Unit 1: Digital Information
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Unit 1 - Lesson 1
Welcome to CSP

Set Up

Create a Code Studio account at:

studio.code.org

Join our class section:

studio.code.org/join/**REPLACE**

Warm Up

Take the CSP Pre-Course Survey!

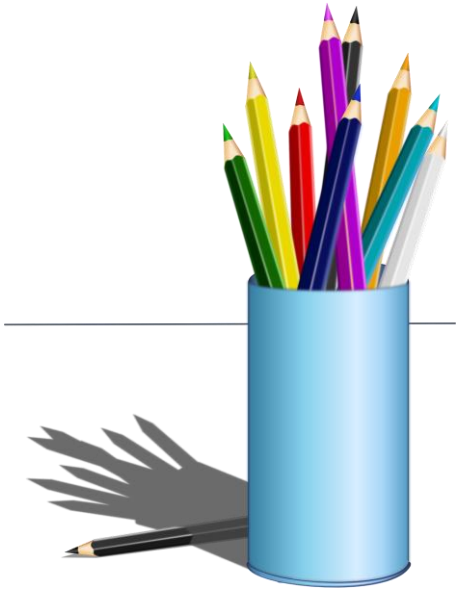
Prompt:

What's something that you know a lot about?

Something that you could teach somebody?

Activity

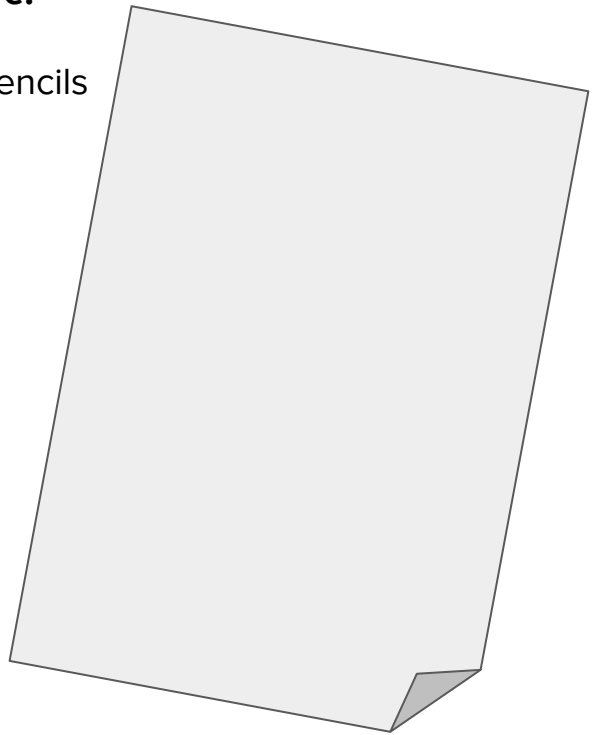
Rapid Prototype



Each group should have:

Poster paper

Pens, pencils, or colored pencils



Do This: Go around the group, and for each individual's area of interest:

1. Identify some way that technology is used with, or affects that thing
2. Make a suggestion for either:
    a. a way that technology might be improved to make it better, faster, easier to use
    b. a creative or innovative new technology that might help solve some problem within that area, or at least make it better

Note: Everyone in the group should make suggestions for any of the areas of interest in your group.

Do This: As a group, nominate the idea you've discussed that you think would be the most interesting to everyone else in the class.

- Start to sketch out that idea on a poster. Make a visual representation of your ideas.

Remember this is a rapid prototype. Just something to quickly convey the idea!

Gallery Walk

Wrap Up


ENERGY
FASHION
MEDICINE
COMPUTER SCIENCE
IS
CHANGING
EVERYTHING
PUBLIC SAFETY
AGRICULTURE

Prompt:

What are you excited to learn about in this class?

Unit 1 - Lesson 2
Representing Information

Warm Up

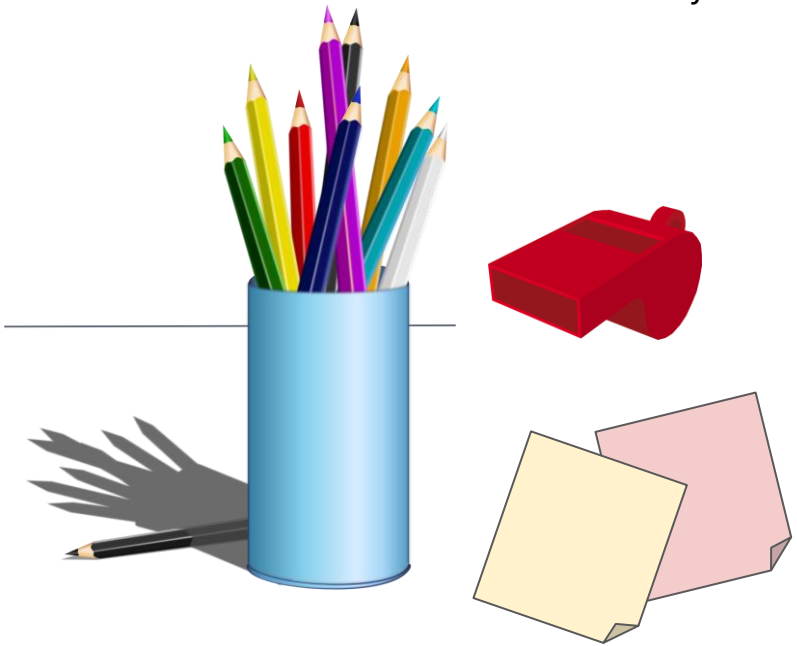
Prompt:

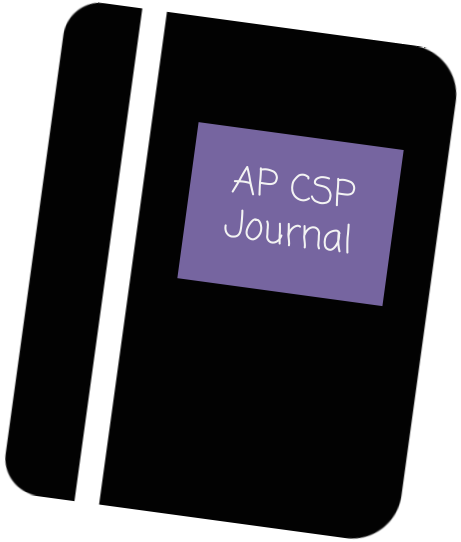
What is your definition of information?

Activity

Information Sending Devices

You and your partner should have:
A variety of everyday classroom materials
Journal





Challenge #1

In your journal, write down a question that has two possible answers.

Do This: Build a device out of classroom supplies to communicate the answer to your question.

Rules:

- No projectiles.
- No language can be used.

Demo Devices

Challenge #2

In your journal, modify the answers to your question so there are now ***four*** possible choices

Do This: Update your device to communicate one of ***four*** possible answers to your question

Consider:

- Should you modify your device?
- Can you use it in a different way?
- Should you make a new device?

Demo Devices

Challenge #3

In your journal, modify the answers to your question so there are now ***eight*** possible choices

Do This: Update your device to communicate one of ***eight*** possible answers to your question

Consider:

- Should you modify your device?
- Can you use it in a different way?
- Should you make a new device?

Demo Devices

Wrap Up

Prompt: Think back to your simple two-option device from Challenge #1.

Instead of changing your device and adding more options every time you added more answers, how could you simply modify the way you use your device with only two options?

Unit 1 - Lesson 3
Circle Square Patterns

Warm Up

Prompt:

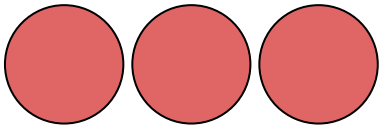
How many ways can you represent 7?

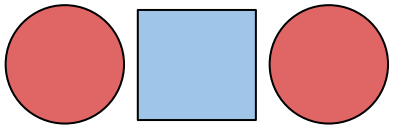
Activity

Prompt:

With a partner, work out how many patterns (made up of circles and squares) you can make with three place values. These patterns could each represent different pieces of information. Write the patterns down in your journal.

Here are two to get you started:

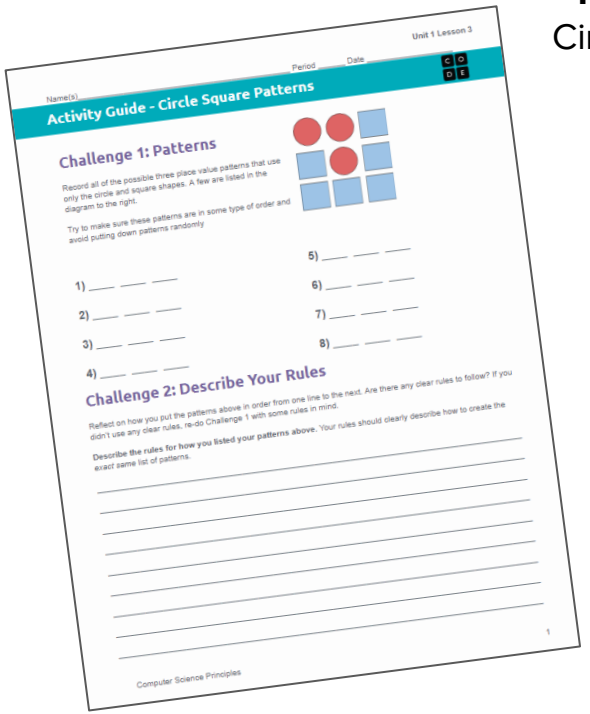




Do This:

Share out your 7th pattern

Circle Square Activity



Unit 1 Lesson 3

Name(s) Period Date

Activity Guide - Circle Square Patterns

Challenge 1: Patterns

Record all of the possible three place value patterns that use only the circle and square shapes. A few are listed in the diagram to the right.

Try to make sure these patterns are in some type of order and avoid putting down patterns randomly

1) ___ ___ ___

2) ___ ___ ___

3) ___ ___ ___

4) ___ ___ ___

5) ___ ___ ___

6) ___ ___ ___

7) ___ ___ ___

8) ___ ___ ___

Challenge 2: Describe Your Rules

Reflect on how you put the patterns above in order from one line to the next. Are there any clear rules to follow? If you didn't use any clear rules, re-do Challenge 1 with some rules in mind.

Describe the rules for how you listed your patterns above. Your rules should clearly describe how to create the exact same list of patterns.

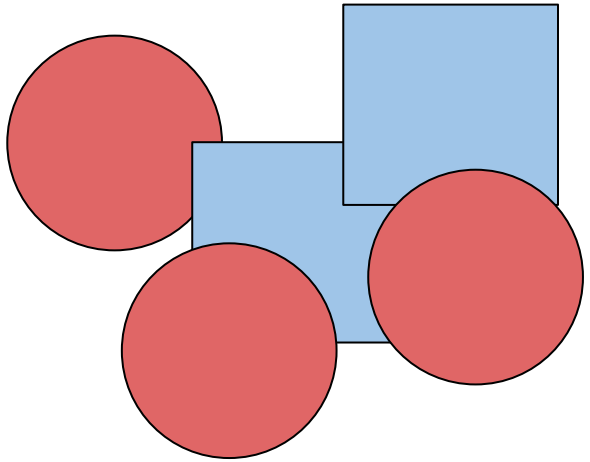
1

Computer Science Principles

You and your partner should have:

Circle Square Patterns - Activity Guide

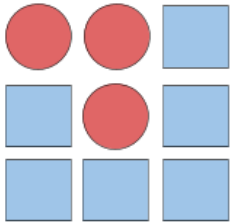
Shape Cutouts



Do This: In your Activity Guide complete the following challenges.

Challenge 1: Patterns

Record all of the possible three place value patterns that use only the circle and square shapes. A few are listed in the diagram to the right. Try to make sure these patterns are in some type of order and avoid putting down patterns randomly.

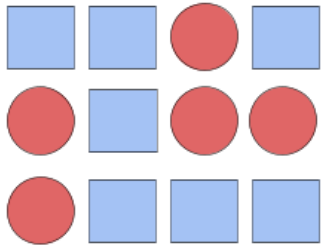


Challenge 2: Describe Your Rules

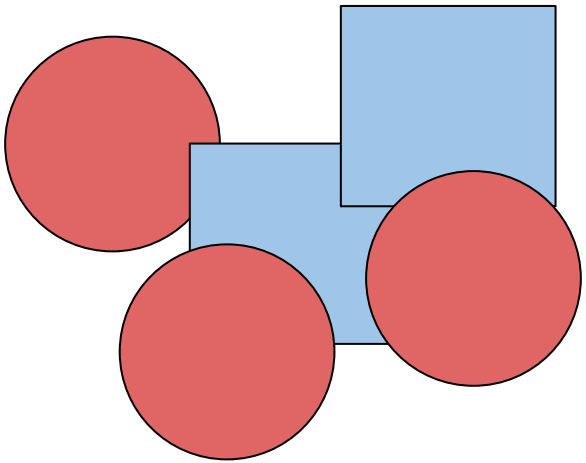
Reflect on how you put the patterns above in order from one line to the next. Are there any clear rules to follow? If you didn't use any clear rules, re-do Challenge 1 with some rules in mind. Describe the rules for how you listed your patterns above. Your rules should clearly describe how to create the *exact same* list of patterns.

