KCS @ home

Seventh Grade
Math

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Name _____

Compute Sums of Integers

I Can identify integer addition problems. I feel confident that I can write and evaluate expressions to solve real-world integer addition problems.

Spark Your Learning

PAIRS

A submarine was stationed 700 feet below sea level. It ascends 250 feet every hour. If the submarine continues to ascend at the same rate, when will the submarine be at the surface?

Turn and Talk How can you express the depth as an integer to show that the submarine is below water?

During the *Spark Your Learning,* listen and watch for strategies students use. See samples of student work on this page.

Use Integer Addition to Find a Sum

Strategy 1

The submarine's depth is −700 feet.

It ascends 250 feet every hour, so I will repeatedly add 250 until I have arrived at a sum greater than zero.

Hour 1: −700 + 250 = −450

Hour 2: −450 + 250 = −200

Hour 3: −200 +250 ≥ 0 (on the surface)

So it will take the submarine a little less than 3 hours to reach the surface.

If students . . . can explain that descending and being below sea level are represented by negative, and that ascending and being above sea level are represented by positive integers, they are demonstrating understanding of using negative numbers in the real world.

Have these students . . . think of some additional real-world examples using integers. **Ask:**

- Q In what other situations might you encounter a situation similar to the submarine (scuba diving, thermometer, etc.)?

Use Number Line to Model Integer Addition

Strategy 2

If students . . . use a number line to model the depth of the submarine each hour, then these students are still relying on a picture to represent the situation because they may not be comfortable using a negative number to represent something in the real world.

Activate prior knowledge . . . by having students write the words that mean the opposite of some positive words. **Ask:**

- Q What are the negative words that have the opposite meaning of the positive words: *profit, increase, above,* and *gain*?

COMMON ERROR: Uses Incorrect Sign in Result

Hour 1: −700 + 250 = 450

The submarine will be 450 feet above the surface after the first hour.

If students . . . incorrectly state that the submarine will be above sea level after only one hour, then they may need help understanding opposites.

Then intervene . . . by giving students a simpler example to think about. **Ask:**

- Q If the temperature is −3 °F, then by how many degrees does the temperature need to rise to be 0°F?
- Q So if I added 1° or 2° to −3°, then would the temperature be positive or negative?

Name _____

Compute Sums of Integers

I Can identify integer addition problems. I feel confident that I can write and evaluate expressions to solve real-world integer addition problems.

Spark Your Learning

PAIRS

A submarine was stationed 700 feet below sea level. It ascends 250 feet every hour. If the submarine continues to ascend at the same rate, when will the submarine be at the surface?

Possible answer using repeated addition:

Hour 1: $-700 + 250 = -450$

Hour 2: $-450 + 250 = -200$

Hour 3: $-200 + 250 \geq 0$ (on the surface)

So it will take the submarine a little less than 3 hours to be at the surface.

Possible answer using rates:
Submarine ascends at 250 ft/hr. It must ascend 700 feet to reach the surface.

After 1 hour: $1 \times 250 = 250$ feet ascended
After 2 hours: $2 \times 250 = 500$ feet ascended
After 3 hours: $3 \times 250 = 750$ feet ascended

The submarine reaches the surface a little bit before 3 hours.

Possible answer using proportions:

$\frac{250 \text{ ft}}{1 \text{ h}} = \frac{700 \text{ ft}}{x \text{ h}}$

$x = \frac{700}{250} = \frac{14}{5} = 2\frac{4}{5}$ hours

Turn and Talk How can you express the depth as an integer to show that the submarine is below water? See possible answer at the right.

SUPPORT SENSE-MAKING • Three Reads

Tell students to read the question stem three times and prompt them with a different question each time.

1. What is this situation about? Possible answer: a submarine rising up from under the sea to sea level
2. What are the quantities in the situation?
the initial position of the submarine relative to sea level, −700 feet; the surface of the ocean, 0 feet; and the submarine's ascension rate of 250 feet each hour
3. What are possible mathematical questions that you could ask for the situation? Possible answer: How long will it take for the submarine to get to the surface?

1 Spark Your Learning

▶ MOTIVATE

Introduce the problem. **Ask students:** Do you know why a submarine lends itself to integer calculations? Have them share explanations with the class that distances below sea level are represented by negative integers. Ask students to share other real-world scenarios that would also lend themselves to integer calculations.

SUPPORT SENSE-MAKING Three Reads
Have students read the problem three times. Use the questions in the Three Reads box below for a different focus each time.

▶ PERSEVERE

If students need support, guide them by asking:

- **Assessing • Use Tools** Which tool could you use to solve the problem? Students' choices of tools will vary.
- **Assessing** If you draw a picture of the initial depth of the submarine, what integer will you use to represent it? Possible answer: The initial depth is −700 because the submarine is 700 feet below sea level.
- **Assessing** How will the fact that the submarine is ascending impact your hourly calculations? Possible answer: Since ascending is moving in the positive direction, I will add positive integers to the negative integers.
- **Advancing** What does sea level represent in the context of this situation? Possible answer: Sea level represents 0 feet above or below.

