Date _____

Writing: Short Story

Practice

A **short story** is a brief, fictional narrative composed of plot, setting, and characters. It is told from a consistent first-person or third-person point of view. It follows a chronological time order, and often includes dialogue.

A Read the following passages. Then, write your answer to each question.

1. I entered the room quietly, hoping that I would not wake the sleeping dog.

What is the point of view in this passage? _____

2. Angela slid into her desk before the bell rang. This was the first day at her new school. She was a year younger than her classmates, most of whom were 15. That made her feel even more shy. Her shyness made her blush as other students filed past her desk, looking at her. She stared down at her desktop, her long blond hair falling forward over her face.

A. Write some key details about the character in this passage.

_____

B. What is the conflict or problem faced by the character in this passage?

_____

3. I knew that somehow the time machine had gone out of control. I found myself in a dense forest of strange plants that appeared to be huge ferns. Little light penetrated the forest, and a thick fog covered the ground. Suddenly I felt the ground begin to tremble. At the same time, I heard an ear-splitting roar very near. It was the roar of an animal—a *very large* animal.

Write the details of the setting described in this passage.

_____

_____

B Choose one of the passages in Exercise A. Add one or more characters to the story. Then, create a brief dialogue between the characters. Make sure the dialogue is related to the story and adds to the action.

_____

_____

Name _____ Date _____

Writing: Short Story

Assess

Choose one of these topics to create a short story. Then, complete the activities.

the case of the missing soccer ball

two friends compete for a place on the team

why Mary Ann wanted to dance

a scientist discovers a strange new animal

1. Briefly summarize your idea for a story.

_____

_____

2. Identify your audience and keep it in mind as you write. _____

3. Identify the point of view you will use. _____

4. List the characters you will include in your story. _____

_____

5. Write the key details about each character: name, age, appearance, and personality traits.

_____

_____

6. Write some details of the setting, including time and place.

_____

7. Decide on a conflict or problem and state it in one or two sentences.

_____

_____

8. Create dialogue that uses words that suit each personality and moves the action of the story forward. Tell where in the plot you will use the dialogue.

_____

_____

Name _____ Date _____

9 CONJUNCTIONS

A conjunction is a word used to connect words or groups of words.

There are three main kinds of conjunctions: coordinating, correlative, and subordinating. These types of conjunctions are described in more detail in the following chart.

Coordinating conjunctions	There are only seven. They connect similar parts of speech or groups of words that have equal grammatical weight.	and, but, for, nor, or, so, yet
Correlative conjunctions	There are only five, and they are paired. They join elements of equal grammatical weight.	both...and; either...or; neither...nor; not only...but also; whether...or
Subordinating conjunctions	There are many. They join two complete ideas by making one of the ideas dependent upon the other.	after, because, although, as if, as long as, so that, whenever, when, where, as though, in order that, while

Practice A Identifying Conjunctions

Read each sentence. Then, underline the conjunctions. If a sentence has a correlative conjunction, remember to underline both parts.

Example: Neither I nor my employees will attend that event.
Answer: Neither I nor my employees will attend that event.

1. I love skiing, but my knees hate it.
2. We will either take the car or take the bus.
3. I love apples and bananas.
4. Do you want a sandwich or some leftovers?
5. I like dessert after I eat dinner.
6. She eats lunch at her desk when she has to.
7. Lukas wanted to help, but he didn't have time.
8. He will study either Spanish or French.
9. Fred likes not only soccer but also basketball.
10. While I load the dishwasher, you put the food away.

Practice B Identifying Kinds of Conjunctions

Read each sentence below. Then, write the conjunction from each sentence, and label it as coordinating, correlative, *or* subordinating.

Example: She likes to knit while she watches TV.
Answer: while—subordinating

1. I like to eat spicy food, yet it bothers my stomach. _____
2. She was awake but drowsy. _____
3. While Jack washed the car, Jill mowed the lawn. _____
4. I walk the dog, but the cat walks herself. _____
5. You can have either chocolate or vanilla _____
6. Michelle and James are getting married. _____
7. I have to go to the doctor whether I like it or not. _____
8. Do you prefer flat shoes or heels? _____
9. Kaya listens to music while she does homework. _____
10. I want to play soccer, but my knee can't take the strain. _____

Writing and Speaking Application

Write three sentences: one that uses a coordinating conjunction, one that uses a correlative conjunction, and one that uses a subordinating conjunction. Read your sentences to a partner, who should identify the type of conjunction used in each sentence. Then, switch roles.

Name _____ Date _____

10 INTERJECTIONS

An interjection is a word that expresses feeling or emotion and functions independently of a sentence.

Interjections are different from most other words because they do not have a grammatical connection to other words in a sentence. Some common interjections are shown in the table below.

ah	dear	hey	oh	well
aha	goodbye	hello	ouch	whew
alas	goodness	hurray	psst	wow

Practice A Identifying Interjections

Underline the interjection in each item.

Example: Ugh! I will have to work a long time to fix that.
Answer: Ugh! I will have to work a long time to fix that.

1. Oh! I love this movie!
2. Goodness! You scared me.
3. Pssst, are you awake?
4. Tsk-tsk, you should not be doing that.
5. Ouch! I think I sprained my wrist.
6. Hurray! We won the game!
7. Alas, the ship was not seaworthy.
8. Whew! That was a close call!
9. Congratulations! I am so proud of you!
10. Whoa! You are driving too fast!

Practice B Supplying Interjections

Read each sentence. Then, write an interjection that shows the feeling expressed in the sentence.

Example: _____ I love this dessert!
Answer: Yum!

1. _____ People are trying to study.
2. _____ I had a terrible day.
3. _____ I'm scared of mice.
4. _____ That casserole looks pretty bad.
5. _____ The superhero took one on the chin.
6. _____ You win some, and you lose some.
7. _____ You must be very happy.
8. _____ I'm feeling pretty discouraged.
9. _____ The tray slipped off the counter.
10. _____ How have you been?

Writing and Speaking Application

Write four sentences, each using an interjection. Circle the interjections. Then, take turns reading your sentences with a partner. Your partner should listen for and name the interjections in your sentences. Then, switch roles with your partner.

Name _____ Date _____

12 SIMPLE SUBJECTS AND PREDICATES

The simple subject is the essential noun, pronoun, or group of words that acts as a noun in a complete subject. The simple predicate is the essential verb or verb phrase in a complete predicate.

The complete subject includes the simple subject plus any words that describe it. The complete predicate includes the simple predicate and all the words that describe it.

Complete Subjects	Complete Predicates
The glass of juice	is sitting on the table next to the couch.
The very sick fox	stayed in his den all day.
My geology paper	will be submitted right after class.

Practice A Identifying Simple Subjects

In the sentences below, the complete subject is underlined. Circle the simple subject (which will be part of the underlined section).

Example: The boy with the short black hair loves to ride his minibike.
Answer: The (boy) with the short black hair loves to ride his minibike.

1. My mother, who loves to skydive, can't swim.
2. The bird on the wire moved closer to its companion.
3. The bananas in the fruit bowl are over-ripe.
4. The printer needs a new ink cartridge.
5. The finger that he bruised should be x-rayed.
6. Ben's painting speaks to my soul.
7. The keys to Sarah's car are hopelessly lost.
8. The biology book includes colorful illustrations.
9. His best and oldest friend lent him money.
10. Many poems describe the night sky.

Practice B Identifying Simple Predicates

In the sentences below, the complete predicate is underlined. Circle the simple predicate (which will be part of the underlined section).

Example: Juanita tossed her backpack into the trunk.
Answer: Juanita (tossed) her backpack into the trunk.

1. The dishes you gave me will make the table beautiful.
2. Gray days remind me of my summer in Seattle.
3. He took his daughter to the park yesterday morning.
4. The man with the yellow hat loves monkeys.
5. I cried during the second act of that play.
6. The president of the PTA tries her best.
7. Uncle Trae wore his best suit to the wedding.
8. The purse that she wants costs fifty dollars.
9. We canceled our plans.
10. That mother knows her children well.

Writing and Speaking Application

Write four sentences, and underline the simple subject and simple predicate in each. Then, read your sentences to a partner, who should listen for and name the simple subject and the simple predicate in each sentence. Then, switch roles with your partner.

Name _____ Date _____

13 FRAGMENTS

A fragment is a group of words that lacks a subject or a predicate, or both. It does not express a complete unit of thought.

Fragments are not usually used in writing because they might not be understood. Fragments can be corrected by adding the parts that are needed to make a complete thought. See the examples in the table below.

Fragments	Complete Sentences
the frog with warts	The frog with warts gives me the creeps.
live in those woods	Beautiful elk live in those woods.

Practice A Distinguishing Sentences and Fragments

Each item below is punctuated like a sentence, but some of the items are fragments. Read each item and, on the line provided, write whether it is a sentence or a fragment.

Example: The monkey who knows sign language.
Answer: fragment

1. Is running late. _____
2. Sunshine makes flowers grow. _____
3. Stronger by lifting weights. _____
4. He watched the movie twice. _____
5. Which is no way to make friends. _____
6. Is a famous boy. _____
7. I don't like that music. _____
8. Was far too tedious for me to finish. _____
9. Gabriel graduated with honors. _____
10. Tanya suddenly stood up. _____

Practice B Fixing Fragments

Read each fragment below. Then, use each fragment in a sentence.

Example: to the store
Answer: My mom asked me to go to the store for her.

1. the little boy _____
2. went running through the field _____
3. the beautiful horse _____
4. sat down at the desk _____
5. was standing in a field _____

Writing and Speaking Application

Write four fragments and read them to a partner. Together, decide how the fragments can be made into sentences. Then, switch roles with your partner.

Grade 11

MATH

Name _____ Date _____ Class _____

LESSON 5-3

Graphing Cubic Functions

Reteach

The graph of the parent function $f(x) = x^3$ can be transformed into $g(x) = a\left(\frac{1}{b}(x-h)\right)^3 + k$.

Each parameter (a, b, h, and k) affects the transformation of the function:

a	$\lvert a\rvert < 1$ Vertical Compression	$\lvert a\rvert > 1$ Vertical Stretch	$a < 0$ Reflection over x-axis
b	$\lvert b\rvert < 1$ Horizontal Compression	$\lvert b\rvert > 1$ Horizontal Stretch	$b < 0$ Reflection over y-axis
h	$h < 0$ Translate Left h	$h > 0$ Translate Right h	
k	$k < 0$ Translate Down k	$k > 0$ Translate Up k	

By using reference points, a graph of the transformed function can be created.

$f(x) = x^3$		$g(x) = a\left(\frac{1}{b}(x-h)\right)^3 + k$	
x	y	x	y
-1	-1	$-b+h$	$-a+k$
0	0	h	k
1	1	$b+h$	$a+k$

Example Identify the transformations that produce the graph of $g(x) = 2(x+1)^3 - 2$. Then, graph $g(x)$ by applying the transformations to the reference points $(-1, -1)$, $(0, 0)$, and $(1, 1)$.

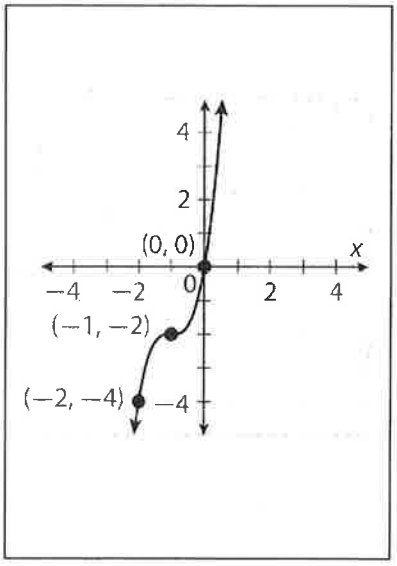
Transformations

$a = 2$ Vertical Stretch by 2
$b = 1$ No Horizontal Stretch or Compression
$h = -1$ Translate Left 1
$k = -2$ Translate Down 2

Reference Points

Original Points	x	y
$(-1, -1)$	$-1+(-1) = -2$	$-2+(-2) = -4$
$(0, 0)$	-1	-2
$(1, 1)$	$1+(-1) = 0$	$2+(-2) = 0$

Graph



Identify the transformations that produce the graph of the given function. Then, graph the function by applying the transformations to the reference points $(-1, -1)$, $(0, 0)$, and $(1, 1)$.

