Grade 8
Assignment Bundle

COMMONLIT

Name: _____ Class: _____

The Keys to Happiness: Partly Genetic, But You Control the Rest

By ABC News
May 10, 2012

Happiness and how it is achieved is a popular area of study for psychologists. This ABC news article addresses how genetic inheritance influences happiness. As you read, take notes on what contributes to a person's happiness.

[1] Is there a "set point" that determines your level of happiness, regardless of your status in life? Is it something you have little power to change?

"Happy to have a twin brother" by Colleen Proppe is licensed under CC BY-NC-ND 2.0.

For several decades psychologists have wrestled with that question, and in recent years many, if not most, have embraced the idea that we are born with a tendency to be happy, or sour, and it doesn't have much to do with our surroundings or lifestyle. One researcher compared it to height. Try as you may, you probably aren't going to get any taller.

But a new study contends that happiness is very different from height or other genetically-determined characteristics. The study concludes that the "set point" is really a range, and we can move up and down on the happiness scale within that range.

All we have to do is keep our lives interesting, and be satisfied with what we already have.

[5] Sounds easy, and psychologist Kennon Sheldon of the University of Missouri, Columbia, argues that it is — although most of us may not succeed.

"We all have good things happen to us, and they lift us for a while and then we kind of fall back where we started," Sheldon, lead author of a study published in the Personality and Social Psychology Bulletin, said in a telephone interview. "We're trying to figure out how people can get more out of the good things that happen to them."

Sheldon and his coauthor, psychologist Sonja Lyubomirsky of the University of California, Riverside, have collaborated on several research projects over the last couple of decades. They have come up with a program that they think could help us inch our way up the happiness scale, and stay there longer, although there will always be a tendency to drop back to our personal "set points."

Their effort is an attempt to deal with an idea that has been kicking around for four decades, called "Hedonic Adaptation," or the "Hedonic Treadmill." That theory suggests that good things may move us up on the happiness scale, but in time the glow dims and we return to a point established chiefly by genetics. Bad things may move us down on the scale, but the impact of even traumatic[1] experiences also diminishes over time, although some research suggests it's harder to forget the bad than remember the good.

We deal as best as we can with bad things as a way of avoiding depression, and that forces us back up the happiness scale. And as for the good things, as soon as we get them, we want more, thus pushing us back down toward the median.

[10] Sheldon and Lyubomirsky argue that simple lifestyle changes can help keep us a bit happier, "despite pessimism[2] from the current literature that the pursuit of happiness may be largely futile,"[3] as Lyubomirsky puts it.

It all comes down to two words: variety and appreciation.

There's a new love in your life? Keep it alive by introducing new experiences and variety. That will keep the relationship fresh and rewarding, and, well, happy. Appreciate what you've got.

"To appreciate something is to savor it, to feel grateful for it, to recognize that one might never have gotten it, or might lose it," the study says.

Without that, you're likely going to lose interest and cast about for something better, whether it's a new mate or a new car. It seems we are never satisfied, and that brings the happiness barometer[4] down.

[15] The researchers tested 481 students over two semesters to measure their level of happiness and determine if savoring a good thing could last even a few weeks. In most cases, it didn't. The participants quickly returned to their regular levels of happiness.

But some participants were able to maintain that elevated level of happiness by keeping the memory alive and appreciating what they already had.

How to Find Happiness. Is It Genetic?

Case closed? Not exactly.

There's still the question of how much our happiness depends on genetics, and how much it is affected by our lifestyles and possessions.

The researchers have come up with a formula that they have used in a number of publications. It's 50 percent genetics. The circumstances we find ourselves in — like where we live, the quality of our love lives, whether we have a few bucks in the bank — account for only about 10 percent. The remaining 40 percent is "within our control, how we think and behave."

1. **Traumatic** ***(adjective):*** emotionally disturbing or distressing
2. **Pessimism** ***(noun):*** a lack of hope or confidence in the future
3. **Futile** ***(adjective):*** pointless
4. something that reflects changes in circumstances or opinions

[20] But where did those numbers come from?

"Basically, we kind of made them up," Sheldon said, adding quickly, "but not entirely."

The 50 percent genetics is based on other research of identical twins who were separated at birth and had no contact with each other. A huge study in Germany found that separated twins ranked almost exactly the same on the happiness scale, regardless of their personal experiences.

"And if you look at studies of various superficial circumstances, like income, where you live, how many cars you have, those are pretty small," Sheldon said. "They don't seem to account for more than about 10 percent.

"So that left 40 percent that we conclude, although not everybody would agree with this conclusion, is the percent that is affected by what you do."

[25] That certainly indicates that our happiness can be greatly influenced by what we do, and if the number is anywhere near correct, simple changes, like appreciating what we already have, can make a significant difference in our level of happiness.

But if that number is way off, as many psychologists would contend, then there isn't a lot we can do to make us keep smiling. Still, it may be worth a try.

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 main claim of the text?
    A. Genetics do not have any detectable impact on a person's individual happiness, as scientists previously believed.
    B. By actively attempting to be happier more often, people can improve their set point of happiness.
    C. While genetics may determine a person's range of happiness, individual choices have a significant impact on happiness levels.
    D. Individual choices can influence a person's happiness levels, but the effects they have on overall happiness are insignificant in comparison to the effects of genetics.