Turn and Talk Be sure students understand the concept of below sea level, and how those depths are represented by negative integers. Ask them for additional real-world scenarios of negative integers that are similar to this problem. Possible answer: To show that the submarine is below water, its depth can be expressed as a negative integer.

▶ BUILD SHARED UNDERSTANDING

Select students who used various strategies and tools to share with the class how they solved the problem. Have students discuss why they chose a specific strategy or tool.

Name _____

Add or Subtract a Negative Integer on a Number Line

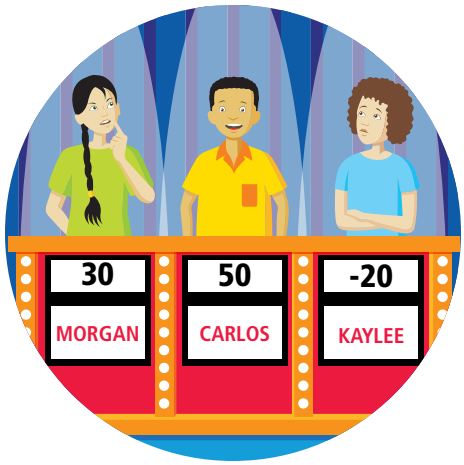
I Can add or subtract negative integers on a number line.

Spark Your Learning

SMALL GROUPS

The scores of three contestants on a game show are shown. The final question is worth 50 points. A correct answer adds 50 points to a contestant's score. An incorrect answer deducts 50 points.

Show the possible final scores for each contestant. What circumstances are necessary for each contestant to win?



Turn and Talk How can you add a number to each score to show a loss?

During the *Spark Your Learning*, listen and watch for strategies students use. See samples of student work on this page.

Use Addition or Subtraction of Positive Integers

Strategy 1

Add 50 points to each score and subtract 50 points from each score.

Carlos wins with 100 points if he gets the final question correct. He could also win with 0 points if he answers incorrectly.

Morgan wins with 80 points if she gets the final question correct and Carlos does not. She cannot win with −20 points. Kaylee wins with 30 points if she gets the final question correct and the others do not. She cannot win with −70 points.

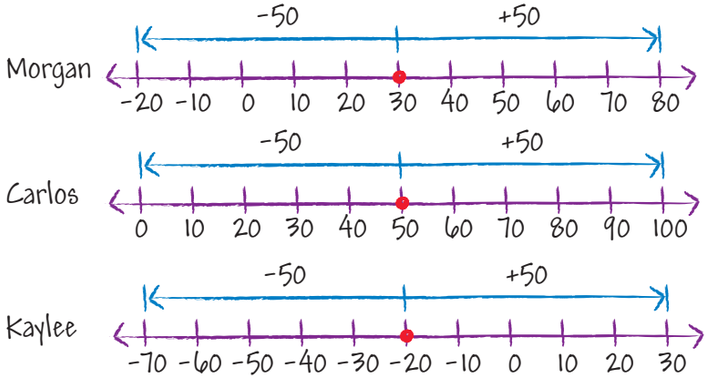
If students ... add and subtract 50 points for each player, then they are demonstrating exemplary understanding of integer operations from Lesson 3.1.

Have these students ... share and explain how they performed these operations. **Ask:**

- Q How did you add 50 points to each score? How did you subtract 50 points?
- Q How did you know when a final score would be negative?
- Q How can you check that the final scores you calculated are reasonable?

Use a Visual Model

Strategy 2



If students ... use number lines or another visual model to represent the relevant integers, then they are demonstrating an understanding of integers from Grade 6.

Activate prior knowledge ... by having students explain their process and then prompt them to transfer their work to a number line. **Ask:**

- Q How do you represent the starting score on a number line?
- Q How can you use the number line to add or subtract 50 points?

COMMON ERROR: Gives Only Positive Scores

Morgan: 30 points

30 + 50 = 80

Carlos: 50 points

50 + 50 = 100

Kaylee: −20 points

If students ... determine that all of the possible final scores are nonnegative, they may be avoiding negative numbers or believe that a negative result of a sum or difference is incorrect.

Then intervene ... by reminding students that a player could lose 50 points by answering the question incorrectly. **Ask:**

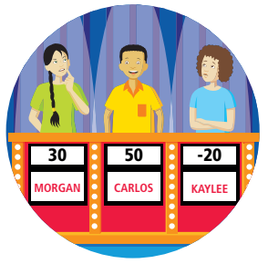
- Q How do you add 50 points to a player's score using a number line?
- Q How do you subtract 50 points from a player's score using a number line?

Name _____

Add or Subtract a Negative Integer on a Number Line

I Can add or subtract negative integers on a number line.

Spark Your Learning



The scores of three contestants on a game show are shown. The final question is worth 50 points. A correct answer adds 50 points to a contestant's score. An incorrect answer deducts 50 points.

Show the possible final scores for each contestant. What circumstances are necessary for each contestant to win?

Possible answer:

Morgan's final score: $30 + 50 = 80$ points; $30 - 50 = -20$

Carlos's final score: $50 + 50 = 100$ points; $50 - 50 = 0$ points

Kaylee's final score: $-20 + 50 = 30$ points; $-20 - 50 = -70$

Carlos wins if he gets the final question correct. Morgan wins if she gets the final question correct and Carlos does not. Kaylee wins if she gets the final question correct and the others do not.