1. $g(x) = -3(x-4)^3 + 1$

2. $g(x) = \frac{1}{2}(x-2)^3 - 4$

3. $g(x) = -(x+3)^3 + 2$

Name _____ Date _____ Class _____

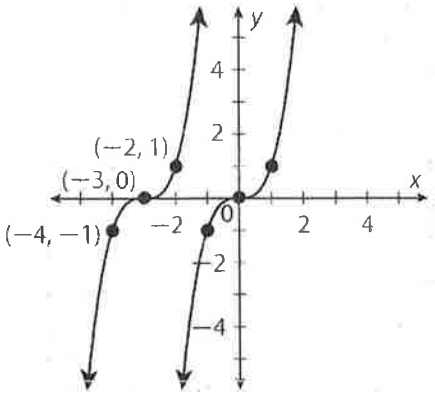
LESSON 5-3

Graphing Cubic Functions

Practice and Problem Solving: Modified

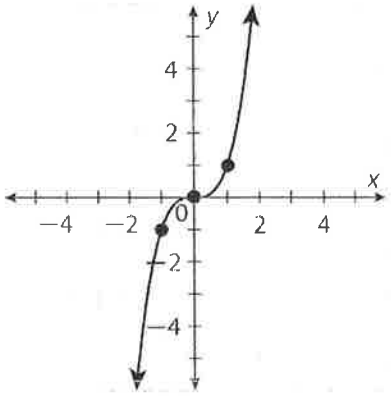
Calculate the reference points for each transformation of the parent function $f(x) = x^3$. Then graph the transformation. (The graph of the parent function is shown.) The first one is done for you.

1. $g(x) = (x+3)^3$



(–4, –1), (–3, 0), and (–2, 1)

2. $g(x) = 3(x-2)^3$



Describe the graphs from Problems 1 and 2 as a transformation of the graph of the parent function, $f(x) = x^3$. The first one is done for you.

3. $g(x) = (x+3)^3$

translation 3 units to the left

4. $g(x) = 3(x-2)^3$

Solve. The first one is done for you.

5. The graph of the function $f(x) = x^3$ is translated 8 units to the right and 4 units down. Write the equation for the new function.

$g(x) = (x-8)^3 - 4$

6. The graph of the function $f(x) = x^3$ is stretched vertically by a factor of 5 and translated 6 units up. Write the equation for the new function.

7. The graph of the function $f(x) = x^3$ is reflected across the x-axis. Write the equation for the new function.

Name _____ Date _____ Class _____

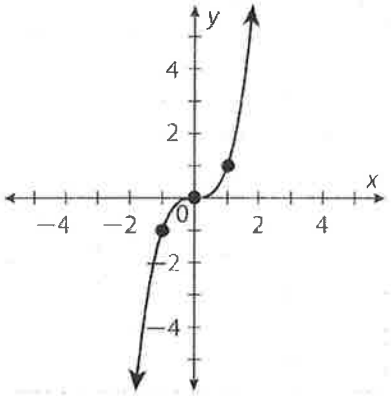
LESSON 5-3

Graphing Cubic Functions

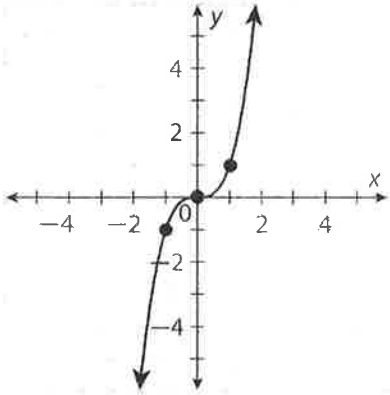
Practice and Problem Solving: A/B

Calculate the reference points for each transformation of the parent function $f(x) = x^3$. Then graph the transformation. (The graph of the parent function is shown.)

1. $g(x) = (x-3)^3 + 2$

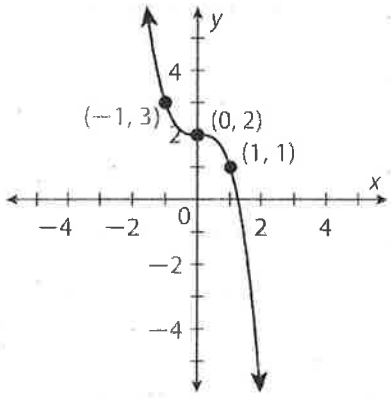


2. $g(x) = -3(x+2)^3 - 2$

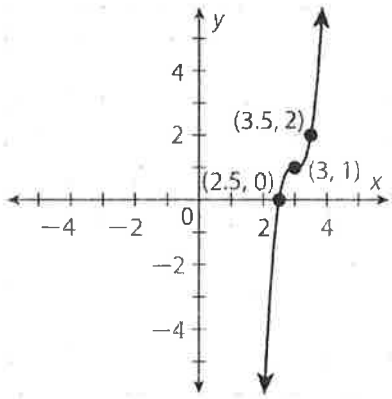


Write the equation of the cubic function whose graph is shown.

3.



4.



Solve.

5. The graph of $f(x) = x^3$ is reflected across the x-axis. The graph is then translated 11 units up and 7 units to the left. Write the equation of the transformed function.

6. The graph of $f(x) = x^3$ is stretched vertically by a factor of 6. The graph is then translated 9 units to the right and 3 units down. Write the equation of the transformed function.

Name _____ Date _____ Class _____

LESSON 5-3

Graphing Cubic Functions

Reading Strategies: Use a Graphic Organizer

Summarize what you know about transformations of cubic functions in a graphic organizer. The parent function is $f(x) = x^3$. Assume $a > 0$.

Function	Effect on Parent Function
$g(x) = (x - h)^3$	$h > 0$; translate right h units $h < 0$; translate left h units
$g(x) = x^3 + k$	$k > 0$; translate up k units $k < 0$; translate down k units
$g(x) = ax^3$	Vertical S T R E T C H by a factor of a
$g(x) = -ax^3$	Vertical S T R E T C H by a factor of a; reflection across the x-axis
$g(x) = \frac{1}{a}x^3$	Vertical compression by a factor of $\frac{1}{a}$
$g(x) = -\frac{1}{a}x^3$	Vertical compression by a factor of $\frac{1}{a}$; reflection across the x-axis
$g(x) = (bx)^3$	Horizontal compression by a factor of $\frac{1}{b}$
$g(x) = (-bx)^3$	Horizontal compression by a factor of $\frac{1}{b}$; reflection across the the y-axis
$g(x) = \left(\frac{1}{b}x\right)^3$	Horizontal S T R E T C H by a factor of b
$g(x) = \left(-\frac{1}{b}x\right)^3$	Horizontal S T R E T C H by a factor of b; reflection across the y-axis

Use the graphic organizer to complete each sentence.

1. The graph of $g(x) = \left(\frac{1}{5}x\right)^3$ is a _____ of the graph of $f(x)$ by a factor of _____.

2. The graph of $g(x) = (x + 5)^3$ is a _____ of the graph of $f(x)$ _____ units to the _____.

3. The graph of $g(x) = (-5x)^3$ is a _____ of the graph of $f(x)$ by a factor of _____ and a reflection across the _____ axis.

4. The graph of $g(x) =$ _____ is a vertical stretch of the graph of $f(x)$ by a factor of 5.

Name _____ Date _____ Class _____

LESSON 5-4

Graphing Polynomial Functions

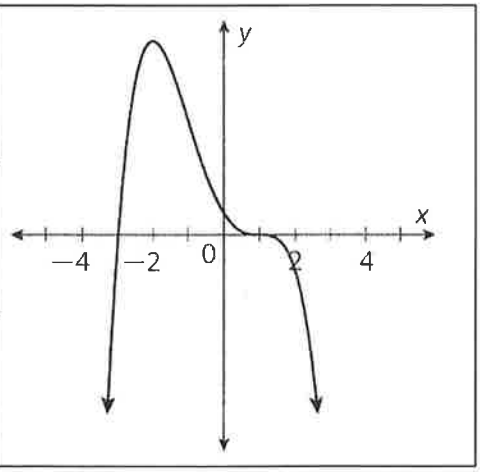
Reteach

To sketch $f(x) = a(x - x_1)(x - x_2)...(x - x_n)$:

n = degree a = constant factor	End Behavior	Graph Description	x-intercepts
n odd $a > 0$	as $x \to -\infty$, $f(x) \to -\infty$ as $x \to +\infty$, $f(x) \to +\infty$	Uphill	$(x - x_1)^{odd}$ Crosses x-axis at x_1
n odd $a < 0$	as $x \to -\infty$, $f(x) \to +\infty$ as $x \to +\infty$, $f(x) \to -\infty$	Downhill	
n even $a > 0$	as $x \to -\infty$, $f(x) \to +\infty$ as $x \to +\infty$, $f(x) \to +\infty$	Opens up	$(x - x_2)^{even}$ Tangent to x-axis at x_2
n even $a < 0$	as $x \to -\infty$, $f(x) \to -\infty$ as $x \to +\infty$, $f(x) \to -\infty$	Opens down	

Example Sketch the graph of the polynomial function $f(x) = \left(-\frac{1}{5}\right)(x+3)(x-1)^3$.

$n = 4$ (even), $a = -\frac{1}{5}$ $(a < 0) \to$ Opens down
$(x+3)$ raised to an odd power $\to$ crosses at $x = -3$
$(x-1)$ raised to an odd power $\to$ crosses at $x = 1$



Sketch the graph of the polynomial function.

1. $f(x) = (x+1)^2(x-2)(x-3)$

2. $f(x) = -2(x+3)^3(x-2)^2$

3. $f(x) = (x-1)^3(x+4)^2$

4. $f(x) = x(x+3)(x+1)(x-1)(x-3)$

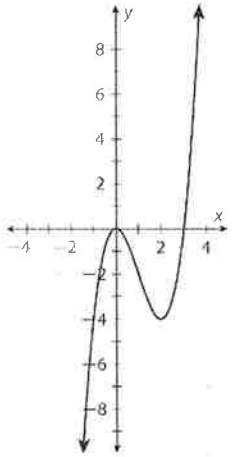
Name _____ Date _____ Class _____

LESSON 5-4

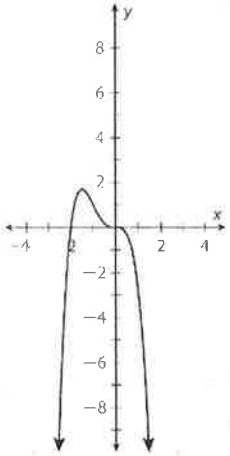
Graphing Polynomial Functions

Practice and Problem Solving: Modified

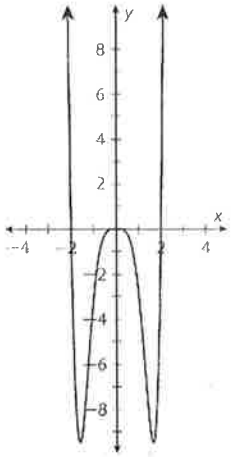
The graphs of three polynomial functions are shown. Use the equations and their graphs to complete the table. The first one is done for you.

1. 

$f(x) = x^2(x-3)$

2. 

$f(x) = -x^3(x+2)$

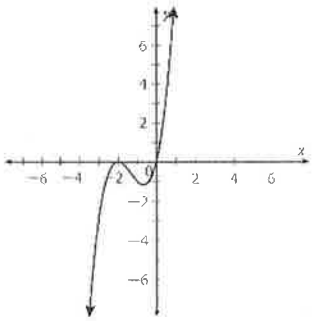
3. 

$f(x) = x^4(x+2)(x-2)$

	Polynomial	*x*-intercepts	Number of Turning Points	End Behavior
1.	$f(x) = x^2(x-3)$	(0, 0) and (3, 0)	2	As $x \to +\infty$, $f(x) \to +\infty$ As $x \to -\infty$, $f(x) \to -\infty$
2.	$f(x) = -x^3(x+2)$			
3.	$f(x) = x^4(x+2)(x-2)$			

Graph the function. State the end behavior, *x*-intercepts, and intervals where the function is above or below the *x*-axis. The first one is started for you.