2. PART B: Which detail from the text best supports the answer to Part A?
    A. "For several decades psychologists have wrestled with that question, and in recent years many, if not most, have embraced the idea that we are born with a tendency to be happy, or sour" (Paragraph 2)
    B. "But some participants were able to maintain that elevated level of happiness by keeping the memory alive and appreciating what they already had." (Paragraph 16)
    C. "'And if you look at studies of various superficial circumstances, like income, where you live, how many cars you have, those are pretty small'" (Paragraph 23)
    D. "'So that left 40 percent that we conclude, although not everybody would agree with this conclusion, is the percent that is affected by what you do.'" (Paragraph 24)

3. How does the detail about the study of twins contribute to the text (Paragraph 22)?
    A. It proves that environment has a significant impact on a person's happiness, as twins do not the same level of happiness after being separated.
    B. It shows that happiness is greatly determined by genetics, so even separated twins are likely to have the same level of happiness.
    C. It shows how twins' happiness levels are affected when separated at birth.
    D. It proves that there is no accurate way to determine what impacts a person's level of happiness.

4. What does the phrase “level of happiness” reveal about how researchers consider happiness to work (Paragraph 15)?

5. How does the author’s claim regarding happiness compare to previous understandings of happiness?

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. What makes you happy? How does this compare with the author's discussion of achieving happiness?

2. In the context of the text, how can we achieve happiness? How does the article suggest people improve their level of happiness? Cite evidence from this text, your own experience, and other literature, art, or history in your answer.

COMMONLIT

Name: _____ Class: _____

From Blossoms

By Li-Young Lee
1986

Li-Young Lee is an American poet who was born in Indonesia to Chinese parents. His family eventually settled in the United States after fleeing anti-Chinese attitudes. In this poem, the speaker describes the experience of biting into a peach. As you read, take note of how the speaker describes peaches and the experience of eating one.

From blossoms comes
this brown paper bag of peaches
we bought from the boy
at the bend in the road where we turned toward
signs painted *Peaches*.

From laden[1] boughs,[2] from hands,
from sweet fellowship[3] in the bins,
comes nectar at the roadside, succulent[4]
peaches we devour, dusty skin and all,
comes the familiar dust of summer, dust we eat.

O, to take what we love inside,
to carry within us an orchard, to eat
not only the skin, but the shade,
not only the sugar, but the days, to hold
the fruit in our hands, adore it, then bite into
the round jubilance[5] of peach.

There are days we live
as if death were nowhere
in the background; from joy
to joy to joy, from wing to wing,
from blossom to blossom to
impossible blossom, to sweet impossible blossom.

"Untitled" by Jongjit Pramchom is licensed under CC0.

1. loaded with something heavy, carrying a lot of weight
2. a main branch of a tree
3. **Fellowship** ***(noun):*** the company of equals or friends
4. **Succulent** ***(adjective):*** juicy flavor, full of juice
5. great joy, triumph, or satisfaction

Text-Dependent Questions

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

1. PART A: Which of the following best identifies the theme of the poem?
    A. People can find boundless joy in unexpectedly simple moments.
    B. People should appreciate every moment because some opportunities may never come again.
    C. Living in the moment can help drive away fears of the future.
    D. Even the simplest actions can be meaningful with friends and family.

2. PART B: Which quote from the poem best supports the answer to Part A?
    A. “From blossoms comes / this brown paper bag of peaches / we bought from the boy” (Lines 1-3)
    B. “From laden boughs, from hands, / from sweet fellowship in the bins, / comes nectar at the roadside” (Lines 6-8)
    C. “peaches we devour, dusty skin and all, / comes the familiar dust of summer, dust we eat.” (Lines 9-10)
    D. “to hold / the fruit in our hands, adore it, then bite into / the round jubilance of peach.” (Lines 14-16)

3. PART A: What do peaches represent for the speaker?
    A. a way to remember those who are gone
    B. gratitude for all life
    C. time together with family
    D. the unavoidability of death

4. PART B: Which quote from the text best supports the answer to Part A?
    A. “peaches / we bought from the boy / at the bend in the road where we turned toward / signs painted Peaches” (Lines 2-5)
    B. “From laden boughs, from hands, / from sweet fellowship in the bins, / comes nectar at the roadside” (Lines 6-8)
    C. “O, to take what we love inside, / to carry within us an orchard” (Lines 11-12)
    D. “There are days we live / as if death were nowhere” (Lines 17-18)

5. How does the final stanza contribute to the development of the poem's theme?

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 your opinion, are the moments of happiness that the speaker finds by chance or does he seek them out? Are we in control of deciding which moments bring us happiness?

2. In your opinion, how do simple things provide powerful experiences? Is this something that only nature is capable of doing?

3. In the context of the poem, what is good and how do we know it? How do we know if something is beautiful or good? Why does the speaker think the peaches are good? Cite evidence from this text, your own experience, and other literature, art, or history in your answer.

4. In the context of the poem, who is in control: man or nature? Is the speaker responsible for the beautiful experience he describes or is nature? Cite evidence from this text, your own experience, and other literature, art, or history in your answer.

Selecting Books for Your Child: Finding 'Just Right' Books

By: Kathleen Rogers

How can parents help their children find books that are not "too hard" and not "too easy" but instead are "just right"? Here's some advice.

Five finger rule

1. Choose a book that you think you will enjoy.
2. Read the second page.
3. Hold up a finger for each word you are not sure of, or do not know.
4. If there are five or more words you did not know, you should choose an easier book.
5. Still think it may not be too difficult? Use the five finger rule on two more pages.

Choose a book that is a good fit for you!

Read two or three pages and ask yourself these questions:

Will it be an easy, fun book to read?

- Do I understand what I am reading?
- Do I know almost every word?
- When I read it aloud, can I read it smoothly?
- Do I think the topic will interest me?

If most of your answers were "yes", this will be an easy book to read independently by yourself.

Will this book be too hard for me?

- Are there five or more words on a page that I don't know, or am unsure of?
- Is this book confusing and hard to understand by myself?
- When I read it aloud, does it sound choppy and slow?