Turn and Talk How can you add a number to each score to show a loss? See possible answer at the right.

SUPPORT SENSE-MAKING • Three Reads

Tell students to read the question stem three times and prompt them with a different question each time.

1. What is the situation about?
   Possible answer: three contestants' scores on a game show
2. What are the quantities in the situation?
   the contestants' scores (30 points, 50 points, −20 points) and the value of the final question (plus or minus 50 points); The information will be combined to figure out the winner.
3. What are possible mathematical questions that you could ask for the situation?
   Possible questions: What will be Morgan's final score if she answers correctly? What will be her final score if she answers incorrectly? What are the possible final scores for each player?

1 Spark Your Learning

▶ MOTIVATE

Introduce the problem. **Ask students:** What do you know about television game shows? In particular, have students discuss different ways the scoring works on various game shows. Tell students to discuss and share with their partner or team members in a small group.

SUPPORT SENSE MAKING Three Reads

Have students read the problem three times. Use the questions in the Three Reads box below for a different focus each time.

▶ PERSEVERE

If students need support, guide them by asking:

- **Assessing** Which contestant is in first place before answering the final question? How do you know? Possible answer: Carlos is in first place because his score, 50, is greater than the other scores, 30 and −20.
- **Assessing** What happens to a contestant's score if he or she answers the final question correctly? 50 points are added to the score.
- **Assessing** What happens to a contestant's score if he or she answers the final question incorrectly? 50 points are subtracted from the score.
- **Advancing • Use Tools** Which tool could you use to solve the problem? Why is this tool more strategic? Students' choices of strategies and tools will vary.
- **Advancing** How many possible final scores are there for each contestant? How do you find those scores? Possible answer: Two final scores are possible for each contestant. To find those scores, add 50 points to each contestant's starting score or subtract 50 points from the contestant's starting score.

Turn and Talk If some students are having difficulty with this question, have them brainstorm with a partner or in a small group. Students may also benefit from considering a specific example, such as writing 30 – 50 as a sum. Possible answer: You can add a negative number, because adding a negative number is like subtracting a positive number.

▶ BUILD SHARED UNDERSTANDING

Select students who used various strategies and tools to share with the class how they solved the problem. Have students discuss why they chose a specific strategy or tool.

Name _____ Date _____ Class _____

UNIT 1

The Number System

Performance Task

Of Kites and Fishing Hooks

The heights of kites and the depths of fishing hooks can be recorded using positive and negative integers and rational numbers. Use the table below. Show your work.

Kite	Height (ft)	Fishing Hook	Depth (ft)
A	21	E	–7.1
B	35.4	F	–5.6
C	$28\frac{3}{4}$	G	$-6\frac{2}{3}$

1. Kite A is at a height of 21 feet. It ascends 15 feet. At what height is it now?

2. Fishing Hook E is at –7.1 feet. It descends another 3.25 feet. What is its depth now?

3. The string on Kite C is tripled. How high can Kite C fly now?

4. Fishing Hook E is dropped 2.5 times its present depth. Where is Fishing Hook E now?

5. What is the distance from Kite C (in Exercise 3) to Fishing Hook E (in Exercise 4)?

6. Fishing Hook G is let down $2\frac{1}{2}$ times its present depth. Where is Fishing Hook G now?

7. Write your own problem using the data in the table.

Unit 1 Performance Task Answer Key

1. $21 + 15 = 36$; 36 ft
2. $-7.1 - 3.25 = -10.35$; -10.35 ft
3. $3 \times 28\frac{3}{4} = 86\frac{1}{4}$; $86\frac{1}{4}$ ft
4. $2.5 \times -7.1 = -17.75$; at -17.75 ft
5. $86.25 - (-17.75) = 104$; 104 ft
6. $2\frac{1}{2} \times -6\frac{2}{3} = -16\frac{2}{3}$; at $-16\frac{2}{3}$ ft
7. Answers will vary.

Seventh Grade
Social Studies

knoxschools.org/kcsathome

Week 1 Social Studies Task Renaissance - 7.40 - 7.43

Objective: Gain a deeper understanding of the Renaissance time period.

