TULSA PUBLIC SCHOOLS

9th - 12th Grades

9th -12th Grade

- **Literacy:** Read a fiction or nonfiction text for at least 20 minutes daily. Complete at least two activities each day.
- **Math:** Complete one of the recommended math activities each day.
- **Science:** Choose one activity from each of the science activities each week.
- **World Languages:** Complete activities
- **English Language Development:** Complete approximately one activity every other day

COMMONLIT

Name: _____ Class: _____

Excerpt from Heart of Darkness

By Joseph Conrad
1899

Joseph Conrad (1857-1924) was a Polish-British writer and is considered one of the greatest novelists in the English language. Conrad's novella Heart of Darkness *tells the story of Charles Marlow's voyage to Africa and explores themes of imperialism and racism. In this excerpt, the narrator describes Marlow, who then imagines what it must have been like for Romans when they first came to England. As you read, take notes about how the narrator characterizes Marlow, especially as compared to other seamen.*

[1] The sun set; the dusk fell on the stream, and lights began to appear along the shore. The Chapman lighthouse, a three-legged thing erect on a mud-flat, shone strongly. Lights of ships moved in the fairway — a great stir of lights going up and going down. And farther west on the upper reaches the place of the monstrous town was still marked ominously on the sky, a brooding gloom in sunshine, a lurid[1] glare under the stars.

"Before the storm" by kilarov zaneit is licensed under CC0

"And this also," said Marlow suddenly, "has been one of the dark places of the earth."

He was the only man of us who still "followed the sea." The worst that could be said of him was that he did not represent his class. He was a seaman, but he was a wanderer, too, while most seamen lead, if one may so express it, a sedentary[2] life. Their minds are of the stay-at-home order, and their home is always with them — the ship; and so is their country — the sea. One ship is very much like another, and the sea is always the same. In the immutability[3] of their surroundings the foreign shores, the foreign faces, the changing immensity of life, glide past, veiled not by a sense of mystery but by a slightly disdainful ignorance; for there is nothing mysterious to a seaman unless it be the sea itself, which is the mistress of his existence and as inscrutable[4] as Destiny. For the rest, after his hours of work, a casual stroll or a casual spree on shore suffices to unfold for him the secret of a whole continent, and generally he finds the secret not worth knowing. The yarns[5] of seamen have a direct simplicity, the whole meaning of which lies within the shell of a cracked nut. But Marlow was not typical (if his propensity to spin yarns[6] be excepted), and to him the meaning of an episode was not inside like a kernel but outside, enveloping the tale which brought it out only as a glow brings out a haze, in the likeness of one of these misty halos that sometimes are made visible by the spectral illumination of moonshine.

1. **Lurid** ***(adjective):*** shinning with a bright and unpleasant color
2. **Sedentary** ***(adjective):*** somewhat inactive
3. **Immutable** ***(adjective):*** unchanging over time or unable to be changed
4. **Inscrutable** ***(adjective):*** impossible to understand or interpret
5. a long or rambling story
6. tell stories

His remark did not seem at all surprising. It was just like Marlow. It was accepted in silence. No one took the trouble to grunt even; and presently he said, very slow —

[5] "I was thinking of very old times, when the Romans first came here, nineteen hundred years ago — the other day… Light came out of this river since — you say Knights? Yes; but it is like a running blaze on a plain, like a flash of lightning in the clouds. We live in the flicker — may it last as long as the old earth keeps rolling! But darkness was here yesterday. Imagine the feelings of a commander of a fine — what d'ye call 'em? — trireme[7] in the Mediterranean, ordered suddenly to the north; run overland across the Gauls[8] in a hurry; put in charge of one of these craft the legionaries, — a wonderful lot of handy men they must have been too — used to build, apparently by the hundred, in a month or two, if we may believe what we read. Imagine him here — the very end of the world, a sea the color of lead, a sky the color of smoke, a kind of ship about as rigid as a concertina[9] — and going up this river with stores, or orders, or what you like. Sandbanks, marshes, forests, savages, — precious little to eat fit for a civilized man, nothing but Thames water to drink. No Falernian wine here, no going ashore. Here and there a military camp lost in a wilderness, like a needle in a bundle of hay — cold, fog, tempests, disease, exile, and death, — death skulking in the air, in the water, in the bush. They must have been dying like flies here. Oh yes — he did it. Did it very well, too, no doubt, and without thinking much about it either, except afterwards to brag of what he had gone through in his time, perhaps. They were men enough to face the darkness."

7. an ancient type of vessel
8. a region of Western Europe
9. a musical instrument resembling an accordion

Text-Dependent Questions

Directions: For the following questions, choose the best answer or respond in complete sentences.

1. PART A: In the passage from Heart of Darkness, the narrator and his companions are sailing on the River Thames near London, England. What does Marlow mean when he says in paragraph 2 that England "has been one of the dark places of earth"?
    A. It was formerly corrupt and full of criminals.
    B. It was once a place beyond the limits of civilization.
    C. It has been the location of many violent confrontations.
    D. It has been less technologically developed than other countries.

2. PART B: Which quotation from Marlow's speech in paragraph 5 best supports the answer to Part A?
    A. "you say Knights? Yes"
    B. "a wonderful lot of handy men they have been too"
    C. "Imagine him here — the very end of the world"
    D. "Did it very well, too, no doubt"

3. PART A: How does the author's comparison of Marlow to other sailors impact the reader's understanding of Marlow?
    A. It shows that he is of a different social class than other sailors.
    B. It shows that he is more intelligent than most sailors.
    C. It shows that he is interested in the deeper significance of events.
    D. It shows that he is quiet and leads a solitary existence.

4. PART B: Which quotation from Heart of Darkness best supports that answer to Part A?
    A. "The worst that could be said of him was that he did not represent his class." (Paragraph 3)
    B. "generally he finds the secret not worth knowing." (Paragraph 3)
    C. "to him the meaning of an episode was not inside like a kernel but outside, enveloping the tale" (Paragraph 3)
    D. "It was just like Marlow. It was accepted in silence." (Paragraph 4)

Discussion Questions

Directions: Brainstorm your answers to the following questions in the space provided. Be prepared to share your original ideas in a class discussion.

1. How can traveling the world further our understanding of it? How do you think a sailor's understanding or appreciation of the world might be different from that of someone who stays on land? In the context of the text, how do most seamen approach their travels to other places? How does that compare to what you think travelers should do when they visit other places?

2. How does Marlow portray the Romans who first came to England? Why did they embark on these dangerous journeys to largely unknown territories? What traits do you think it's important for travelers, such as the Romans and Marlow, to have?

Name: _____ Class: _____

I felt a Funeral, in my Brain

By Emily Dickinson
1896

Emily Dickinson (1830-1886) was an American poet who lived a very private life. In her seclusion, she wrote about 1,800 poems. In this poem, the speaker describes experiencing a great loss. As you read, take notes on the sounds described throughout the poem.

I felt a Funeral, in my Brain,
And Mourners to and fro
Kept treading - treading - till it seemed
That Sense was breaking through -

And when they all were seated,
A Service, like a Drum -
Kept beating - beating - till I thought
My mind was going numb -

And then I heard them lift a Box
And creak across my Soul
With those same Boots of Lead, again,
Then Space - began to toll,

As all the Heavens were a Bell,
And Being, but an Ear,
And I, and Silence, some strange Race,
Wrecked, solitary, here -

And then a Plank in Reason, broke,
And I dropped down, and down -
And hit a World, at every plunge,
And Finished knowing - then -

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Text-Dependent Questions

Directions: For the following questions, choose the best answer or respond in complete sentences.

1. PART A: Which of the following identifies the theme of the poem? [RL.2]
    A. There is nothing more painful than losing someone you love.
    B. By allowing time for grieving, a person is more likely to recover.
    C. A person's loss of self can feel as tragic as a death.
    D. It is common to feel abandoned when you are left alone.

2. PART B: Which detail from the poem best supports the answer to Part A? [RL.1]
    A. "Kept treading – treading – till it seemed / That sense was breaking through – " (Lines 3-4)
    B. "Kept beating – beating – till I thought / My mind was going numb – " (Lines 7-8)
    C. "And then I heard them lift a Box / And creak across my Soul" (Lines 9-10)
    D. "With those same Boots of Lead, again, / Then Space began to toll," (Lines 11-12)

3. How does stanza 5 contribute to the speaker's depiction of their experiences (Lines 17-20)? [RL.5]
    A. It portrays them as overcoming their emotional turmoil.
    B. It depicts them as not being able to make sense of anything.
    C. It emphasizes the advanced outlook on the world they now have.
    D. It shows how pessimistic their experiences have made them.

4. What rhyme scheme does the poet use and how does it contribute to the poem? [RL.4]

Discussion Questions

Directions: Brainstorm your answers to the following questions in the space provided. Be prepared to share your original ideas in a class discussion.

1. In the context of the poem, how do people face death? How is the death that the speaker is mourning different from a literal death? How does this impact their reaction to the death?

2. In the context of the poem, what does it mean to be alone? Why does the speaker feel so alone? How does it affect them? Cite evidence from this text, your own experience, and other literature, art, or history in your answer.

3. Cognitive dissonance is the process of simultaneously having two or more thoughts or beliefs that do not agree with one another. How can this poem be read through the lens of someone experiencing cognitive dissonance? Does the speaker overcome cognitive dissonance, and if so, how?

Algebraic Expressions

Lesson 2 of 7

Interpreting Expressions

Description:

Students will begin this lesson by engaging in a "magic math" activity. This lesson will give students opportunities to explore and determine their understanding of expressions. They will be asked to consider, create and understand verbal representations of numbers and operations to symbolic representations using expressions. They will examine how symbolic manipulation of expressions affects values in real circumstances.

College Readiness Standards Addressed:

- A.1: Interpret expressions that represent a quantity in terms of its context.

Mathematical Process Readiness Indicator(s) Emphasized:

- PRI 2: Reason abstractly and quantitatively by using multiple forms of representations to make sense of and understand mathematics.
- PRI 6: Attend to precision.
- PRI 7: Look for and make use of patters and structure.
- PRI 8: Look for and express regularity in repeated reasoning.

Sequence of Instruction	Activities Checklist

Engage

Magic Math: Number Guess Introduction

- Have each student choose a number between one and 20 and write it down at the top of the Magic Math template provided in the student manual.
- Students should complete the following steps on their paper under their original number and write the instructions given in the second column:
  - Double your original number.
  - Add 6.
  - Divide by 2.
  - Subtract the original number from the new number.
  - Fold the paper once so your work/answer cannot be seen.

INCLUDED IN THE STUDENT MANUAL

Numbers and Operations

Magic Math

Original Number	Instructions

- Tell the students that you are going to come around and write your "guess" for their answer on the outside of the paper.
- Go around the room and write a 3 on the outside of their paper and turn your writing face down on the desk.
- Once you are finished writing your "guesses" on all of the papers ask them to look at your guess and if it matches their answer then have them raise their hand. (Hopefully all students will have their hand up at this point; however, if some do not just make note of it and address their calculation mistakes during the practice session).
- Make a "big deal" about how they must have all chosen the same original number.
- Ask two different students what numbers they chose. When you get two different original numbers, look puzzled, as if to say "How could that be?"
- Ask the class as a whole, "How is it that <John> started with <4> and <Jane> started with <11>? They both performed the same operations on the two different numbers, but ended up with the same answer.
- Tell the students that you are going to give some time to discuss it.

Explore

MATH 2&7 PROCESS

Magic Math: Number Guess Exploration

- Have students pair up (one group of three if an odd number of students are present) with someone that chose a different original number.
- Have students discuss and write down on a sheet of paper their pair's understanding of why this process always results in a "3." Ask them to create a visual model of their thoughts. Have students look for and make use of structure as they create an expression representing all of the steps in the magic math number trick.
- Announce that if anyone did not get "3" as their answer (from a miscalculation), he/she should discuss the steps taken to arrive at the different solution with his/her partner. (Listen to the conversation surrounding the students' process and be prepared to ask guiding questions as necessary to help students find their errors in the event they are unable to locate the miscalculation.)
- Give time for student pairs to both quantitatively and abstractly reason through the problem and provide sound justification for their decisions.
- Walk around the room observing the explanations/models. Pay attention to the different correct approaches. Make note of any incorrect assumptions/processes.