4. $f(x) = x(x+2)^2$



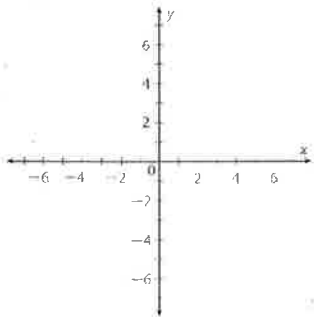
End behavior: _____

x-intercepts: **(–2, 0) and (0, 0)**

Above *x*-axis: ***x* > 0**

Below *x* axis: _____

5. $f(x) = -x(x+2)^3(x-1)$



End behavior: _____

x-intercepts: _____

Above *x*-axis: _____

Below *x*-axis: _____

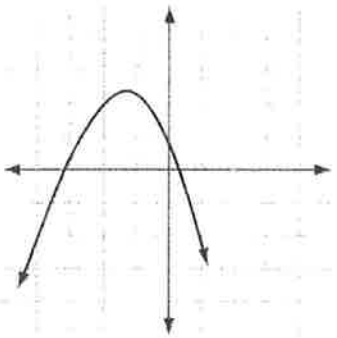
Name _____ Date _____ Class _____

LESSON 5-4

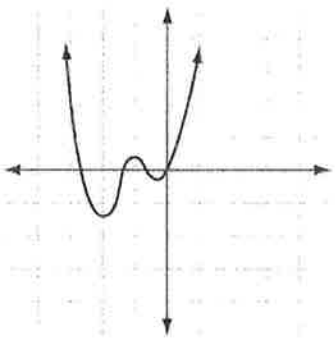
Graphing Polynomial Functions

Practice and Problem Solving: A/B

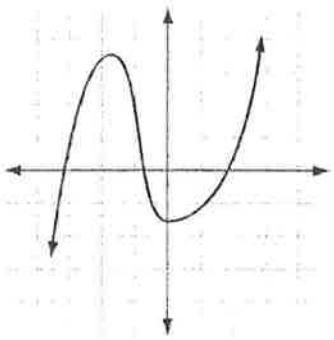
Identify whether the function graphed has an odd or even degree and a positive or negative leading coefficient.

1. 

_____

2. 

_____

3. 

_____

Use a graphing calculator to determine the number of turning points and the number and type (global or local) of any maximum or minimum values.

4. $f(x) = x(x-4)^2$

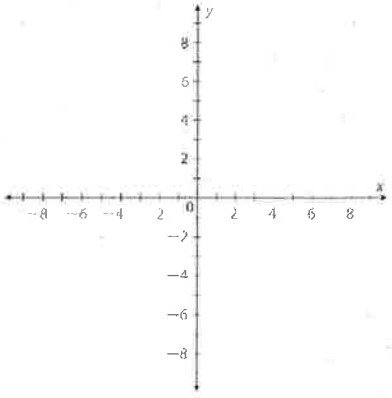
_____

5. $f(x) = -x^2(x-2)(x+1)$

_____

Graph the function. State the end behavior, *x*-intercepts, and intervals where the function is above or below the *x*-axis.

6. $f(x) = -(x-1)^2(x+3)$



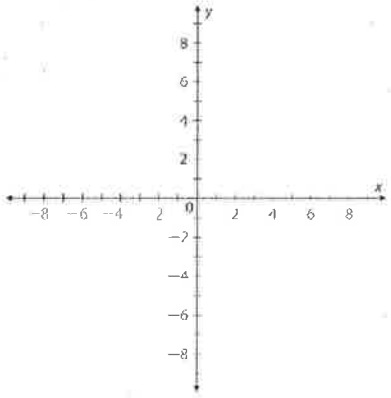
End behavior: _____

x-intercepts: _____

Above *x*-axis: _____

Below *x* axis: _____

7. $f(x) = (x+2)(x-3)(x-1)$



End behavior: _____

x-intercepts: _____

Above *x*-axis: _____

Below *x*-axis: _____

Name _____ Date _____ Class _____

LESSON 5-4

Graphing Polynomial Functions

Reading Strategies: Analyze Information

The **end behavior** of a function tells you how the function behaves as its x-value approaches positive or negative infinity. You can find the end behavior of a function by looking at its degree and its leading coefficient.

	Degree of Polynomial Is ODD	**Degree of Polynomial Is EVEN**
Leading Coefficient: $a > 0$	As $x \to +\infty$, $P(x) \to +\infty$ As $x \to -\infty$, $P(x) \to -\infty$	As $x \to +\infty$, $P(x) \to +\infty$ As $x \to -\infty$, $P(x) \to +\infty$
Leading Coefficient: $a < 0$	As $x \to +\infty$, $P(x) \to -\infty$ As $x \to -\infty$, $P(x) \to +\infty$	As $x \to +\infty$, $P(x) \to -\infty$ As $x \to -\infty$, $P(x) \to -\infty$

Use the function $f(x) = x(x + 2)(x + 1)$.

1. a. What information about this function will help you find its end behavior?

_____

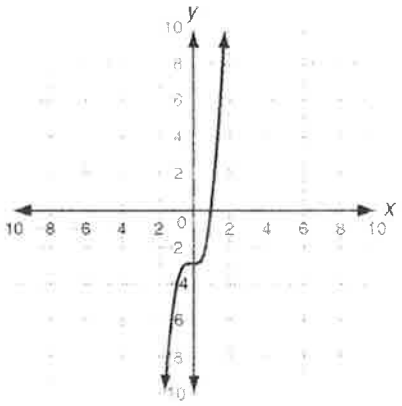
b. Explain how this function behaves as $x \to +\infty$.

_____

c. Explain how this function behaves as $x \to -\infty$.

_____

Use the graph to answer the questions.



2. Explain the end behavior of the function shown in the graph.

_____

3. What conclusion can you draw about the degree of this polynomial function?

_____

4. What conclusion can you draw about the leading coefficient of this polynomial function?

_____

Name _____ Date _____ Class _____

LESSON 6-1

Adding and Subtracting Polynomials

Reteach

Example $(-3x^4 + 2x - x^3 - 12) + (4 + 2x^4 - x^2 + 9x)$

1. Write in standard form.	$-3x^4 \quad -x^3 \quad +2x \quad -12$
2. Align like terms.	$+\ 2x^4 \quad -x^2 \quad +9x \quad +4$
3. Add.	$-x^4 \quad -x^3 \quad -x^2 \quad +11x \quad -8$

$$(-3x^4 + 2x - x^3 - 12) + (4 + 2x^4 - x^2 + 9x) = -x^4 - x^3 - x^2 + 11x - 8$$

Add the polynomials.

1. $(2x^2 - 7x + 5x^4 + 4x^3 - 11) + (6x^3 + x^4 - 3x^2 + 10x)$

_____

2. $(6x^2 - 9 + x^3) + (3x^3 - 4 - x)$

_____

3. $(4a^4 - 9a^2 + 3a^3 - a) + (-5a^3 + 14 - a)$

_____

4. $(y^2 - 5y + 18) + (2y - y^2 - 11)$

_____

Example $(-x + 5x^3 + 2x^4 - 10x) - (4x^2 - 2x - x^4 + 1)$

1. Write in standard form.	$2x^4 \quad +5x^3 \quad -x^2 \quad -10x$
2. Align like terms and add the opposite.	$+\ x^4 \quad -4x^2 \quad +2x \quad -1$
3. Add.	$3x^4 \quad +5x^3 \quad -5x^2 \quad -8x \quad -1$

$$(-x + 5x^3 + 2x^4 - 10x) - (4x^2 - 2x - x^4 + 1) = 3x^4 + 5x^3 - 5x^2 - 8x - 1$$

Subtract the polynomials.

5. $(-4x^3 + 3x^2 - x^4 + 8x) - (9 + 5x^4 - 3x^2 + 10x)$

_____

6. $(x^3 - 7x + 3x^4 - 5) - (3 + 2x^3 - 4x^2 - 2x)$

_____

7. $(c^4 + 7c - c^3 - 12) - (-c^4 + 4c^3 - c^2 + 5)$

_____

8. $(3r^3 + r - 8) - (-2r^2 - 8)$

_____

Name _____ Date _____ Class _____

LESSON 6-1

Adding and Subtracting Polynomials

Practice and Problem Solving: Modified

Identify the degree of each monomial. The first one is done for you.

1. x^2 — **2**
2. 3 — _____
3. a^2b^2 — _____
4. $7x$ — _____
5. $4x^2y$ — _____
6. $2x^5$ — _____

Solve. The first one is started for you.

7. a. Rewrite the polynomial $2x^2 + x^3 + -7x + 1$ in standard form. — **$x^3 + 2x^2 - 7x + 1$**

   b. What is the leading coefficient? — **1**

   c. What is the degree? — _____

   d. How many terms are in this polynomial? — _____

8. a. Rewrite the polynomial $5 - 3x + 4x^2$ in standard form. — _____

   b. What is the leading coefficient? — _____

   c. What is the degree? — _____

   d. How many terms are in this polynomial? — _____

Add or subtract the following polynomials. Write your answer in standard form. The first one is done for you.

9. $(6x + 7) + (3x + 8)$ — **$9x + 15$**
10. $(5x - 3) - (3x + 9)$ — _____
11. $(2x^2 + 3x + 4) - (x^2 + x + 2)$ — _____
12. $(x^2 - 4x + 5) + (-2x^2 + 7x - 10)$ — _____

Solve.

13. Britt has 4 full boxes plus 12 extra CDs, and Jim has 3 full boxes and 5 extra CDs. If the number of CDs in each box is represented by c, write an expression that shows the total number of CDs that Britt and Jim have. _____

Name _____ Date _____ Class _____

LESSON 6-1

Adding and Subtracting Polynomials

Practice and Problem Solving: A/B

Identify the degree of each monomial.

1. $6x^2$ _____

2. $3p^3m^4$ _____

3. $2x^8y^3$ _____

Rewrite each polynomial in standard form. Then identify the leading coefficient, degree, and number of terms.

4. $6 + 7x - 4x^3 + x^2$

_____

5. $x^2 - 3 + 2x^5 + 7x^4 - 12x$

_____

Add or subtract. Write your answer in standard form.

6. $(2x^2 - 2x + 6) + (11x^3 - x^2 - 2 + 5x)$

_____

7. $(x^2 - 8) - (3x^3 - 6x - 4 + 9x^2)$

_____

8. $(5x^4 + x^2) + (7 + 9x^2 - 2x^4 + x^3)$

_____

9. $(12x^2 + x) - (6 - 9x^2 + x^7 - 8x)$

_____

Solve.

10. An accountant finds that the gross income, in thousands of dollars, of a small business can be modeled by the polynomial $-0.3t^2 + 8t + 198$, where t is the number of years after 2010. The yearly expenses of the business, in thousands of dollars, can be modeled by the polynomial $-0.2t^2 + 2t + 131$.

    a. Find a polynomial that predicts the net profit of the business after t years.

    _____

    b. Assuming that the models continue to hold, how much net profit can the business expect to make in the year 2016?

    _____

Name _____ Date _____ Class _____

LESSON 6-1

Adding and Subtracting Polynomials

Reading Strategies: Understand Vocabulary

A **monomial** is a number or a product of a number and a variable, such as $-2x$ or $3x^2$. A monomial cannot have

- variables in denominators or exponents.
- roots of variables.
- absolute value signs.
- exponents that are not whole numbers.

6^x or $\frac{3}{x^2}$, $6\sqrt{x}$, $|x^3|$, $x^{0.3}$ — These are NOT monomials.

A **polynomial** is a monomial or the sum or difference of monomials. Each monomial in a polynomial is called a **term**. Here are some ways to describe polynomials.

	Standard Form	Degree	Number of Terms	Leading Coefficient
Definition	Terms arranged in descending order by degree	The greatest exponent in a polynomial	The number of monomials	The coefficient of the first term in standard form
Example	$5x^3 - 2x^2 + x + 3$	3	4	5

Answer each question.

1. What is the difference between a monomial and a polynomial?

_____

2. Circle the polynomials below. Cross out the expressions that are not polynomials.

$4x^2 - x$ $\quad |2n^2 + 1|$ $\quad 3x\sqrt{17}$ $\quad 6z^2$ $\quad \frac{2}{z^2} + 1$

3. Write the polynomials in standard form. Classify the polynomial based on its degree.

   a. $x - x^5 + 1$ _____ Degree _____

   b. $x^2 + 6 + x^3 - 2x$ _____ Degree _____

Complete the table.