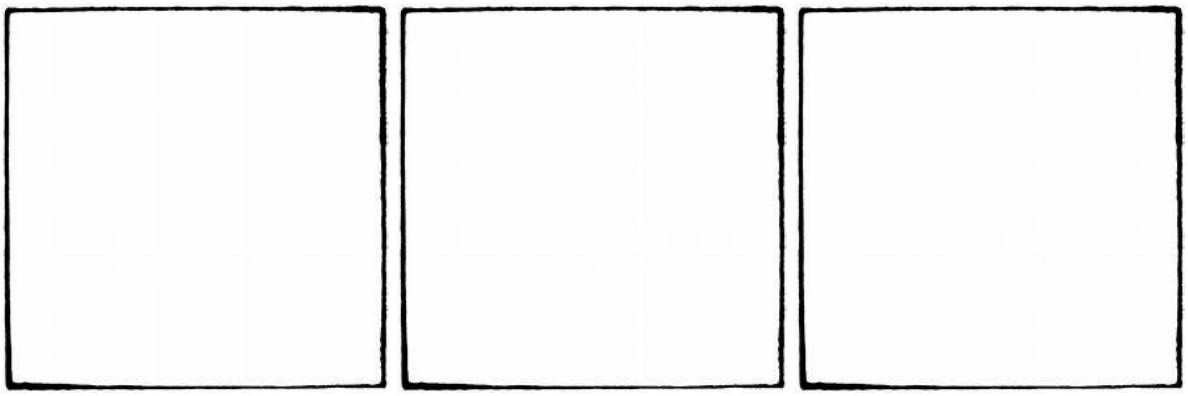
Task: Make a museum exhibit based on knowledge you learned in class and the attached readings. Check off each step as you complete it.

____ Step 1: Write facts that you already know about the topics below.
____ Step 2: Read the attached information and annotate as you read.
____ Step 3: Choose topics to complete the attached exhibit pages.
____ Step 4: Complete the museum topic pages. Use complete sentences and correct grammar.
____ Step 5: Use colors if you have them to make it creative and interesting.
____ Step 6: Put the sheets together to make a museum exhibit.
____ Step 7: Take those people that you live with through your museum exhibit explaining each topic.

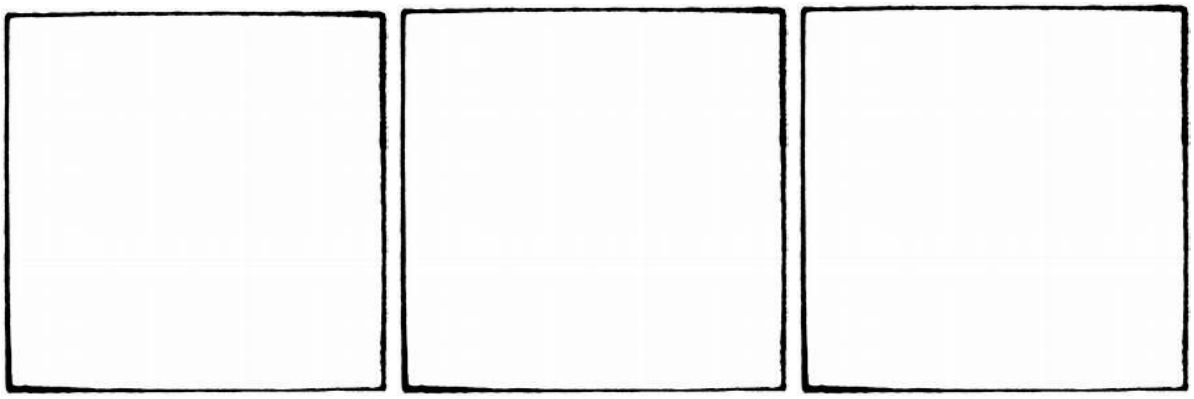
Optional suggestions (optional and if you have the supplies at home):

1. Tape the pages on cereal boxes or other items to help them stand up and be seen easily.
2. Make 3D representations of the topics (legos, blocks, etc.)
3. Make a page with the name of your museum and add it to your exhibit.
4. Complete more exhibit pages for your museum. If you don't have any paper, you can even use the back of something that has already been written on!

Notes (write any information about the topics below that you already know):



Italy and the Medici Family Humanism The Renaissance



Leonardo da Vinci Michelangelo Shakespeare

Task Reading

HUMANISM: Humanism began in Italy in the 13th century. By the 1300's, scholars had begun to broaden their studies away from just religious ones to include poetry, history, art, and Greek and Latin languages. These subjects are known as the humanities because it was the study of human activities rather than religious ones. The study of humanities led to a movement called humanism. This is a belief system that stresses the importance of human abilities and actions. This movement was, in part, caused by the rediscovery of ancient writings and history of past civilization. Thomas Aquinas (1225 - 1274) lived in Italy and was a friar, priest, and philosopher. His ideas of using reason and faith together. He believed that all knowledge came from God so it was okay to use both. He believed that human nature was good and not evil.

ITALY: The Renaissance is generally considered to have started in Florence, Italy around the years 1350 to 1400. The start of the Renaissance is also considered to be the end of the Middle Ages. Italy was a peninsula in the center of the Mediterrean Sea allowing trade from other continents and cultures to travel through it.

RENAISSANCE: The Renaissance is a shift in thinking and works of art from the Middle Ages. It lasted from around 1450 to 1700. It began in Florence, Italy. Renaissance is a French word meaning "rebirth". During this time period artists and governments began to look back to the ancient cultures of Greece and Rome. This led to many advancements in art and thinking. There were many famous artists, writers, sculptures, philosophers, scientists, and mathematicians during this time. This rebirth of art and learning still impacts our world today.