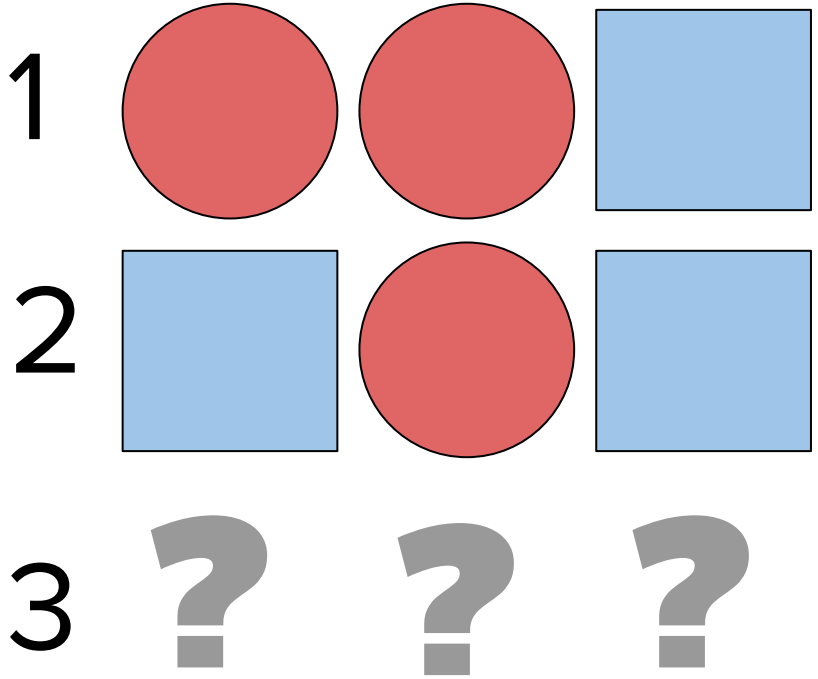
Challenge 3: More Patterns

Use your rules from the last page to try and generate all possible four place value patterns using only circles and squares. Three examples are listed to the right. You may need to add new rules or slightly change your rules to account for all four place value patterns, but try to keep them as similar as possible.



Do This: Let's share our rules with the class





Wrap Up

Congratulations! You just invented your own system!

Prompt:

How is counting in this circle and square system similar to how we count in our regular lives? How is it different?

Unit 1 - Lesson 4
Binary Numbers

Warm Up

Prompt:

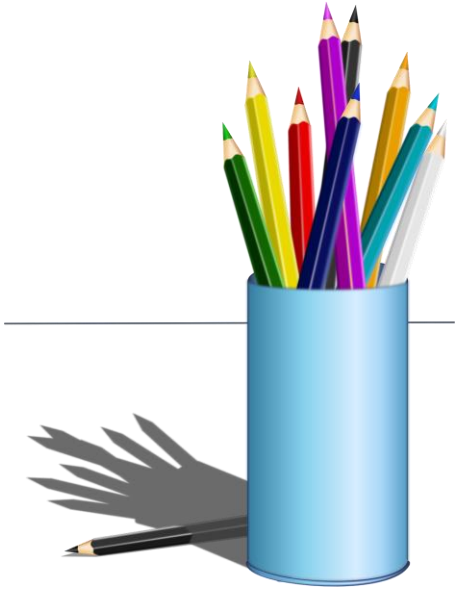
Yesterday you created your own number system using circles and squares.

What can we communicate using only two symbols? Is there a limit?

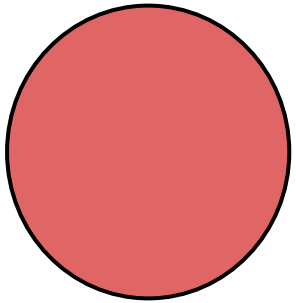
Activity

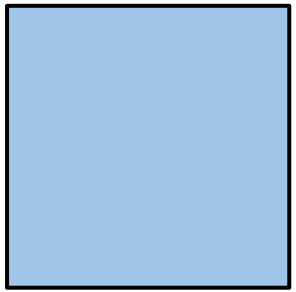
Binary Numbers

You and your partner should each have:
A Pen or Pencil

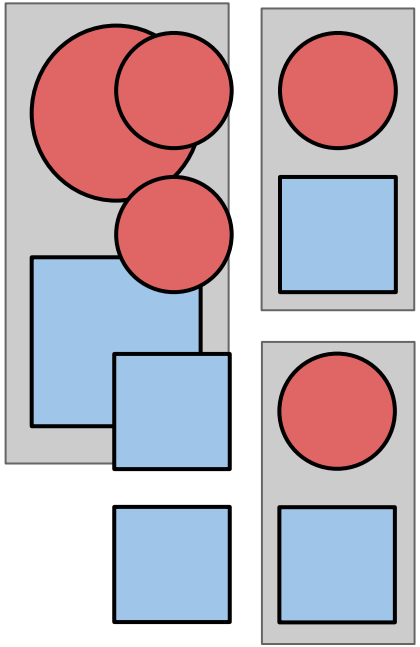


1 place value = **2** possible patterns



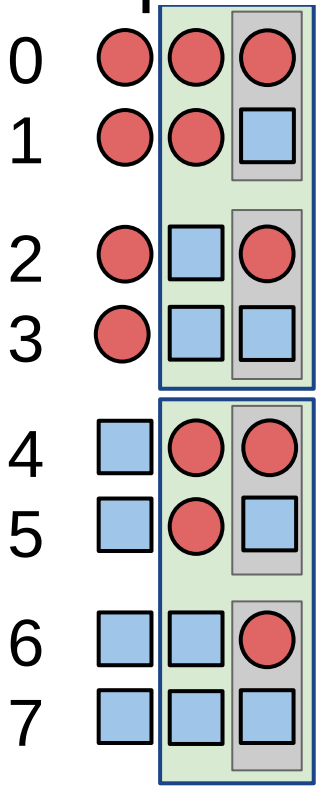


2 place values= 4 possible patterns



3 place values= 8 possible patterns

We can then map our patterns to a numbered list.



Note: Computer scientists like to start counting at 0!

Instead of 2 shapes, what if we had 10 shapes?

1 place value = Ten 1-shape patterns

0
1
2
3
4 ← These are just shapes!
5
6
7
8
9

2 places = one hundred 2-shape patterns

00	10	20	30	40	50	60	70	80	90
01	11	21	31	41	51	61	71	81	91
02	12	22	32	42	52	62	72	82	92
03	13	23	33	43	53	63	73	83	93
04	14	24	34	44	54	64	74	84	94
05	15	25	35	45	55	65	75	85	95
06	16	26	36	46	56	66	76	86	96
07	17	27	37	47	57	67	77	87	97
08	18	28	38	48	58	68	78	88	98
09	19	29	39	49	59	69	79	89	99

Quiz: What comes next?

Ten shapes

0 1 2 3 4 5 6 7 8 9

0 9 9

_ _ _

Quiz: What comes next?

Ten shapes

0
1
2
3
4
5
6
7
8
9

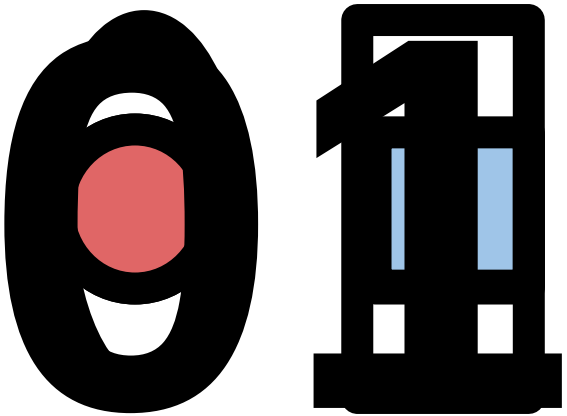
0 9 9

1 0 0

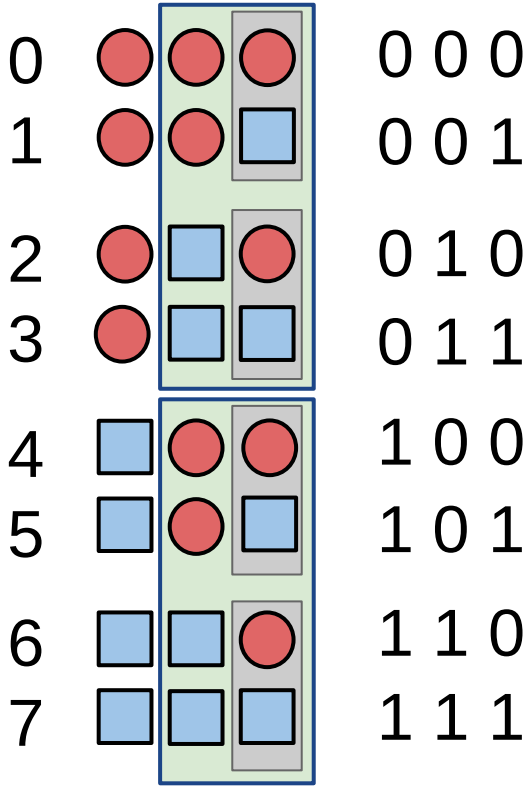
Where is this heading?

...binary...

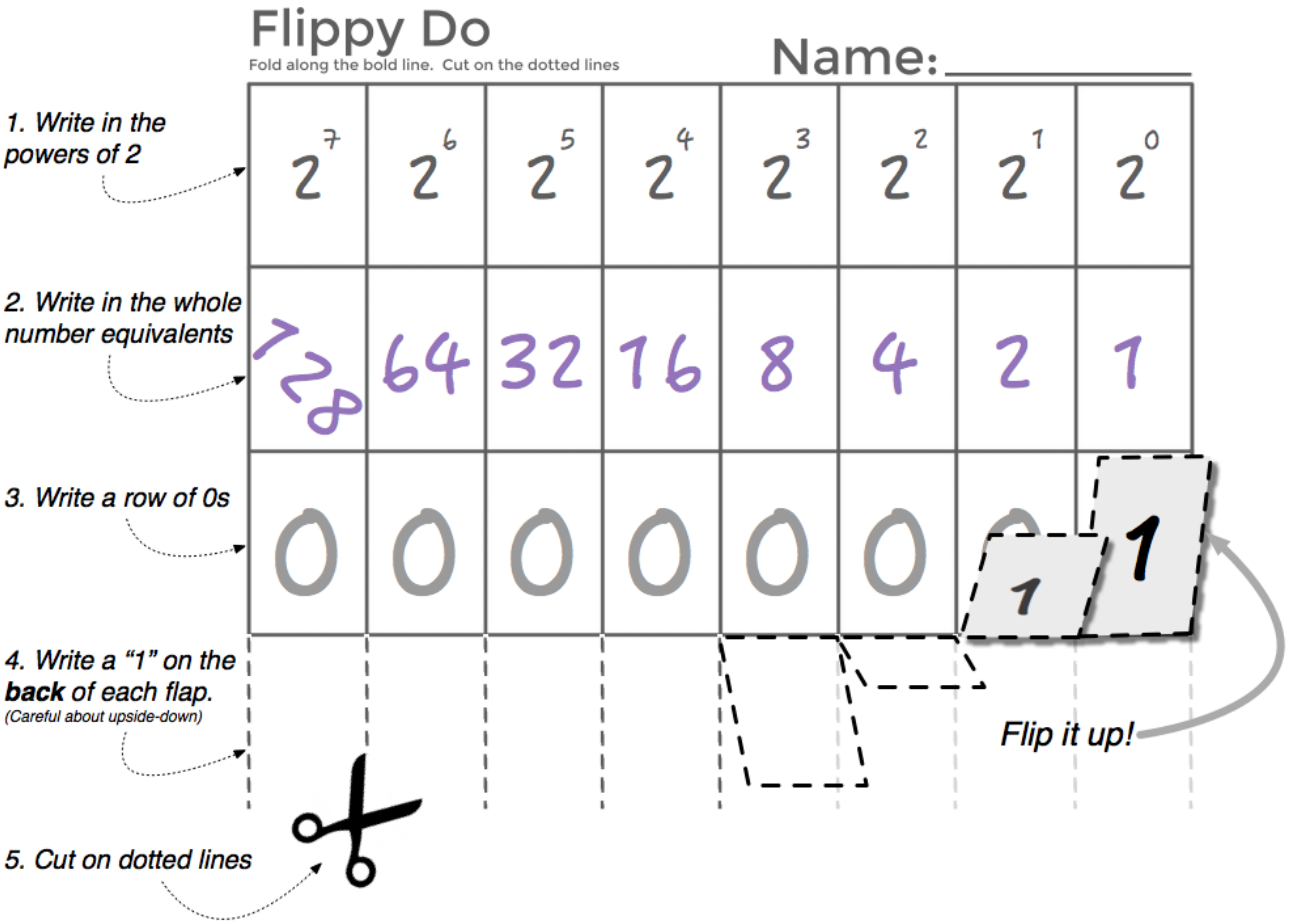
“Binary” is a number system with 2 shapes...



Making Organized Lists -> Counting in Binary



Make Your Flippy Do!



Each place value represents one "**bit**" (binary digit). A bit can be a zero or a one.

Your flippy do has 8 bits...

which together make...

1 byte

Try Out Your Flippy Do!

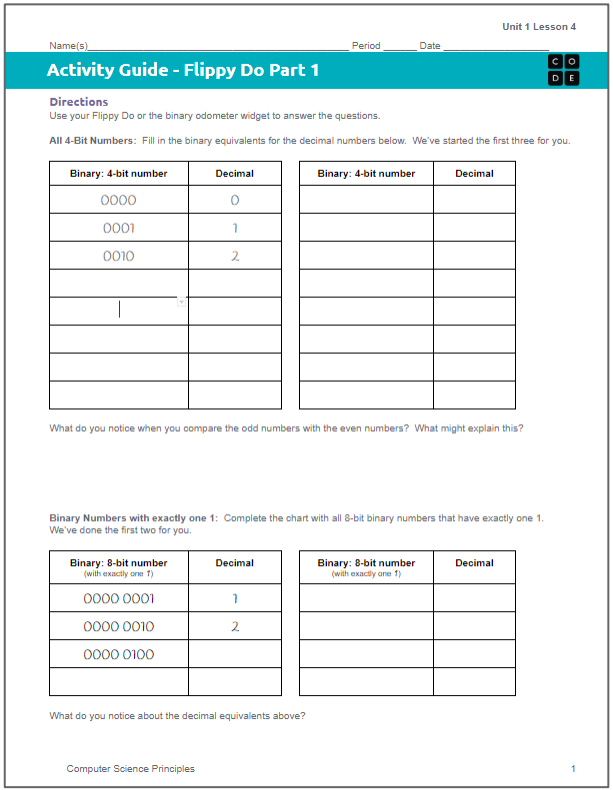
Represent these decimal numbers in binary

- 7 0000 0111
- 20 0001 0100

Represent these binary numbers in decimal

- 0001 0010 18
- 0001 1111 31

Flippy Do Activity Guide



Unit 1 Lesson 4

Name(s)_____ Period _____ Date _____

Activity Guide - Flippy Do Part 1

Directions
Use your Flippy Do or the binary odometer widget to answer the questions.