	Polynomial	Degree	Number of Terms	Leading Coefficient
4.	$2y^4 + 3y^3 + y^2 - 7$			
5.	$-6x^5 - x^3 + 2$			

Name _____ Date _____ Class _____

LESSON 6-2

Multiplying Polynomials

Reteach

You can multiply polynomials horizontally or vertically.

Example Find the product by multiplying horizontally. $(x-5)(3x+x^2-7)$

Multiply each term of the first polynomial by each term of the second polynomial, then simplify.

1. Write polynomials in standard form. $(x-5)(x^2+3x-7)$
2. Distribute x and -5. $x(x^2)+x(3x)+x(-7)+(-5)(x^2)+(-5)(3x)+(-5)(-7)$
3. Simplify. $x^3+3x^2-7x-5x^2-15x+35$
4. Combine like terms. $x^3-2x^2-22x+35$

Find the product by multiplying horizontally.

1. $(x+8)(6-2x^2+x)$

2. $(2x-3)(x^2+4-5x)$

_____ _____

Example Find the product by multiplying vertically. $(x-5)(3x+x^2-7)$

1. Write each polynomial in standard form.
2. Multiply -5 and $(3x+x^2-7)$.
3. Multiply x and $(3x+x^2-7)$.
4. Combine like terms.

$$\begin{array}{rrrr} & x^2 & +3x & -7 \\ & & x & -5 \\ \hline & -5x^2 & -15x & +35 \\ x^3 & +3x^2 & -7x & \\ \hline x^3 & -2x^2 & -22x & +35 \end{array}$$

Find the product by multiplying vertically.

3. $(x-3)(5x-8+2x^2)$

4. $(5-3x)(4x^2-1+7x)$

_____ _____

Name _____ Date _____ Class _____

LESSON 6-2

Multiplying Polynomials

Practice and Problem Solving: Modified

Find each product. The first one is done for you.

1. $2x(x^2+4)$

$= 2x \cdot \underline{x^2} + 2x \cdot \underline{4}$

$\underline{2x^3 + 8x}$

2. $3m(2-m^3)$

$= 3m \cdot \_\_\_\_ - 3m \cdot \_\_\_\_$

_____

3. $6p(p+7)$

_____

4. $x(x^2+3x-1)$

_____

5. $2x(2x^2-5x+6)$

_____

6. $(x-3)(x^2+2x-1)$

	x^2	$2x$	-1
x	x^3	$2x^2$	$-x$
-3	D	E	F

a. $D =$ _____ b. $E =$ _____ c. $F =$ _____

d. $D + E + F =$ _____

e. $(x^3 + 2x^2 - x) + (D + E + F) =$ _____

7. $(x-1)(x^2+3x-2)$

$= x(\_\_\_\_) + x(\_\_\_\_) + x(\_\_\_\_) - 1(\_\_\_\_) - 1(\_\_\_\_) - 1(\_\_\_\_)$

_____

8. $(x+3)^3$

$= (x+3)(\_\_\_\_)(\_\_\_\_)$

$= (x+3)(\_\_\_\_)$

_____

9. $(x-5)^3$

$= (x-5)(\_\_\_\_)(\_\_\_\_)$

$= (x-5)(\_\_\_\_)$

_____

Solve.

10. Kevin lives on a city block that has a perimeter of $w - 2$ miles. Each day he runs around the block 3 times and then runs to the high school, which is an additional 2 miles. How many miles does Kevin run in d days?

_____

Name _____ Date _____ Class _____

LESSON 6-2

Multiplying Polynomials

Practice and Problem Solving: A/B

Find each product.

1. $4x^2(3x^2+1)$

2. $-9x(x^2+2x+4)$

3. $-6x^2(x^3+7x^2-4x+3)$

4. $x^3(-4x^3+10x^2-7x+2)$

5. $-5m^3(7n^4-2mn^3+6)$

6. $(x+2)(y^2+2y-12)$

7. $(p+q)(4p^2-p-8q^2-q)$

8. $(2x^2+xy-y)(y^2+3x)$

Expand each expression.

9. $(3x-1)^3$

10. $(x-4)^4$

11. $3(a-4b)^2$

12. $5(x^2-2y)^3$

Solve.

13. A biologist has found that the number of branches on a certain rare tree in its first few years of life can be modeled by the polynomial $b(y)=4y^2+y$. The number of leaves on each branch can be modeled by the polynomial $l(y)=2y^3+3y^2+y$, where y is the number of years after the tree reaches a height of 6 feet. Write a polynomial describing the total number of leaves on the tree.

Name _____ Date _____ Class _____

LESSON 6-2

Multiplying Polynomials

Reading Strategies: Use a Graphic Organizer

You can multiply a polynomial by a monomial. Use the Distributive Property to multiply each term of the polynomial by the monomial.

Definition	**Facts**
Distributive Property: $a(b+c+d)=ab+ac+ad$	The product of a polynomial and a monomial is a polynomial. Use Properties of Exponents to multiply monomials.
Example $4x(x^2+2x-3)$ $=4x(x^2)+4x(2x)+4x(-3)$ $=4x^3+8x^2-12x$	**Useful Hints** Make sure that the polynomial is in standard form before multiplying. Combine like terms before multiplying.

Use the information in the table to answer each question.

A	B
$5x^2-2x^2$	$x+2x^2-3$

1. Expression A has two terms. Can you simplify it so it is a monomial? If yes, write A as a monomial. _____

2. Is B in standard form? If not, write it in standard form. _____

3. a. Multiply A × B. Write your answer in standard form.

   _____

   b. How many terms does the product have? _____

   c. What is the degree of the product? _____

4. Describe how you find the exponent when you multiply $x^m(x^n)$.

   _____

Name _____ Date _____ Class _____

LESSON 6-4

Factoring Polynomials

Reteach

Factoring a sum of two cubes: $a^3 + b^3 = (a+b)(a^2 - ab + b^2)$

Example Factor $125a^3 + 8$.

	$125x^3 + 8$
Recognize the sum of two cubes.	$(5x)^3 + (2)^3$
Factor using factoring pattern.	$(5x + 2)((5x)^2 - (5x)(2) + (2)^2)$
Simplify.	$(5x + 2)(25x^2 - 10x + 4)$

Factor.

1. $27x^3 + 1$
2. $m^3 + \frac{1}{8}$
3. $p^3 + 216$

Factoring a difference of two cubes: $a^3 - b^3 = (a-b)(a^2 + ab + b^2)$

Example Factor $27a^3 - 64$.

	$27a^3 - 64$
Recognize the difference of two cubes.	$(3a)^3 - (4)^3$
Factor using factoring pattern.	$(3a - 4)((3a)^2 + (3a)(4) + (4)^2)$
Simplify.	$(3a - 4)(9a^2 + 12a + 16)$

Factor.

4. $8x^3 - 1$
5. $b^3 - 1000$
6. $125t^3 - 343$

Name _____ Date _____ Class _____

LESSON 6-4

Factoring Polynomials

Practice and Problem Solving: Modified

Find the greatest common monomial factor for each pair of monomials. The first one is done for you.

1. $15y^3$ and $21y^2$

   $3y^2$

2. $6p^4$ and $8p$

3. $12x^6$ and $36y^2$

4. $7xy^2$ and $35xy^3$

Factor each polynomial. Check your answer. The first one is done for you.

5. $x^2 + 7x$

   $x(\underline{x} + \underline{7})$

6. $2m^3 + 18$

   $\_\_(\_\_ + 9)$

7. $6y^3 + 8y^5 - 20$

   $\_\_(3y^3 + 4\_\_ - \_\_)$

8. $8y^2 + 36y^3$

9. $-14t^5 + 7t$

10. $10x^4 + 25x^3 + 5x^2$

Factor out the common binomial factor in each expression. The first one is done for you.

11. $5x(x + 3) + 8(x + 3)$

    $(x + 3)(5x + 8)$

12. $15(x - 2) + 3x(x - 2)$

Factor each polynomial by grouping. The first one is done for you.

13. $7a^3 + 21a^2 - 3a - 9$

    $(7a^2 - 3)(a + 3)$

14. $20r^3 + 28r^2 + 15r + 21$

Factor each perfect square binomial.

15. $9n^2 + 30n + 25$

16. $4a^4 - 20a^2 + 25$

Factor each sum or difference of cubes.

17. $m^3 + 64$

18. $125x^3 - 1$

Grade 11

H/SS

Fritz Haber's experiments in life and death

By Smithsonian.com, adapted by Newsela staff on 08.04.19
Word Count **1,309**
Level **1160L**

Image 1. Belgian troops wearing early gas masks in 1915. Photo from the book, "The Great War: The Standard History of the All Europe Conflict" edited by H. W. Wilson and J. A. Hammerton (Amalgamated Press, London 1915).

In April 1915, Europe was in the midst of World War I. Allied forces – including French, British, Belgian and Canadian soldiers – were battling the Germany army for control of Ypres, a town in Belgium. Months before, fighting with many young soldiers, the Germans had taken heavy casualties there in a battle they called the Massacre of the Innocents of Ypres.

This time, they were determined to launch their first major attack on the Western Front. With thousands of Allied forces dug in around the town, the Germans turned to scientist Fritz Haber.

In 1918, Haber would be awarded the Nobel Prize in chemistry for his work in developing a method of synthesizing ammonia from nitrogen in the air. The process enabled the production of fertilizer in quantities that would revolutionize agriculture worldwide. However, in the winter of 1915, Haber's thoughts turned to destroying the Allies. For his efforts directing a team of scientists on the front lines in World War I, he would become known as the father of chemical warfare.

Haber's Nitrogen Gas Discovery

Haber was born in 1868 in Breslau in Prussia, which is now in Poland. He studied chemistry at the University of Heidelberg under the famed German chemist Robert Bunsen. Haber was ultimately appointed a professor of chemistry at the Karlsruhe Institute of Technology. When scientists warned that the world would not be able to produce enough food to feed its growing human population in the 20th century, he listened.

Scientists knew nitrogen was crucial to plant life. They also knew the Earth's supply of usable quantities was quite limited. Haber discovered a way to convert the nitrogen gas in the Earth's atmosphere into a compound that could be used in fertilizer.

The Haber–Bosch process of synthesizing and manufacturing ammonia from nitrogen and hydrogen (and later industrialized by Carl Bosch, Haber's brother-in-law) was likely the most important technological innovation of the 20th century. It supports the food base for the equivalent of half of the world's population today.

Poison Gas Called "Unchivalrous" And "Repulsive"

In 1901, Haber married the brilliant chemist Clara Immerwahr, the first woman to receive a doctorate degree from Breslau University. Years before, she had spurned a marriage proposal from him to focus on her studies and career. Like Haber, she converted from Judaism to Christianity, and the couple settled in Karlsruhe. However, it wasn't long before Clara Haber's research took a back seat to the demands of being a homemaker and, after the birth of their son in 1902, a mother.

Around the start of World War I, the German army requested Haber's help in the development of chemical weapons. Haber, unlike his friend Albert Einstein, willingly became a consultant to the German War Office.

During World War I, he began drawing on experiments he had done on using chlorine gasses as a weapon. Finding an effective delivery system was challenging – one test resulted in the deaths of several German troops. By 1915, however, defeats on the front lines hardened Haber's resolve to use gas weapons. Doing so, however, would be a violation of the Hague Convention agreements, which prohibited chemical agents in battle.

Haber had a difficult time finding any German army commanders who would agree even to a test in the field. One general called the use of poison gas "unchivalrous." Another declared that poisoning the enemy "just as one poisons rats" was "repulsive." If it meant victory, though, that general was willing to "do what must be done."

Launching The Yellow Death Cloud

Clara Haber, however, condemned her husband's weapons work as a "perversion of the ideals of science" and "a sign of barbarity, corrupting the very discipline which ought to bring new insights into life." Publicly, she pleaded with him to end his experiments in chemical warfare. Privately, Haber said her statements amounted to treason.