MEDICI: Florence is where the Renaissance first began partly because of where it was located within Italy and partly because the powerful and wealthy Medici family lived there. The Medici was a powerful family that lived in Florence from around 1434 to 1737. The Medici used their money and power to make Florence a huge center of trade and culture. The Medici owed much of their wealth and power to the Medici bank. It made them one of the richest families in all of Europe. It was the largest bank in Europe during its peak and was very well respected. The bank even held the money of the Catholic Church and the Pope. The Medici also owned the largest wool industry in Italy. Many of the Medici Family members went on to become rulers of Florence, Italy, popes, and queens.

The Medici family are most famous for their patronage of the arts. Patronage is where a wealthy person or family sponsors an artist. They would pay artists commissions for major works of art. This allowed artists to focus on their work without having to worry about money. They supported Michelangelo, Donatello and da Vinci as well as helping to pay the architect Brunelleschi to rebuild the Basilica of San Lorenzo, now known as the Duomo. The Medici Family also supported science. They supported the famous scientist Galileo. Galileo also worked as a tutor for the Medici children.

MICHELANGELO: Michelangelo Buonarotti was born in Caprese, Italy on March 6, 1475 and died in Rome in 1564. He was still young when his family moved to Florence, Italy where Michelangelo grew up. When he was young he was sent to the powerful Medici family to train under the artist Geovanni. Michelangelo was able to work with some of the finest artists and philosophers of the time.

Michelangelo made many famous works of art. These include the Pieta which depicts Mary holding Jesus after he is taken from the cross. The David is his most famous work of art. It is thirteen feet tall, shows deep emotion, and is extremely lifelike. It is considered by many experts in art to be a near perfect sculpture. Today the statue resides in the Academy of Fine Arts in Florence, Italy. In 1508 he was asked by the Pope to paint the ceiling of the Sistine Chapel. Michelangelo considered himself to be a sculptor, but agreed to paint the

chapel for the Pope. He worked for four years, painting on a scaffold in order to finish the painting. The painting was huge (141 feet long by 43 feet wide). It contains nine scenes from the Bible down the center and over 300 people. Most of the works of art by Michelangelo were inspired by religion. He also worked as an architect. He worked on the Medici Chapel, the steps of the Laurentian Library, and even the military fortifications of the city of Florence.

Da VINCI: Leonardo da Vinci was an artist, scientist, and inventor during the Renaissance. He is considered by many to be one of the most talented and intelligent people of all time. Leonardo was born in the town of Vinci, Italy in 1452 and died in 1519 in France. About the age of 14 he became an apprentice to a famous artist named Verrocchio.

Leonardo is regarded as one of the greatest artists in history. He excelled in many areas including drawing, painting, and sculpture. Two of his most famous paintings, and perhaps two of the most famous in the world, are the Mona Lisa and The Last Supper.

Many of da Vinci's drawings and journals were made in his pursuit of scientific knowledge and inventions. Some of his drawings were previews to later paintings, some were of anatomy, and some were closer to scientific studies. His journals were filled with over 13,000 paiges of his observations of the world. He drew pictures and designs of hang gliders, helicopters, war machines, musical instruments, and more.

SHAKESPEARE: William Shakespeare was born in the English city Stratford-upon-Avon about 100 miles northwest of London in 1564 and died in 1616 in the same city. William became part of an acting company called the Lord Chamberlain's Men where he wrote many of the plays that were performed. His plays became very popular and soon the Lord Chamberlain's Men became the most popular acting company in the city. The plays were performed at the Globe Theater in London, England.

Much of Shakespeare's works were completed between 1590 and 1613. These include *Hamlet*, *Othello, King Lear*, and *Macbeth*. Most of his plays were taken from events in history. He wrote histories, many based on English history, tragedies and comedies and, occasionally, sonnets.

Shakespeare is considered by many to be the greatest writer of the English language. He is also one of the most influential. Through his works, he is credited with introducing nearly 3,000 words to the English language. In addition, his works are the second most quoted after the Bible.

Extra resources:
http://www.museivaticani.va/content/museivaticani/en/collezioni/musei/cappella-sistina.html
khan academy - Renaissance in Italy 1400's

Museum Exhibit Topic::

_____

Describe three of the major accomplishments of this topic.

Analyze the impact of this topic on the Renaissance.

In your opinion, what is the most interesting fact about this topic?

Identify when and where the topic lived or took place.

Illustrate what this topic is best known for.

Write one complete paragraph about this topic.

Seventh Grade
ELA

knoxschools.org/kcsathome

Name: _____ Class: _____

Five reasons why being kind makes you feel good — according to science

By Jo Cutler, Robin Banerjee
2018

Have you ever experienced that warm, fuzzy feeling after doing something kind for someone else? In this informational text, Jo Cutler and Robin Banerjee discuss five reasons why being kind to others makes you feel good. As you read, take notes on why people are kind to others and how it affects them.

[1] Everybody can appreciate acts of kindness. But when it comes to explaining why we do them, people often take one of two extreme positions. Some think kindness is something completely selfless that we do out of love and care, while others believe it is just a tool that we cunningly[1] use to become more popular and reap the benefits.