If most of your answers were "yes," this book is too hard. You should wait awhile before you read this book. Give the book another try later, or ask an adult to read the book to you.

Tips on reading with your child

- When they can't read the word, say…
- Can you sound it out?
- Fingertap it.
- Can you think of the word or movement that helps you remember that vowel sound?
- What is the first and last sound? What word would make sense?
- Does it have a pattern that you have seen in other words? (ex-an, ack)
- How does the word begin?
- You said_____. Does that make sense?
- What word would make sense that would start with these sounds?
- Put your finger under the word as you say it.

When they want to read a book that is too hard, say…

- Let's read it together.
- This is a book you will enjoy more if you save it until you are older — or later in the year.
- [Be honest!] When people read books that are too hard for them, they often skip important parts. You will have more fun with this book if you wait until you can read it easily.

Rogers, K. (2008). Selecting Books for Your Child: Finding 'Just Right' Books. Retrieved November 7, 2008, from www.readingtogether.org.

HERE'S THE IMPACT OF READING 20 MINUTES PER DAY!

A student who reads	A student who reads	A student who reads
20:00	5:00	1:00
minutes per day	minutes per day	minute per day
will be exposed to **1.8 MILLION** words per year and scores in **90th PERCENTILE** on standardized tests	will be exposed to **282,000** words per year and scores in **50th PERCENTILE** on standardized tests	will be exposed to **8,000** words per year and scores in **10th PERCENTILE** on standardized tests

Source: Nagy, Anderson and Herman, 1987

SCHOLASTIC

Home Reading Log

Student Information			
Student Name		Grade Level	
School Name		Teacher	

Log

Date	Title	Author	Time Spent	Number of Pages Read

Find the positive value of x.

1) $x^3 = 8$

2) $x^3 = 27$

3) $x^3 = 64$

4) $x^3 = 125$

5) $x^3 = 216$

6) $x^3 = 343$

7) $x^3 = 512$

8) $x^3 = 729$

9) $x^3 = 1{,}000$

10) $x^2 = 1$

11) $x^2 = 4$

12) $x^2 = 9$

13) $x^2 = 16$

14) $x^2 = 25$

15) $x^2 = 36$

16) $x^2 = 49$

17) $x^2 = 64$

18) $x^2 = 81$

19) $x^2 = 100$

20) $x^2 = 121$

Answers

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____
9. _____
10. _____
11. _____
12. _____
13. _____
14. _____
15. _____
16. _____
17. _____
18. _____
19. _____
20. _____

1-10	95	90	85	80	75	70	65	60	55	50
11-20	45	40	35	30	25	20	15	10	5	0

Lesson Summary

A linear equation $y = mx + b$ describes a rule for a function. We call any function defined by a linear equation a linear function.

Problems involving a constant rate of change or a proportional relationship can be described by linear functions.

Problem Set

1. A food bank distributes cans of vegetables every Saturday. The following table shows the total number of cans they have distributed since the beginning of the year. Assume that this total is a linear function of the number of weeks that have passed.

Number of weeks (x)	1	12	20	45
Total number of cans of vegetables distributed (y)	180	2,160	3,600	8,100

   a. Describe the function being considered in words.

   b. Write the linear equation that describes the total number of cans handed out, y, in terms of the number of weeks, x, that have passed.

   c. Assume that the food bank wants to distribute $20{,}000$ cans of vegetables. How long will it take them to meet that goal?

   d. The manager had forgotten to record that they had distributed $35{,}000$ cans on January 1. Write an adjusted linear equation to reflect this forgotten information.

   e. Using your function in part (d), determine how long in years it will take the food bank to hand out $80{,}000$ cans of vegetables.

2. A linear function has the table of values below. It gives the number of miles a plane travels over a given number of hours while flying at a constant speed.

Number of hours traveled (x)	2.5	4	4.2
Distance in miles (y)	1,062.5	1,700	1,785

   a. Describe in words the function given in this problem.

   b. Write the equation that gives the distance traveled, y, in miles, as a linear function of the number of hours, x, spent flying. .

   c. Assume that the airplane is making a trip from New York to Los Angeles, which is a journey of approximately $2{,}475$ miles. How long will it take the airplane to get to Los Angeles?

   d. If the airplane flies for 8 hours, how many miles will it cover?

3. A linear function has the table of values below. It gives the number of miles a car travels over a given number of hours.

Number of hours traveled (x)	3.5	3.75	4	4.25
Distance in miles (y)	203	217.5	232	246.5

   a. Describe in words the function given.
   b. Write the equation that gives the distance traveled, in miles, as a linear function of the number of hours spent driving.
   c. Assume that the person driving the car is going on a road trip to reach a location 500 miles from her starting point. How long will it take the person to get to the destination?

4. A particular linear function has the table of values below.

Input (x)	2	3	8	11	15	20	23
Output (y)	7	10		34		61	

   a. What is the equation that describes the function?
   b. Complete the table using the rule.

5. A particular linear function has the table of values below.

Input (x)	0	5	8	13	15	18	21
Output (y)	6	11	14		21		

   a. What is the rule that describes the function?
   b. Complete the table using the rule.