All 4-Bit Numbers: Fill in the binary equivalents for the decimal numbers below. We've started the first three for you.

Binary: 4-bit number	Decimal	Binary: 4-bit number	Decimal
0000	0		
0001	1		
0010	2		

What do you notice when you compare the odd numbers with the even numbers? What might explain this?

Binary Numbers with exactly one 1: Complete the chart with all 8-bit binary numbers that have exactly one 1. We've done the first two for you.

Binary: 8-bit number (with exactly one 1)	Decimal	Binary: 8-bit number (with exactly one 1)	Decimal
0000 0001	1		
0000 0010	2		
0000 0100			

What do you notice about the decimal equivalents above?

Computer Science Principles 1

Wrap Up

Decimal number: a base 10 number with ten possible different digits

0 1 2 3 4 5 6 7 8 9

10^1	10^0
10	1
2	3

Same number represented two different ways.

← Decimal

Binary →

Binary number: a base 2 number with two possible different digits

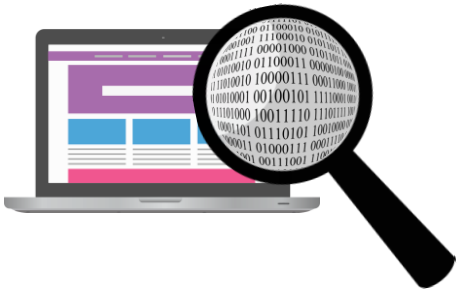
0 1

2^4	2^3	2^2	2^1	2^0
16	8	4	2	1
1	0	1	1	1

Prompt: Now that we've had a chance to practice, let's find out what we've learned and what we still have questions about. Write down:

- 3 things you learned today
- 2 things you found interesting
- 1 question you still have

Bit: A contraction of "Binary Digit"; the single unit of information in a computer, typically represented as a 0 or 1



Byte: 8 bits

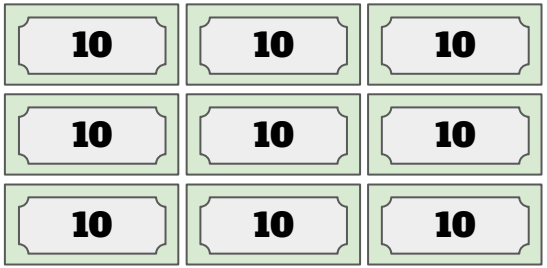
`10010101`

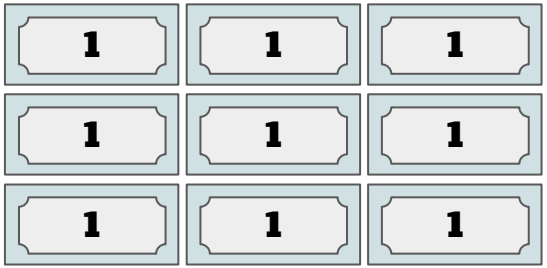
Unit 1 - Lesson 5
Overflow and Rounding

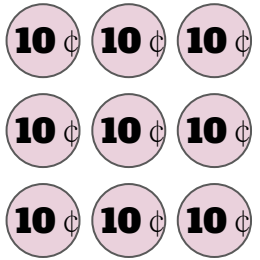
Warm Up

Prompt: Imagine you work at a local store. In the register all you have are nine $10 bills, nine $1 bills, and nine dimes.

- What's the largest amount of change that you can give someone?
- What's the smallest amount?
- What would you do if someone needed 7 cents in change?

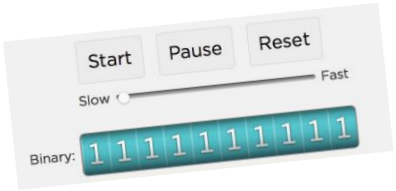




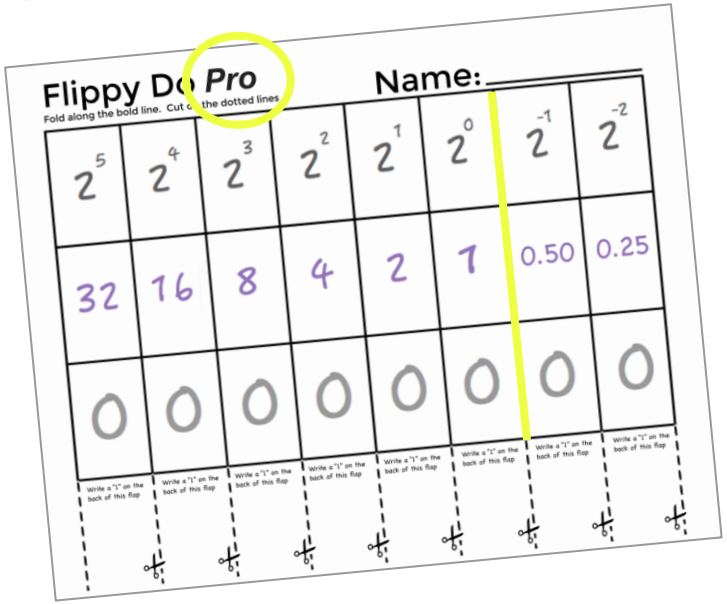


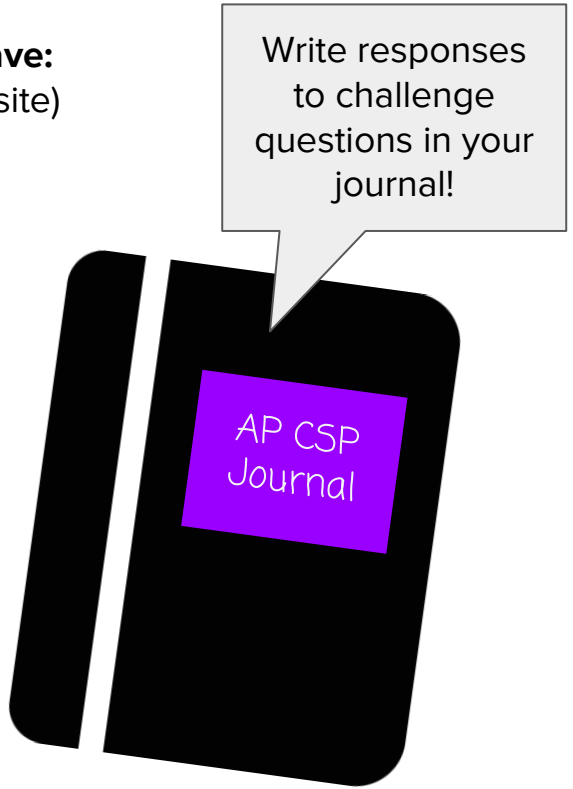
Activity

Overflow and Rounding



You and your partner should have:
Binary Odometer (Code.org website)
Flippy Do Pro Template
Scissors
Journal

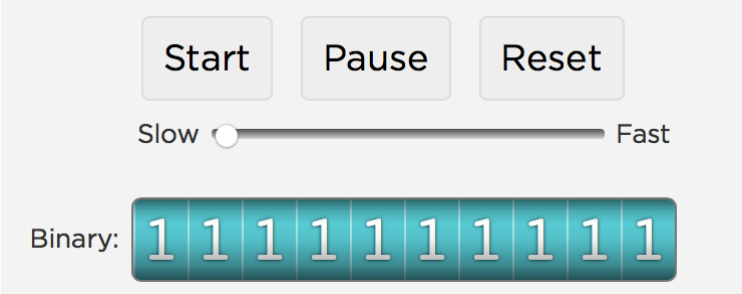




Do This:

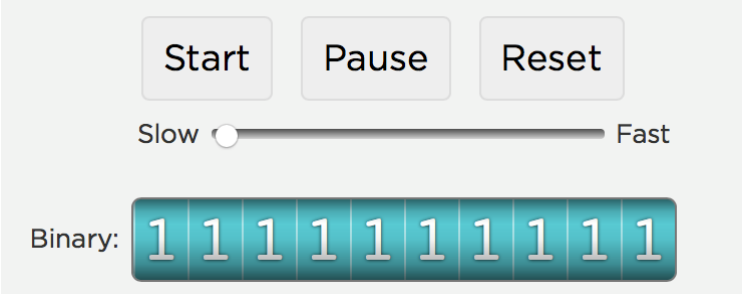
Navigate to Level 2.

Play with the odometer to figure out how it works.



Do This:

Set the odometer to the highest number possible. Then let it run!



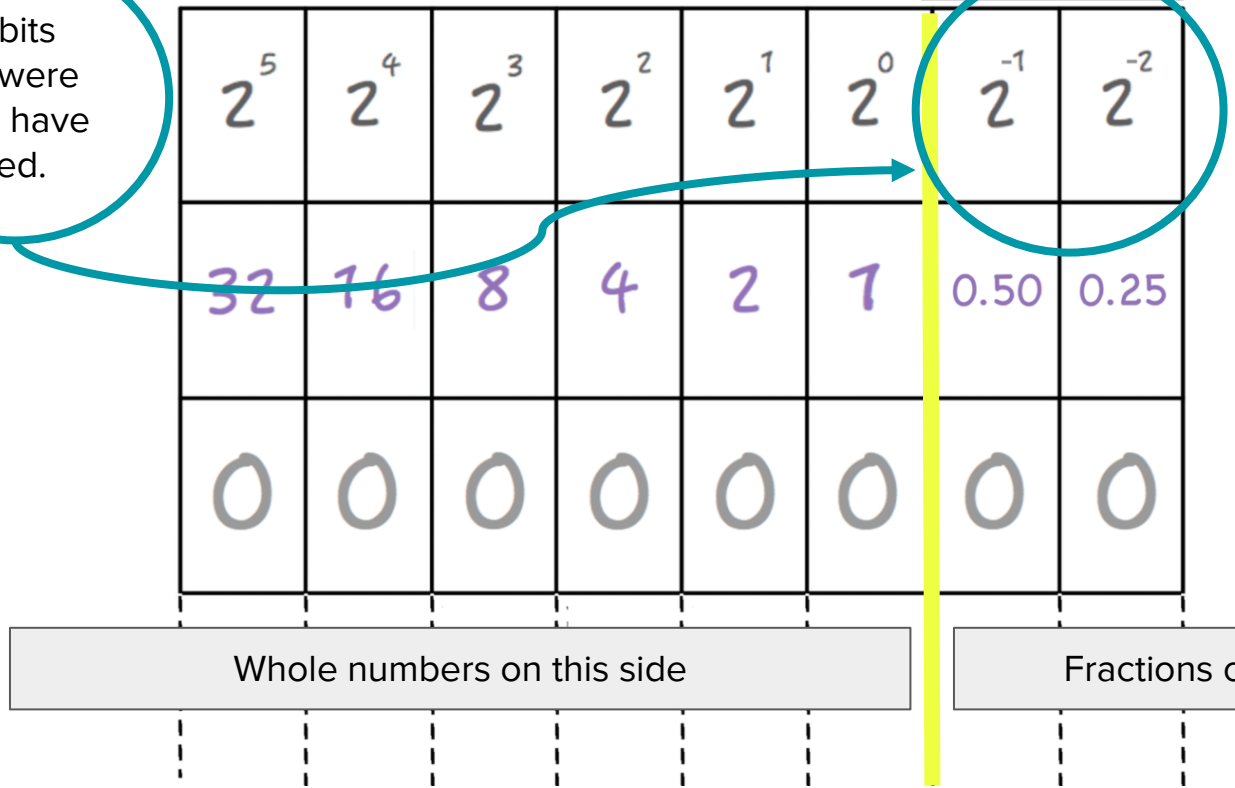
Prompt:

What happened to the odometer reading?

Does the odometer still show the distance driven by the car?

Cut and Fold your Flippy Do Pro

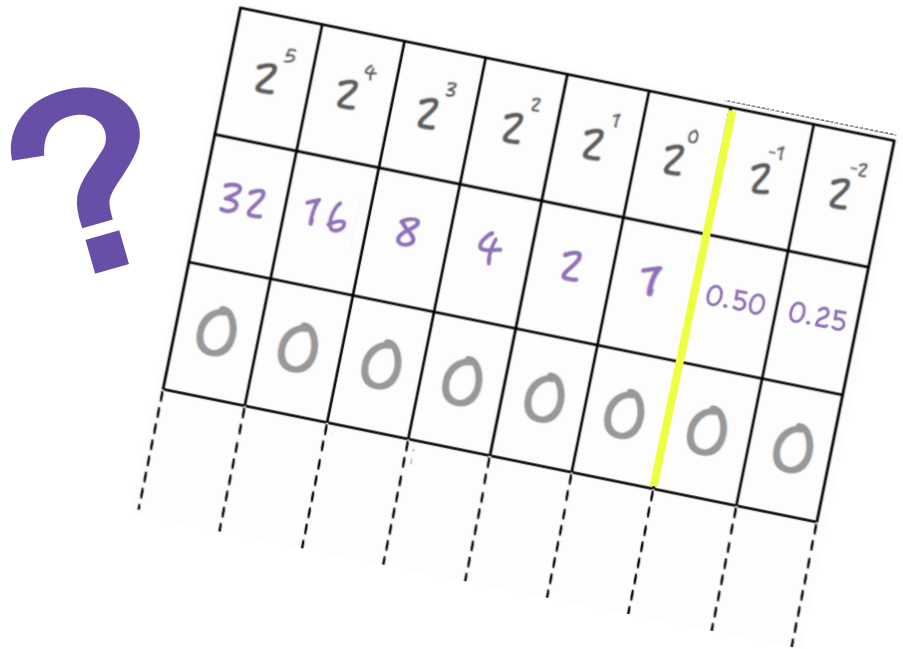
The bits that were here have moved.



Challenge # 1 - Smallest Non-Zero Number

Make the smallest nonzero number possible, in binary, with your Flipply Do Pro.

What is the decimal (Base 10) equivalent?