"Unititled" by rawpixel is licensed under CC0

But research shows that being kind to others can actually make us genuinely happy in a number of different ways. We know that deciding to be generous or cooperating with others activates an area of the brain called the striatum. Interestingly, this area responds to things we find rewarding, such as nice food and even addictive drugs. The feel-good emotion from helping has been termed "warm glow" and the activity we see in the striatum is the likely biological basis of that feeling.

Of course, you don't have to scan brains to see that kindness has this kind of benefit. Research in psychology shows a link between kindness and well-being throughout life, starting at a very young age. In fact, even just reflecting on having been kind in the past may be enough to improve teenagers' mood. Research has also shown that spending extra money on other people may be more powerful in increasing happiness than spending it on yourself.

But why and how does kindness make us so happy? There are a number of different mechanisms involved, and how powerful they are in making us feel good may depend on our personalities.

1. **Cunning** ***(adjective):*** having or showing skill at achieving an end; crafty

1. Contagious smiling

[5] Being kind is likely to make someone smile and if you see that smile for yourself, it might be catchy. A key theory about how we understand other people in neuroscience suggests that seeing someone else show an emotion automatically activates the same areas of the brain as if we experienced that emotion for ourselves.

You may have been in a situation where you find yourself laughing just because someone else is — why not set off that chain of good feelings with a nice surprise for someone?

2. Righting a wrong

The same mechanism also makes us empathize[2] with others when they are feeling negative, which could make us feel down. This is particularly true for close friends and family, as our representations of them in the brain physically overlap with our representations of ourselves. Doing a kind act to make someone who is sad feel better can also make us feel good — partly because we feel the same relief they do and partly because we are putting something right. Although this effect is especially powerful for people we are close to, it can even apply to humanitarian problems such as poverty or climate change. Getting engaged with charities that tackle these issues provide a way to have a positive impact, which in turn improves mood.

3. Making connections

Being kind opens up many different possibilities to start or develop a social connection with someone. Kind acts such as a buying someone a thoughtful present or even just a coffee strengthens friendships, and that in itself is linked to improved mood.

Similarly, charities offer the opportunity to connect with someone on the other side of the world through donating to improve their life. Volunteering also opens up new circles of people to connect with, both other volunteers and those you are helping.

4. A kind identity

[10] Most people would like to think of themselves as a kind person, so acts of kindness help us to demonstrate that positive identity and make us feel proud of ourselves. In one recent study, even children in their first year of secondary school recognized how being kind can make you feel "better as a person … more complete," leading to feelings of happiness. This effect is even more powerful when the kind act links with other aspects of our personality, perhaps creating a more purposeful feeling. For example, an animal-lover could rescue a bird, an art-lover could donate to a gallery or a retired teacher could volunteer at an after-school group. Research suggests that the more someone identifies with the organization they volunteer for, the more satisfied they are.

2. **Empathize** ***(verb):*** to understand and share the feelings of someone else

5. Kindness comes back around

Work on the psychology of kindness shows that one out of several possible motivations is reciprocity, the returning of a favor. This can happen directly or indirectly. Someone might remember that you helped them out last time and therefore be more likely to help you in the future. It could also be that one person being kind makes others in the group more kind, which lifts everyone's spirits. Imagine that you bake cakes for the office and it catches on so someone does it each month. That is a lot more days that you're getting cakes than providing them.

The story doesn't end there. Being kind may boost your mood, but research has also shown that being in a good mood can make you more kind. This makes it a wonderful two-way relationship which just keeps giving.

Grade 7 English, Week 1

Article of the Week “Five Reasons why being kind makes you feel good -according to science”

Monday

Read the article and annotate it. Consider annotating by underlining key ideas, circling unknown vocabulary words, and asking questions you have about the text in the margins.

Tuesday

Paraphrase the article by explaining it to someone in your home. Share the key points the author makes and your thoughts and impressions of the article.

Wednesday

Review the article and write a summary.

Thursday

Answer the following text-dependent questions. Be sure to write complete sentences.

1. What is one central idea presented in the text?

2. Cite at least one piece of evidence from the text that supports the central idea.

Grade 7 English, Week 1

Article of the Week “Five Reasons why being kind makes you feel good -according to science”

3. How does paragraph 1 contribute to the authors’ explanation of kindness in the text?

   A. It shows how people have conflicting opinions about why people are kind.
   B. It introduces the idea that being kind to others makes us feel good
   C. It emphasizes the idea that people are kind more often than we realize.
   D. It highlights the darker motivations for why people are kind.

4. What is the authors’ main purpose in the text?

   A. to encourage readers to be kinder to one another
   B. to emphasize the disadvantages of only being concerned with yourself
   C. to explore the different explanations for why being kind makes us happy
   D. to suggest that humans are kind for largely selfish reasons

Friday

Answer the following question in a complete paragraph. Include text evidence from the article.

According to the article, what is the relationship between how others feel and how we feel?

KCS @ home

Seventh Grade
Science

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Parts of an Atom Challenge

Fill in the chart below: Remember to use the important information to help you fill in the blank spaces.