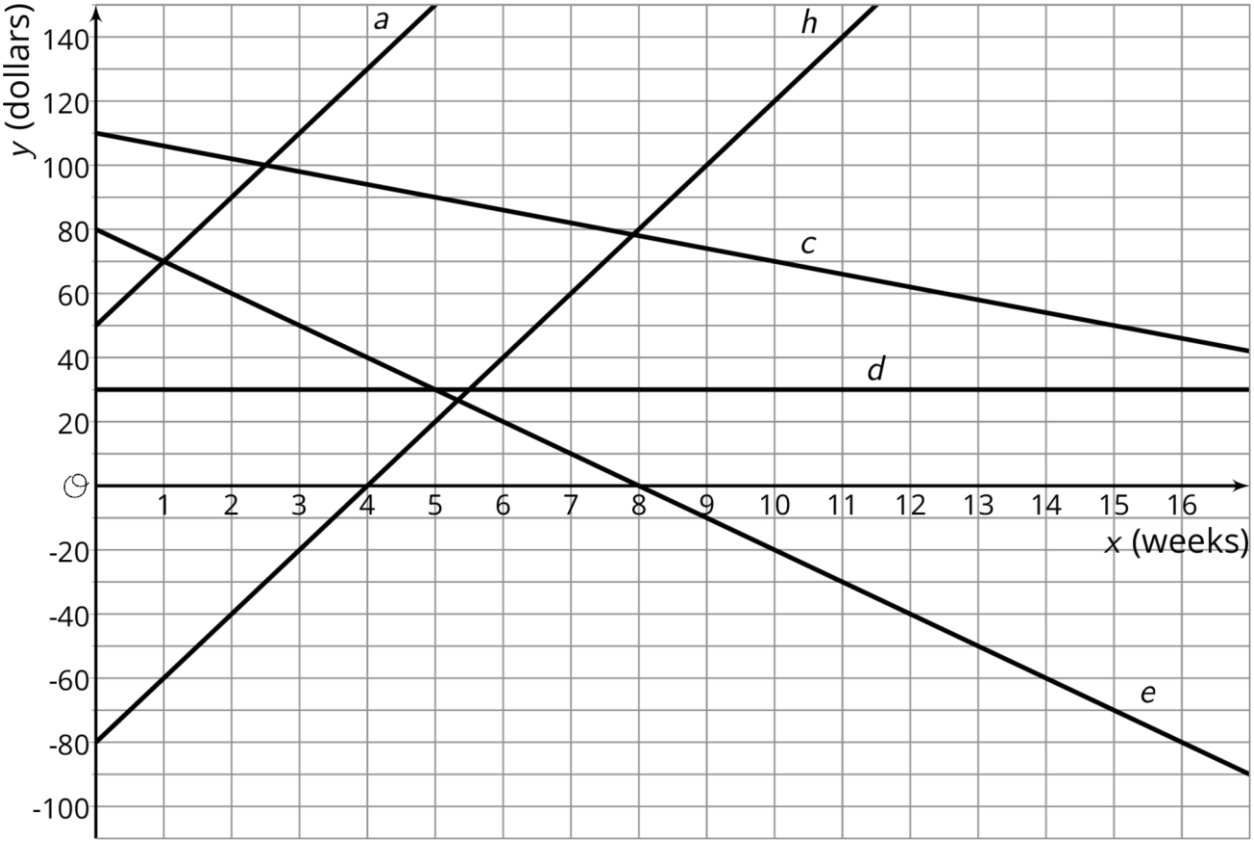
NAME DATE PERIOD

Student Task Statements

Lesson 14: Using Linear Relations to Solve Problems

14.2: Five Savings Accounts

Each line represents one person's weekly savings account balance from the start of the year.



1. Choose one line and write a description of what happens to that person's account over the first 17 weeks of the year. Do not tell your group which line you chose.
2. Share your story with your group and see if anyone can guess your line.
3. Write an equation for each line on the graph. What do the slope, m, and vertical intercept, b, in each equation mean in the situation?
4. For which equation is (1,70) a solution? Interpret this solution in terms of your story.
5. Predict the balance in each account after 20 weeks.

8.EE Coffee by the Pound

Task

Lena paid $18.96 for 3 pounds of coffee.

a. What is the cost per pound for this coffee?

b. How many pounds of coffee could she buy for $1.00?

c. Draw a graph in the coordinate plane of the relationship between the number of pounds of coffee and the total cost.

d. In this situation, what is the meaning of the slope of the line you drew in part (c)?

14.1: Buying Fruit

For each relationship described, write an equation to represent the relationship.

1. Grapes cost $2.39 per pound. Bananas cost $0.59 per pound. You have $15 to spend on g pounds of grapes and b pounds of bananas.

2. A savings account has $50 in it at the start of the year and $20 is deposited each week. After x weeks, there are y dollars in the account.

8th Grade Science
Assignment #1

Part I

1. Watch the following videos to observe the phenomenon we will be exploring in this lesson.
    a. April 7, 2013 - Kansas https://bit.ly/2UR9cdF
    b. October 5, 2010 - Arizona https://bit.ly/3aSZUn9
    c. June 10, 2013 - Canada https://bit.ly/3aUqmfZ

2. Complete the *Notice and Wonder* chart below.
    a. What do you notice in the videos? Write down as many observations as possible in the *Notice* column.
    b. What do the videos make you wonder? Write down questions you have about what you observed in the *Wonder* column.