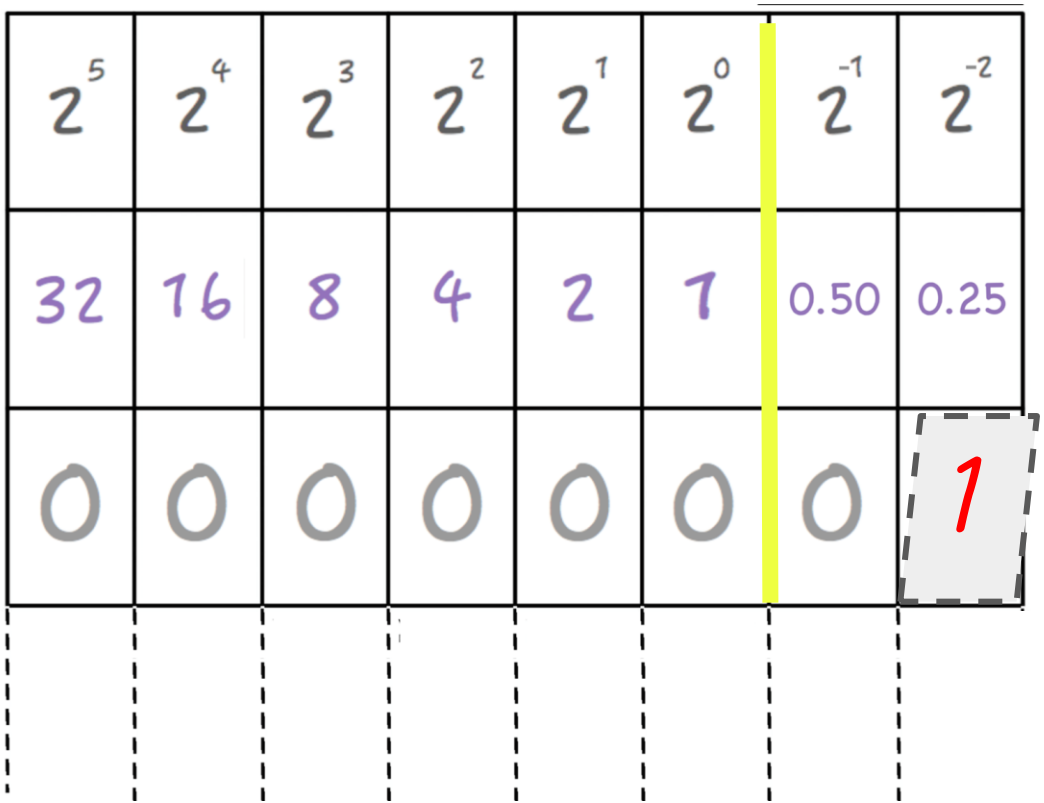


ANSWER -- Smallest Number

The smallest nonzero number possible, in binary: 000000.01

What is the decimal (Base 10) equivalent?

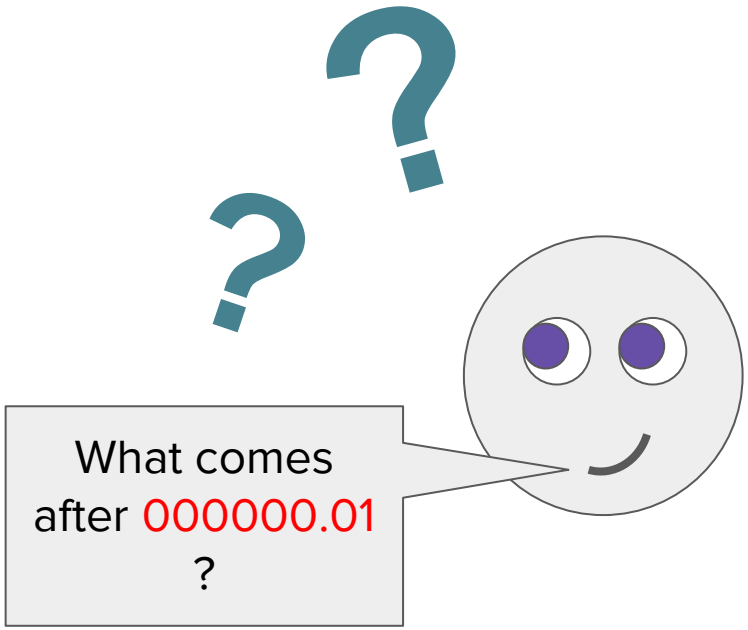
0.25



Challenge #2 - Next Value

Increase the number made in Challenge 1 to the next value with your Flipply Do Pro.

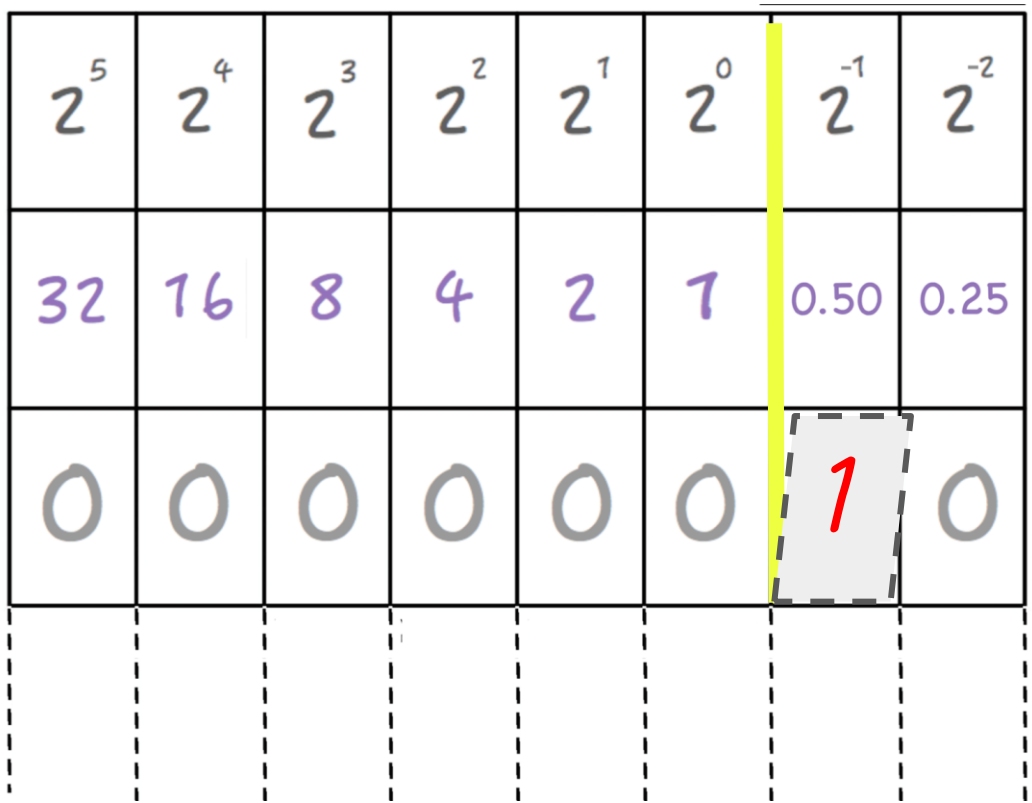
What is the decimal equivalent?



ANSWER -- Next Value

The next value,
in binary:
000000.10

What is the decimal
(Base 10) equivalent?
0.50



Challenge #3 -- Got Quarters?

Make the binary equivalents of

0.25

0.50

and

0.75

ANSWER -- Got Quarters?

Decimal		Decimal
	Decimal	
0.25	+	0.50
=	0.75	

Binary

2^5	2^4	2^3	2^2	2^1	2^0	2^{-1}	2^{-2}
32	16	8	4	2	1	0.50	0.25
0	0	0	0	0	0	0	1

11

2^5	2^4	2^3	2^2	2^1	2^0	2^{-1}	2^{-2}
32	16	8	4	2	1	0.50	0.25
0	0	0	0	0	0	1	0

0(

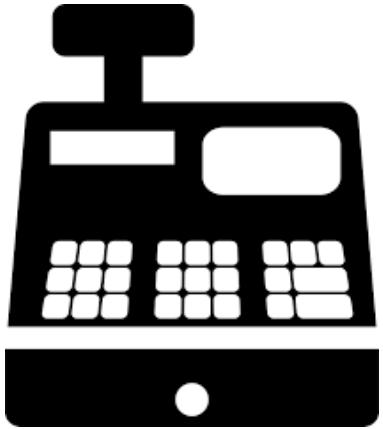
Binary

2^5	2^4	2^3	2^2	2^1	2^0	2^{-1}	2^{-2}
32	16	8	4	2	1	0.50	0.25
0	0	0	0	0	0	1	1

Challenge #4 - Can’t Make Change

Make all the values
of change (fractional)
you can with
your Flippy Do Pro.

Can you make the binary
number for 39 cents
(0.39 decimal)?



ANSWER -- Can't Make Change

The only change values you can make with this Flippy Do Pro are 25 cents, 50 cents, and 75 cents.

Can you make the binary number for 39 cents (0.39 decimal)? No!

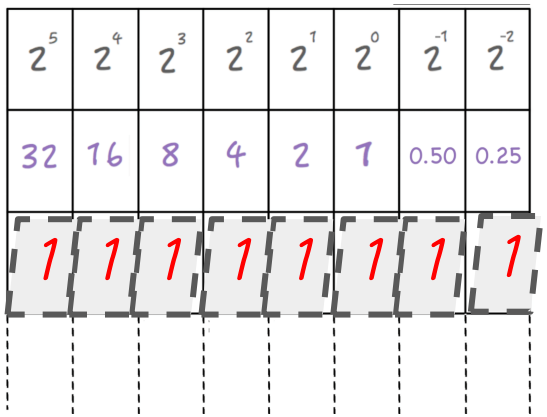
Roundoff error occurs when an exact value cannot be made with available place values.

Challenge #5 - Largest Number

What is the largest number (in decimal) you can make with the Flippy Do Pro?

Challenge #5 - Largest Number

What is the largest number (in decimal) you can make with the Flippy Do Pro?



32 + 16 + 8 + 4 + 2 + 1 + 0.50 + 0.25 = 63.75

Challenge #6 - How Much Pie

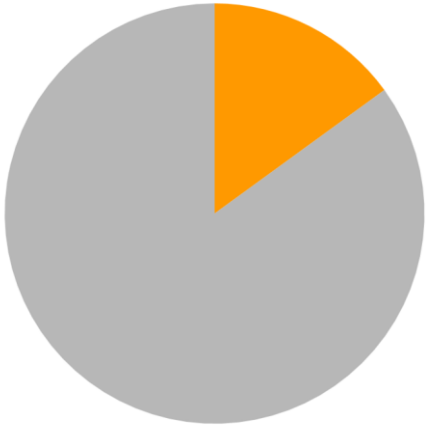
Use a Flippy Do Pro to determine how much pie is left at the end of dessert. For each pie, make a decision how you want to round the number to fit on the Flippy Do Pro. Write this number down in your journal.

Challenge #6 - How Much Pie

Pie #1 - Pumpkin

Do this:

1. Estimate how big the orange slice is.
2. Use your Flippy Do Pro to represent how big the orange slice is. You may need to round up or down.
3. Convert your binary number to a decimal number.
4. Write down the number your journal.



Challenge #6 - How Much Pie

Pie #2 - Cherry

Do this:

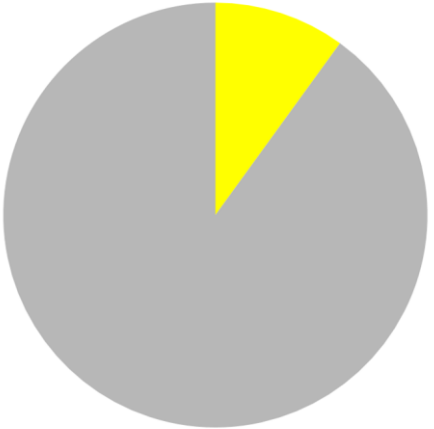
1. Estimate how big the red slice is.
2. Use your Flippy Do Pro to represent how big the red slice is. You may need to round up or down.
3. Convert your binary number to a decimal number.
4. Write down the number your journal.

Challenge #6 - How Much Pie

Pie #3 - Lemon

Do this:

1. Estimate how big the yellow slice is.
2. Use your Flippy Do Pro to represent how big the yellow slice is. You may need to round up or down.
3. Convert your binary number to a decimal number.
4. Write down the number your journal.

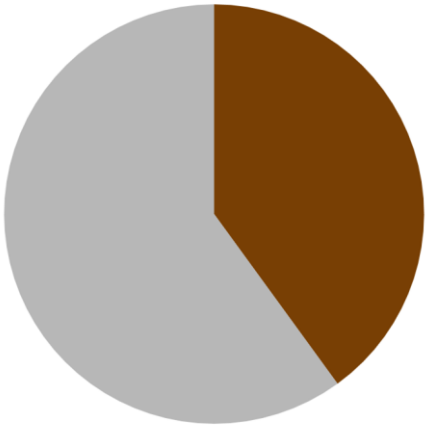


Challenge #6 - How Much Pie

Pie #4 - Chocolate

Do this:

1. Estimate how big the brown slice is.
2. Use your Flippy Do Pro to represent how big the Brown slice is. You may need to round up or down.
3. Convert your binary number to a decimal number.
4. Write down the number your journal.

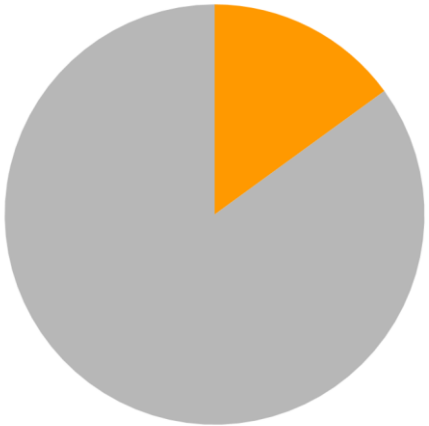


Challenge #6 - How Much Pie

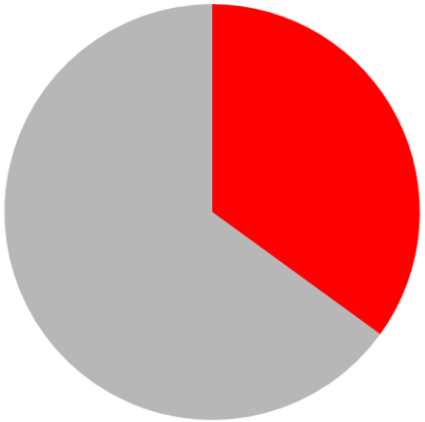
How much pie is left? Add all the decimal numbers up together. Compare with a partner and discuss.