In 1914, Haber placed his laboratory at the service of the German government. By April of 1915, he was on the front lines in Ypres, calculating the timing of what he hoped would be a deadly gas attack. Thousands of steel cylinders containing chlorine gas had been transported to German positions. There would be no launching or dropping of the gas on Allied troops. Instead, Haber calculated, the best delivery system was the prevailing winds in Belgium.

After weeks of waiting for ideal winds, the Germans released more than 168 tons of chlorine gas from nearly 6,000 canisters at sunrise on April 22. A sickly cloud, one witness said, "like a yellow low wall," began to drift toward the French trenches.

The cloud settled over some 10,000 troops, and more than half were believed to have died within minutes.

As thousands of French troops fled, blinded and stunned, the Germans opened fire. Then, after the cloud had disappeared, they captured 2,000 prisoners of war, confiscating rifles and urging the afflicted French to lie down "to die better."

The Habers' Tragedy

The Second Battle of Ypres saw casualties of nearly 70,000 Allied troops. Only half as many Germans were killed, owing largely to what is considered to have been the first large-scale use of chemical weapons. Fritz Haber was soon after given the rank of captain, and on May 2, 1915, he returned to his home in Berlin to attend a party in his honor. The next day, he was to travel to the Eastern Front to initiate another gas attack, this time against the Russians.

Hours after the party for her husband, Clara Haber wandered into the garden with Haber's army pistol. She pointed the gun at her heart and pulled the trigger, taking her life. His wife's suicide did not delay Haber's deployment to the Eastern Front.

The unpredictability of the wind's effect on chlorine gas released from cylinders led the Germans to eventually develop gas-filled shells that could be fired over distances. By the end of the war, the Germans were using mustard gas on Allied troops. However, improvements in gas masks and filters for various chemicals enabled the Allies to adapt.

Nazi Government Turns The Tables On Fritz Haber

Despite his Nobel Prize, Haber's postwar life was hardly filled with honors. He was discouraged by the German defeat, and felt responsible for the debilitating German war debt. As Hitler rose to power, Nazis attacked both him and his institute for harboring Jewish scientists. The Christian convert became "Haber the Jew" in the eyes of the Nazi government. Rather than fire his staff as requested, Haber resigned and fled Germany for England. Scientists there, however, shunned him for his work with chemical weapons.

He traveled Europe, fruitlessly searching for a place to call home, then suffered heart failure in a hotel in Switzerland in 1934. He passed away shortly thereafter at the age of 65, but not before repenting for devoting his mind and his talents to waging war with poison gasses.

Haber was praised for his work that still enables agriculture around the world, but also condemned for his work on chemical weapons. In this way, the scientist personified the extremes of technological innovation in the 20th century.

It was, however, a kind twist of fate that Haber never lived to see Zyklon B, a poisonous gas developed in the 1920s at the laboratory that he ran. The poison was used on some of his own relatives after they were sent off to Nazi concentration camps.

Quiz

1 Which of these statements would be MOST important to include in an objective summary of the article?

(A) Haber should have listened to the army generals who said his work was repulsive.

(B) Haber received the rank of captain and a pardon for his despicable actions at Ypres.

(C) Haber was rightly shunned by scientists in England for his work with poison gas.

(D) Haber repented his role in creating deadly poison gasses before his death.

2 Read the following selection from the section "Nazi Government Turns The Tables On Fritz Haber."

> *It was, however, a kind twist of fate that Haber never lived to see Zyklon B, a poisonous gas developed in the 1920s at the laboratory that he ran. The poison was used on some of his own relatives after they were sent off to Nazi concentration camps.*

Which CENTRAL idea of the article is MOST supported by the selection above?

(A) Many Germans objected to Haber's development of chemical weapons.

(B) Haber's work on chemical weapons had consequences he did not foresee.

(C) The outcome of World War I was not what Haber expected it to be.

(D) Haber was a gifted scientist whose work was praised and condemned.

3 Which option BEST explains how Clara Haber's opinions interacted with Fritz Haber's development of chemical weapons?

(A) Clara's opinions led her to give up science in favor of being a wife and mother, which convinced Haber that she no longer understood his work.

(B) Clara's opinions led her to give up Judaism in favor of Christianity, but her conversion did not convince Haber to stop working for Germany.

(C) Clara's opinions led her to publicly denounce his work and stop her own experiments, which caused Haber to publicly condemn her for treason.

(D) Clara's opinions led her to publicly denounce his work and later commit suicide, but neither caused Haber to stop his use of chemical weapons.

4 How does the author distinguish between Haber's work on fertilizer and his work on chemical weapons?

(A) The author contrasts the honor given to Haber for helping agriculture feed the world with the condemnation he received for creating mass death.

(B) The author categorizes the chemicals that were used by Haber to create agricultural tools separately from those used to create destruction.

(C) The author chronologically describes the decline of Haber's honors in the scientific community after he worked on chemical weapons in 1915.

(D) The author creates an analogy between Haber's scientific work during World War I and the actions of German Nazis during World War II.

Fill out flow map of the following events for: **"Fritz Haber's experiments in life and death"**

Haber's Nitrogen Gas Discover

Poison Gas Called "Unchivalrous And Repulsive"

Grade 11

SCIENCE

BIOMEDICAL SCIENCE JOURNAL FOR TEENS

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How can we use genetic engineering to get rid of malaria for good?

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Abstract

Nobody likes the buzzing sound or itchy bite of mosquitoes. But mosquito bites (only females bite, by the way!) are not just irritating: they can carry and spread deadly diseases such as *malaria*, dengue, yellow fever and many more. Every year, millions of people die from *mosquito-borne* diseases and most of them are young children. There are ways to get rid of mosquitoes and prevent such diseases, but they are not as effective as we would like.

What if we used *genetic engineering*? Here we modified the genetic makeup of *Anopheles gambiae* mosquitoes (the main carriers of malaria). The *mutation* prevented females from biting and laying eggs. It spread through our caged populations quickly and drove them extinct. Our results pave the way for lowering mosquito populations in the wild and getting rid of malaria in the future.

Introduction

You may have heard about malaria and the devastation it causes in Africa. But did you know that a child dies of malaria every two minutes? Despite global efforts, malaria remains one of the world's deadliest diseases. More than 400,000 people die of it every year, most of them children. Why can't we stop it?

Anopheles gambiae mosquitoes are the main *vectors* of malaria. This means they transmit malaria-causing parasites from one infected human to another. Available methods to control mosquito populations such as spraying *insecticides* or using sleeping nets have helped to prevent malaria, but they are not enough on their own. We believe genetic engineering could be the solution.

In this study, we used a gene-editing tool known as CRISPR/Cas9 (Fig. 1). We developed a way of genetically modifying *Anopheles* mosquitoes to disrupt their sexual development and force the whole population to collapse.

So how did our gene editing work and what could it mean for the future of mosquito control?

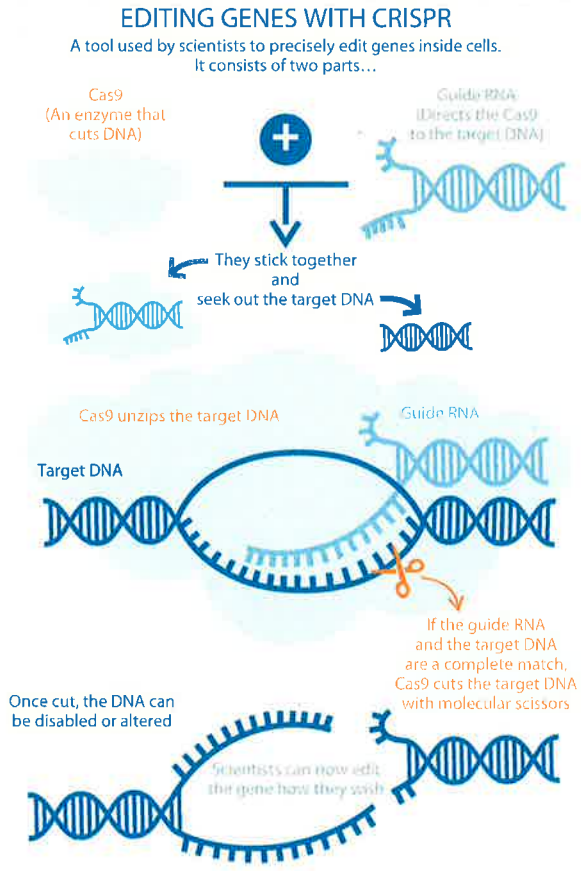


Figure 1:
How CRISPR/Cas9 works. (Adapted from Cancer Research UK.)

Methods

The *doublesex (dsx)* gene determines the sex of each mosquito. The gene is the same in both sexes, but female *dsx* has an extra region of *DNA* called exon5. This female-specific region is responsible for the fertility and body structures of females that allow them to bite and suck blood. Using CRISPR/Cas9 we modified exon5 in mosquitoes. The females changed and the males were unaffected (but still carriers of the altered gene).

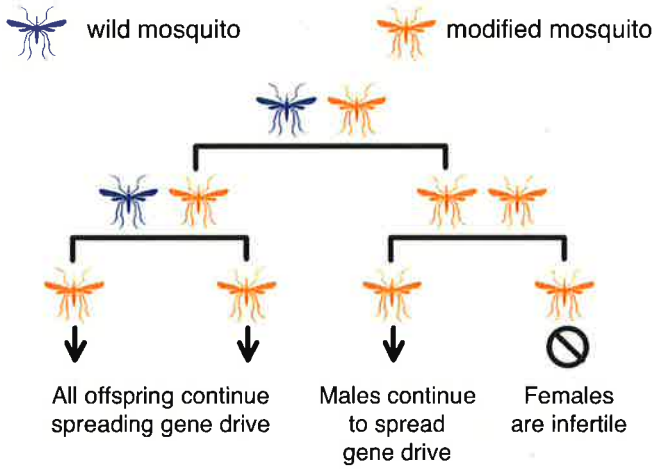
Then, we developed a *gene drive* for the modified exon5 region in the *dsx* gene. Mosquitoes, like humans, carry two copies of each gene in their cells. In sexual reproduction, individuals receive one copy of the gene from the father, and the other from the mother. A gene drive is a genetic technology that enables the mutated gene to copy itself and then replace the unmutated gene that comes from the unmodified parent. This ensures that all of the offspring will carry the mutated gene (see Fig. 2). Therefore, the new mutation will spread through a population at a much higher rate than normal.

Our mathematical model showed that in an initial population with 25% *heterozygous* individuals (those with a single copy of the mutated gene), the mutation would spread to the whole population in 9-13 generations. To test this, we created two caged populations of 600 mosquitoes each. In each group there was:

300 wild-type female + 150 wild-type male + 150 males carrying one copy of the mutation

In each generation, we counted the hatched larvae and genetically screened them for the presence of the modified gene.

Figure 2:
When a modified mosquito mates with an unmodified mosquito in the wild, their offspring are fertile, contributing to the spread of the gene drive. When two modified mosquitoes mate with each other, the female offspring becomes infertile. As the gene drive increases in frequency, the infertile females become more common and eventually the population size reduces.



Results

- Male mosquitoes were unaffected. They continued to breed and spread the modified gene until there were no more eggs.
- Females with one copy of the mutation behaved normally. They had lower fertility but passed the mutation to their offspring.
- Females born with two copies of the mutation had characteristics of both males and females. They had male-type mouthparts (so they couldn't bite or transmit the disease), they were infertile and they couldn't lay eggs. When the mutation spread to enough female mosquitoes, the population couldn't produce offspring and it crashed (Fig. 3).
- In Cage 2, all of the mosquitoes in the 7th generation were mutated. 8th generation females couldn't lay eggs and the population collapsed. Cage 1 reached 100% mutation at the 11th generation, and the collapse happened at the 12th generation. The mutation spread at different rates but both were within the predicted range of our mathematical model. It took about 6 months for both populations to crash.