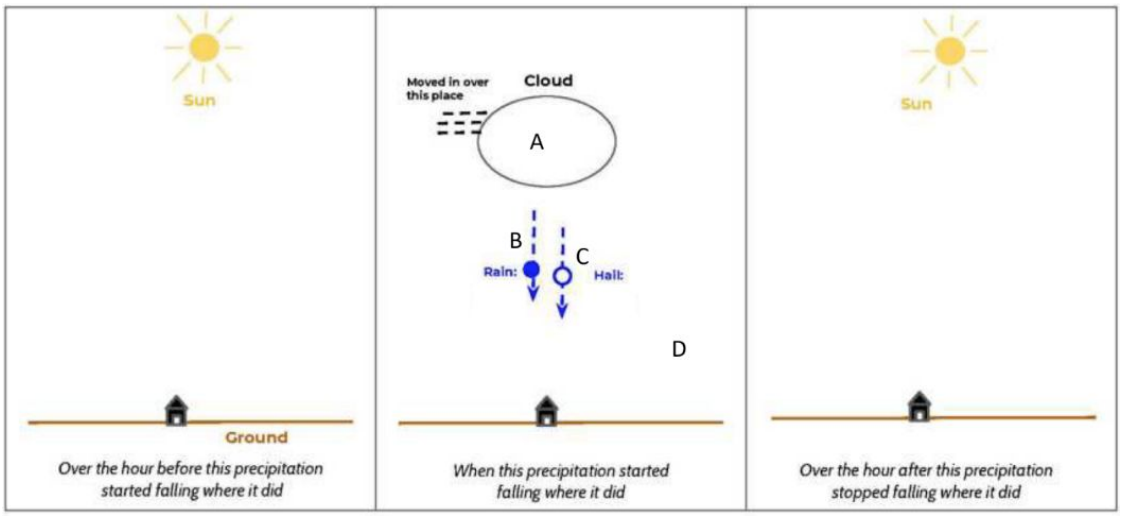
Notice	Wonder

3. Share your noticings and wonderings with a classmate or family member.

Part 2

1. **Precipitation** is a way to refer to any liquid or solid forms of water that fall to the ground from above.
    a. Watch a video (https://bit.ly/2y22M2g) reviewing states of matter at the particle level.

    b. Use this model of the precipitation events observed in Part 1 to answer the discussion questions below.



i. Where do you think the cloud that appeared when the precipitation occurred came from?

ii. Why would a cloud appear when precipitation occurs?

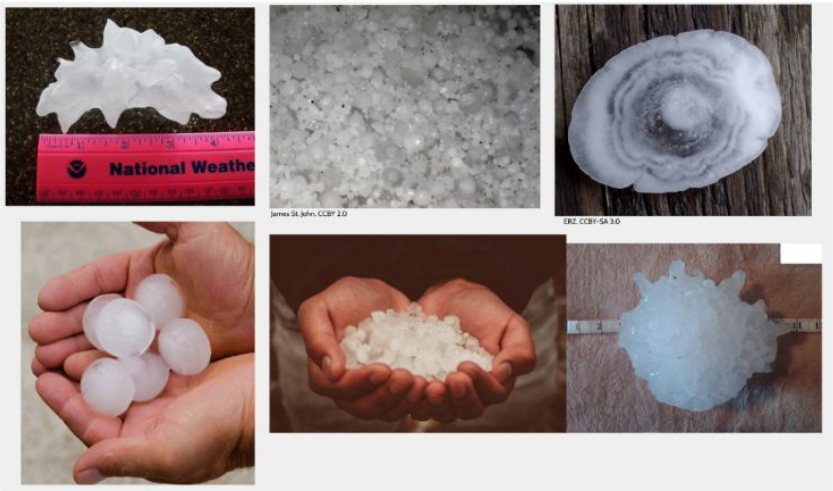
iii. Imagine you had a microscope strong enough to see matter at the particle level. Draw what you think it looks like at the particle level for each labeled part of the model. (A: Inside cloud, B: Rain, C: Hail, D: Air)

A	**B**	**C**	**D**

Assignment #2

Part I

1. Look at the images of different hailstones and write down what you notice and what questions the photos make you wonder about in the chart below.



Notice	Wonder

2. Considering your observations:
    a. When do you think hail storms happen most frequently in the United States?

    b. What do you think the weather conditions are like during a hail storm?

Part 2

1. Look at the Weather Data handout for the Fort Scott hailstorm.

    a. Based on Chart A, during what season(s) did most hailstorms occur? Does this support your prediction from Part 1?

    b. What was the date and time for the hailstorm in Fort Scott, KS?

    c. Using Chart B, what was the approximate temperature when the hailstorm occurred? Does this support your prediction from Part 1?

    d. Using Chart B, what was happening with the wind around the time that the hailstorm occurred?

2. Look at data from the two hail storms that occured in Phoenix, AZ on October 5.

    a. Based on all the data you've reviewed so far,
        i. How would you describe the typical temperature during a hailstorm?

        ii. Relative humidity is the quantity of water in air compared to the utmost amount of water the air can take in. How would you describe the typical relative humidity during a hailstorm?