Challenge #6 - How Much Pie

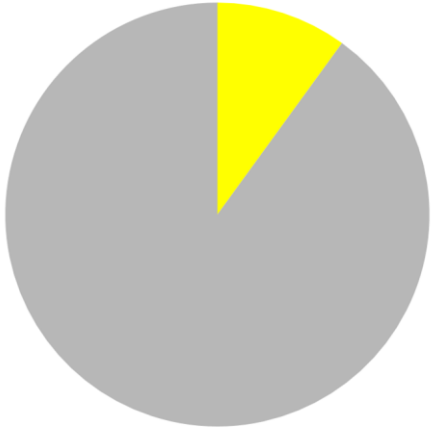
Your rounding may look similar to the answers below:



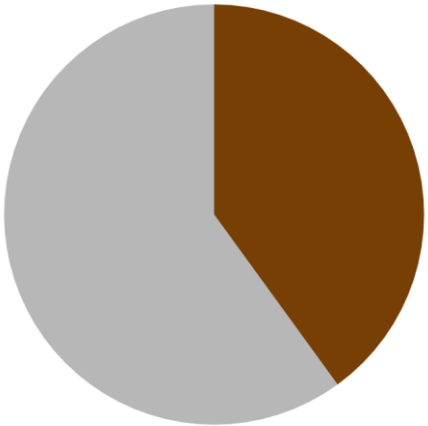
BINARY : 0000.01
DECIMAL : 0.25



BINARY : 0000.01
DECIMAL : 0.25



BINARY : 0000.00
DECIMAL : 0

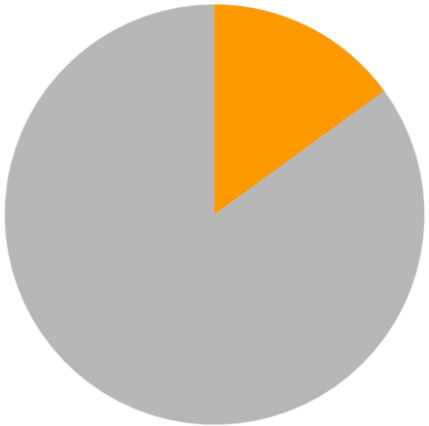


BINARY : 0000.11
DECIMAL : 0.50

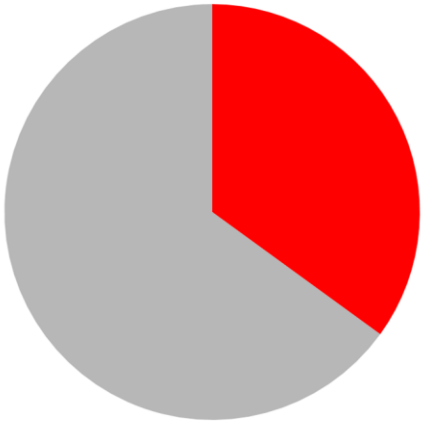
Challenge #6 - How Much Pie

Or, your rounding may look similar to the answers below:

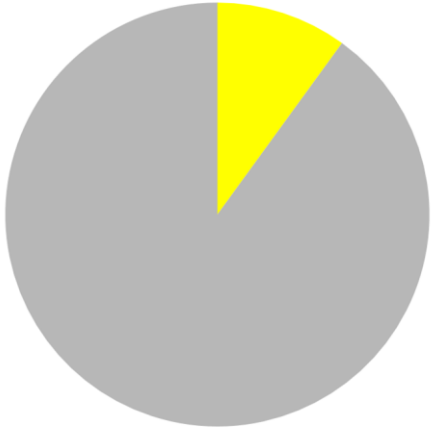
TOTAL: 1.25 Pies left over



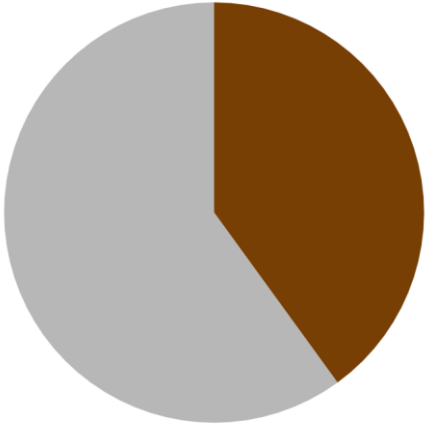
BINARY : 0000.01
DECIMAL : 0.25



BINARY : 0000.11
DECIMAL : 0.50



BINARY : 0000.00
DECIMAL : 0



BINARY : 0000.11
DECIMAL : 0.50

Challenge #6 - How Much Pie

Your answer may be a little different depending on how you rounded - up or down. If you did not have to round at all, you would see that exactly one whole pie is left over!

Prompt: Why is it a problem for a computer if your answers are different than others?

Wrap Up

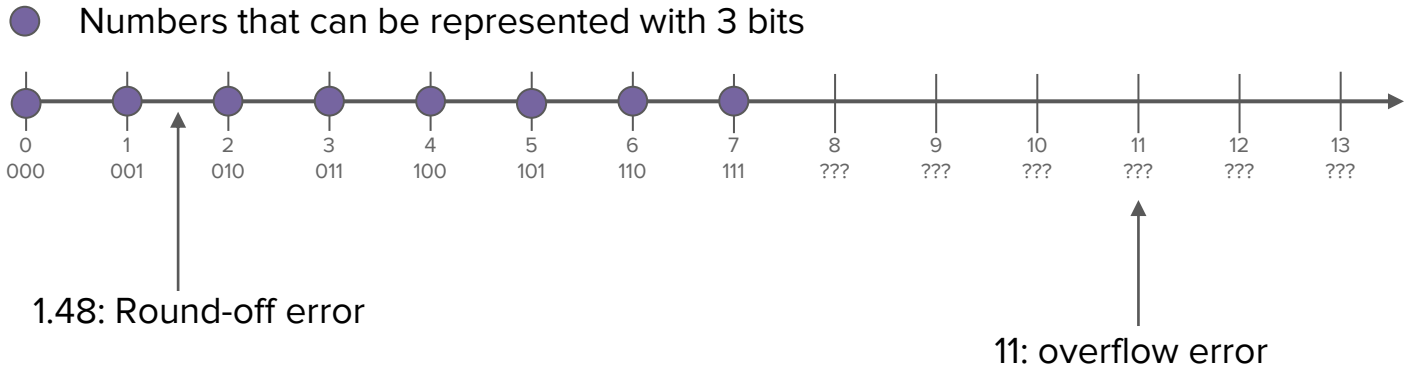
Prompt:

- What does the binary odometer show about representing large numbers?
- What does the Flippy Do Pro show about representing very small numbers?
- If we had a big enough odometer or Flippy Do Pro, could we represent every possible number?

With a fixed number of bits computers can only represent a fixed set of numbers.

Overflow Error: Error from attempting to represent a number that is too large.

Round-off Error: Error from attempting to represent a number that is too precise. The value is rounded.



Unit 1 - Lesson 6
Representing Text

Warm Up

1 1

2 14

7 4

10 31

Prompt: Brainstorm with your partner what you think this list represents. When you think you have an idea, come up with another item to add to this list and be ready to explain why it belongs.

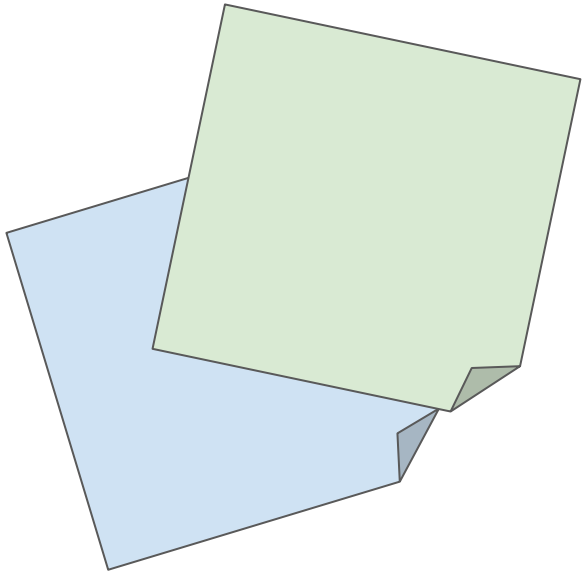
Activity

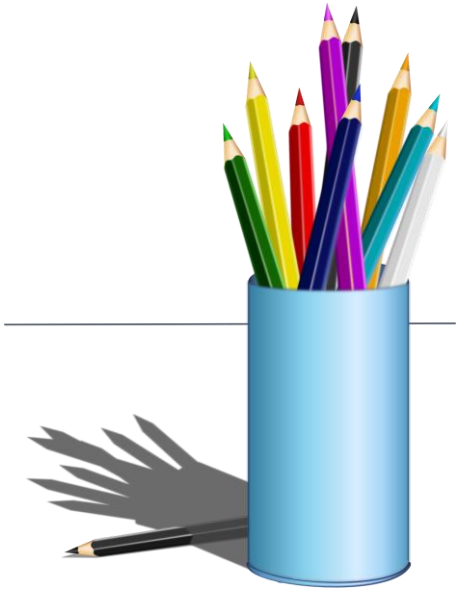
Representing Text

You and your partner should have:

Sticky Notes

Pen or pencil





Do This: Look at the samples on the screen. Using only numbers, you will need to communicate these samples to a partner. No letters or characters allowed! Come up with a system that allows you to do this.

Text Samples

hey
ttyl
morning

Challenge #1

Partner A

Heads Down!

Partner B

On a sticky note, use your system to write the message:

oh no

Partner A

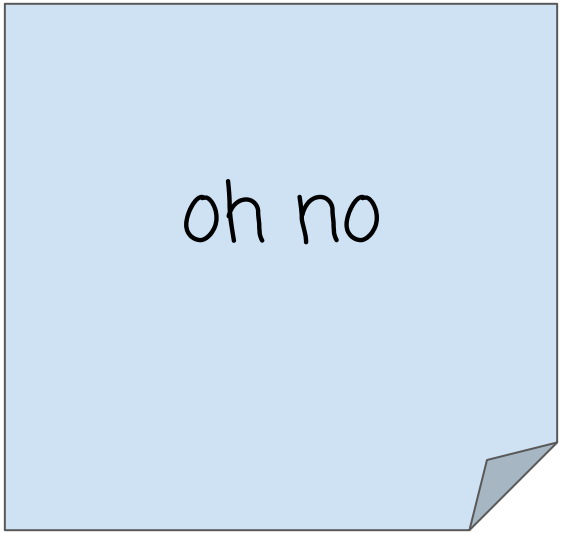
Heads Up! Translate the message on the sticky note using your system.

Partner B

Heads down!

Heads up!

Check your answers:



Do This:

Update your system if needed!

Challenge #2

Partner A

On a sticky note, use your system to write the message:

Great!

Partner B

Heads Down!

Partner A

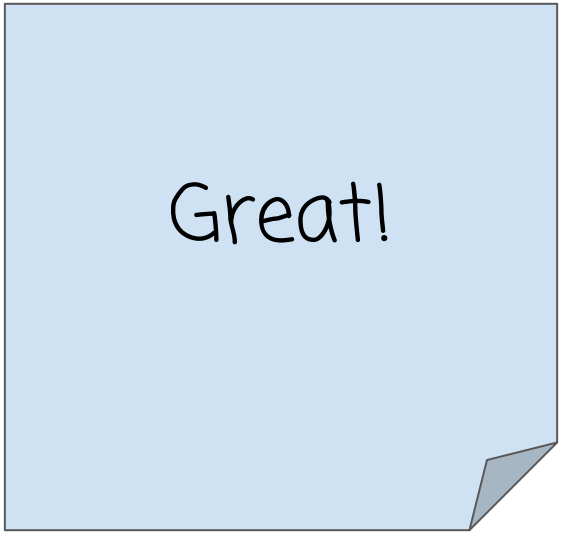
Heads down.

Partner B

Heads Up! Translate the message on the sticky note using your system.

Heads up!

Check your answers:



Do This:

Update your system if needed!

Challenge #3

Partner A

Heads Down!

Partner B

On a sticky note, use your system to write the message:

Free at 5?

Partner A

Heads Up! Translate the message on the sticky note using your system.

Partner B

Heads down.

Heads up!

Check your answers:

Do This:

Update your system if needed!

Challenge #4

Partner A

On a sticky note, use your system to write the message:

Cya 2nite!

Partner B

Heads Down!

Partner A

Heads down.

Partner B

Heads Up! Translate the message on the sticky note using your system.

Heads up!

Check your answers:

Prompt: Find another group. Discuss with them the following prompts before discussing with the class:

- Compare your systems. How are they the same? How are they different?
- What's the minimum number of bits each of your systems would need per character? How do you know?
  - Hint: Convert your largest number in your system into binary. How many bits does this number require?