Explanation

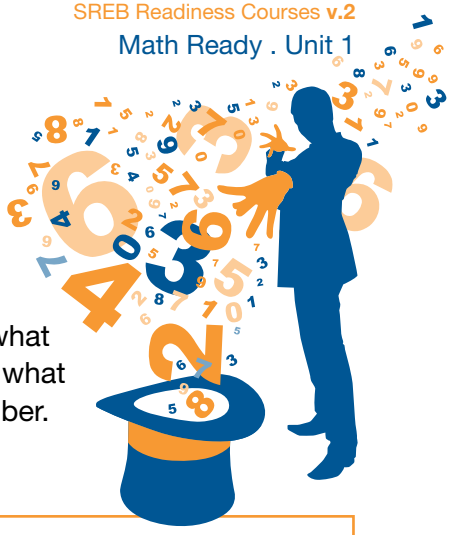
MATH 6 PROCESS

Magic Math: Number Guess Explanation

- Ask one to three groups to communicate methods and solutions precisely to others through a report of their processes. Try to select groups that have varying methods.
  - There is no need for the same exact process to be explained multiple times so choose pairs having some variations to share.
  - If you had one group that has an incorrect process you might sandwich them

between two correct groups. This way the students can solidify their thoughts with the first group. The second group will probably see their error and address it when presenting (but this provides a great opportunity for a group discussion about the reason for their miscalculation). Then the third group will provide reinforcement of the procedure.

- Leave students in their current groups and facilitate a whole group discussion about the process to include verbal, algebraic, and modeling representations.



Magic Math: Number Guess (Explanations)

When I asked you to choose a number between one and 20, I had no real idea what you would choose. And in math, if we know a number exists but we don't know what particular number it is, then we use a variable or a symbol to represent that number. So let's go through this problem with ★ and *x* representing the chosen number.

Modeling Explanation	Verbal Process	Algebraic Explanation
★	Chosen Number	x
★ ★	Double it	$x \cdot 2 = 2x$
★ + ★ ● ● ● ● ●	Add 6 to it	$2x + 6$
★ + ● ● ● ★ + ● ● ●	Divide by 2	$\frac{2x + 6}{2} = x + 3$
~~★~~ + ● ● ● - ~~★~~	Subtract your original number	$x + 3 - x = 3$
● ● ●	Leaves 3	3

Practice Together in Small Groups

MATH 6&8 PROCESS

Magic Math: Birthday Trick

- Have students work in pairs to complete the Math Magic: Birthday Trick from the Student Manual, taking turns with each student's own information.

INCLUDED IN THE STUDENT MANUAL

Do you believe that I can figure out your birthday by using simple math?

Get a calculator and ask your classmate to try the following. Your classmate must press equal (or enter) between every step.

a) Enter the month of his/her birth into the calculator. (Ex: enter 5 for May)
b) Multiply that number by 7.
c) Subtract 1 from that result.
d) Multiply that result by 13.
e) Add the day of birth. (Ex: For June 14th add 14)
f) Add 3.
g) Multiply by 11.
h) Subtract the month of birth.
i) Subtract the day of birth.
j) Divide by 10.
k) Add 11.
l) Divide by 100.

- Have the students look for and make use of repeated reasoning to model the process algebraically.
- Make sure that each of the members of the group can communicate the process that his/her pair used precisely.
- Have one student from each pair rotate to a different group.
- Have each student in the newly formed pairs explain to one another his/her model and the reasoning for each step.

Evaluate Understanding

Magic Math: Birthday Trick

- Monitor the different explanations in the groups and ask guiding questions aimed at correcting any misconceptions that may exist.

Closing Activity

Introduce Independent Practice

- In a whole-group discussion, introduce students to the independent practice where they are asked to create their own "magic trick." The trick should include at least five steps and should be represented through both verbal and algebraic representations. This is to be competed without the use of technology.
- Allow time for students to ask clarifying questions and summarize the independent practice task.

Independent Practice:

- Ask the students to use quantitative and abstract reasoning to create his/her own "magic trick." This should be at least a five step math process and should be represented through both verbal and algebraic representations.

Notes

Numbers and Operations

Magic Math: Number Guess

Original Number	Instructions

Numbers and Operations

Magic Math: Birthday Trick

Do you believe that I can figure out your birthday by using simple math?

Get a calculator and ask your classmate to try the following. Your classmate must press equal (or enter) between every step.

a) Enter the month of his/her birth into the calculator. (Ex: enter 5 for May)

b) Multiply that number by 7.

c) Subtract 1 from that result.

d) Multiply that result by 13.

e) Add the day of birth. (Ex: For June 14th add 14)

f) Add 3.

g) Multiply by 11.

h) Subtract the month of birth.

i) Subtract the day of birth.

j) Divide by 10.

k) Add11.

l) Divide by 100.

Algebraic Expressions

Lesson 5 of 7

Constucting Equivalent Expressions

Description:

Students will begin this lesson by engaging in a task on developing expressions for a particular geometric pattern. This lesson will strengthen the ability of students to compare expressions presented in different forms and determine equivalency.

College Readiness Standards Addressed:

- A.3: Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression.
- F.7: Write a function defined by an expression in different but equivalent forms.

Mathematical Process Readiness Indicator(s) Emphasized:

- PRI 1: Make sense of problems and persevere in solving through reasoning and exploration.
- PRI 3: Describe and justify mathematical understandings by constructing viable arguments, critiquing the reasoning of others and engaging in meaningful mathematical discourse.
- PRI 7: Look for and make use of patterns and structure.
- PRI 8: Look for and express regularity in repeated reasoning.

Sequence of Instruction	Activities Checklist

Engage

Task #8: Sidewalk Patterns

Sidewalk Patterns that can be found at the Shell Center website http://map.mathshell.org/materials/tasks.php?taskid=254&subpage=apprentice and on the next page.

- Ask students to complete the grid on page one of the task, and have volunteers share their results.
- Explain that we wish to construct a large square in accordance with this pattern. How many white blocks would you need? How many black blocks?

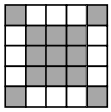
INCLUDED IN THE STUDENT MANUAL

Task #8: Sidewalk Patterns

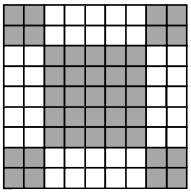
Sidewalk Patterns

In Prague some sidewalks are made of small square blocks of stone.

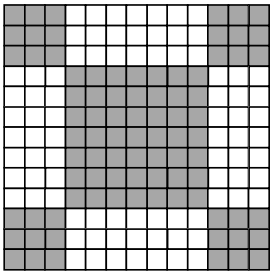
The blocks are in different shades to make patterns that are in various sizes.



Pattern #1

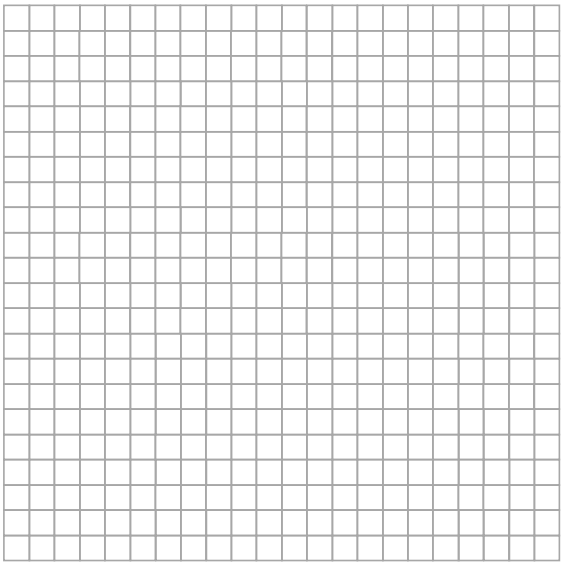


Pattern #2



Pattern #3

Draw the next pattern in this series.



Pattern #4

INCLUDED IN THE STUDENT MANUAL

1. Complete the table below

Pattern number, *n*	1	2	3	4
Number of white blocks	12	40		
Number of gray blocks	13			
Total number of blocks	25			

2. What do you notice about the number of white blocks and the number of gray blocks?

_____

3. The total number of blocks can be found by squaring the number of blocks along one side of the pattern.

a. Fill in the blank spaces in this list.

$25 = 5^2$ $81 =$ _____ $169 =$ _____ $289 = 17^2$

b. How many blocks will pattern #5 need? _____

c. How many blocks will pattern #*n* need? _____

4. a. If you know the total number of blocks in a pattern you can work out the number of white blocks in it. Explain how you can do this.

_____

_____

b. Pattern # 6 has a total of 625 blocks.
How many white blocks are needed for pattern #6? _____
Show how you figured this out.

Explore

MATH PROCESS 1&3

- Split students into small groups (two to three students)
- Ask them to make sense of the problem and complete page two of the task together. They should construct viable arguments for their choices and critique the reasoning of their partner.
- When the group completes the task, ask them to write their answer for part 3c on a large piece of sticky paper.
- After all groups have finished, ask each to post their answer to 3c on the wall.
- Ask each group to decide which answers are correct.
- Ask a group that has the correct answer to explain how they found their expression.
- Ask if another group solved the task differently, and how that was reflected in the structure of their expression, and connect back to the ideas discussed with the pool tiles from the previous lesson.
- If any answers were incorrect, ask how you could prove their expression is not the same as one of the correct answers.

Guiding questions:

- What does it mean for expressions to be equivalent?
- How can you prove that two expressions are not equivalent?

Explanation

At this point review the general concept of what it means for two expressions to be equivalent; namely two expressions are equivalent if they have the same value for every possible value(s) you substitute in for each of the variable(s). Stress that if you try one value and see the output is the same, that is not enough to claim the expressions are the same for ALL values you could substitute into the expression. For example:

- (x^2+y^2) and $(x+y)^2$ have the same value if you substitute in x=0 and y=2 into both expressions (you get 4). However you need to show this for all possible pairs of values you could substitute for x and y. Thus, since x=1 and y=1 give a value of 2 in the first expression and a value of 4 in the second, these two expressions are not equivalent.
- Showing expressions are not equivalent is easier than showing two expressions are equivalent since you presumably need to check all possible values you could substitute.
- You could ask students to think of other possible ways you might determine whether these two expressions are equivalent. Some students might explain you could use algebra to expand the second expression and get $x^2+2xy+y^2$ that is not the same as the first expression. You could use this as pre-assessment for distributing and collecting like terms covered in the next day's classes.

Practice Together / in Small Groups / Individually

MATH PROCESS 7

Divide the class up into small groups to complete Task #9: Expression Pairs: Equivalent or Not? Which pairs of algebraic expressions are equivalent and which are not

equivalent. Ask them to specifically look for and make sense of the structure. If they believe the pair of expressions is not equivalent, ask them to provide values for the variable(s) that lead to different values when you evaluate.
If they believe they are equivalent, ask them to show or explain how they determined equivalence. For example, which properties of operations are being used (associative, commutative, and distributive)? You may need to review these properties with students.

Notice that some of the pairs highlight common student misconceptions.

INCLUDED IN THE STUDENT MANUAL

Task #9: Expression Pairs: Equivalent or Not?

- $a+(3-b)$ and $(a+3)-b$
- $2+\frac{k}{5}$ and $10+k$
- $(a-b)^2$ and a^2-b^2
- $3(z+w)$ and $3z+3w$
- $-a+2$ and $-(a+2)$
- $\frac{1}{(x+y)}$ and $\frac{1}{x}+\frac{1}{y}$
- x^2+4x^2 and $5x^2$
- $\sqrt{(x^2+y^2)}$ and $x+y$
- $bc-cd$ and $c(b-d)$
- $(2x)^2$ and $4x^2$
- $2x+4$ and $x+2$

(More pairs could be added here if students need more practice.)

Evaluate Understanding

After the groups have had the opportunity to determine which pairs of algebraic expressions are equivalent and which are not equivalent, ask the groups to share their answers. If they all agree on the answer to the first set of expressions, move to the next pair. If they do not agree, ask two of the groups that disagree to come to the board and demonstrate how they determined that the expressions were equivalent or not equivalent.

It is important to emphasize that if you ever forget whether $\frac{1}{(x+y)} = \frac{1}{x}+\frac{1}{y}$, you can always check by substituting some values. If the results are yield a false statement, clearly they are not equivalent. If the results are equivalent, then they still may not be equivalent for all values you substitute, so be careful.

It is also important to emphasize properties of operations with algebraic expressions that are exactly the same as the properties of operations on numerical expressions. We are not inventing new operations, rather extending previous understanding with numbers to algebraic expressions. Refrain from using gimmicks such as PEMDAS to tell students the order with which they MUST evaluate. When working with algebraic expressions, you still use distributive property just as with numbers.

To illustrate this point to teachers (you may not want to show this to students unless necessary), consider 7-2(3-8x). A student blindly recalling “PEMDAS” might simplify as

follows 7-2(3-8x)=7-2(-5x)=7+10x since P comes first. Or a student may think n-2+5=n-7 since you do A before S. While strictly interpreting PEMDAS would lead one to (incorrectly) say 8(5+1) = 8(5) + 8(1). You first need to add 5 and 1.