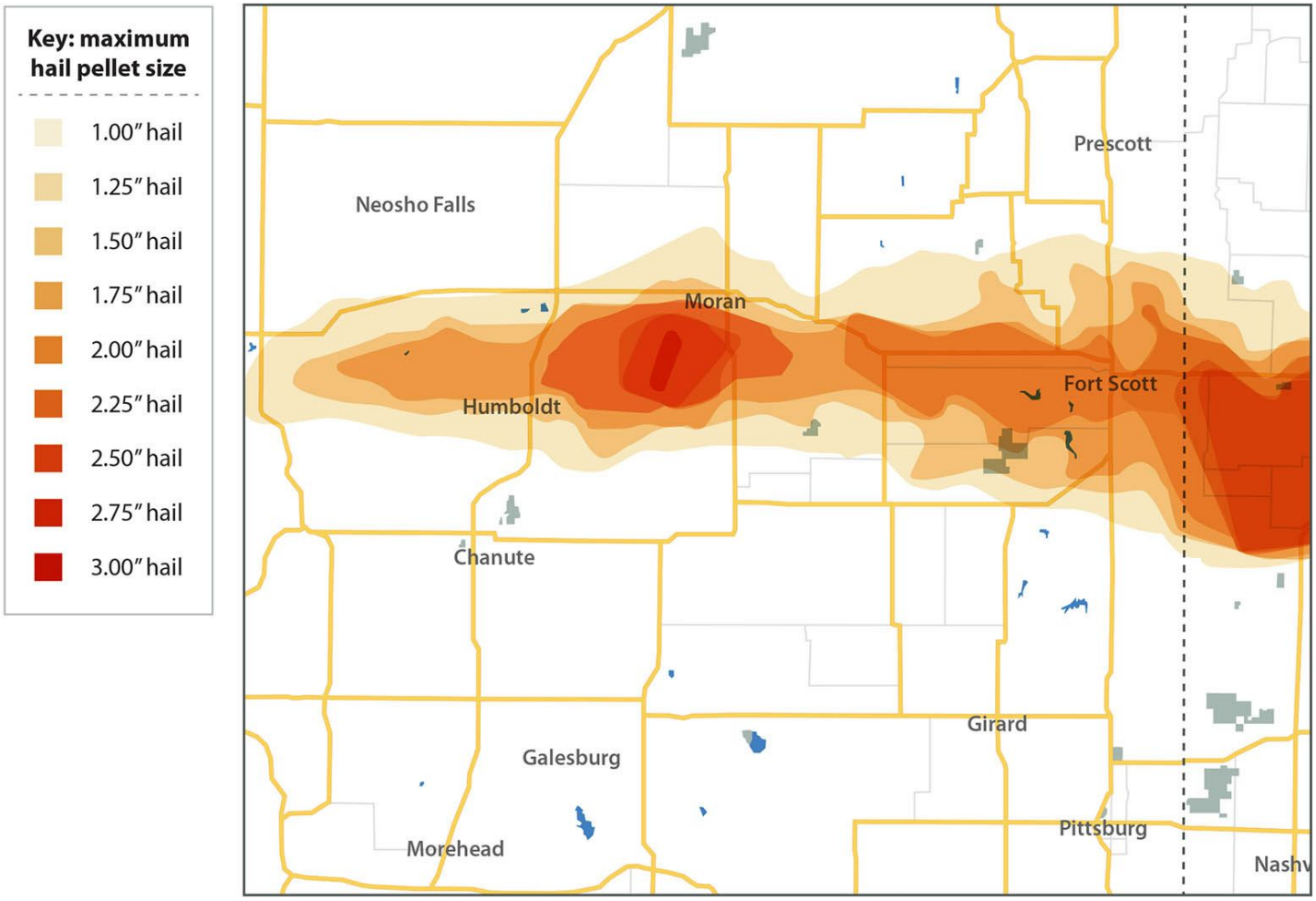
        iii. How would you describe the wind during a hailstorm?

Weather Data for Fort Scott*

A

Site	Location	Date	Approximate time of day
❉	Fort Scott, KS	April 7, 2013	4:25 PM
A	Phoenix, AZ	Oct. 5, 2010	12:30 and 4:30 PM
B	Oklahoma City, OK	April 26, 2013	8:30 PM
C	Dallas, TX	June 13, 2012	6:30 PM
D	Winnipeg, Manitoba, Canada	June 10, 2013	6:30 PM
E	New Orleans, LA	Feb. 24, 2013	9:15 PM
F	Indianapolis, IN	Aug. 25, 2018	5:30 PM
G	Pittsfield, MA	May 15, 2018	No record avail.