Num.	Bits	Char.	Num.	Bits	Char.	Num.	Bits	Char.
32	00100000	Space	64	01000000	@	96	01100000	`
33	00100001	!	65	01000001	A	97	01100001	a
34	00100010	"	66	01000010	B	98	01100010	b
35	00100011	#	67	01000011	C	99	01100011	c
36	00100100	$	68	01000100	D	100	01100100	d
37	00100101	%	69	01000101	E	101	01100101	e
38	00100110	&	70	01000110	F	102	01100110	f
39	00100111	'	71	01000111	G	103	01100111	g
40	00101000	(	72	01001000	H	104	01101000	h
41	00101001	)	73	01001001	I	105	01101001	i
42	00101010	*	74	01001010	J	106	01101010	j
43	00101011	+	75	01001011	K	107	01101011	k
44	00101100	,	76	01001100	L	108	01101100	l
45	00101101	-	77	01001101	M	109	01101101	m
46	00101110	.	78	01001110	N	110	01101110	n
47	00101111	/	79	01001111	O	111	01101111	o
48	00110000	0	80	01010000	P	112	01110000	p
49	00110001	1	81	01010001	Q	113	01110001	q
50	00110010	2	82	01010010	R	114	01110010	r
51	00110011	3	83	01010011	S	115	01110011	s
52	00110100	4	84	01010100	T	116	01110100	t
53	00110101	5	85	01010101	U	117	01110101	u
54	00110110	6	86	01010110	V	118	01110110	v
55	00110111	7	87	01010111	W	119	01110111	w
56	00111000	8	88	01011000	X	120	01111000	x
57	00111001	9	89	01011001	Y	121	01111001	y
58	00111010	:	90	01011010	Z	122	01111010	z
59	00111011	;	91	01011011	[	123	01111011	{
60	00111100	<	92	01011100	\	124	01111100	|
61	00111101	=	93	01011101	]	125	01111101	}
62	00111110	>	94	01011110	^	126	01111110	~
63	00111111	?	95	01011111	_			

Prompt:

- What's the same as the systems you created?
- What's different?
- What is most interesting or surprising about this system?

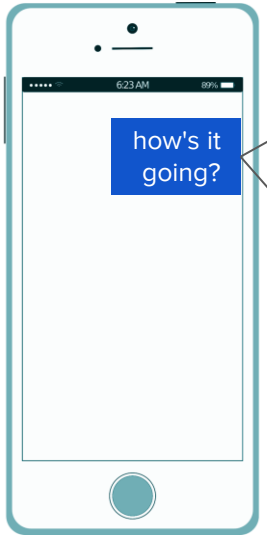
ASCII (American Standard Code for Information Interchange)

Wrap Up

Prompt:

- What problem were we trying to solve today?
- What details from the last few lessons were hidden or out of focus?

Abstraction



ASCII

104 111 119 39 115
32 105 116 32 103
111 105 110 103 63

We don't have to think about this layer when we send a text message... but every message is really just zeroes and ones!

TEXT **ASCII** **BINARY**

Prompt:

What is another example of an abstraction from your everyday life? Something where you don’t completely understand how it works but you can still use it with confidence?

Unit 1 - Lesson 7
Black and White Images

Warm Up

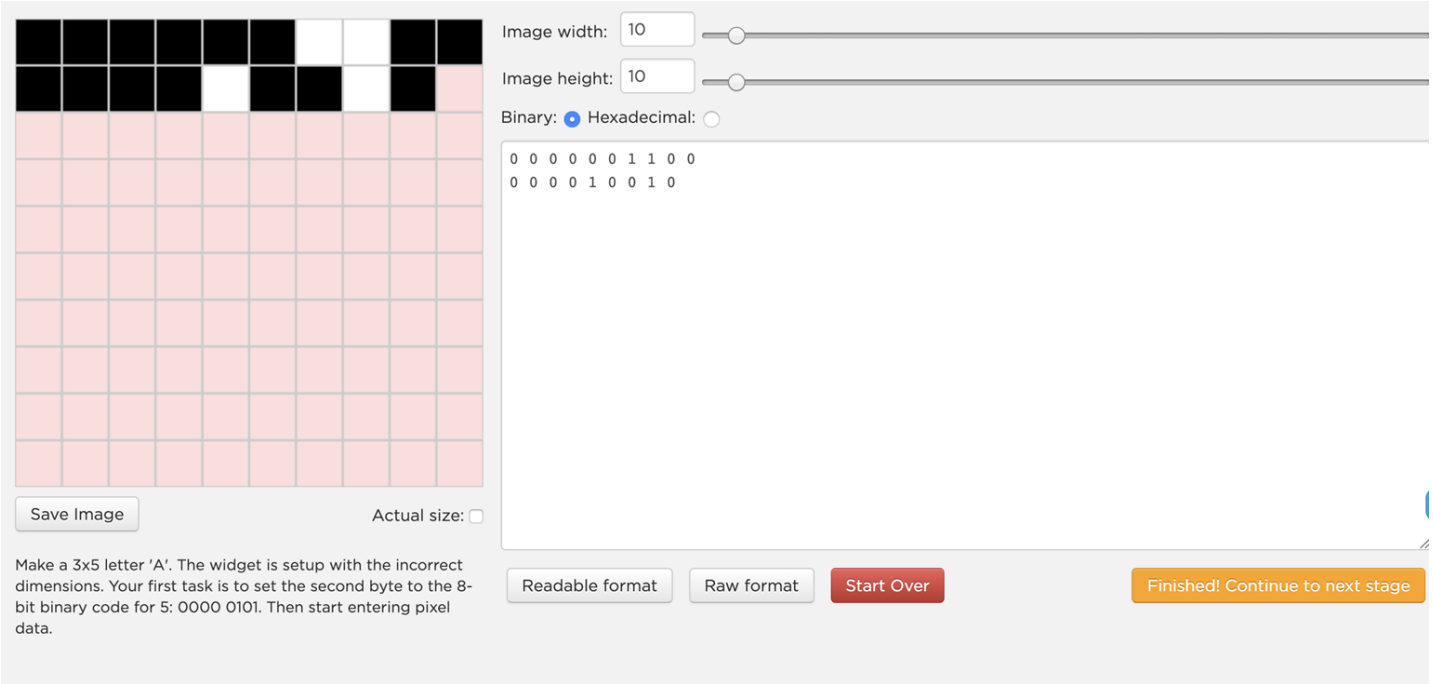
Prompt: You recently did some online shopping and are expecting a package to arrive in about a month. The delivery service has a tracking system which reads the location of the package.

- How often would you want the location read? Every week? Every day? Every hour? Every minute? Be ready to explain your answer.

Activity

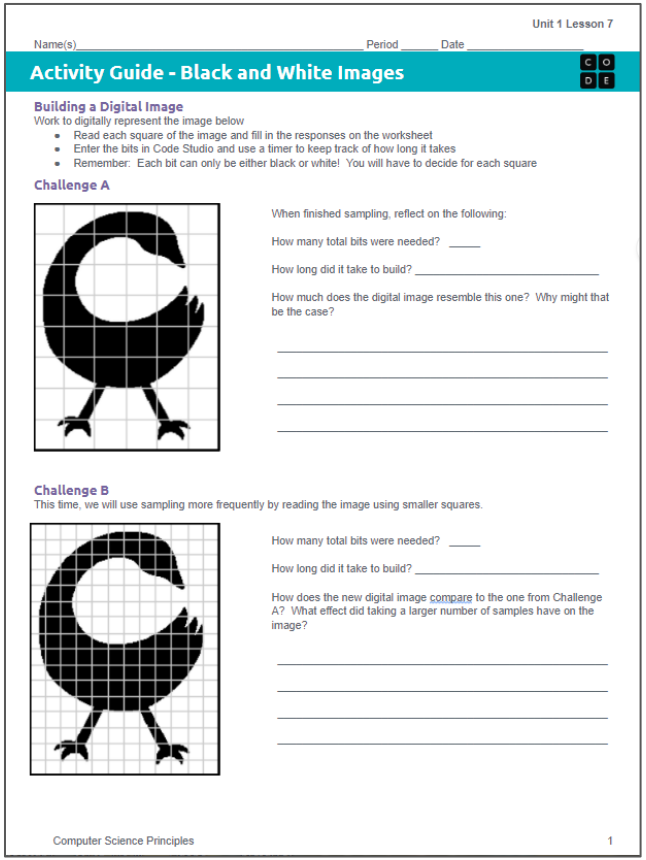

INTRO TO THE
B&W PIXELATION WIDGET
CSP
COMPUTER SCIENCE PRINCIPLES
CODE

Pixelation Widget: B&W Levels 3&4



Do This: Challenges A (Level 5) **& B** (level 6)

- Read values from Challenge A (black or white for each square) and input the values into the widget.
- After Challenge A, answer the questions on the activity guide
- Repeat for Challenge B.
- Answer the questions in the activity guide after each challenge.



Unit 1 Lesson 7

Name(s)_____ Period _____ Date _____

Activity Guide - Black and White Images

Building a Digital Image

Work to digitally represent the image below

- Read each square of the image and fill in the responses on the worksheet
- Enter the bits in Code Studio and use a timer to keep track of how long it takes
- Remember: Each bit can only be either black or white! You will have to decide for each square

Challenge A

When finished sampling, reflect on the following:

How many total bits were needed? _____

How long did it take to build? _____

How much does the digital image resemble this one? Why might that be the case?

Challenge B

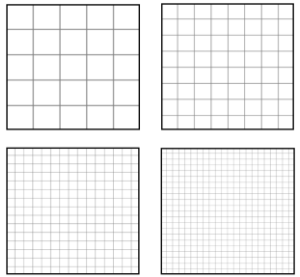
This time, we will use sampling more frequently by reading the image using smaller squares.

How many total bits were needed? _____

How long did it take to build? _____

How does the new digital image compare to the one from Challenge A? What effect did taking a larger number of samples have on the image?

Computer Science Principles 1



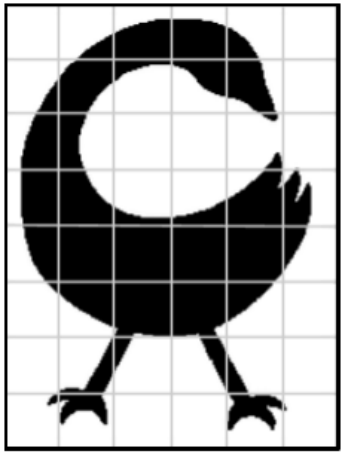
Do This: Challenge C

- Select your favorite company logo.
- Decide how you are going to sample this logo - use one of the grids in your Activity Guide. Draw the logo.
- Recreate the logo in the Pixelation Widget on Level 7.
- Show it to a classmate. Do they recognize the logo? Make adjustments if needed.
    - For example: You may need to increase the sampling.

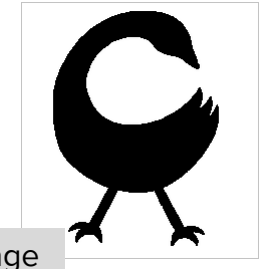
Wrap Up

Prompt: In Challenges A and B, you and your partner practiced sampling the same image twice. The second time, we did a more frequent sampling by using smaller squares.

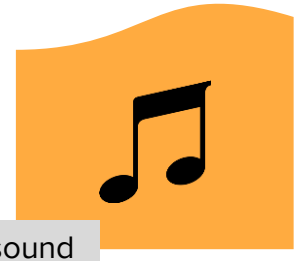
- What are the pros and cons of sampling an image more frequently?



Analog Data: Data with values that change continuously, or smoothly, over time. Some examples of analog data include music, colors of a painting, or position of a sprinter during a race.

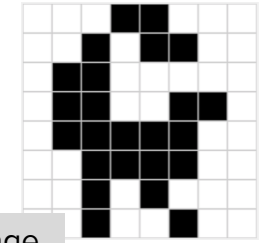


image

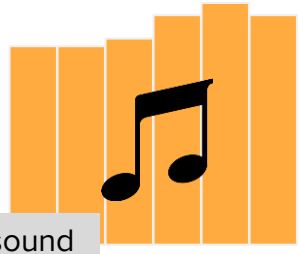


sound

Digital Data: Data that changes discreetly through a finite set of possible values

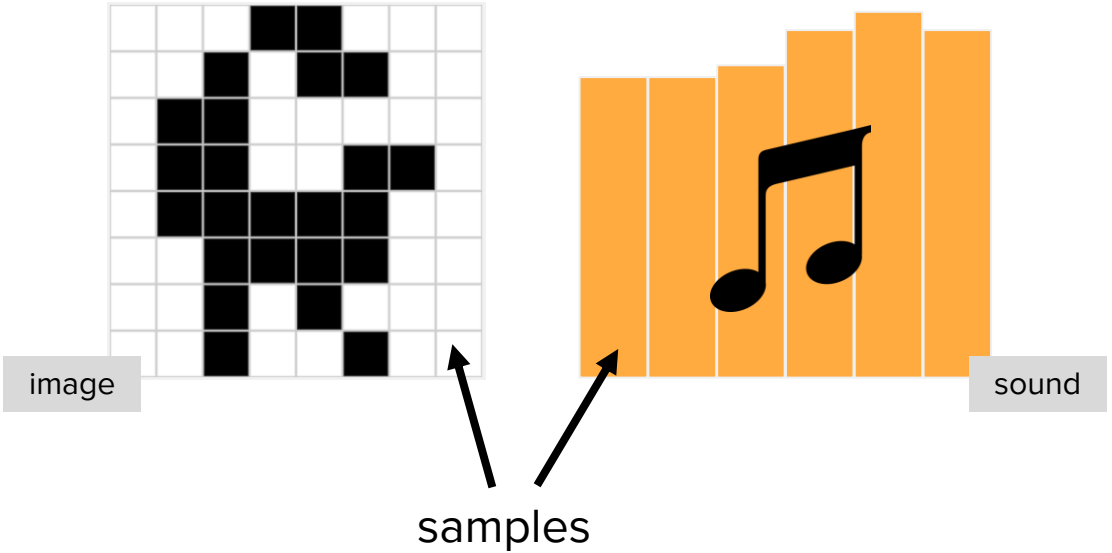


image



sound

Sampling: A process for creating a digital representation of analog data by measuring the analog data at regular intervals called samples.