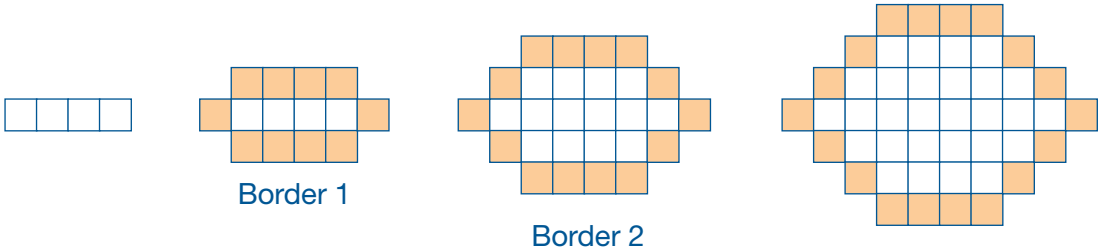
Closing Activity

MATH 3,7 & 8 PROCESS

INCLUDED IN THE STUDENT MANUAL

Task #10: Kitchen Floor Tiles

Fred has some colored kitchen floor tiles and wants to choose a pattern to make a border around white tiles. He generates patterns by starting with a row of four white tiles. He surrounds these four tiles with a border of colored tiles (Border 1). The design continues as shown below:



Border 1 Border 2 Border 3

Fred writes the expression 4(*b*-1) + 10 for the number of tiles in each border, where *b* is the border number, *b* ≥1.

- Explain why Fred's expression is correct.
- Emma wants to start with five tiles in a row. She reasons, "Fred started with four tiles and his expression was 4(*b*-1) + 10. So if I start with five tiles, the expression will be 5(*b*-1) + 10. Is Emma's statement correct? Explain your reasoning.
- If Emma starts with a row of *n* tiles, what should the expression be?

Adapted from: http://illustrativemathematics.org/illustrations/215

Commentary *for the Teacher:*

The purpose of this task is for students to practice reading, analyzing, and constructing algebraic expressions, attending to the relationship between the form of an expression and the context from which it arises. The context here is intentionally thin; the point is not to provide a practical application to kitchen floors but to give a framework that imbues the expressions with an external meaning.

Analyzing and generalizing geometric patterns such as the one in this task may be familiar to students from work in previous grades, so part (a) may be a review of that process. It requires students to make use of the structure in the expression, to notice and express the regularity in the repeated geometric construction and to explain and justify the reasoning of others. Part (b) requires a deeper analysis of the expression, identifying the referents for its various parts. Students may still need guidance in writing the formula for part (c) since it introduces a second variable.

Possible Solution:

For Border 1, tiles are added above and below the original four tiles — a total of eight additional tiles — and a tile is added to each end of the row of original tiles — two additional tiles — for a total of 10 tiles.

For Border 2, we have four additional tiles needed to fill in the corners of the diagram (one tile for each corner gap), plus the original 10 tiles coming from the top and bottom rows of four tiles each and the two end tiles:

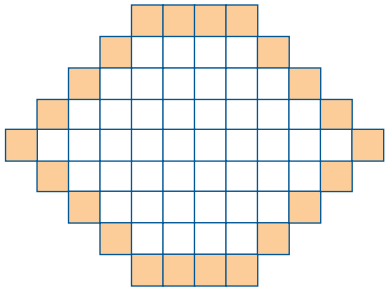
4+10 colored tiles in Border 2.

For Border 3, there are now two tiles in each of the four corners, plus the same 10 tiles from the top, bottom and ends, so there are:

4(2)+10 colored tiles in Border 3.

For Border 4, we have three tiles in each corner, for a total of:

4(3)+10 colored tiles in Border 4.



Border 4

The following table illustrates the pattern:

Border number	Number of tiles in the border
1	10
2	4(1)+10
3	4(2)+10
4	4(3)+10
□	
b	4(*b*–1)+10

In Border *b* there are *b*–1 extra tiles needed at each of the four corners, so the number of border tiles needed is given by Fred's expression:

4(*b*–1)+10

- In part a, the number 10 comes from the top row of tiles, the bottom row of tiles, and the two tiles on the ends of the original four tiles. If Emma starts with five tiles, that number would change to 12 – 5 tiles above the originals — five tiles below the originals, and one tile on each end. Emma's formula is not correct. She has incorrectly assumed that the 4 in Fred's formula came from the number of tiles in the beginning row, when it actually comes from the number of corners in the diagram itself. Regardless of the number of tiles in the beginning row, there will always be "4" corners to be filled. If Emma wants a formula for the number of tiles in each border starting with five tiles in the original row, she could use:

t=4(*b*–1)+12

- In general, the number of tiles added at the top and the bottom in each border will always match the number in the original row (n) and there will always be one tile added to each end. If there are n tiles in the original row, the constant in the expression will be $2n+2$.

  The number of tiles needed for each corner will remain the same regardless of the number of tiles in the original row. If b is the number of the border, $4(b\text{-}1)$ corner tiles are needed. So if Emma starts with a row of n tiles, the number of tiles in the Border b is:

  $$4(b-1)+(2n+2).$$

Independent Practice

INCLUDED IN THE STUDENT MANUAL

On the figure below, indicate intervals of length:

- x+1
- 3x+1
- 3(x+1)

What do your answers tell you about whether 3x+1 and 3(x+1) are equivalent?

Notes:

1. Complete the table below

Pattern number, *n*	1	2	3	4
Number of white blocks	12	40		
Number of gray blocks	13			
Total number of blocks	25			

2. What do you notice about the number of white blocks and the number of gray blocks?

_____

3. The total number of blocks can be found by squaring the number of blocks along one side of the pattern.

   a. Fill in the blank spaces in this list.

   $25 = 5^2$ $\quad 81 =$ _____ $\quad 169 =$ _____ $\quad 289 = 17^2$

   b. How many blocks will pattern #5 need? _____

   c. How many blocks will pattern #*n* need? _____

4. a. If you know the total number of blocks in a pattern you can work out the number of white blocks in it. Explain how you can do this.

_____

_____

   b. Pattern # 6 has a total of 625 blocks.
   How many white blocks are needed for pattern #6? _____
   Show how you figured this out.

Task #9: Expression Pairs: Equivalent or Not?

$a+(3-b)$ and $(a+3)-b$

$2+\frac{k}{5}$ and $10+k$

$(a-b)^2$ and a^2-b^2

$3(z+w)$ and $3z+3w$

$-a+2$ and $-(a+2)$

$\frac{1}{x+y}$ and $\frac{1}{x}+\frac{1}{y}$

x^2+4x^2 and $5x^2$

$\sqrt{x^2+y^2}$ and $x+y$

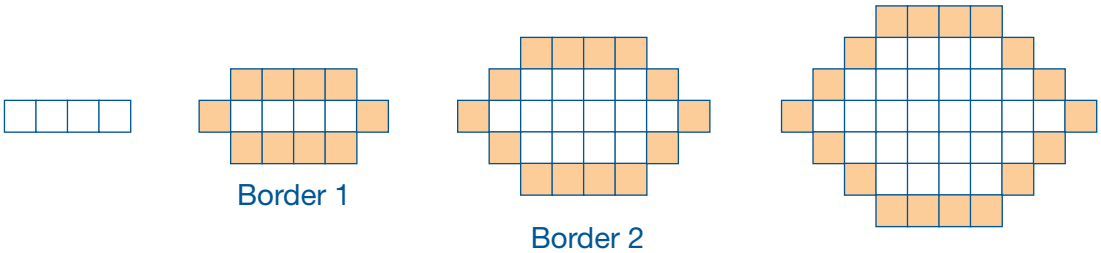
$bc-cd$ and $c(b-d)$

$(2x)^2$ and $4x^2$

$2x+4$ and $x+2$

Task #10: Kitchen Floor Tiles

Fred has some colored kitchen floor tiles and wants to choose a pattern to make a border around white tiles. He generates patterns by starting with a row of four white tiles. He surrounds these four tiles with a border of colored tiles (Border 1). The design continues as shown below:



Border 1

Border 2

Border 3

Fred writes the expression $4(b\text{-}1) + 10$ for the number of tiles in each border, where b is the border number, $b \geq 1$.

- Explain why Fred's expression is correct.

- Emma wants to start with five tiles in a row. She reasons, "Fred started with four tiles and his expression was $4(b\text{-}1) + 10$. So if I start with five tiles, the expression will be $5(b\text{-}1) + 10$. Is Emma's statement correct? Explain your reasoning.

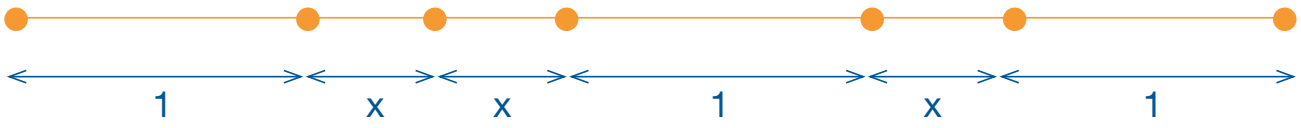
- If Emma starts with a row of n tiles, what should the expression be?

Adapted from Illustrative Mathematics

Independent Practice

On the figure below, indicate intervals of length:

- x+1
- 3x+1
- 3(x+1)



What do your answers tell you about whether 3x+1 and 3(x+1) are quivalent?

HS Instructions for at-home activities

	Physical Science	**Biology**	**Chemistry**	**Physics**
PRACTICE	Choose 1 activity sheet every 2-3 days. Solve all the problems on your own and then check your answers. Rework any problems you missed and write down any questions you have.	Choose 1 activity sheet every 2-3 days. Solve all the problems on your own and then check your answers. Rework any problems you missed and write down any questions you have.	Choose 1 activity sheet every 2-3 days. Solve all the problems on your own and then check your answers. Rework any problems you missed and write down any questions you have.	Choose 1 activity sheet every 2-3 days. Solve all the problems on your own and then check your answers. Rework any problems you missed and write down any questions you have.
LABS	Look through the Chemistry and Physics at-home labs and complete one each week. Work with someone from home and teach them some science!	Do an at-home lab once per week with a guardian. Work with someone from home and teach them some science!	Do an at-home lab once per week with a guardian. Work with someone from home and teach them some science!	Do an at-home lab once per week with a guardian. Work with someone from home and teach them some science!
PREPARE	Every 2 days: Create a study guide for a past topic to help you when you return to school.	Every 2 days: Create a study guide for a past topic to help you when you return to school.	Every 2 days: Create a study guide for a past topic to help you when you return to school.	Every 2 days: Create a study guide for a past topic to help you when you return to school.

Semester Quiz Review Sheet

1) Name the piece of equipment used for each of the following tasks (1 pt each):

- Conducting a chemical reaction with a liquid: _____
- Covering a beaker that's being heated: _____

2) What elements should the hypothesis of an experiment always have? (2 pt)

3) Convert 14 centimeters to micrometers. (3 pt)

4) If we know data are precise, should we use them in an experiment? Why or why not? (3 pt)

5) How many significant figures are in the following numbers? (1 pt each)

0.0031 mg ____ 300 L ____

6) If I add the weight of a beaker that's 23.40 grams to the weight of a sample that's 1.214 grams, what's the total weight of both items? (3 pt)

7) Why is it improper to "connect the dots" when making a graph? (3 pt)

8) What are the differences between an element, a compound, a homogeneous mixture, and a heterogeneous mixture? (2 pt):

9) How do chemical properties differ from physical properties? (2 pt)

10) What is the law of conservation of mass? (2 pt)

11) What did Thomson's cathode ray experiment prove? (2 pt)

12) How many protons, neutrons, and electrons does an atom of ^{261}Rf have? (3 pt)

Protons: _____ Neutrons: _____ Electrons: _____

13) What is the general equation for determining the average atomic mass of an element from its isotopic abundances? (3 pt)

14) What is a line spectrum, and what can it be used for? (3 pt)

15) What is a probability distribution? (3 pt)

16) What's the abbreviated electron configuration of copper? (1 pt)

17) What group on the periodic table comprises the alkali metals? (1 pt) _____

18) What do elements in the same period have in common with one another? (2 pt)

19) Why does electronegativity decrease as you move down a column in the periodic table? (3 pt)

21) Why are ionic compounds hard and brittle, while covalent compounds are relatively soft and squishy? (4 pt)

22) Name the following chemical compounds (1 pt each)

- NaBr _____
- PBr_3 _____
- H_2SO_4 _____
- BF_3 _____
- MnO_2 _____

23) Write the formulas of the following chemical compounds (1 pt each)

- phosphoric acid _____
- oxygen difluoride _____
- chromium (IV) nitride _____
- silicon tetrachloride _____
- ammonia _____

24) What is the electron sea theory? (2 pts)

25) For the molecule diboron tetrahydride, draw the Lewis structure and determine the bond angles, hybridization of boron, and molecular shape (3 pt Lewis structure, 1 pt bond angles, 1 pt hybridization, 1 pt shape):

Lewis structure:

Hybridization: _____

Bond angles: _____

Shape: _____

26) What does it mean when we refer to a molecule as being “polar”? (3 pt)

27) How many grams are there in 18.6 moles of nitrogen dioxide? (3 pt)

28) Write complete, balanced equations for each of the following (5 pt each)

- When the butane (C_4H_{10}) in a gas camp stove is burned in oxygen, the products of the reaction are carbon dioxide gas and water vapor.