Hail map



Weather Data for Fort Scott, continued

Weather station: Chanute Martin Johnson Station, KS

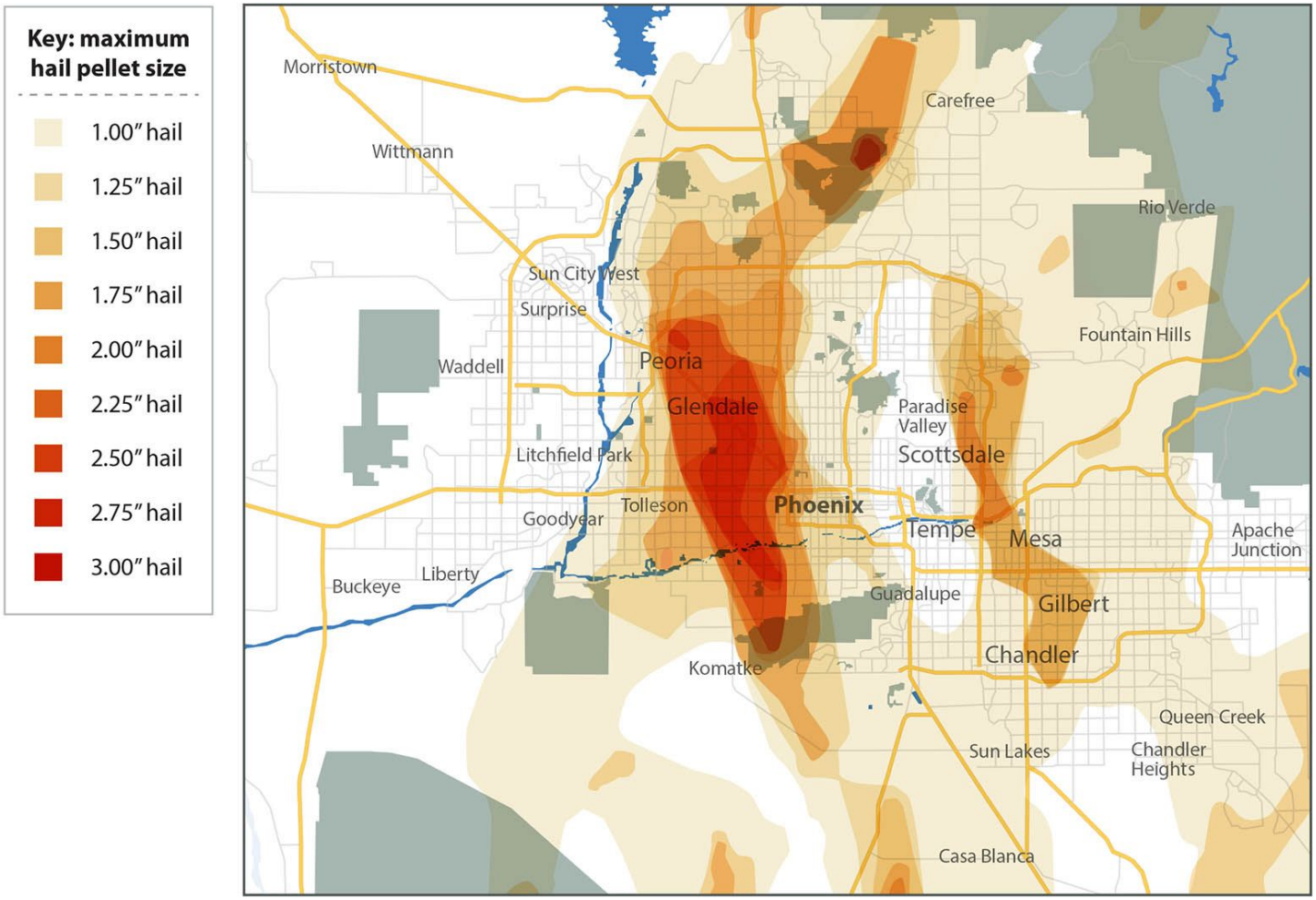
B

Time	Temperature (°F)	Relative humidity (%)	Wind speed (mph)	Wind gust (mph)
5:52 AM	44	93	3	0
6:52 AM	46	89	0	0
7:52 AM	50	89	0	0
8:52 AM	55	83	5	0
9:52 AM	62	72	9	0
10:52 AM	64	75	8	0
11:52 AM	67	70	8	0
12:52 PM	70	63	13	17
1:52 PM	73	57	17	24
2:52 PM	70	65	15	20
3:52 PM	68	68	12	17
4:52 PM	59	78	30	37
4:59 PM	59	77	17	37
5:30 PM	63	72	6	0
5:52 PM	65	68	3	0
6:52 PM	64	75	6	0
7:35 PM	66	73	17	25
7:52 PM	63	84	17	28

Weather Data for Site A (Phoenix)

Site	Location	Date	Approximate time of day
❄	Fort Scott, KS	April 7, 2013	4:25 PM
A	Phoenix, AZ	Oct. 5, 2010	12:30 and 4:30 PM
B	Oklahoma City, OK	April 26, 2013	8:30 PM
C	Dallas, TX	June 13, 2012	6:30 PM
D	Winnipeg, Manitoba, Canada	June 10, 2013	6:30 PM
E	New Orleans, LA	Feb. 24, 2013	9:15 PM
F	Indianapolis, IN	Aug. 25, 2018	5:30 PM
G	Pittsfield, MA	May 15, 2018	No record avail.

Hail map



Weather Data for Site A, continued

Weather station: Phoenix Sky Harbor International Station, AZ

Time	Temperature (°F)	Relative humidity (%)	Wind speed (mph)	Wind gust (mph)
6:51 AM	73	66	9	0
7:51 AM	73	64	10	0
8:51 AM	77	54	13	17
9:51 AM	78	52	15	0
10:51 AM	81	45	10	0
11:51 AM	86	38	13	21
12:06 PM	86	37	1	0
12:36 PM	81	45	17	37
12:38 PM	75	53	15	37
12:49 PM	73	57	6	0
12:51 PM	74	55	9	0
1:16 PM	72	60	8	0
1:40 PM	73	65	9	0
1:51 PM	75	57	12	0
2:11 PM	75	53	9	0
2:51 PM	79	48	6	0
3:24 PM	73	69	16	0
3:51 PM	71	78	7	0
4:13 PM	72	83	14	0
4:51 PM	68	94	3	25
5:04 PM	66	94	10	0
5:35 PM	66	94	7	0
5:51 PM	69	84	8	0
6:51 PM	70	84	8	0
7:51 PM	70	81	9	0

Assignment #3

Part I

1. Watch the video titled "Hail and Hailstones" (https://bit.ly/3aTfqiL).

2. Based on what you learned from the video, why do you think hail storms tend to happen when there are warmer temperatures even though they are made of ice?

Part 2

1. Read the article titled **"After a freak hailstorm turned a beach white, we look at what causes hail and if it's dangerous"**.

2. Draw a diagram that shows how hailstorms are formed. Include pictures, labels, and directional arrows.

3. Explain how the data you analyzed in Part 2 supports what you learned in the video and article. Why wouldn't you expect more hailstorms to happen during winter when cold temperatures are occuring?

KIDSNEWS

After a freak hailstorm turned a beach white, we look at what causes hail and if it's dangerous

Toni Hetherington, May 12, 2019 **6:45PM** Kids News

EXPLAINERS

A freak* and furious hailstorm has turned an Australian beach into a winter wonderland*.

Heavy hail came down in the coastal town of Cape Paterson in Gippsland, Victoria on Friday and transformed the sandy shoreline into a sea of white. It also turned horse paddocks into icy fields and tennis courts into surfaces more suitable for ice hockey.