Unit 1 - Lesson 8
Color Images

Warm Up

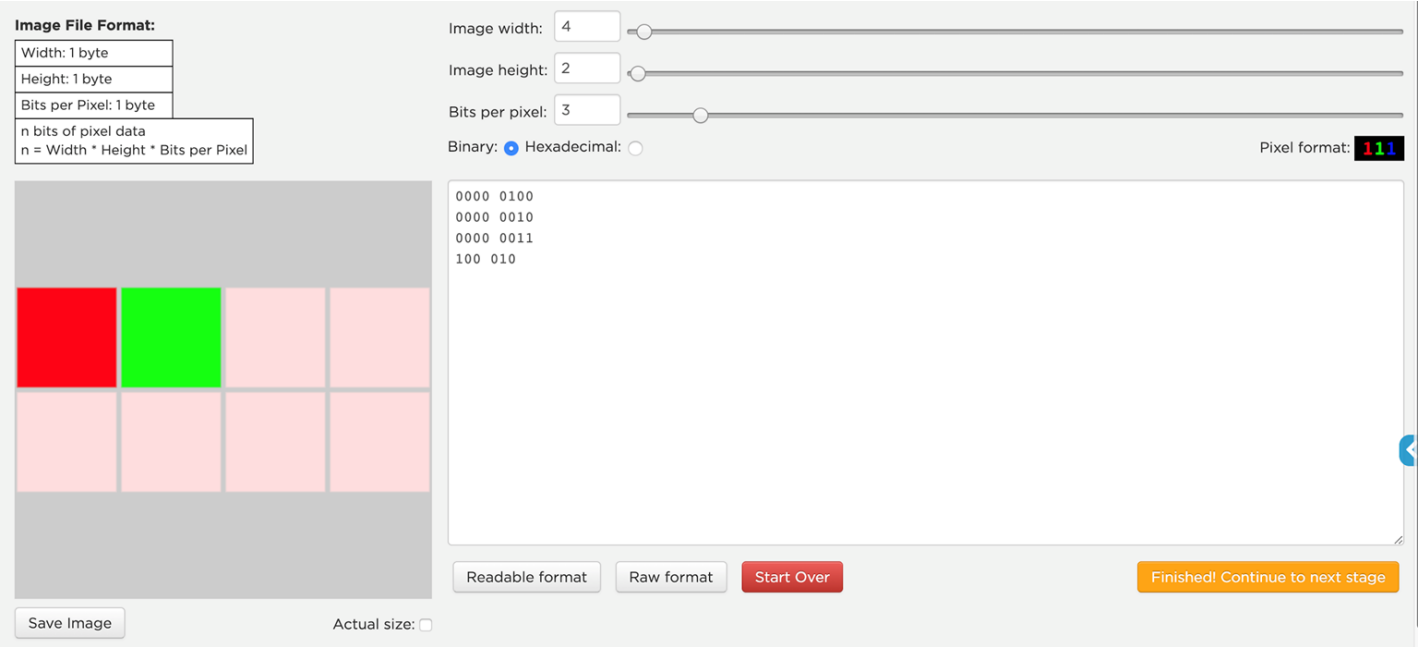
Prompt:

How many different shades of the color blue can you name? How many do you think there are in total?

Activity

Pixelation Widget: Color

Levels 2-6



Levels 7-8

Try your best to match the colors using the widget and reproduce the gradient. Don’t worry if it doesn’t match exactly!

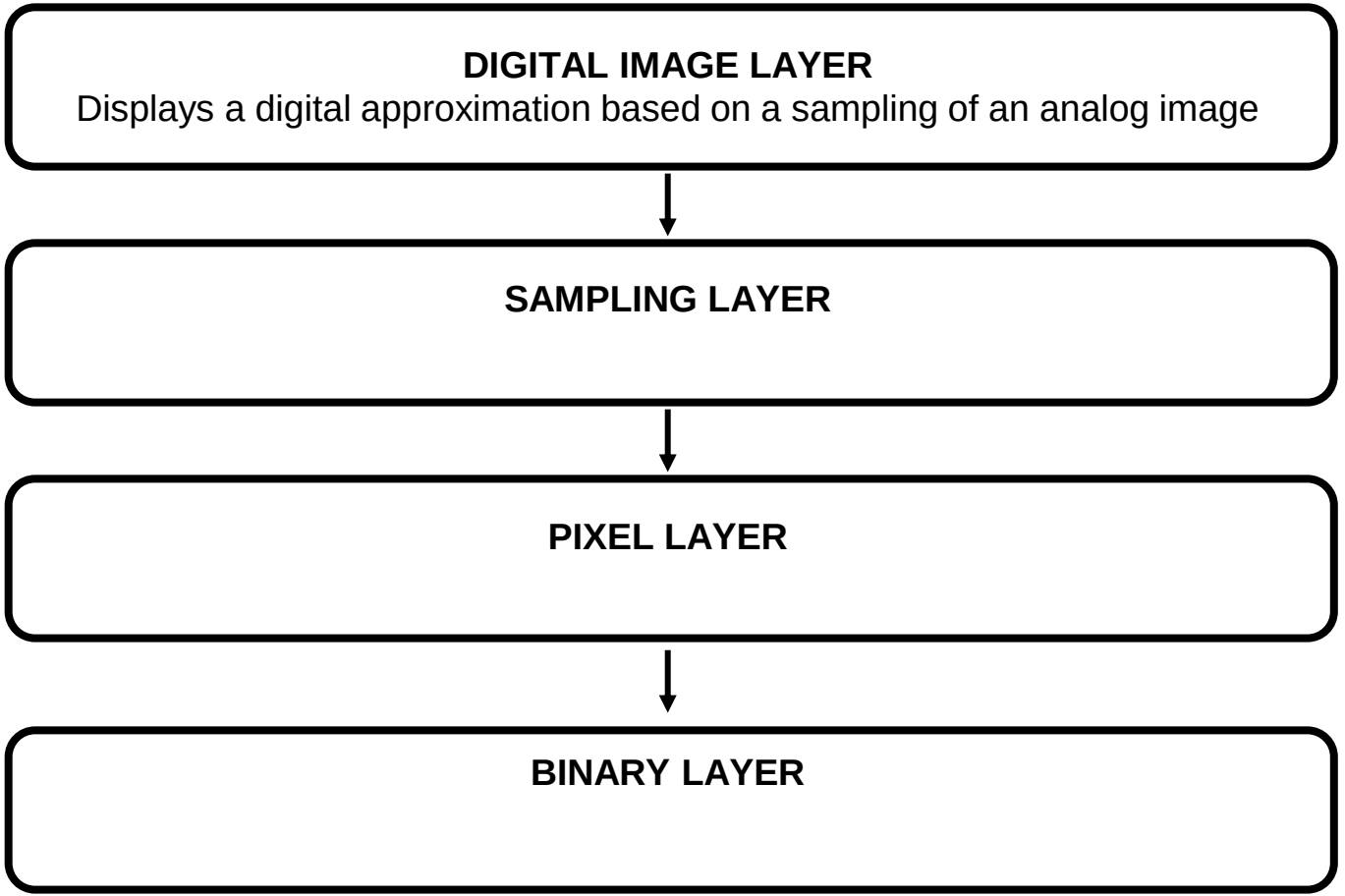
Wrap Up

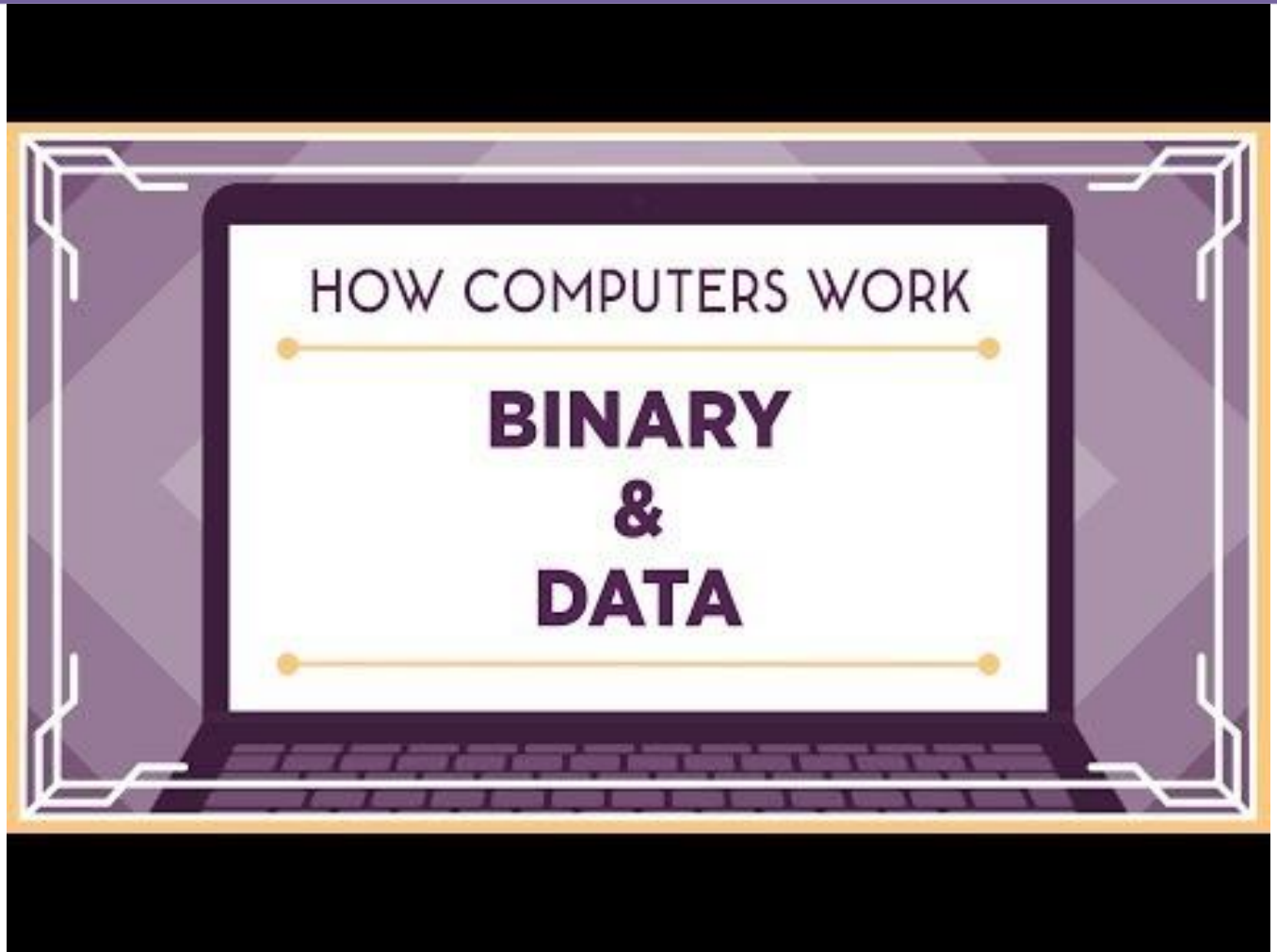
Prompt:

What happens at each level of creating a digital color image?

Hint: Think binary...

Layers of Abstraction in Color Images




HOW COMPUTERS WORK
BINARY
&
DATA

Unit 1 - Lesson 9
Lossless Compression

Warm Up

Prompt: This list represents several common abbreviations used in text messages. What other abbreviations could you add to this list?

- **lol**
- **ty**
- **c u soon**

Prompt:

Why might we use abbreviations when sending messages? What are the advantages?

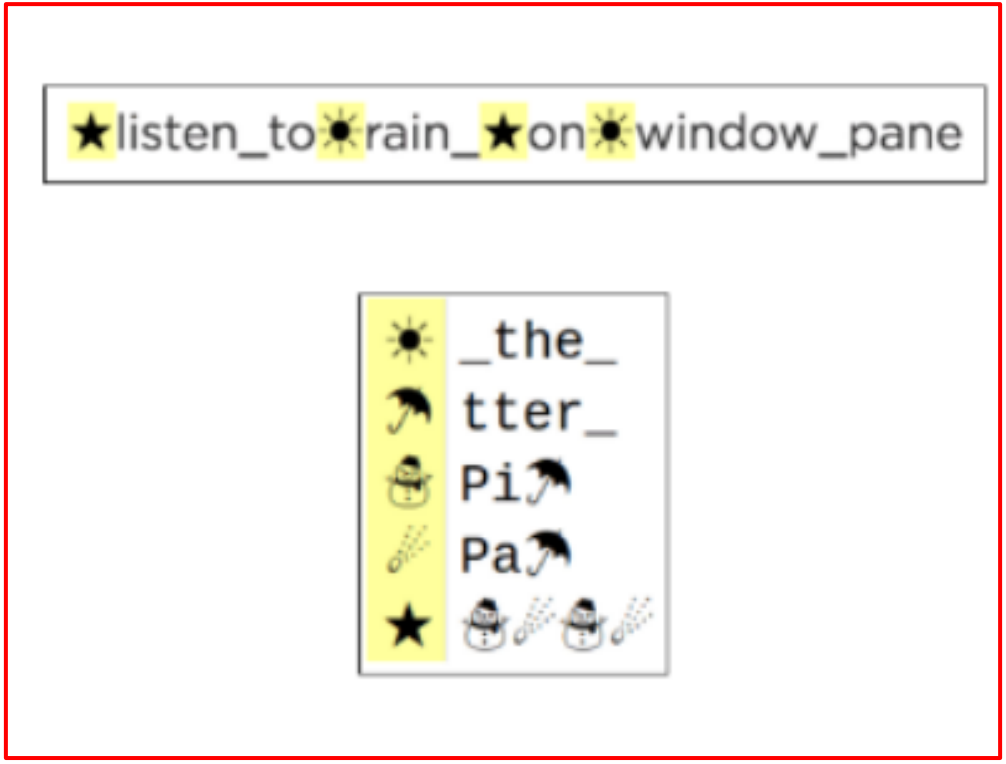
Activity

Text Compression

Pitter_patter_pitter_patter_listen_to
_the_rain_pitter_patter_pitter_
patter_on_the_window_pane

Text Compression

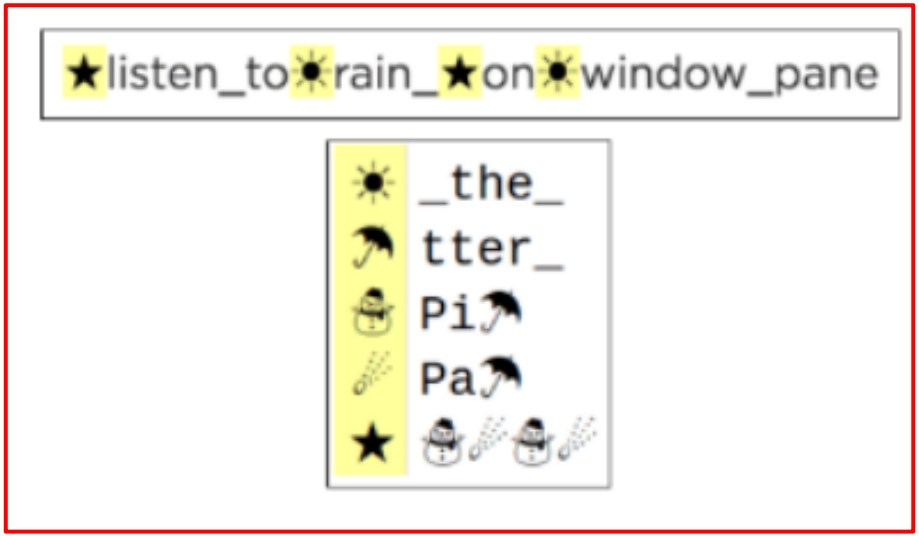
Pitter_patter_pitter_patter_listen_to_the_rain_pitter_patter_pitter_patter_on_the_window_pane