- When chlorine gas is combined with ethylene gas (C_2H_4) at high temperature and pressure, tetrachloroethylene gas (C_2Cl_4) and hydrogen gas are formed.

STOP! This is the end of the practice quiz. On the next few pages you’ll find the answer key. I highly recommend that you not look at the answers until you do the entire practice quiz – this will give you a better idea of how you’re likely to do on the real thing!

Semester Quiz Review Sheet – ANSWER KEY

1) Name the piece of equipment used for each of the following tasks (1 pt each):

- Conducting a chemical reaction with a liquid: **beaker or Erlenmeyer flask**
- Covering a beaker that's being heated: **watch glass**

2) What elements should the hypothesis of an experiment always have? (2 pt)
It should have the general form of "If [independent variable], then [dependent variable]". Another acceptable alternate would be "The effect of [dependent variable] on [independent variable]", which says the same thing.

3) Convert 14 centimeters to micrometers. (3 pt)
14 cm = 0.14 m = 140,000 µm. Note: Micrometers are often referred to as "microns."

4) If we know data are precise, should we use them in an experiment? Why or why not? (3 pt)
Maybe: Here's why:
- **If you have precise data, that means that the data are reproducible using your experimental setup.**
- **Precise data aren't necessarily accurate (i.e. the true answer you're trying to find). If this is the case, you don't want to work with these data.**
- **However, precision implies accuracy. If your data aren't precise, that means that your method is erratic, which is always bad. However, if your data are precise, you may not be right but at least you're getting the same thing, which seems good.**
- **An important caveat: The term "precision" is strictly useful only for telling you if you're doing something consistently. "Accuracy" tells you if your answer is right. Because you don't know whether you're accurate or not (otherwise, you wouldn't be doing the measurement in the first place), you've pretty much got to trust that precise data are probably accurate. Remember, though, that this may not be the case!**

5) How many significant figures are in the following numbers? (1 pt each)

0.0031 mg **2** 300 L **1**

6) If I add the weight of a beaker that's 23.40 grams to the weight of a sample that's 1.214 grams, what's the total weight of both items? (3 pt)
Using the rules of significant figures, we get an answer of 24.614 grams, which rounds to 24.61 grams.

7) Why is it improper to “connect the dots” when making a graph? (3 pt)
The purpose of drawing graphs is to figure out what the trends in a series of data are. Put another way, anybody who takes measurements knows that their experiments may not give perfect answers, but connecting the dots tells us that the answers are so perfect that they must be followed to infinite precision. Because it is never the case that data are perfect, we draw trend lines rather than connect the dots so that those who look at the data aren't fooled.

8) What are the differences between an element, a compound, a homogeneous mixture, and a heterogeneous mixture? (2 pt):
Element = one type of atom; compound = one type of molecule; homogeneous mixture = mixture in which the composition is uniform in all places; heterogeneous mixture = uneven mixture.

9) How do chemical properties differ from physical properties? (2 pt)
- **Chemical properties determine the ability of something to undergo a chemical change, while physical properties determine how something behaves in other circumstances.**
- **One common misunderstanding is that certain chemical and physical properties apply only to certain materials. For example, people may believe that flammability applies only to things that burn. This is not the case. In order to make this into a property, we need to know whether or not something is flammable. As a result, it's fair to say that a chemical property of gasoline is that it is flammable, and a chemical property of water is that it is not flammable.**

10) What is the law of conservation of mass? (2 pt)
The weight of what you make = the weight of what you started with.

11) What did Thomson’s cathode ray experiment prove? (2 pt)
It demonstrated the existence of negatively charged electrons in an atom. Given the outcome of the cathode ray experiment, it was clear from his results that these negative particles were very small and light compared to whatever had the positive charge. This is where the “plum pudding” model came from, in which small negative electrons are embedded in a big blob of positive charge.

12) How many protons, neutrons, and electrons does an atom of ^{261}Rf have? (3 pt)

Protons: **104** Neutrons: **157** Electrons: **104**

13) What is the general equation for determining the average atomic mass of an element from its isotopic abundances? (3 pt)
Average atomic mass = (abundance of isotope 1)(mass of isotope 1) + …

14) What is a line spectrum, and what can it be used for? (3 pt)
Line spectra are individual energies of light that are given off when an electron absorbs energy and then re-emits it. They can be used to identify elements, as all elements have unique line spectra.

- **As an add-on to this, the formation of line spectra and continuous spectra happen by completely different processes. Continuous spectra are caused by transitions, not of electrons in isolated particles, but by transitions in giant numbers of particles. For reasons having to do with quantum mechanics, this means that you'll see a big broad continuous spectrum rather than the line spectra of smaller samples.**

15) What is a probability distribution? (3 pt)
Probability distributions indicate the intensity of an electron at a given distance from the nucleus.

- **This is sometimes falsely described in the sense of the electron jumping from one place to another in an atom. This isn't the case – what really happens is that electrons in an atom take various 3-D shapes (called waves) when in the atom. This follows the Heisenberg uncertainty principle, which states that you can't simultaneously know the position and energy of an object to infinite precision.**

16) What's the abbreviated electron configuration of copper? (1 pt)
$[Ar]4s^2 3d^9$

17) What group on the periodic table comprises the alkali metals? (1 pt) **1**

18) What do elements in the same period have in common with one another? (2 pt)
Their electrons have similar energies.

19) Why does electronegativity decrease as you move down a column in the periodic table? (3 pt)
Because of the shielding effect, in which electrons in inner energy levels push away electrons from outer energy levels. This push makes it less likely that an atom will pull electrons into its outer energy level.

21) Why are ionic compounds hard and brittle, while covalent compounds are relatively soft and squishy? (4 pt)
Ionic compounds are big blocks of cations and anions all stuck to one another, while in covalent compounds the atoms form molecules that have very little interaction with one another.

22) Name the following chemical compounds (1 pt each)

- NaBr **sodium bromide**
- PBr_3 **phosphorus tribromide**
- H_2SO_4 **sulfuric acid**
- BF_3 **boron trifluoride**
- MnO_2 **manganese (IV) oxide**

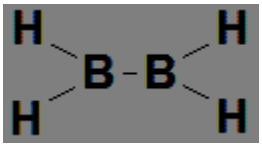
23) Write the formulas of the following chemical compounds (1 pt each)

- phosphoric acid **H_3PO_4**
- oxygen difluoride **OF_2**
- chromium (IV) nitride **Cr_3N_4**
- silicon tetrachloride **$SiCl_4$**
- ammonia **NH_3**

24) What is the electron sea theory? (2 pts)
In metals, the nuclei act as "islands" of positive charge in an ocean of delocalized electrons, which bind them all together.

25) For the molecule diboron tetrahydride, draw the Lewis structure and determine the bond angles, hybridization of boron, and molecular shape (3 pt Lewis structure, 1 pt bond angles, 1 pt hybridization, 1 pt shape):

Lewis structure:



Hybridization: **sp^2**

Bond angles: **120º**

Shape: **trigonal planar**

26) What does it mean when we refer to a molecule as being "polar"? (3 pt)
This means that the electrons are unequally distributed, with more on one side of the molecule than the other.

27) How many grams are there in 18.6 moles of nitrogen dioxide? (3 pt)
18.6 moles of NO_2 has a mass of 856 grams

28) Write complete, balanced equations for each of the following (5 pt each)

- When the butane (C_4H_{10}) in a gas camp stove is burned in oxygen, the products of the reaction are carbon dioxide gas and water vapor.

  $2\ C_4H_{10(g)} + 13\ O_{2(g)} \rightarrow 8\ CO_{2(g)} + 10\ H_2O_{(g)}$ $\Delta H = -$

  (there should also be a Δ written above the arrow)

- When chlorine gas is combined with ethylene gas (C_2H_4) at high temperature and pressure, tetrachloroethylene gas (C_2Cl_4) and hydrogen gas are formed.

  $2\ Cl_{2(g)} + C_2H_{4(g)} \rightarrow C_2Cl_{4(g)} + 2\ H_{2(g)}$ $\Delta H = -$

  (there should be a Δ written above the arrow plus some indication that high pressure is being used)

ProblemSet: Velocity

$$V = \frac{\Delta d}{\Delta t}$$

(Show all work and include UNITS for each answer.)

1. Find the velocity of a turtle who swims 100 meters toward the shore in 25 seconds.

V = ?

t =

t =

Velocity =

2. Find the velocity of a baseball thrown across a field, a distance of 40 meters. It takes the ball 4 seconds to cross the field.

V = ?

t =

t =

Velocity =

3. Find the velocity of a car that travels north 80 km in 2 hours. *Check your units!

V = ?

t =

t =

Velocity =

4. Find the velocity of a dog that runs 120 meters towards a cat in 60 seconds.

V = ?

t =

t =

Velocity =

5. Find the velocity of the cat that outruns the dog by doing the same 120 meters in 40 seconds.

V = ?

t =

t =

Velocity =

Part 2: Calculate distance using the same equation. (d = v x t)

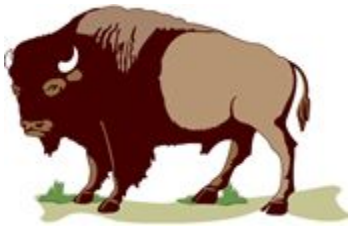
6. Determine the distance of a cyclist that travels 5 hours at a velocity of 12 km/h.

V =

t =

d = ?

distance =



7. Determine the distance a buffalo travels in 4 hours at a velocity of 6 km/h.

V =

t =

d = ?

distance =

8. Determine the distance a bus travels in 2 hours at a velocity of 100 km/h.

V =

t =

d = ?

distance =

Part 3: Determine the time it takes for:

9. A skater moving 50 km/h to move 100 km.

V =

t = ?

d =

time=

10. A plane moving 100 km/h to move 600 kilometers.

V =

t = ?

d =

time=

REMOTE PHYSICS: NUCLEAR REACTIONS & RADIOACTIVITY

Name:_____ period:_____ teacher:_____

READ THIS!

If you have questions: email your teacher or email Dr. Jennifer Miller (milleje3@tulsaschools.org) for help. You may also call 918.925.1118 if you need help and do not have internet access.

Goal: Explain and predict nuclear reactions and the types of radiation/ amount of energy they emit.

BIG QUESTION: Why are nuclear reactions such a powerful source of energy and why are there such great risks associated with nuclear energy?

Standards:

HS-PS1-8 Develop models to illustrate the changes in the composition of the nucleus of the atom and the energy released during the processes of fission, fusion, and radioactive decay.

Student outcomes:

By the end of this unit you should be able to:

- ❏ Students develop models to identify and describe the relevant components of the models, including:
  - ❏ Identification of an element by the number of protons;
  - ❏ Calculating the number of protons and neutrons in the nucleus before and after the decay;
  - ❏ Identification of the emitted particles (i.e., alpha, beta — both electrons and positrons, and gamma);
  - ❏ The scale of energy changes associated with nuclear processes, relative to the scale of energy changes associated with chemical processes.
- ❏ develop five distinct models to illustrate the relationships between components underlying the nuclear processes of 1) fission, 2) fusion and 3) three distinct types of radioactive decay.
  - ❏ include the following features, based on evidence, in all five models:
    - ❏ The total number of neutrons plus protons is the same both before and after the nuclear process, although the total number of protons and the total number of neutrons may be different before and after.
    - ❏ The scale of energy changes in a nuclear process is much larger (hundreds of thousands or even millions of times larger) than the scale of energy changes in a chemical process.
- ❏ develop a fusion model that illustrates a process in which two nuclei merge to form a single, larger nucleus with a larger number of protons than were in either of the two original nuclei.
- ❏ develop a fission model that illustrates a process in which a nucleus splits into two or more fragments that each have a smaller number of protons than were in the original nucleus.

- ❏ In both the fission and fusion models, students illustrate that these processes may release energy and may require initial energy for the reaction to take place.
- ❏ Students develop radioactive decay models that illustrate the differences in type of energy (e.g., kinetic energy, electromagnetic radiation) and type of particle (e.g., alpha particle, beta particle) released during alpha, beta, and gamma radioactive decay, and any change from one element to another that can occur due to the process.
- ❏ Students develop radioactive decay models that describe that alpha particle emission is a type of fission reaction, and that beta and gamma emission are not.

NUCLEAR REACTIONS & RADIOACTIVITY

Radioactivity was discovered quite by accident. In 1896, Henri Becquerel was studying the effect of certain uranium salts on photographic film plates. He believed that the salts had an effect on the film only when they had been exposed to sunlight. He accidentally found that uranium salts that had not been exposed to sunlight still had an effect on the photographic plates. The Curies, associates of Becquerel at the time, showed that the uranium was emitting a type of ray that interacted with the film. Marie Curie called this radioactivity. Radioactivity is the spontaneous breakdown of an atom's nucleus by the emission of particles and/or radiation. RadiatIon is the emission of energy through space in the form of particles and/or waves.