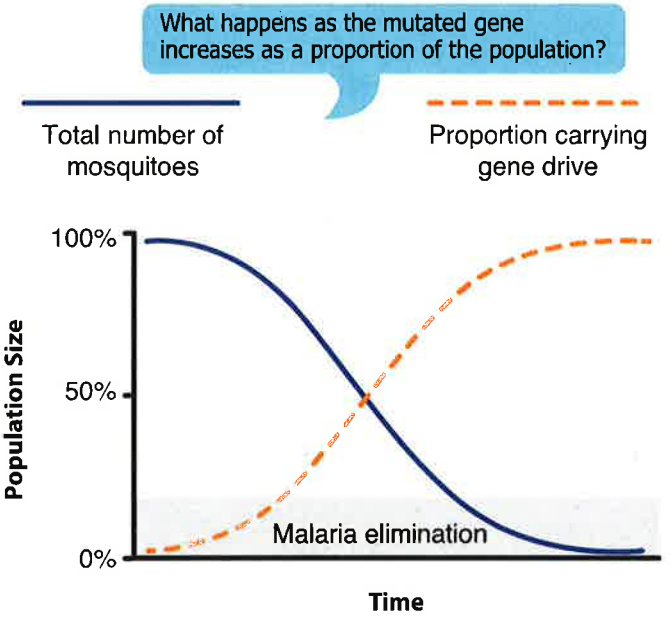


Figure 3:
Effect on mosquito population as the mutated gene spreads. This would lead to the elimination of malaria in the wild.

Discussion

The CRISPR/Cas9 gene drive generated a mutant gene leaving female mosquitoes unable to reproduce. It also allowed the males to continue spreading this female infertility mutation to offspring. If used in the wild, our method could quickly reduce local *Anopheles* populations. Releasing 200 drive-carrying mosquitoes in each village would eliminate malaria across significant areas of Africa in a couple of decades.

But introducing a gene drive into the wild would require agreement at local, national, and international levels. Once released, we cannot keep it in a single country or disable it easily. Some people are worried about the ecological consequences of gene drives. Luckily, every insect species has its own version of the *doublesex* gene so a *dsx* gene drive in *Anopheles gambiae* mosquitoes cannot jump to other insects such as bees. For that same reason, eliminating other mosquito-borne diseases would require different *dsx* gene drives targeting each species of mosquito that carries them.

Conclusion

Gene drives give us a powerful tool in our long and frustrating fight with malaria and other mosquito-borne diseases. But we still need some time for small-scale *field trials* and public approval. In the meantitme, you can do many things to limit mosquito populations and protect yourself:

- Get rid of sources of standing water, like buckets. These are breeding grounds for mosquitoes.
- Protect yourself from mosquito bites when traveling to a high-risk country by wearing long-sleeved shirts and pants, using insect repellents and sleeping under a net.
- Educate yourself and others about the potentials of genetic engineering and genetically modified organisms. Understanding how the technology works and who it affects can build trust in this new technology.

Glossary of Key Terms

Anopheles gambiae – mosquito species that serves as the main vector (carrier) for malaria.

CRISPR/Cas9 – a genetic engineering method used to change the genetic makeup of living organisms. The proteins and RNA molecules used in CRISPR cut and edit targeted sections of a gene very precisely.

DNA (short for DeoxyriboNucleic Acid) – a molecule that carries the genetic instructions used in the growth, development, functioning, and reproduction of all known living organisms, including humans.

Doublesex gene (dsx) – a gene that controls the sexual development of insects.

Field trials – Experiments designed for and conducted outside of the laboratory in a 'real world' setting that is relevant to the question being explored.

Gene – A small section of DNA with the instructions for characteristics of the organism.

Genetic Engineering – the direct manipulation of an organism's genes using technology.

Gene drive – a genetic engineering method that increases the chances of passing down a mutated gene during sexual reproduction. A gene drive gene (mutated gene) copies itself to its counterpart that comes from the normal (unmutated) parent.

Heterozygote – an individual that has two different versions of a particular gene or genes.

Insecticide – a substance (usually chemicals) used to kill insects.

Malaria – a blood disease caused by a *Plasmodium* parasite, transmitted by the bite of infected mosquitoes. The severity of malaria varies based on the species of *Plasmodium*. Symptoms include chills, fever, and sweating, usually occurring a few weeks after being bitten. Treatment includes antimalarial drugs.

Mosquito-borne diseases – diseases that are transmitted by infected mosquitoes. Some examples are malaria, dengue, yellow fever, Zika, and West Nile virus. Different species of mosquitoes transmit different diseases.

Mutation – a change that occurs in a DNA sequence and genes. These changes may result in changes to physical traits.

Vector – an organism that carries and transmits disease-causing pathogens.

Check your understanding

1. *Anopheles gambiae* mosquitoes are a vector species for malaria. What is a vector species? Can you find out about some other vector species and the diseases they transmit?

2. Scientists genetically engineered *Anopheles gambiae* mosquitoes. What were the characteristics of engineered mosquitoes that drove the lab populations to extinction?

3. Scientists used a new approach that made this study so successful at wiping out mosquito populations: CRISPR/Cas9 gene drive. What is the purpose of a gene drive? How does it speed up the spread of a useful genetic mutation?

4. **Writing connection:** This study gives us a very powerful tool in our fight against malaria and other mosquito-borne diseases. But we need public support and approval to use it. Write a letter to a skeptical audience and persuade them to support the genetic engineering method used in this study.

   Consider: Who is your target audience? What are their concerns? How would you address these concerns using scientific evidence?

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Grade 11

Learning Packet Answer Key

Part 1: Grammar Practice Answers

Chapter 13 Nouns (1)

Practice A Identifying Nouns

1. The present is on the table.
2. Please take Sally to the dentist.
3. My brother slept through the movie.
4. Call the office after the package arrives.
5. The weather in Chicago is cold in January.
6. The firefighter received a medal for her bravery.
7. Her family moved to the United States from China.
8. Gymnastics requires balance and strength.
9. Our choir visited the White House in Washington, D.C.
10. The friendship between Rich and Tom has lasted for years.

Practice B Labeling Nouns

1. friendship—common, abstract
2. Aunt Mary—proper, concrete; family—common, concrete
3. potatoes—common, concrete
4. uncle—common, concrete; Florida—proper, concrete
5. puppy—common, concrete; attention—common, abstract
6. telephone—common, concrete; Grandpa—proper, concrete
7. hope—common, abstract; freedom—common, abstract
8. *Tom Sawyer*—proper, concrete; Mark Twain—proper, concrete
9. frustration—common, abstract; time—common, abstract
10. bridge—common, concrete; Brooklyn Bridge—proper, concrete

Chapter 13 Pronouns (2)

Practice A Identifying Antecedents

1. Mary
2. Jamal
3. students
4. Rachel
5. Andrew
6. Roderick
7. Jessie
8. Dennis
9. Kate
10. Cameron

Practice B Identifying Reciprocal Pronouns

1. each other
2. one another
3. each other
4. one another
5. one another

Chapter 13 Action Verbs and Linking Verbs (3)

Practice A Identifying Action Verbs

1. plays
2. works
3. drank
4. helps
5. cooks
6. swam

Practice B Identifying Linking Verbs

1. is
2. sounds
3. became

4. felt
5. appeared

Practice C Distinguishing Between Action Verbs and Linking Verbs

1. became—linking verb
2. played—action verb
3. was—linking verb
4. is—linking verb
5. argued—action verb

Chapter 13 Transitive and Intransitive Verbs (4)

Practice A Identifying Transitive Verbs and Their Objects

Students will underline the first term and circle the second.

1. sold—hot chocolate
2. wore—glasses
3. ate—all
4. scratched—hand
5. pictured—success
6. took—garbage
7. forgot—backpack
8. asked—questions
9. ate—leftovers
10. washed—hands

Practice B Distinguishing Between Transitive and Intransitive Verbs

1. walked—intransitive
2. did—transitive
3. played—transitive
4. grew—intransitive
5. holds—transitive
6. sprained—transitive
7. runs—intransitive
8. wants—transitive
9. forgot—transitive
10. washed—transitive

Chapter 13 Verb Phrases (5)

Practice A Recognizing Verb Phrases

1. should have finished
2. is leaving
3. is painting
4. was expecting
5. does use
6. have seen
7. will be working
8. has been posting
9. is raising
10. is planning

Practice B Identifying Helping Verbs and Main Verbs

Students will underline the first term and circle the second.

1. are—adopting
2. should be—making
3. are—climbing
4. do—want
5. might—go
6. might—learn
7. have—seen
8. will—play
9. was—praising
10. am—getting

Chapter 13 Adjectives (6)

Practice A Identifying Adjectives

1. that
2. classical
3. putt-putt
4. some, long
5. red
6. the broken, the
7. complicated
8. the old, slow
9. modern
10. my favorite

Practice B Identifying Nouns Used as Adjectives

1. dinner
2. winter
3. band
4. basketball
5. smoothie
6. office
7. earthquake
8. fruit
9. airplane
10. adventure

Chapter 13 Adverbs (7)

Practice A Recognizing Adverbs

1. loudly
2. anywhere
3. abroad
4. underground
5. accidentally
6. always
7. finally
8. soon
9. tomorrow
10. cheerfully

Practice B Identifying Adverbs and the Words They Modify

1. utterly—wonderful
2. seldom—rings
3. upwardly—mobile
4. sometimes—appreciate
5. usually—arrives
6. often—practices
7. swiftly—dropped
8. thoughtfully—practices
9. soon—will move
10. mortally—was wounded

Chapter 13 Prepositions and Prepositional Phrases (8)

Practice A Identifying Prepositions and Prepositional Phrases

1. on the table
2. of Tricia's
3. in the morning
4. between the two brothers
5. in the sink
6. in San Diego
7. under the bed
8. into the night
9. without your hat
10. on the beach

Practice B Identifying Prepositions and Their Objects

Students will underline the first term and circle the second.

1. at—sunset
2. because—problem
3. in—park
4. near—ocean
5. toward—shore
6. for—years
7. of—musician
8. to—work
9. with—music
10. for—transportation

Chapter 13 Conjunctions (9)

Practice A Identifying Conjunctions

1. but
2. either…or
3. and
4. or
5. after

6. when
7. but
8. either…or
9. not only…but also
10. while

Practice B Identifying Kinds of Conjunctions

1. yet—coordinating
2. but—coordinating
3. while—subordinating
4. but—coordinating
5. either…or—correlative
6. and—coordinating
7. whether…or—correlative
8. or—coordinating
9. while—subordinating
10. but—coordinating

Chapter 13 Interjections (10)

Practice A Identifying Interjections

1. Oh!
2. Goodness!
3. Pssst
4. Tsk-tsk
5. Ouch!
6. Hurray!
7. Alas
8. Whew!
9. Congratulations!
10. Whoa!

Practice B Supplying Interjections

Answers may vary. Sample answers are given.

1. Shhhh!
2. Ugh!
3. EEEK!
4. Yuck!
5. Pow!
6. Oh, well.
7. Congratulations!
8. Alas!
9. Whoops!
10. Howdy!

Chapter 13 Identifying Parts of Speech (11)

Practice A Identifying Parts of Speech: Nouns, Pronouns, Verbs, Adjectives, and Adverbs

1. pronoun
2. verb
3. noun
4. adjective
5. adverb

Practice B Identifying Parts of Speech: Prepositions, Conjunctions, and Interjections

1. preposition
2. interjection
3. preposition
4. conjunction
5. conjunction

3. compliant; I was *compliant* with all their demands.
4. Chaplinesque; He had a *Chaplinesque* gift for using body language.

B Sample answers:
1. N; to demolish something means to knock it down. After *demolishing* the old building, they hauled away the rubble.
2. N; someone who is acquitted is found innocent of a crime. At the trial, the prisoner was *acquitted* and released.
3. Y; to acknowledge means to recognize something.
4. Y; to decelerate means to slow down.

Grammar: Regular Verbs

Practice, p. 64

A 1. (completed for student)
2. stop, stopping, stopped, stopped
3. play, playing, played, played
4. hire, hiring, hired, hired
5. confuse, confusing, confused, confused

B. 1. present; 2. past participle
3. present participle; 4. past participle; 5. past

Assess, p. 65

A 1. contain, containing, contained, contained
2. clap, clapping, clapped, clapped
3. whistle, whistling, whistled, whistled
4. fold, folding, folded, folded
5. practice, practicing, practiced, practiced
6. wiggle, wiggling, wiggled, wiggled

B 1. present; 2. present participle
3. past participle; 4. past; 5. present participle
6. past participle

C Sample answers:
1. The team exercises before practice.
2. My brother can't stop biting his nails.
3. I tripped on the stairs.
4. The animal shelter has rescued many dogs and cats.