Important Information	
Atomic Number	# of Protons = # of Electrons
Atomic Mass	# of Protons + # of Neutrons
# of Neutrons	Atomic Mass – Atomic Number

Element	Atomic #	Atomic Mass	# of Protons	# of Neutrons	# of Electrons
Lithium (example)	*3*	*7*	*3*	*4*	*3*
Sodium		**23**	**11**		
Gold	**79**	**197**			
Aluminum	**13**			**14**	
Neon	**10**			**10**	
Oxygen	**8**			**8**	
Phosphorus		**31**		**16**	**15**
Nitrogen			**7**	**7**	
Carbon		**12**			**6**
Tennesssine	**117**	**294**			
Bromine		**80**	**35**		
Helium	**2**			**2**	

Parts of an Atom Challenge

Fill in the chart below: Remember to use the important information to help you fill in the blank spaces.

Important Information	
Atomic Number	# of Protons = # of Electrons
Atomic Mass	# of Protons + # of Neutrons
# of Neutrons	Atomic Mass – Atomic Number

Element	Atomic #	Atomic Mass	# of Protons	# of Neutrons	# of Electrons
Lithium (example)	***3***	***7***	***3***	***4***	***3***
Sodium	***11***	***23***	***11***	***12***	***11***
Gold	**79**	**197**	***79***	***118***	***79***
Aluminum	**13**	**27**	**13**	**14**	**13**
Neon	**10**	**20**	**10**	**10**	**10**
Oxygen	**8**	**16**	**8**	**8**	**8**
Phosphorus	**15**	**31**	**15**	**16**	**15**
Nitrogen	**7**	**14**	**7**	**7**	**7**
Carbon	**6**	**12**	**6**	**6**	**6**
Tennesssine	**117**	**294**	**117**	**177**	**117**
Bromine	**35**	**80**	**35**	**45**	**35**
Helium	**2**	**4**	**2**	**2**	**2**

Build Bohr Diagrams of Atoms at Home

What is a Bohr Model?

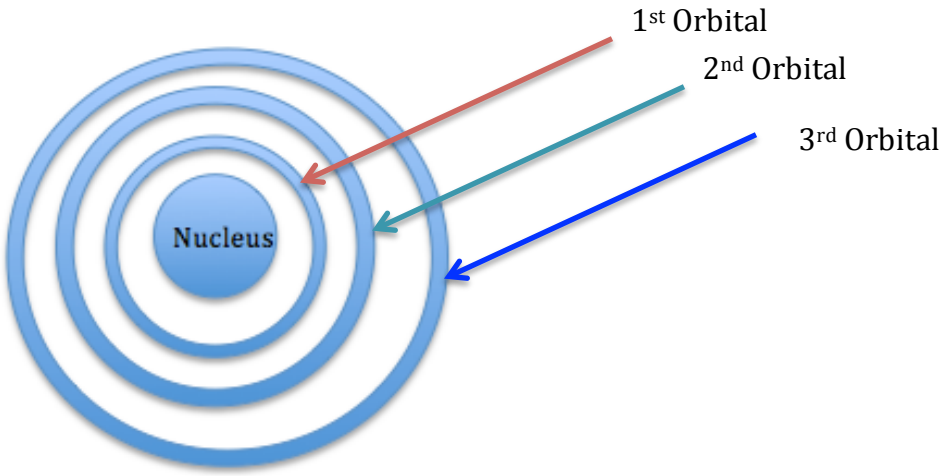
- Bohr models are simple diagrams of how electrons, protons, and neutrons are arranged within an atom.

How do I make a Bohr Model of an Atom?

- Pick an atom with an atomic number of 1-18. (We will not work with elements with higher atomic numbers right now.)
-

Important Information	
Atomic Number	# of Protons = # of Electrons
Atomic Mass	# of Protons + # of Neutrons
# of Neutrons	Atomic Mass – Atomic Number

Draw the nucleus and orbitals on paper:



Use little things you find around the house to add electrons to the orbitals :
Always begin placing electrons on the 1st orbital.

- 1st Orbital holds up to 2 electrons
- 2nd Orbital holds up to 8 electrons
- 3rd Orbital holds up to 8 electrons

Example:

As an example, here is a Bohr model diagram of **Aluminum, atomic number of 13** with an atomic mass of 26.98, which rounds up to 27.

Atomic Number = 13 which is the number of electrons and the number of protons (13P shown in nucleus)

Electrons are shown in the orbitals like this:

1st orbital has 2 electrons (which filled this orbital up)