Nuclear reactions are very different from chemical reactions. In chemical reactions, atoms become more stable by participating in a transfer of electrons or by sharing electrons with other atoms. In nuclear reactions, it is the nucleus of the atom that gains stability by undergoing a change of some kind. Some elements have no stable isotopes, which means that any atom of that element is radioactive. For some other elements, only certain isotopes are radioactive. A radioisotope is an isotope of an element that is unstable and undergoes radioactive decay. The energies that are released in nuclear reactions are many orders of magnitude greater than the energies involved in chemical reactions. Unlike chemical reactions, nuclear reactions are not noticeably affected by changes in environmental conditions, such as temperature or pressure. Major differences between nuclear and chemical reactions include:

1. Nuclear reactions involve a change in an atom's nucleus, usually producing a different element. Chemical reactions, on the other hand, involve only a rearrangement of electrons and do not involve changes in the nuclei.
2. Chemical reactions always conserve mass. Nuclear reactions do not, but only conserve the total number of protons + neutrons.
3. Different isotopes of an element normally behave similarly in chemical reactions. The nuclear chemistry of different isotopes vary greatly from each other.
4. Rates of chemical reactions are influenced by temperature and catalysts. Rates of nuclear reactions are unaffected by such factors.
5. Nuclear reactions are independent of the chemical form of the element.
6. Energy changes accompanying nuclear reactions are much larger. This energy comes from destruction of mass.

The discovery of radioactivity and its effects on the nuclei of elements disproved Dalton's assumption that atoms are indivisible. A nuclide is a term for an atom with a specific number of

protons and neutrons in its nucleus. As we will see, when nuclides of one type emit radiation, they are changed into different nuclides.

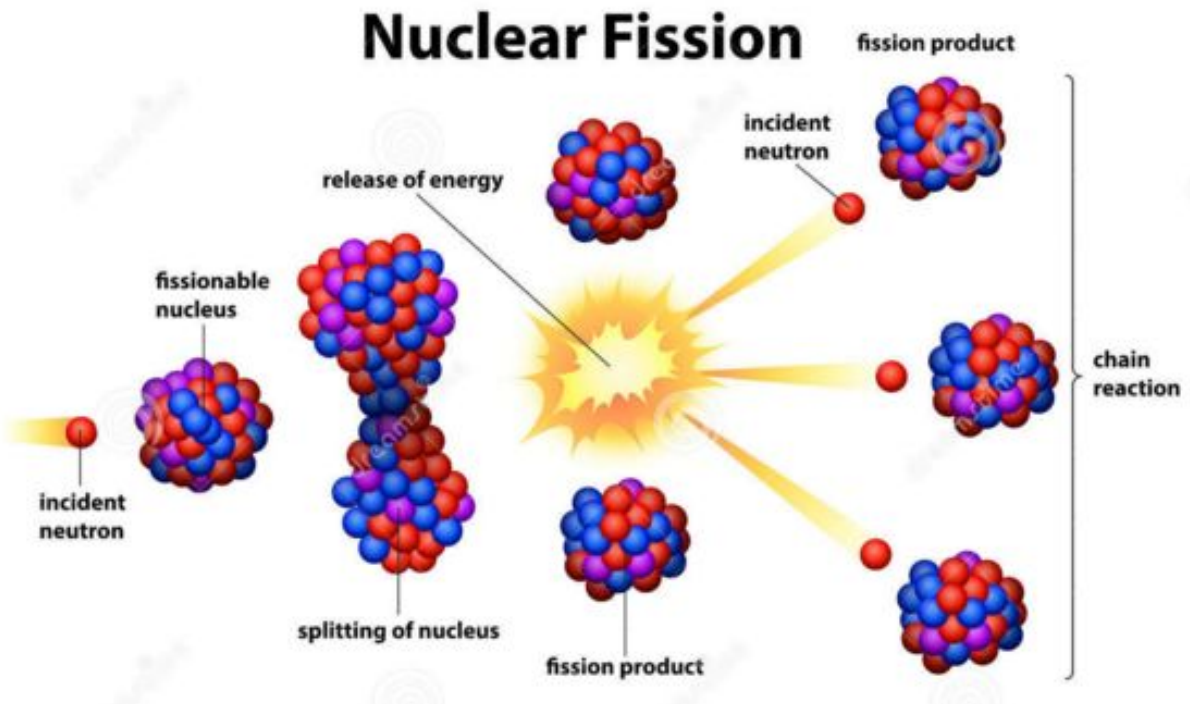
Radioactive decay is spontaneous and does not require an input of energy to occur. The stability of a particular nuclide depends on the composition of its nucleus, including the number of protons, the number of neutrons, and the proton-to-neutron ratio.

If you have internet access: https://www.youtube.com/watch?v=TJgc28csgV0

(Fission Reactions)

Fission reactions occur when the nuclei of an isotope are bombarded with neutrons, causing the isotopes to split into two smaller fragments of the same size.

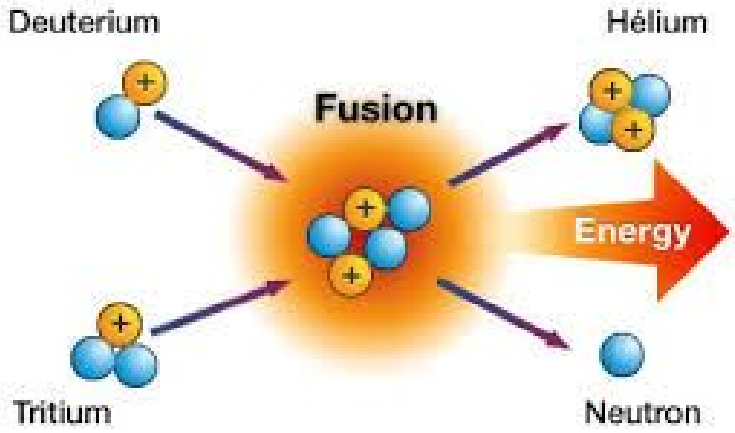
- Release large amounts of energy
- Atomic bombs are uncontrolled fission reactions
- Controlled fission is how we harness nuclear energy
    - Lots of nuclear waste from fuel rods made of "used up" isotopes
    - Highly radioactive
    - Usually Pu-239 or U-235
    - It takes ~20,000 years for used Pu-239 to decay to safe levels



[Fusion Reactions]

Fusion reactions occur when nuclei combine to form a nucleus of a greater mass.

- Release much more energy than Fission
- Process that occurs on the sun, providing energy for the universe.
- Occurs at extremely high temperatures
    - The Hydrogen bomb was an uncontrolled fusion reaction
    - Humans are currently unable to harness fusion energy in a controlled way



Radioactive Decay

Radioactive decay is when an atomic nucleus of an unstable atom loses energy by emitting nuclear radiation.

- ALL atoms with atomic numbers greater than 83 are radioactive due to instability.

IF you have internet access→ https://www.youtube.com/watch?v=FU6y1XIADdg

Note: in a balanced nuclear equation, the sum of the atomic numbers (subscripts) and the sum of the mass numbers (superscripts) must be equal on both sides of the equation. Recall the notation system for isotopes, which shows both the atomic number and mass number along with the chemical symbol.

Alpha decay

- Alpha decay is the loss of an α-particle (which is a helium nucleus)
- Alpha decay typically occurs for very heavy nuclei in which the nuclei are unstable due to large numbers of nucleons. For nuclei that undergo alpha decay, their stability is increased by the subtraction of two protons and two neutrons. For example, polonium-210 decays into lead-206 by the emission of an alpha particle (see equation below).

$$^{210}_{84}\mathrm{Po} \rightarrow {}^{206}_{82}\mathrm{Pb} + {}^{4}_{2}\mathrm{He}$$

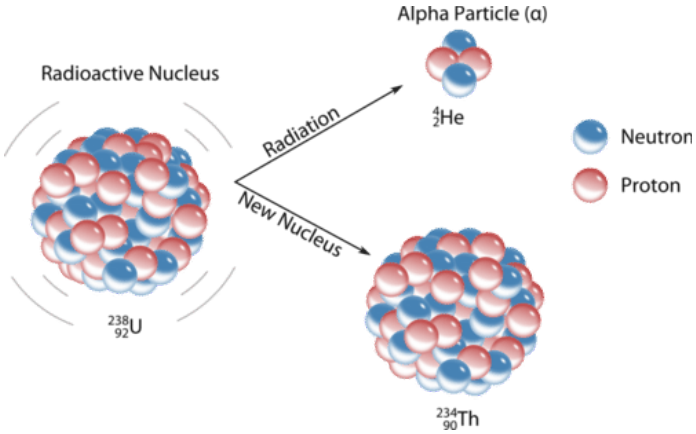


Figure: The unstable uranium-238 nucleus spontaneously decays into a thorium-234 nucleus by emitting an alpha particle

Health Impacts:

- Not harmful unless ingested or inhaled (e.g. cigarettes and Po-210)
- Blocked by skin

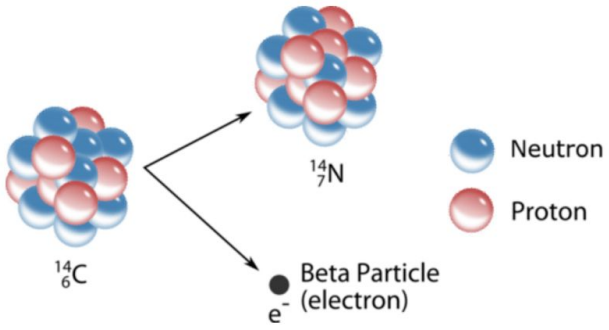
Beta Decay

A beta particle (β) is a high-speed electron emitted from the nucleus of an atom during some kinds of radioactive decay (see figure below).

- The symbol for a beta particle in an equation is either β or $^{0}_{-1}e$.
- or Carbon-14 undergoes beta decay, transmutating into a nitrogen-14 nucleus.
- The beta decay of a carbon-14 nuclide involves the conversion of a neutron to a proton and an electron, with the electron being emitted from the nucleus

$$^{14}_{6}C \rightarrow {}^{14}_{7}N + {}^{0}_{-1}e$$

Note that beta decay increases the atomic number by one, but the mass number remains the same.



Health Impacts:

- More penetrating than alpha particles
- Blocked by a few cm plastic/ mm of metal

Positron Emission (aka Beta positive decay)

A positron is a particle with the same mass as an electron, but with a positive charge. Like the beta particle, a positron is immediately ejected from the nucleus upon its formation. The symbol for a positron in an equation is $^{0}_{+1}e$. For example, potassium-38 emits a positron, becoming argon-38.

$$^{38}_{19}K \rightarrow {}^{38}_{18}Ar + {}^{0}_{1}e$$

Positron emission decreases the atomic number by one, but the mass number remains the same.

Electron Capture

An alternate way for a nuclide to increase its neutron to proton ratio is by a phenomenon called electron capture. In electron capture, an electron from an inner orbital is captured by the nucleus of the atom and combined with a proton to form a neutron. For example, silver-106 undergoes electron capture to become palladium-106.

$$^{106}_{47}\mathrm{Ag} + {}^{0}_{-1}\mathrm{e} \rightarrow {}^{106}_{46}\mathrm{Pd}$$

Note that the overall result of electron capture is identical to positron emission. The atomic number decreases by one while the mass number remains the same.

Gamma Decay

Gamma rays (γ) are very high energy electromagnetic waves emitted from a nucleus. Gamma rays are emitted by a nucleus when nuclear particles undergo transitions between nuclear energy levels. This is analogous to the electromagnetic radiation emitted when excited electrons drop from higher to lower energy levels; the only difference is that nuclear transitions release much more energetic radiation. Gamma ray emission often accompanies the decay of a nuclide by other means.

$$^{230}_{90}\mathrm{Th} \rightarrow {}^{226}_{88}\mathrm{Ra} + {}^{4}_{2}\mathrm{He} + \gamma$$

The emission of gamma radiation has no effect on the atomic number or mass number of the products, but it reduces their overall energy.