Grammar: Irregular Verbs

Practice, p. 66

A 1. running, ran
2. brought, bringing
3. sent, sent
4. cost, costs
5. rise, risen

B 1. knew; 2. hurt; 3. left

Assess, p. 67

A 1. drawn; 2. worn; 3. swam; 4. sunk; 5. frozen
6. taken; 7. rode; 8. taken; 9. fell; 10. drunk

B 1. gave; 2. stung; 3. left; 4. frozen; 5. taught
6. lent; 7. eaten; 8. broke

Grammar: Verb Tenses

Practice, p. 68

A 1. remembered; 2. learned; 3. will live
4. cooked; 5. uses

B 1. expected; 2. are; 3. was
4. arrive; 5. got

Assess, p. 69

A 1. A; 2. D; 3. C; 4. B; 5. D; 6. A

B 1. works; 2. had gone; 3. propped
4. will fail; 5. plans

Writing: Alternative Ending

Practice, p. 70

1. A.; 2. D.

Assess, p. 71

Sample answer:

"Are they your men?" asked Georg. "Are they your men?" he repeated impatiently as Ulrich did not answer.

"Yes," replied Ulrich. "We'll be freed soon." After being rescued, the two men kept their promise. While they did not become friends, they returned to their normal lives. A few years later, Ulrich's son and Georg's daughter married. Their family feud was finally and fully over.

Writing: News Story

Practice, p. 72

A *Who?* the Carpenter family
What? saved from tragedy by their family dog
When? early Tuesday
Where? their family home
Why? Tommy was protective of the family.
How? Tommy woke them when the fire started.

B The first sentence makes the reader want to know what the tragedy was and how the dog saved them.

Assess, p. 73

Sample Answers:

A *Who?* a new student, Jan Golchecki
What? moved to our town from Germany
When? the beginning of the school year
Where? here at Roper High
Why? Her father was stationed in Germany and transferred here.
How? flew from Germany on a military transport

B What is it like coming back to America after living in Germany for three years? Our newest student, Jan Golchecki, can tell you. She just moved to Middleton from Munich, Germany, two days before school started here at Roper High. Her father, a colonel in the army, was stationed in Germany and was just transferred back here. Jan, her family, and all their belongings were flown on a military transport plane to the base here. So when you see Jan in the halls, be sure to tell her, "Welcome home!"

Writing: Short Story

Practice, p. 74

A **Sample answers:**

1. first person point of view
2. A. She is shy; she is 14 years old; she has long blond hair.
   B. She is shy and feels uncomfortable around the other students.
3. a dense forest of huge ferns; thick fog on the ground; a large, frightening animal

B **Sample answers:**

Maria grabbed my hand. "What was that?" she said, her voice trembling.

"I don't know, but it sounds big," I answered. "Maybe we should stay really quiet until it passes."

"Is that the best you can think of," she said, her voice rising. "You're the one who got us into this mess. How do you plan to get us out?"

Assess, p. 75

Students should demonstrate an understanding of the characteristics of a short story. Students should provide concrete sensory details that add vividness to the people, place, and events of the story.

Literary Analysis: Character and Characterization

Practice, p. 76

A 1. Direct; 2. Indirect; 3. Indirect

B **Sample answers:**

1. "Roberto has arrived," said Roberto loudly.; He handed his jacket to Rodney, the friend who followed him everywhere.; a top-brand sports shirt; He flexed his arm muscles so that others could admire them.; The other players looked at each other nervously.; Roberto is full of himself and likes to be the center of attention. He seems to be in shape and a good ball player.
2. Paula called the museum to find out what the hours were.; Then, she dug around in Susan's kitchen until she found the bus schedule.; She got Susan and Janet out the door; Paula is a leader, the kind of person who takes charge and gets things done. She likes to be active.

Assess, p. 77

A 1. Direct; 2. Indirect; 3. Indirect
4. Direct; 5. Indirect

B **Sample answers:**

She suspected that, as usual, Jack had gotten distracted and had forgotten all about it.; "Sure," said Jack, "A tiger escaped from the zoo, and the police are out warning people."; "Jack," said his sister, "you aren't telling me one of your stories, by any chance?"; Jack is a dreamer, easily distracted. He tells tall tales and invents excuses for himself.

Literary Analysis: Dialogue

Practice, p. 78

"I'm glad summer is coming."; "I need a break."; "You told me last time I came home that you had a lot of homework."; "What else happened?"; "I joined the basketball team." "Whoah, little brother. You have to make sure you pace yourself."; "I know."; "It's probably even harder in college, right?"

1. Todd: It is almost summer. Todd is glad.
2. Todd: Todd needs a break.
3. Joe: Todd has a lot of homework. Joe is living away from home.
4. Joe: Joe does not talk to Todd every day.
5. Todd: Todd has joined the basketball team recently.
6. Joe: Joe is Todd's older brother.
7. Todd: Todd knows he has to pace himself.
8. Todd: Joe is in college.

Assess, p. 79

A 1. "You are doing a great job!"
2. "Your painting is beautiful."
3. "Let's go back."
4. "Okay, I'll get the car."
5. "Craig is always in a bad mood."

B **Sample answers:**

"What was that noise?" "Shhh." "That was just your nerves. Do you want to wake up the guard?" "Okay, Elaine, but I want you to know that I wouldn't be prowling around this museum basement if you were not my friend." "I know, Anna," "and believe me, I appreciate your help." "All right, ladies," "and just what is it that brings you to the museum basement in the middle of the night, might I ask?"

1. Anna: Anna hears a noise.
2. Elaine: Elaine thinks it's Anna's nerves and that she should be quiet or they will wake up a guard.

Practice B Identifying Nouns Used as Adjectives

1. dinner
2. winter
3. band
4. basketball
5. smoothie
6. office
7. earthquake
8. fruit
9. airplane
10. adventure

Chapter 13 Adverbs (7)

Practice A Recognizing Adverbs

1. loudly
2. anywhere
3. abroad
4. underground
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6. always
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8. soon
9. tomorrow
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Practice B Identifying Adverbs and the Words They Modify

1. utterly—wonderful
2. seldom—rings
3. upwardly—mobile
4. sometimes—appreciate
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6. often—practices
7. swiftly—dropped
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9. soon—will move
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Chapter 13 Prepositions and Prepositional Phrases (8)

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1. on the table
2. of Tricia's
3. in the morning
4. between the two brothers
5. in the sink
6. in San Diego
7. under the bed
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Practice B Identifying Prepositions and Their Objects

Students will underline the first term and circle the second.

1. at—sunset
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5. toward—shore
6. for—years
7. of—musician
8. to—work
9. with—music
10. for—transportation

Chapter 13 Conjunctions (9)

Practice A Identifying Conjunctions

1. but
2. either…or
3. and
4. or
5. after

6. when
7. but
8. either…or
9. not only…but also
10. while

Practice B Identifying Kinds of Conjunctions

1. yet—coordinating
2. but—coordinating
3. while—subordinating
4. but—coordinating
5. either…or—correlative
6. and—coordinating
7. whether…or—correlative
8. or—coordinating
9. while—subordinating
10. but—coordinating

Chapter 13 Interjections (10)

Practice A Identifying Interjections

1. Oh!
2. Goodness!
3. Pssst
4. Tsk-tsk
5. Ouch!
6. Hurray!
7. Alas
8. Whew!
9. Congratulations!
10. Whoa!

Practice B Supplying Interjections

Answers may vary. Sample answers are given.

1. Shhhh!
2. Ugh!
3. EEEK!
4. Yuck!
5. Pow!
6. Oh, well.
7. Congratulations!
8. Alas!
9. Whoops!
10. Howdy!

Chapter 13 Identifying Parts of Speech (11)

Practice A Identifying Parts of Speech: Nouns, Pronouns, Verbs, Adjectives, and Adverbs

1. pronoun
2. verb
3. noun
4. adjective
5. adverb

Practice B Identifying Parts of Speech: Prepositions, Conjunctions, and Interjections

1. preposition
2. interjection
3. preposition
4. conjunction
5. conjunction

11th Grade Math Answer Key

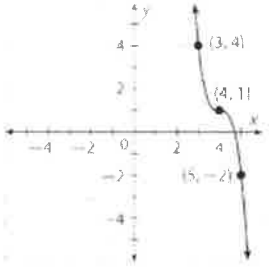
Reteach 5-3: Graphing Cubic Functions

1. Vertical stretch by 3, reflection over *x*-axis, translate right 4, translate up 1;

   $(-1, -1) \rightarrow (3, 4)$

   $(0, 0) \rightarrow (4, 1)$

   $(1, 1) \rightarrow (5, -2)$

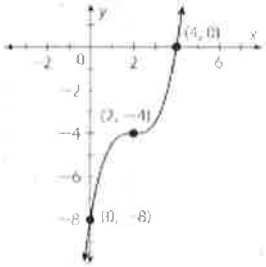


2. Vertical compression by $\frac{1}{2}$, translate right 2 units, translate down 4 units;

   $(-1, -1) \rightarrow (0, -8)$

   $(0, 0) \rightarrow (2, -4)$

   $(1, 1) \rightarrow (4, 0)$

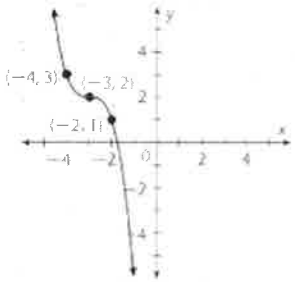


3. Reflect over *x*-axis, translate left 3 units, translate up 2 units;

   $(-1, -1) \rightarrow (-4, 3)$

   $(0, 0) \rightarrow (-3, 2)$

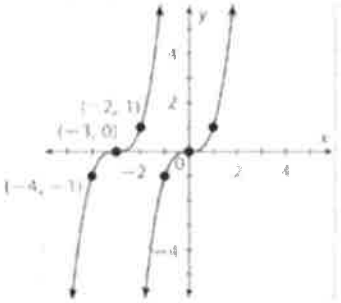
   $(1, 1) \rightarrow (-2, 1)$



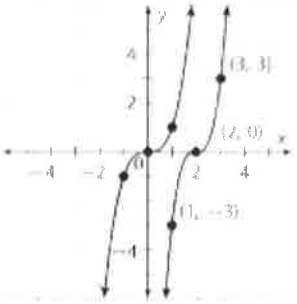
LESSON 5-3

Practice and Problem Solving: Modified

1. reference points: (−4, −1), (−3, 0), and (−2, 1)



2. reference points: (1, −3), (2, 0), and (3, 3)



3. translation 3 units to the left
4. vertical stretch by a factor of 3 and translation 2 units to the right
5. $g(x) = (x - 8)^3 - 4$
6. $g(x) = 5(x)^3 + 6$
7. $g(x) = -(x)^3$

LESSON 5-3

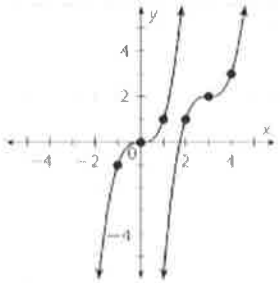
Reading Strategies

1. horizontal stretch, 5
2. translation, 5, left
3. horizontal compression, $\frac{1}{5}$; y
4. $5x^3$

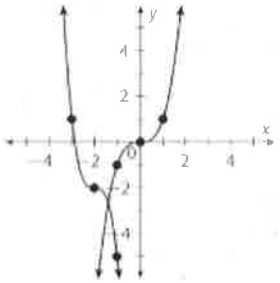
LESSON 5-3

Practice and Problem Solving: A/B

1. reference points: (2, 1), (3, 2), and (4, 3)



2. reference points: (–3, 1), (–2, –2), and (–1, –5)

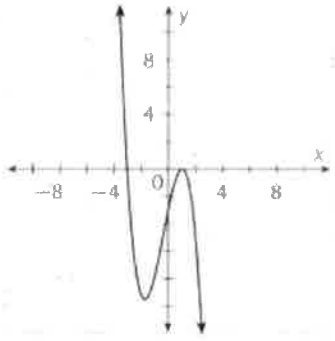


3. $g(x) = -x^3 + 2$
4. $g(x) = (2(x-3))^3 + 1$
5. $g(x) = -(x+7)^3 + 11$
6. $g(x) = 6(x-9)^3 - 3$

LESSON 5-4

Practice and Problem Solving: A/B

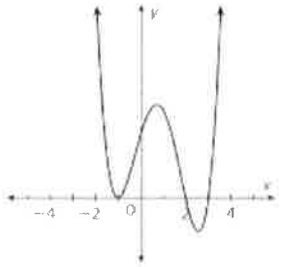
1. Even; negative
2. Even; positive
3. Odd; positive
4. 2 turning points; 1 local max; 1 local min
5. 3 turning points; 1 local max; 1 global max; 1 local min
6.