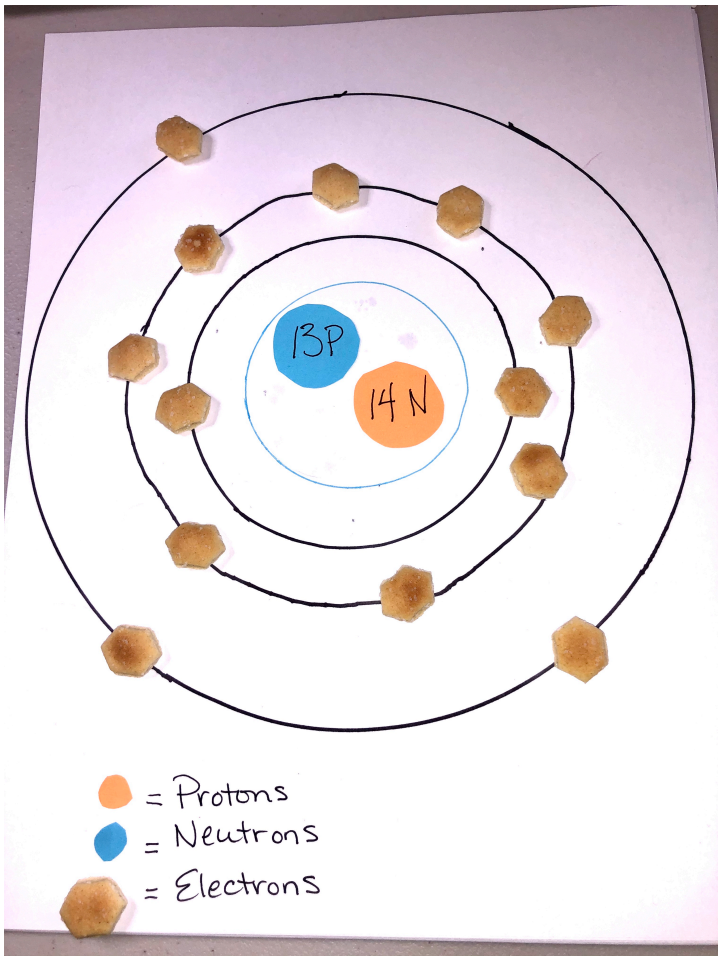
2nd orbital has 8 electrons (which filled this orbital up)

3rd orbital has 3 electrons (this orbital is not full with only 3, but since there are only 13 electrons total in Aluminum, there are no more to place now.)

The nucleus contains 13 Protons.

How many neutrons will it contain?

27 (atomic mass) minus 13 (atomic number) = **14 Neutrons**



As you build Bohr models for other elements between 1 and 18, think about:

1. Why does the number of electrons need to match the number of electrons?

2. Remember what you have learned about valence electrons this year (those electrons in the outer orbital). Remember that atoms try to get to a state where their outermost orbital is full. Would the atoms you build each time be looking to get rid of electrons or take electrons from other atoms? Why do you say that?

Bohr Model Answer Key

For each of the first 18 elements, here are the numbers of atomic particles that should be found in the nucleus and in the orbitals surrounding the nucleus.

Hydrogen Nucleus: 1 proton 0 neutron 1st orbital: 1e 2nd orbital: empty 3rd orbital: empty	**Helium** Nucleus: 2 Protons 2 Neutrons 1st orbital: 2e 2nd orbital: empty 3rd orbital: empty	**Lithium** Nucleus: 3 Protons 4 Neutrons 1st orbital: 2e 2nd orbital: 1 electron 3rd orbital: empty	**Beryllium** Nucleus: 4 Protons 5 Neutrons 1st orbital: 2e 2nd orbital: 2 electrons 3rd orbital: empty	**Boron** Nucleus: 5 Protons 6 Neutrons 1st orbital: 2e 2nd orbital: 3 electrons 3rd orbital: empty	**Carbon** Nucleus: 6Protons 6 Neutrons 1st orbital: 2e 2nd orbital: 4 electrons 3rd orbital: empty
Nitrogen Nucleus: 7 Protons 7 Neutrons 1st orbital: 2e 2nd orbital: 5 electrons 3rd orbital: empty	**Oxygen** Nucleus: 8 Protons 8 Neutrons 1st orbital: 2e 2nd orbital: 6 electrons 3rd orbital: empty	**Fluorine** Nucleus: 9 Protons 10 Neutrons 1st orbital: 2e 2nd orbital: 7 electrons 3rd orbital: empty	**Neon** Nucleus: 10 Protons 10 Neutrons 1st orbital: 2e 2nd orbital: 8 electrons 3rd orbital: empty	**Sodium** Nucleus: 11 Protons 12 Neutrons 1st orbital: 2e 2nd orbital: 8 electrons 3rd orbital: 1 electron	**Magnesium** Nucleus: 12 Protons 12 Neutrons 1st orbital: 2e 2nd orbital: 8 electrons 3rd orbital: 2 electrons
Aluminum Nucleus: 13 Protons 14 Neutrons 1st orbital: 2e 2nd orbital: 8 electrons 3rd orbital: 3 electrons	**Silicon** Nucleus: 14 Protons 14 Neutrons 1st orbital: 2e 2nd orbital: 8 electrons 3rd orbital: 4 electrons	**Phosphorus** Nucleus: 15 Protons 16 Neutrons 1st orbital: 2e 2nd orbital: 8 electrons 3rd orbital: 5 electrons	**Sulfur** Nucleus: 16 Protons 16 Neutrons 1st orbital: 2e 2nd orbital: 8 electrons 3rd orbital: 6 electrons	**Chlorine** Nucleus: 17 Protons 18 Neutrons 1st orbital: 2e 2nd orbital: 8 electrons 3rd orbital: 7 electrons	**Argon** Nucleus: 18 Protons 22 Neutrons 1st orbital: 2e 2nd orbital: 8 electrons 3rd orbital: 8 electrons