Health Impacts:

- High penetration levels
- Dampened by heavy metals (mm of lead) or thick dense material (e.g. block of solid concrete)

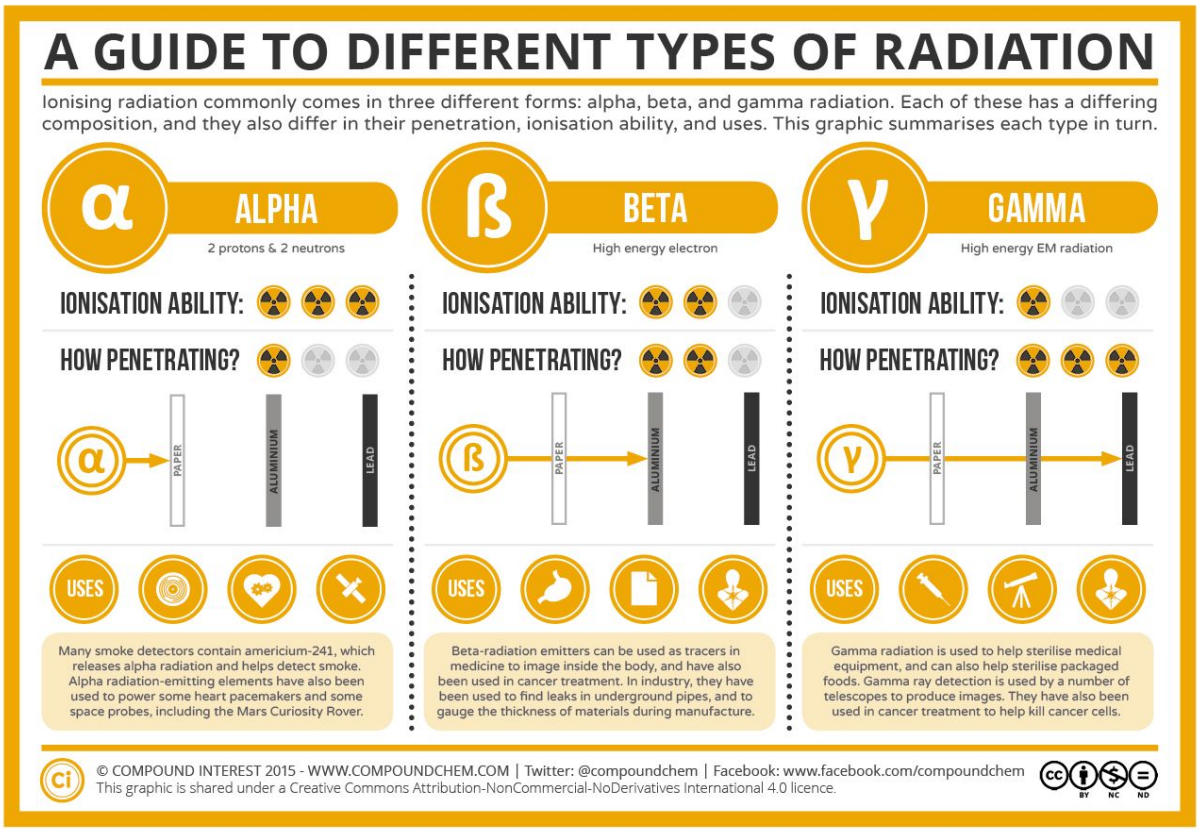


Table 10.1.1 *Summary of types of nuclear radiation.*

Type	Symbol	Mass number	Charge	Penetration Power	Shielding
Alpha particle	$^{4}_{2}\mathrm{He}$ or α	4	$2+$	Low	Paper, skin
Beta particle	$^{0}_{-1}\mathrm{e}$ or β	0	$1-$	Moderate	Heavy cloth, plastic
Positron	$^{0}_{1}\mathrm{e}$ or β^{+}	0	$1+$	Moderate	Heavy cloth, plastic
Gamma ray	γ or $^{0}_{0}\gamma$	0	0	High	Lead, concrete
Neutron	$^{1}_{0}\mathrm{n}$	1	0	High	Water, lead

For questions 1-7 identify each as a fusion or fission. For 8-13 circle the correct choice and correct any false statements.

1. Used in nuclear power plants: fusion or fission

2. Occurs on the sun: fusion or fission

3. More power per gram: fusion or fission

4. A larger nucleus divides to make a smaller nucleus: fusion or fission

5. Two hydrogen atoms fuse to make a helium atom: fusion or fission

6. An atomic bomb: fusion or fission

7. A hydrogen bomb: fusion or fission

8. What characteristic defines an element?
   a. number of protons
   b. number of electrons
   c. number of neutrons
   d. sum of protons and neutrons
   e. atomic weight
9. The disintegration of certain isotopes by the emission of subatomic particles is:
   a. radioactive decay
   b. Fusion
   c. daughter production
   d. Fission
   e. carbon dating
10. Alpha decay involves the:
   a. loss of 2 protons and 2 neutrons
   b. conversion of a neutron to proton
   c. combining of a proton and an electron to form a neutron
   d. loss of a proton and gain of a neutron
   e. capture of a neutron
11. Fission produces heavier elements than the starting ones. True/False

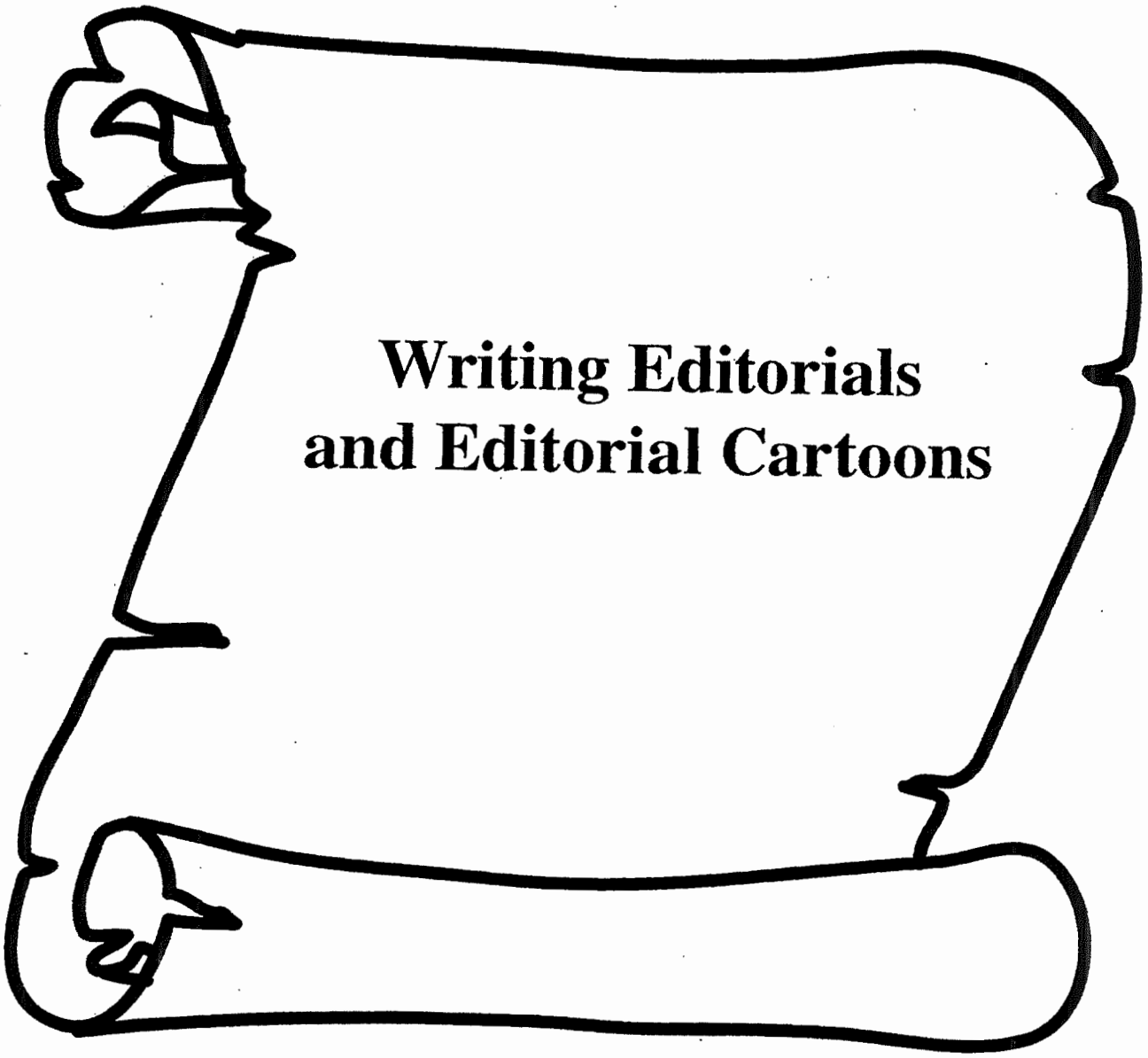
12. Gamma rays are a form of:
   a. neutron radiation
   b. particle radiation
   c. electromagnetic radiation
   d. beta radiation
   e. alpha radiation
13. Alpha radiation is extremely dangerous because it is a highly penetrating form of radiation. True/False

14. For each of the nuclear reactions below, identify them as fission, fusion, or radioactive decay

$^{235}_{92}U + {}^{1}_{0}n \rightarrow {}^{80}_{38}Sr + {}^{153}_{54}Xe + 3\,{}^{1}_{0}n$	a.
$^{13}_{7}N \rightarrow {}^{13}_{6}C + {}^{0}_{1}e$	b.
$^{241}_{95}Am \rightarrow {}^{237}_{93}Np + {}^{4}_{2}He$	c.
$^{2}_{1}H + {}^{2}_{1}H \rightarrow {}^{3}_{2}He + {}^{1}_{0}n$	d.
$^{14}_{7}N + {}^{4}_{2}\alpha \rightarrow {}^{17}_{8}O + {}^{1}_{1}p$	e. transmutation
$^{14}_{6}C \rightarrow {}^{14}_{7}N + {}^{0}_{-1}e$	f.
$^{97}_{42}Mo + {}^{2}_{1}H \rightarrow {}^{97}_{43}Tc + 2\,{}^{1}_{0}n$	g. transmutation
$^{26}_{13}Al + {}^{0}_{-1}e \rightarrow {}^{26}_{12}Mg + {}^{0}_{0}\gamma$	h.
$^{58}_{26}Fe + 2\,{}^{1}_{0}n \rightarrow {}^{60}_{27}Co + 2\,{}^{0}_{-1}e$	i. transmutation
$^{2}_{1}H + {}^{3}_{1}H \rightarrow {}^{4}_{2}He + {}^{1}_{0}n$	J.

15. Use 2 of the nuclear reactions in question 14 above to prove that the number of protons and neutrons are conserved in nuclear reactions.

Resources:
https://chem.libretexts.org/Bookshelves/Introductory_Chemistry/Book%3A_Chemistry_for_Allied_Health_(Soult)/11%3A_Nuclear_and_Chemical_Reactions/11.1%3A_Nuclear_Radiation
http://ch302.cm.utexas.edu/worksheets/Identifying%20Nuclear%20Reactions%20-%20KEY.pdf



Writing Editorials and Editorial Cartoons

Write an Editorial
(Synthesize)
Teacher Instructions

Timeline

2 to 3 periods

Rationale

This writing style provides students opportunities to persuade fellow students or community members their arguments about an issue or topic. Using this strategy will prepare students to participate as a citizen. Students assess the credibility of the sources and draw sound conclusions.

Instruction

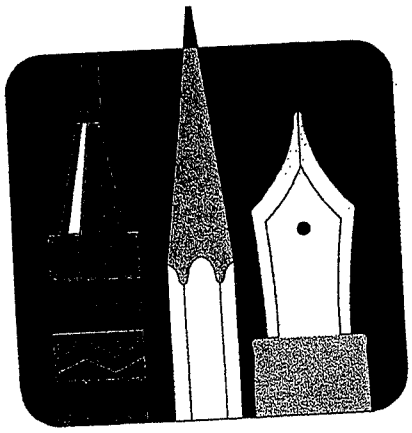
1. Examine Editorials in the newspaper and discuss
2. Read about a topic or issue from the textbook, newspaper, magazine, or Internet.
3. Discuss the reading.
4. Review the student examples and discuss the format.
5. Share with group or class your editorial.
6. Use Peer Review to strengthen editorial, examining conventions and format.

Assessment

Use the scoring guide on Constructing Meaning.

Extension

Students may create an editorial during the study of various topics in history, geography, civics, and economics.



Write an Editorial

Student Instructions

The editorial page is a lively marketplace of ideas. Readers may accept or reject those ideas, but they almost always learn something by considering the opinions offered on the editorial page.

Good editorials are the conscience of the community and the defender of the community values. In a broader sense, they are a crucial component of a robust public dialogue, which is the hallmark of the American experiment in self-government.

The editorial page is the one place in the newspaper where the facts of our complex world are synthesized into analysis and opinion to help guide the public debate and search out solutions to society's problems. The editorial page is for thinkers, for readers who want another dimension on the news, who want more than just the facts.

Of course, the very best editorials are persuasive. But every editorial should have as its goal not only to persuade but also to educate. This requires the writer to buttress his opinions with facts and to counter the arguments made by those who hold the opposite view.

Above all, good editorials take a strong stand, even when that might be controversial or unpopular. Editorialists are not afraid to argue a contested point of view, not afraid to offend, afraid to stake out a firm position; the power of their ideas can exert a crucial influence on events.

Helpful Ideas

1. Do not use I, me, or my in the editorial. Remember, editorials reflect the viewpoint of the newspaper; therefore, it is acceptable to use words such as we, our, us.

2. Keep in mind the main purposes of the editorial: to explain or interpret, to criticize, to persuade, and to praise. Editorials always have one of these purposes as their primary goal, and often they have one or more of the other purposes as a secondary goal.

3. Editorials are similar to letters to the editor in that they use facts to support opinions and often they include the opposing viewpoint for comparison and contrast.