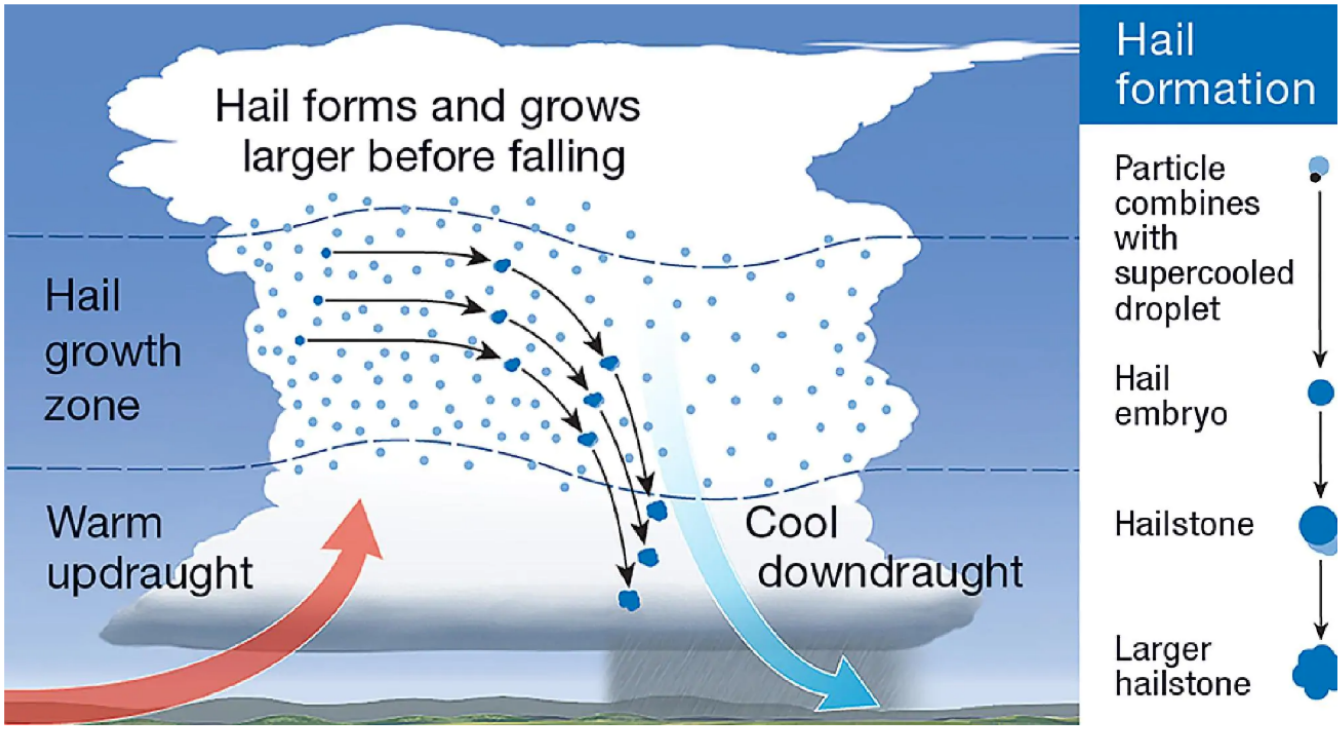
It made for an unusual sight and got us wondering here at Kids News, what causes hail?

Here are some answers:

Facebook images of the beach at Cape Paterson in Victoria after it was turned into a sea of white. Picture: Brad Richards

WHAT CAUSES HAIL?

Hail is created when small water droplets* are caught in the updraught* of a thunderstorm. These water droplets are lifted higher and higher into the sky until they move way above the freezing level and they form into ice. Once they become too heavy for the updraught to support, they will start to fall as hail.



How hail forms from Bureau of Meteorology

Hailstones are actually clumps* of layered ice.

Hailstones start as small ice balls (called hail embryos*) if they come into contact with tiny particles in the air, such as a speck* of dust or dirt, or a salt crystal.

Growth into a full hailstone happens in the hail growth zone, where the updraught air temperature is -10 degrees Celcius* to -25 degrees Celcius. Here, hail embryos collide with super-cooled water droplets, causing them to freeze on impact. Once the hailstones have collided with enough of these droplets, building up in size, they become heavy enough for gravity* to take over, and begin to fall.

Hail can only form in thunderstorms or Cumulonimbus clouds*.

HOW BIG CAN HAILSTONES GET?

Hailstones can be as big as the size of a cricket ball.

Their size depends on the strength and size of the updraught. Most of the time hailstones are smaller than 25mm which is about the size of a 10c piece. However, in very intense thunderstorms, the upward air motion inside the updraught is so strong that even larger hailstones are suspended or fall very slowly. In these storms, hailstones have more time to collect even more super-cooled water droplets and grow to larger sizes, such as golf-ball or cricket-ball size.

AUSTRALIA'S WORST HAILSTORM

On April 14, 1999, Sydney experienced Australia's worst hailstorm in history.

Hailstones the size of cricket balls hit the city at more than 200km/h. The storm hit 85 suburbs, causing damage to 20,000 houses, including windows, roofs and skylights.

More than 70,000 cars had windscreen and panel damage and 25 commercial planes were affected.

When the storm was at its worst, emergency services received a call for help every 10 seconds.

When it was over, the damage bill came to $1.7 billion, the most expensive natural disaster in Australian history.

MOST COMMON TIMES FOR HAILSTORMS IN AUSTRALIA

Hail can occur at any time of year, but large hail is most common in Australia during spring and early summer when temperatures are warm enough to promote the development of strong thunderstorms and the upper atmosphere is still cool enough to support growth of stronger storms.

Source: Bureau of Meteorology

GLOSSARY

- **freak:** unusual, not normal
- **wonderland:** a place full of wonderful things
- **droplets:** a very small drop of liquid
- **updraught:** upward movement of air
- **clumps:** bunch
- **embryos:** at an early stage, such as a seed
- **speck:** a tiny spot
- **Celcius:** measurement of heat
- **gravity:** downward force
- **Cumulonimbus clouds**: rain clouds

CLASSROOM ACTIVITY

Draw a diagram

Based on the information presented in the article, draw a diagram that shows how hailstones are formed. Be sure to include a heading, pictures, labels and directional arrows to make the information easy to understand.