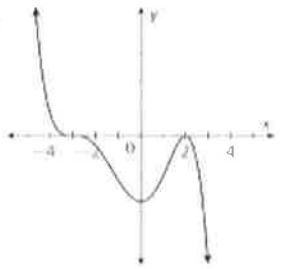
End behavior: As $x \to +\infty$, $f(x) \to -\infty$, As $x \to -\infty$, $f(x) \to +\infty$; x-intercepts: $(-3, 0)$ and $(1, 0)$; Above: $x < -3$; Below: $x > -3$

Reteach 5-4: Graphing Polynomial Functions

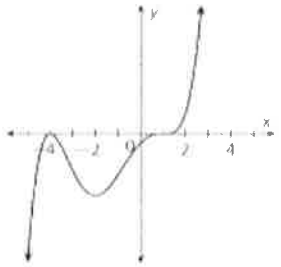
1.



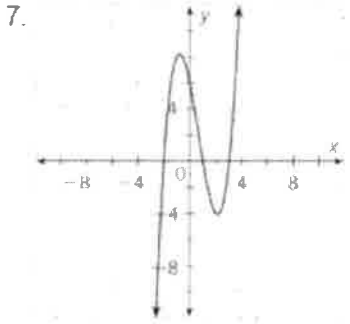
2.



3.



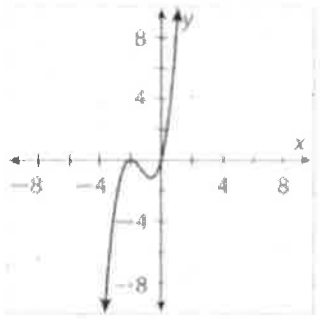
7.

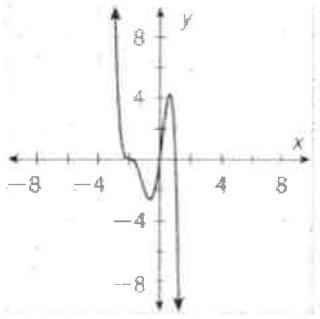


End behavior: As $x \to +\infty$, $f(x) \to +\infty$, As $x \to -\infty$, $f(x) \to -\infty$; x-intercepts: $(-2, 0)$, $(1, 0)$ and $(3, 0)$; Above: $-2 < x < 1$ and $x > 3$; Below: $x < -2$ and $1 < x < 3$

LESSON 5-4

Practice and Problem Solving: Modified

1. x-intercepts: (0, 0) and (3, 0); Number of turning points: 2; End behavior: As $x \to +\infty$, $f(x) \to +\infty$, As $x \to -\infty$, $f(x) \to -\infty$
2. x-intercepts: (−2, 0) and (0, 0); Number of turning points: 1; End behavior: As $x \to +\infty$, $f(x) \to -\infty$, As $x \to -\infty$, $f(x) \to -\infty$
3. x-intercepts: (−2, 0), (0, 0), and (2, 0); Number of turning points: 3; End behavior: As $x \to +\infty$, $f(x) \to +\infty$, As $x \to -\infty$, $f(x) \to +\infty$
4. 

End behavior: As $x \to +\infty$, $f(x) \to +\infty$, As $x \to -\infty$, $f(x) \to -\infty$; x-intercepts: (−2, 0), and (0, 0); Above: $x > 0$; Below: $x < 0$
5. 

End behavior: As $x \to +\infty$, $f(x) \to -\infty$, As $x \to -\infty$, $f(x) \to +\infty$; x-intercepts: (−2, 0), (0, 0), and (1, 0); Above: $x < -2$ and $0 < x < 1$; Below: $-2 < x < 0$ and $x > 1$

LESSON 5-4

Reading Strategies

1. a. Its degree is odd and the leading coefficient is greater than zero.
   b. The function approaches $+\infty$ as $x \to +\infty$.
   c. The function approaches $-\infty$ as $x \to -\infty$.
2. As $x \to +\infty$, $P(x) \to +\infty$ and as $x \to -\infty$, $P(x) \to -\infty$.
3. Odd
4. It is positive.

Reteach 6-1: Adding and Subtracting Polynomials

1. $6x^4 + 10x^3 - x^2 + 3x - 11$
2. $4x^3 + 6x^2 - x - 13$
3. $4a^4 - 2a^3 - 9a^2 - 2a + 14$
4. $-3y + 7$
5. $-6x^4 - 4x^3 + 6x^2 - 2x - 9$
6. $3x^4 - x^3 + 4x^2 - 5x - 8$
7. $2c^4 - 5c^3 + c^2 + 7c - 17$
8. $3r^3 + 2r^2 + r$

LESSON 6-1

Practice and Problem Solving: A/B

1. 2
2. 7
3. 11
4. $-4x^3 + x^2 + 7x + 6$; −4; 3; 4
5. $2x^5 + 7x^4 + x^2 - 12x - 3$; 2; 5; 5
6. $11x^3 + x^2 + 3x + 4$
7. $-3x^3 - 8x^2 + 6x - 4$
8. $3x^4 - x^3 + 10x^2 + 7$
9. $-x^7 + 21x^2 + 9x - 6$
10. a. $-0.1t^2 + 6t + 67$
    b. $99,400

LESSON 6-1

Practice and Problem Solving: Modified

1. 2
2. 0
3. 4
4. 1
5. 3
6. 5
7. a. $x^3 + 2x^2 - 7x + 1$
   b. 1
   c. 3
   d. 4
8. a. $4x^2 - 3x + 5$
   b. 4
   c. 2
   d. 3
9. $9x + 15$
10. $2x - 12$
11. $x^2 + 2x + 2$
12. $-x^2 + 3x - 5$
13. $7c + 17$

LESSON 6-1

Reading Strategies

1. A monomial has only one term, whereas a polynomial has one or more terms.
2. $4x^2 - x$; ~~$2n^2 + 1$~~; $3x\sqrt{17}$; $6z^2$; ~~$\frac{2}{z^2} + 1$~~
3. a. $-x^5 + x + 1$; 5
   b. $x^3 + x^2 - 2x + 6$; 3
4. 4; 4; 2
5. 5; 3; –6

Reteach 6-2: Multiplying Polynomials

1. $-2x^3 - 15x^2 + 14x + 48$
2. $2x^3 - 13x^2 + 23x - 12$
3. $2x^3 - x^2 - 23x + 24$
4. $-12x^3 - x^2 + 38x - 5$

Lesson 6-2

Practice and Problem Solving: Modified

1. x^2; 4; $2x^3 - 8x$
2. 2; m^3; $6m - 3m^4$
3. $6p^2 + 42p$
4. $x^3 + 3x^2 - x$
5. $4x^3 - 10x^2 + 12x$
6. a. $-3x^2$
   b. $-6x$
   c. 3
   d. $-3x^2 - 6x + 3$
   e. $x^3 - x^2 - 7x + 3$
7. x^2; $3x$; –2; x^2; $3x$; –2; $x^3 + 2x^2 - 5x + 2$
8. $x + 3$; $x + 3$; $x^2 + 6x + 9$;
   $x^3 + 9x^2 + 27x + 27$
9. $x - 5$; $x - 5$; $x^2 - 10x + 25$;
   $x^3 - 15x^2 + 75x - 125$
10. $3wd - 4d$

Lesson 6-2

Reading Strategies

1. Yes; $3x^2$
2. No; $2x^2 + x - 3$
3. a. $6x^4 + 3x^3 - 9x^2$
   b. 3
   c. 4
4. Possible answer: Add the exponents.
   $x^m(x^n) = x^{m+n}$

Lesson 6-2

Practice and Problem Solving: A/B

1. $12x^4 + 4x^2$
2. $-9x^3 - 18x^2 - 36x$
3. $-6x^5 - 42x^4 + 24x^3 - 18x^2$
4. $-4x^6 + 10x^5 - 7x^4 + 2x^3$
5. $-35m^3n^4 + 10m^4n^3 - 30m^3$
6. $xy^2 + 2xy - 12x + 2y^2 + 4y - 24$
7. $4p^3 - p^2 + 4p^2q - 2pq - 8pq^2 - q^2 - 8q^3$
8. $2x^2y^2 + 6x^3 + xy^3 + 3x^2y - y^3 - 3xy$
9. $27x^3 - 27x^2 + 9x - 1$
10. $x^4 - 16x^3 + 96x^2 - 256x + 256$
11. $3a^2 - 24ab + 48b^2$
12. $5x^6 - 30x^4y + 60x^2y^2 - 40y^3$
13. $8y^5 + 14y^4 + 7y^3 + y^2$

Reteach 6-4: Factoring Polynomials

1. $(3x+1)(9x^2-3x+1)$
2. $\left(m+\frac{1}{2}\right)\left(m^2-\frac{1}{2}m+\frac{1}{4}\right)$
3. $(p+6)(p^2-6p+36)$
4. $(2x-1)(4x^2+2x+1)$
5. $(b-10)(b^2+100b+100)$
6. $(5t-7)(25t^2+35t+49)$

LESSON 6-4

Practice and Problem Solving: Modified

1. $3y^2$
2. $2p$
3. 12
4. $7xy^2$
5. x, 7
6. 2; m^3
7. 2; y^5; 10
8. $4y^2(2+9y)$
9. $7t(-2t^4+1)$
10. $5x^2(2x^2+5x+1)$
11. $(x+3)(5x+8)$
12. $(15+3x)(x-2)$
13. $(7a^2-3)(a+3)$
14. $(4r^2+3)(5r+7)$
15. $(3n+5)^2$
16. $(2a^2-5)^2$
17. $(m+4)(m^2-4m+16)$
18. $(5x-1)(25x^2+5x+1)$

Answer Key

1 Which of these statements would be MOST important to include in an objective summary of the article?

(A) Haber should have listened to the army generals who said his work was repulsive.

(B) Haber received the rank of captain and a pardon for his despicable actions at Ypres.

(C) Haber was rightly shunned by scientists in England for his work with poison gas.

(D) Haber repented his role in creating deadly poison gasses before his death.

2 Read the following selection from the section "Nazi Government Turns The Tables On Fritz Haber."

> *It was, however, a kind twist of fate that Haber never lived to see Zyklon B, a poisonous gas developed in the 1920s at the laboratory that he ran. The poison was used on some of his own relatives after they were sent off to Nazi concentration camps.*

Which CENTRAL idea of the article is MOST supported by the selection above?

(A) Many Germans objected to Haber's development of chemical weapons.

(B) Haber's work on chemical weapons had consequences he did not foresee.

(C) The outcome of World War I was not what Haber expected it to be.

(D) Haber was a gifted scientist whose work was praised and condemned.

3 Which option BEST explains how Clara Haber's opinions interacted with Fritz Haber's development of chemical weapons?

(A) Clara's opinions led her to give up science in favor of being a wife and mother, which convinced Haber that she no longer understood his work.

(B) Clara's opinions led her to give up Judaism in favor of Christianity, but her conversion did not convince Haber to stop working for Germany.

(C) Clara's opinions led her to publicly denounce his work and stop her own experiments, which caused Haber to publicly condemn her for treason.

(D) Clara's opinions led her to publicly denounce his work and later commit suicide, but neither caused Haber to stop his use of chemical weapons.

4 How does the author distinguish between Haber's work on fertilizer and his work on chemical weapons?

(A) The author contrasts the honor given to Haber for helping agriculture feed the world with the condemnation he received for creating mass death.

(B) The author categorizes the chemicals that were used by Haber to create agricultural tools separately from those used to create destruction.

(C) The author chronologically describes the decline of Haber's honors in the scientific community after he worked on chemical weapons in 1915.

(D) The author creates an analogy between Haber's scientific work during World War I and the actions of German Nazis during World War II.