4. Editorial writers use transitional words or phrases to link paragraphs together.

In general, editorials follow a three-part structure:

1. Introduction of the issue and the newspaper's viewpoint;

2. Body of the editorial, which focuses on background information and details that support the newspaper's opinion;

3. Conclusion that restates the newspaper's viewpoint.

Editorial Sample
San Diego Union Tribune Newspaper in Education Program
"Teach your Children Well"
Student Example

"We were right about a lot of things in the 1960's," rocker David Crosby once said. "We were right that peace is better than war and that love is better than hate ... But we were wrong about drugs."

Today's baby-boomer parents should consider those words.

Introduction

Crosby knows from experience. A product of the free-wheeling '60s, he abused drugs and alcohol for years. That lifestyle nearly killed him, just as it did many of the famous and not-so-famous who once believed drugs really weren't so bad. Although clean and sober for a decade, Crosby recently needed a liver transplant because his original one was so damaged.

But today, many parents apparently are not teaching their children well, as a Crosby, Stills and Nash song once urged. A study by Columbia University's Center on Addition and Substance Abuse shows that today's parents are far too tolerant of drug use.

Main Point

Thus, it's not surprising that teen-age drug use is up, and will continue to rise. The Center on Addiction study showed that 22 percent of teens say they are likely to use drugs at some time, twice the rate reported last year.

Of course, some people would like to make this into a political issue. But we have no one to blame but ourselves.

Just like in the '60s and '70s, our society has become tolerant of drugs, and once again popular culture is leading the way. It's becoming common to see kids wearing T-shirts with the marijuana leaf emblem on them-even in the company of their parents. The lyrics of popular songs are once again talking nonchalantly about getting high, while some bands openly espouse drug use. Accepting attitudes toward drugs have crept back into, magazines and books. And once again, people are saying that marijuana is harmless, that it's just an herb.

Apparently, we haven't learned anything. Marijuana is a dangerous drug. It can lead to harder drug use. It impairs short-term memory. It's particularly harmful to young people because it damages their ability to maintain their attention span and it cripples emotional development. These two things alone are extremely critical for growing and learning teen-agers.

Another retread idea from the '60s and '70s is that marijuana is somehow less dangerous for teens than alcohol. What rot! Both are dangerous. And besides, teens that abuse drugs are more likely to abuse alcohol, anyway.

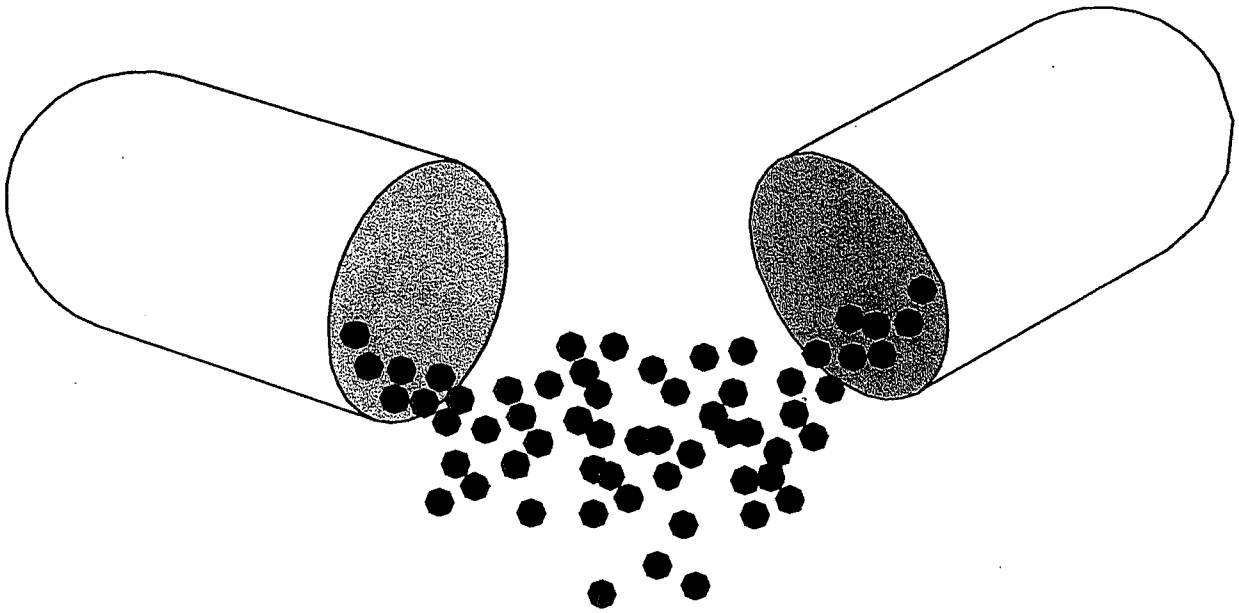
The height of hypocrisy is that many baby boomers and their teenage kids who are tolerant toward drugs are at the same time horrified by the violent crime, gang shootings and street drug-dealing that plague our cities. But they don't see the connection.

Editorial Sample
San Diego Union Tribune Newspaper in Education Program
"Teach your Children Well" (continued)
Student Example

Study after study dating back for decades shows a direct link between drug and alcohol abuse and violent crime. What's more, the marijuana that suburban kids smoke has the blood of drug smugglers and the blight of our inner cities on it?

Drugs come from drug dealers, and drug dealers don't differentiate between trading in marijuana, crack cocaine or even weapons, for that matter.

Parents who blame society, culture or politicians for rising teen drug use need to look in the mirror. Our society was wrong conclusion about drugs in the '60s. Any tolerance or leniency about drugs is doubly wrong today.



Creating Editorial and Political Cartoons (Synthesize)

There are many ways to express opinions, such as speeches, letters, and editorials. Creating an editorial cartoon or political cartoon has been popular for many years. These cartoons use both drawings and words to convey an idea or message about a current issue, event, or problem. They inform and influence public opinion in an entertaining and sometimes humorous way, making fun of a public figure, program, or idea.

An editorial or political cartoon is a simple graphic analysis of a news story or event. The cartoonist may use written labels or messages with the drawing. Often the cartoonist will use symbols to help convey their message.

Editorial and political cartoons provide excellent sources of information about people's attitudes about problems and issues from different time periods. Some cartoons share the "ills" of society while others attempt to prescribe a cure as well.

Find an editorial or political cartoon in the newspaper or your textbook. Analyze and discuss your cartoons, using the discussion questions at the bottom of the page.

Create an editorial or political cartoon about a historic event, or current issue, or past or present problem. After you have completed your interpretative drawing, answer the discussion questions about your cartoon:

Identify the general topic that you want presented.

Create characters in the cartoon and determine whether their features are to be exaggerated.

Create symbols in the cartoon.

1. What is the general subject of the cartoon?

2. What titles or written messages are included?

3. Who are the characters and what do they represent?

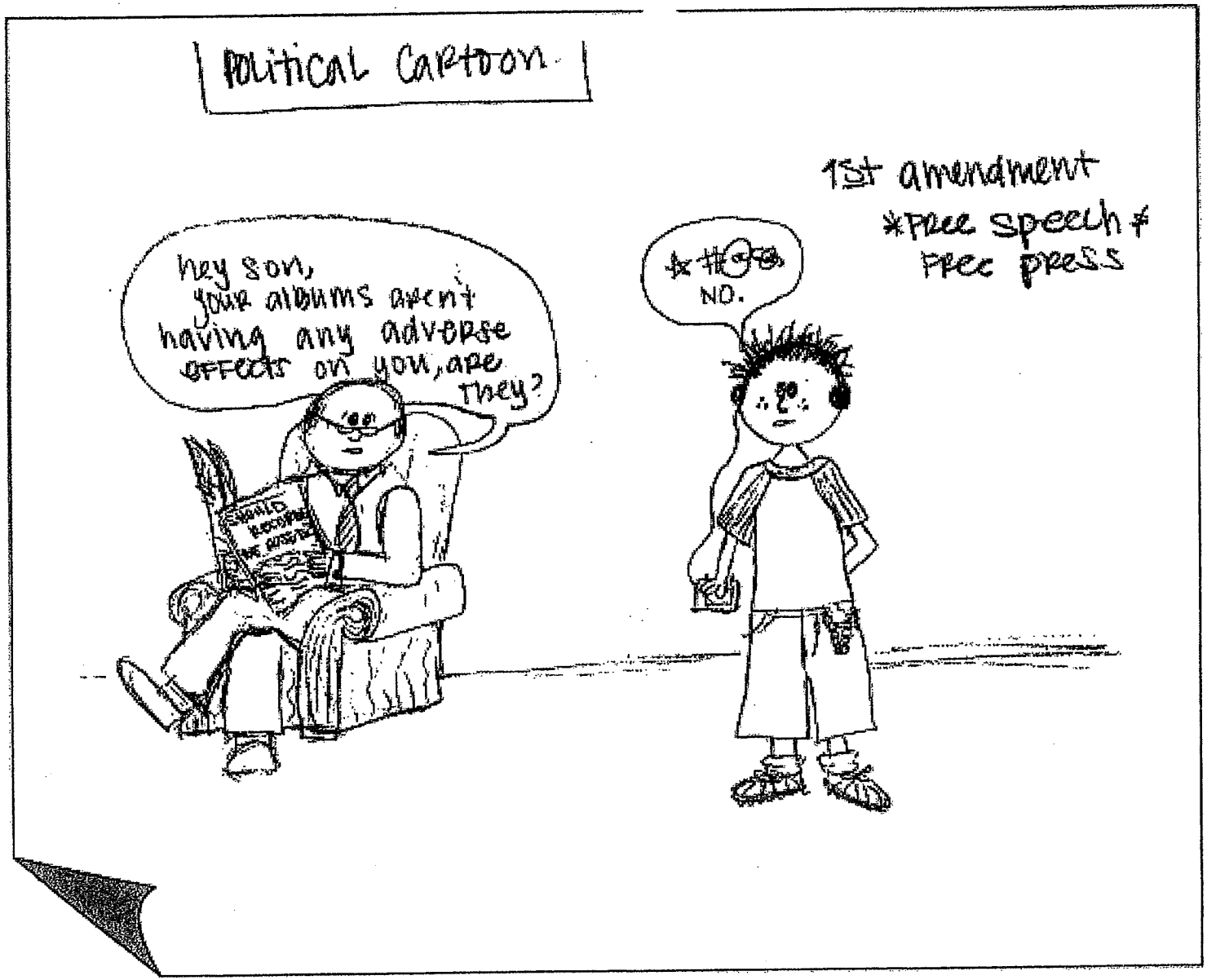
4. What other symbols are used?

5. What is the cartoonist's message?

editorial cartoon

SAMPLE

Reprinted by permission, 2000


Political Cartoon
1st amendment
*Free speech ≠ Free press
hey son, your albums aren't having any adverse effects on you, are they?
NO.

Interpreting Editorial Cartoons
First Amendment

Student Explanation of Political Cartoon

1. The general subject of our cartoon is about the regulation of music lyrics and its influence on children.

2. Our titles or written messages are the dialogue between the son and father along with the newspaper headliner that asks the question, Should Records be Rated?

3. The main characters include the father and the son. Most interesting, they represent the older generation and the younger generation, parents vs. children.

4. Our other symbols include the son's Walkman, also his grungy appearance, the typical father reading the newspaper and not being tuned into his family.

5. Our message is that parents need to pay more attention to what their children listen to and understand that some music lyrics do influence kids.

Secondary World Language Writing Activities

As a team, we recognize that all scholars have different technology access and needs. We also want to make sure you can engage in learning in a way that you enjoy and grow from. As such, we have created a choice board for each language skill. Each skill has options both with and without technology use.

Writing:

Choose any 5 prompts from the options attached. You must write a response for each in your target language. **DO NOT use English, or a translator.** If you must use a dictionary, keep it to a minimum in order to practice writing with what you know. Remember to write as much as you can in complete sentences in the language and to stay on topic.

Level I: ***Choose the 5 topics you want to write about. If you have not learned how to write about one, choose another.*** 😊 ***Level I students looking for a challenge may also choose a Level II prompt if they prefer.***

- List the activities you like and do not like to do- sports included. (Write a sentence about each.)
- List the foods you like and do not like to eat. (Write a sentence about each.)
- Pretend you are at the doctor. Describe what is wrong and what hurts. Make a list of the body parts and problems you have.
- Describe your best friend or a family member. (minimum 5 descriptive adjectives)
- Describe your favorite celebrity. (minimum 5 descriptive adjectives)
- Describe your family - (Who do you live with, describe them - age, appearance, etc., and list what they like to do.)
- Describe your house – (What colors do you see? What furniture is in it? What does it look like?)
- Describe your dream house. (What is it like? What does it have?)
- Write a description of Tulsa and what activities a visitor from another country may enjoy doing here.
- List and describe animals at the zoo. Choose at least 5.
- Describe the weather in Oklahoma. List the seasons and how the weather is like in each and what clothing you wear for each weather condition.
- Write a comparison between yourself and your best friend. How are you similar and different?
- Write a review of a restaurant you have been to or a movie you saw. What do you like or dislike about it?
- Describe your morning routine. What time do you wake up? What do you do before school? What time do you leave for school? What time do you arrive?
- Describe your school schedule. What school supplies do you bring? What subjects do you have? What classes do you like or dislike?

Level II+: ***Choose the 5 topics you want to write about.***

- Your friend is having a party. They would like to know what your suggestions would be for popular foods and desserts from your area. Explain why you think these would be best.
- What traits have you inherited from family members? How are you similar to your parents or grandparents?
- You are messaging with a pen pal from another country. In his or her last message, he or she asked you to describe your favorite things about school. Respond to him or her and include a variety of different classes, club events or after school activities and why you enjoy them.
- Discuss your childhood. What did you enjoy doing? Who were your friends and what were they like?
- You lost your backpack at school. Describe what it looks like and at least 3 items in it so that your teacher and classmates can help you find it.
- You are going to the zoo this weekend. Write a message for your friend about what you are going to do. Share your plan and describe the animals you hope to see. Explain why you want to see those animals and invite him to go with you.
- How do you stay active and healthy? What are some activities you do for exercise? Explain why you enjoy them and why your friends should do the same.
- What will your life be like in 10 years? What do you hope to be doing? Where will you live? What else do you hope for?
- A friend from another country is spending a year in Tulsa. He or she wants to find out as much as he or she can about where you live; the schools, the best shopping areas, popular music, points of interest, fun things to do, etc. Describe life in Tulsa for him or her!
- In your target language, describe what a typical school day would look like. Describe at least 5 different things that students might experience on any given day. What do you do that is similar to or different from a typical student at a non-language immersion school? Describe what you like most about your day, and why.
- Write about different 'simple' decisions teens might have to make and how different choices might affect them - either negatively or positively, now or in the future. Give examples and advice to the young people around you.
- Write advice for a new student at your school next year. Share with them how to succeed in your language class. Discuss, in detail, three or more strategies that could be used. Use personal examples to show how you have implemented the strategies you are suggesting.
- There are a number of ways to make a difference in your community; clean up a neighborhood, participate in beautification projects, plant a community garden or read to a child. Write an essay describing something you feel is needed or desired in your area. Convince your readers that they should dedicate some of their time to helping in this cause.
- Write a (fake or real) news story summarizing what happened.
- What do you think would make our school better? Write about the ways that you would change our school if you had the power to change anything.
- Describe your favorite holiday and traditions for it.

At Home Activities and Resources for Families (English Language Development)

Greetings dear parent/guardian. Thank you for supporting your child's learning at home. The resources provided in this packet will provide your child with additional opportunities to practice English language development skills through different vocabulary, grammar, and reading skills.

Each packet has stories to read in English with questions and vocabulary activities. You do not need to print any activities as responses can be written on a separate sheet of paper.

Thank you again for your enthusiasm and willingness to do activities with your child at home.

Actividades en el hogar y recursos para familias (Desarrollo del idioma inglés)

Saludos querido padre/tutor. Gracias por apoyar el aprendizaje de su hijo en casa. Los recursos en este paquete le brindarán a su hijo oportunidades para practicar su desarrollo del inglés a través de diferentes actividades de vocabulario, gramática y lectura.

Cada paquete tiene historias para leer en inglés con preguntas y actividades de vocabulario. No necesita imprimir ninguna actividad, ya que las respuestas pueden escribirse en una hoja de papel por separado.

Gracias nuevamente por su entusiasmo en completar las actividades con su hijo en casa.

The Road Not Taken

By Robert Frost

Close Reading

The Road Not Taken

by Robert Frost

Two roads **diverged** in a yellow wood,
And sorry I could not travel both
And be one traveler, long I stood
And looked down one as far as I could
To where it bent in the undergrowth;

Then took the other, as just as fair,
And having perhaps the better **claim**
Because it was grassy and wanted wear,
Though as for that the passing there
Had worn them really about the same,

And both that morning equally lay
In leaves no step had trodden black.
Oh, I marked the first for another day!
Yet knowing how way leads on to way
I doubted if I should ever come back.

I shall be telling this with a sigh
Somewhere ages and ages **hence**:
Two roads diverged in a wood, and I,
I took the one less traveled by,
And that has made all the difference.

In Other Words
diverged split
claim look
hence in the future

Name _____

Read for Understanding

A. What kind of text is this? How do you know?

_____

B. Write a sentence that tells the topic of the poem.

_____

_____

Reread and Summarize

C. On **Practice Book** page 28, circle the 3–5 most important words in each section. Make notes about why you chose each word. Why is the word important in the section?

1. Section 1: (stanzas 1–2; lines 1–10)

_____

_____

2. Section 2: (stanzas 3–4; lines 11–20)

_____

_____

D. Use your topic sentence from above and your notes to write a summary of the selection.

_____

_____

_____

Name _____

Reread and Analyze

E. Make connections to the poem.

1. Reread the fourth stanza on **Practice Book** page 28. Think of a time when you made a difficult choice. How does this experience help you understand the poem?

_____

_____

_____

2. Underline words or sentences on **Practice Book** page 28 that tell about the choice the poet made. Continue to make connections to your own choice.

_____

_____

F. Make inferences about the poem.

1. Reread the fourth stanza on **Practice Book** page 28. Make an inference about how the poet feels about the choice he made.

_____

_____

_____

2. On **Practice Book** page 28, underline parts of the poem that support your inference. Tell what personal knowledge helped you make this inference.

_____

_____

Name _____

Discuss and Write

G. Synthesize your ideas about making connections and inferences.

1. With the class, discuss how your connections and inferences added to your understanding of the poem. How did linking your experiences and things you know with the poem help you figure it out?

_____

_____

_____

_____

_____

2. Write a paragraph about how your connections or inferences added to your understanding. Choose one connection or inference.
   - What connection or inference did you make?
   - How did your connection or inference help you understand the poem?

_____

_____

_____

Connect with GUIDING QUESTION

H. Discuss the Guiding Question: How do decisions affect your identity?

1. Based on the decisions the poet made, what kind of person do you think he is?

_____

_____

2. What choice have you made that has affected your identity?

_____

_____

Adventures Of Tom Sawyer

By Mark Twain

Close Reading

from the Adventures of TOM SAWYER

BY MARK TWAIN

Tom Sawyer ' "Well, I don't see why I oughtn't to like it." ' (Tom Sawyer Whitewashing the Fence by Norman Rockwell*) The Adventures of Tom Sawyer;* Twain, Mark; 1936

1 Tom began to think of the fun he had planned for this day, and his sorrows multiplied. Soon the free boys would come tripping along on all sorts of delicious expeditions, and they would make a world of fun of him for having to work—the very thought of it burnt him like fire. He got out his worldly wealth and examined it—bits of toys, marbles, and trash; enough to buy an exchange of work, maybe, but not half enough to buy so much as half an hour of pure freedom. So he returned his **straitened means** to his pocket, and gave up the idea of trying to buy the boys. At this dark and hopeless moment an inspiration burst upon him! Nothing less than a great, magnificent inspiration.

2 He took up his brush and went tranquilly to work. Ben Rogers hove in sight presently—the very boy, of all boys, whose ridicule he had been dreading. Ben's gait was the hop-skip-and-jump—proof enough that his heart was light and his anticipations high. He was eating an apple, and giving a long, melodious whoop, at intervals, followed by a deep-toned ding-dong-dong, ding-dong-dong, for he was personating a steamboat. As he drew near, he slackened speed, took the middle of the street, leaned far over to starboard and rounded to ponderously and with laborious pomp and circumstance—for he was personating the Big Missouri, and considered himself to be drawing nine feet of water.

3 Tom went on whitewashing—paid no attention to the steamboat. Ben stared a moment and then said:

4 "Hi-*yi! You're* **up a stump, ain't you**?"

5 No answer. Tom surveyed his last touch with the eye of an artist, then he gave his brush another gentle sweep and surveyed the result, as before. Ben ranged up alongside of him. Tom's mouth watered for the apple, but he stuck to his work. Ben said:

6 "Hello, old chap, you got to work, hey?"

7 Tom wheeled suddenly and said:

8 "Why, it's you, Ben! **I warn't noticing**."

In Other Words

straitened means tiny amount of treasure
up a stump, ain't you in trouble, aren't you
I warn't noticing I didn't see you.

9 "Say—I'm going in a-swimming, I am. Don't you wish you could? But of course you'd **druther** *work*—wouldn't you? Course you would!"

10 Tom contemplated the boy a bit, and said:

11 "What do you call work?"

12 "Why, ain't *that* work?"

13 Tom resumed his whitewashing, and answered carelessly:

14 "Well, maybe it is, and maybe it ain't. All I know, is, it suits Tom Sawyer."

15 "Oh come, now, you don't mean to let on that you like it?"

16 The brush continued to move.

17 "Like it? Well, I don't see why I oughtn't to like it. Does a boy get a chance to whitewash a fence every day?"

"What do you call work?"

18 **That put the thing in a new light.** Ben stopped nibbling his apple. Tom swept his brush daintily back and forth—stepped back to note the effect—added a touch here and there—criticized the effect again—Ben watching every move and getting more and more interested, more and more absorbed. Presently he said:

19 "Say, Tom, let me whitewash a little."

20 Tom considered, was about to consent; but he altered his mind:

21 "No—no—I reckon it wouldn't hardly do, Ben. You see, Aunt Polly's awful particular about this fence—right here on the street, you know—but if it was the back fence I wouldn't mind and she wouldn't. Yes, she's awful particular about this fence; it's got to be done very careful; I reckon there ain't one boy in a thousand, maybe two thousand, that can do it the way it's got to be done."

22 "Oh, shucks, I'll be just as careful. Now lemme try. Say—I'll give you the core of my apple."

23 "Well, here—No, Ben, now don't. I'm afeard—"

24 "I'll give you *all* of it!"

25 Tom gave up the brush with reluctance in his face, but **alacrity** in his heart. And while the late steamer Big Missouri worked and sweated in the sun, the retired artist sat on a barrel in the shade close by, dangled his legs, munched his apple, and planned the slaughter of more innocents. There was no lack of material; boys happened along every little while; they came to jeer, but remained to whitewash. And when the middle of the afternoon came, from being a poor poverty-stricken boy in the morning, Tom was literally rolling in wealth.

26 Tom said to himself that it was not such a hollow world, after all. He had discovered a great law of human action, without knowing it—namely, that in order to make a man or a boy covet a thing, it is only necessary to make the thing difficult to attain.

In Other Words
druther prefer to
That put the thing in a new light. That changed how Ben saw it.
alacrity eagerness

Name _____

Read for Understanding

A. From what kind of text is this passage taken? How do you know?

_____

B. Write a sentence that tells the topic of the selection.

_____

Reread and Summarize

C. On **Practice Book** pages 60–61, circle the 3–5 most important words in each section. Make notes about why you chose the word. Why is each word important?

1. Section 1: (paragraphs 1–8)

_____

_____

2. Section 2: (paragraphs 9–24)

_____

_____

3. Section 3: (paragraphs 25–26)

_____

_____

D. Use your topic sentence from above and your notes to write a summary of the selection.

_____

_____

_____

Name _____

Reread and Analyze

E. Analyze how the author uses dialogue to characterize Tom.

1. Reread paragraph 21 on **Practice Book** page 61. What does the writer show you about Tom through this dialogue? Underline words and phrases to support your answers. Explain how the text evidence supports your answer.

_____

_____

_____

_____

2. Underline another line of dialogue on **Practice Book** pages 60–61 that shows what Tom is like. Explain what it shows about Tom.

_____

_____

F. Analyze how the author uses actions to characterize Tom.

1. Read the first sentence in paragraph 25 on **Practice Book** page 61. What does the writer show you about Tom through this action? Underline the words and phrases that support your answer. Explain how the text evidence supports your answer.

_____

_____

_____

2. In the **Practice Book**, underline other words about Tom's actions that show what he is like. Explain what it shows about Tom.

_____

_____

Name _____

Discuss and Write

G. Synthesize your ideas about how the author characterized Tom.

1. With the class, discuss how the writer showed Tom's characteristics. List the characteristics that you discuss.

_____ _____ _____

_____ _____ _____

_____ _____ _____

2. Choose one of the characteristics that you listed. Write a paragraph about how the writer showed the characteristic. Use the questions below to organize your thoughts.

   - What characteristic did the writer show?
   - What dialogue supports this characteristic? Give 2 examples.
   - What actions support this characteristic? Give 2 examples.
   - Was the writer's characterization convincing? Why?

_____

_____

_____

_____

_____

Connect with GUIDING QUESTION

H. Discuss the Guiding Question: What happens when people come face-to-face with a rival?

1. Who are Tom's rivals in this text?

_____

2. How does he respond to the rivals?

_____

3. What is the writer's message about rivals?

_____

_____