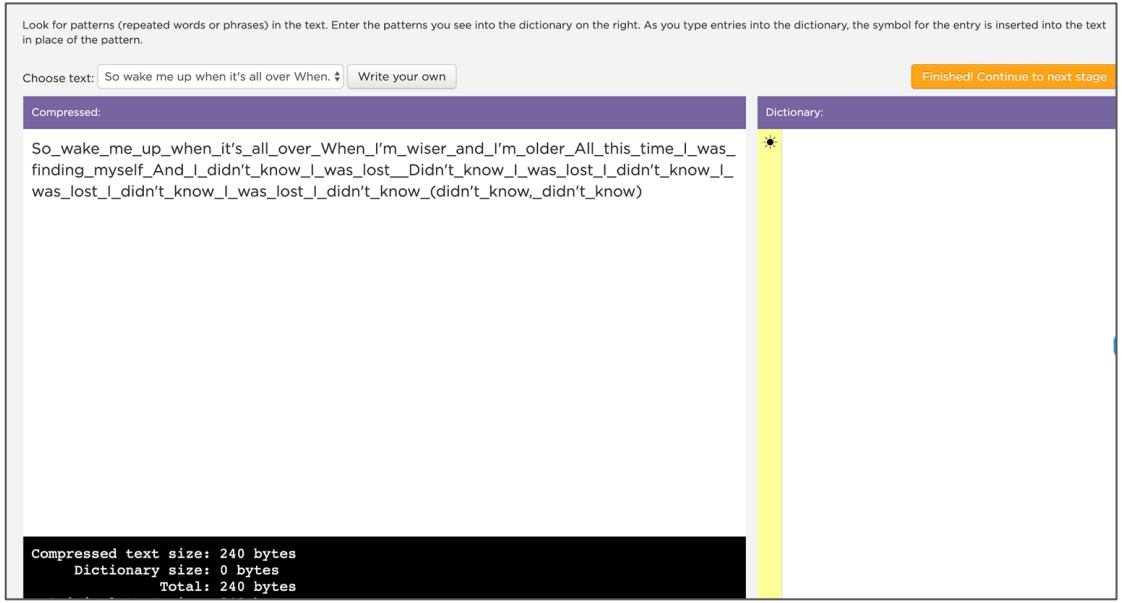
Prompt:

How is this message the same as the first?
What actually gets sent to my friend?

Pitter_patter_pitter_patter_listen_to_the_rain_pitter_patter_pitter_patter_on_the_window_pane



Text Compression Widget



Do This:

- Navigate to Code Studio Lesson 9
- Go to Level 2
- Try to compress the text

Make Note of your Compression Rating

Prompt:

What strategies are you using to compress your sample text? Which ones seem most successful?


ALOE
SINGER SONGWRITER

Do this: Continue to try and compress this text, using some of the strategies we just discussed

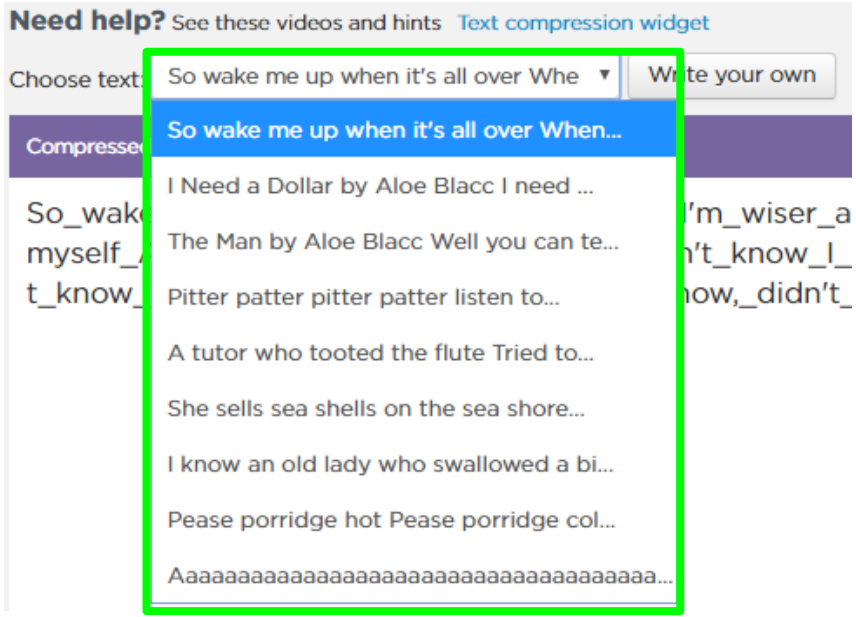
Compressed:

So_wake_me_up_when_it's_all_over_When_I'm_wiser_and_I'm_older_All_this_time_I_was_finding_myself_And_I_didn't_know_I_was_lost__Didn't_know_I_was_lost_I_didn't_know_I_was_lost_I_didn't_know_I_was_lost_I_didn't_know_(didn't_know,_didn't_know)

```
Compressed text size: 240 bytes
    Dictionary size: 0 bytes
              Total: 240 bytes
 Original text size: 240 bytes
        Compression: 0%
```

Dictionary:

Type In Here



Click the Drop-Down Menu to explore other texts to compress

Be looking for texts you predict will be ‘easy’ to compress and texts you predict will be ‘difficult’

‘Easy’ & ‘Difficult’ Compressions

Step 1: Decide

- With your neighbor, choose an ‘easy’ message and a ‘difficult’ message for you both to attempt together

Step 2: Pair Compressing

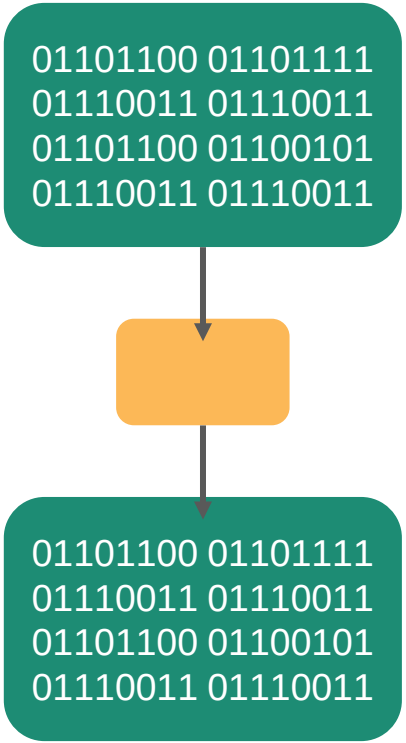
- Using one computer: work together to compress the ‘easy’ message as much as you can
- Using the other computer: work together to compress the ‘difficult’ message as much as you can

Wrap Up

Prompt:

- What made some messages “easier” to compress than others?
- What made some messages more “difficult” to compress than others?

Lossless Compression: A process for reducing the number of bits needed to represent something without losing any information. This process is reversible.



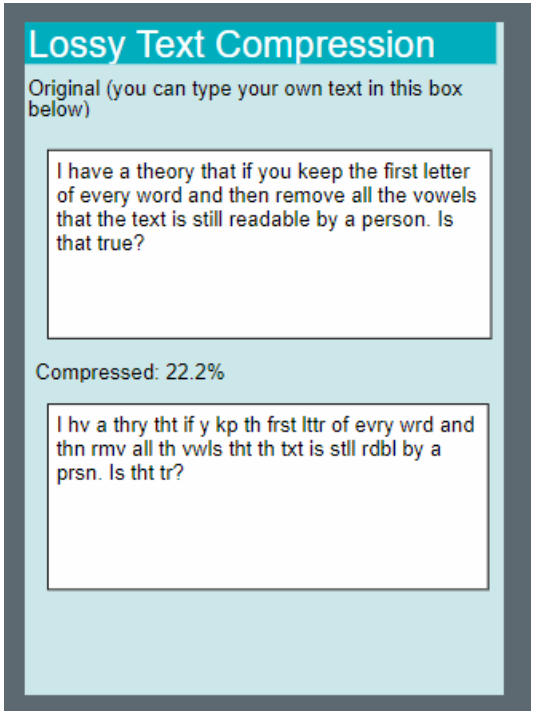
Unit 1 - Lesson 10
Lossy Compression

Warm Up

Prompt:

Click here!

How is this widget similar to the widget we used yesterday? How is it different?

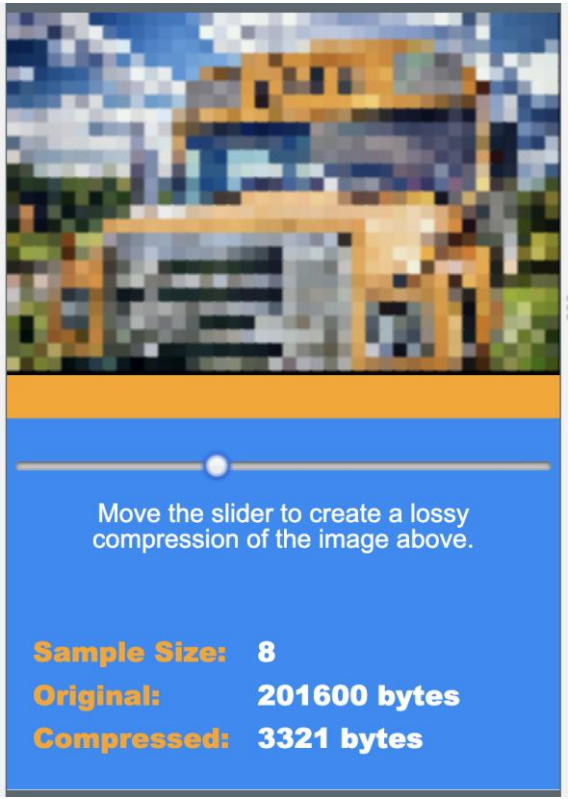


Activity

Do This:

Navigate to Code Studio, Lesson 10
Go to Level 2

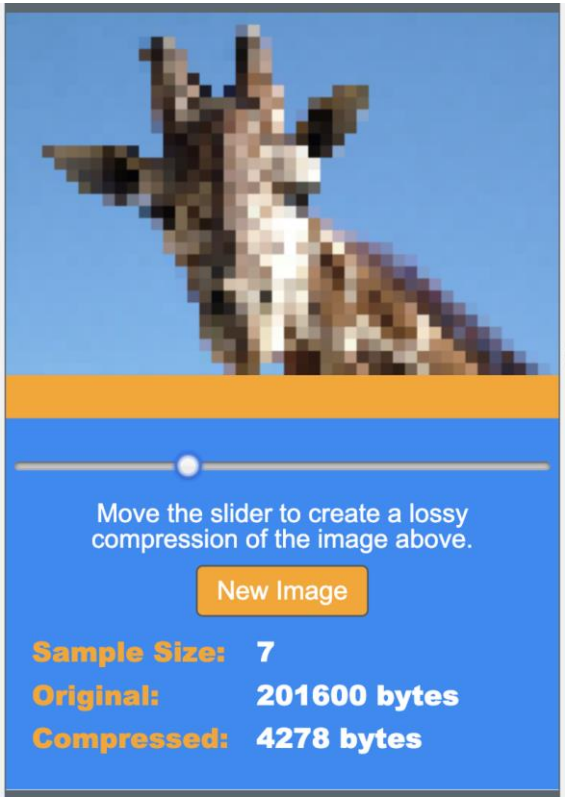
Lossy Compression Widget, v1 - Level 2



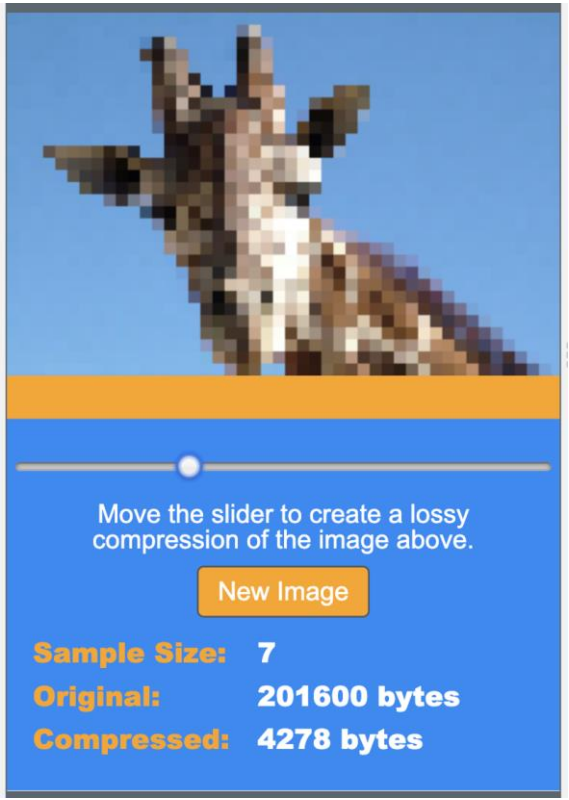
Prompt:

1. What do you notice about the quality of the image when you compress it?
2. What do you notice about the compressed file size?

Lossy Compression Widget, v2 - Level 3



Share Out



Do This:

Share out the compressions you have made with students nearby. Try to guess the images!

How Much??

We are trying to use this image for a particular purpose and we need to decide how much lossy compression we want to use.

Scenario 1: You are sending this as a text message to a friend but you've almost run out of data on your phone plan

1 - No compression (original image)

2 - Small amount of compression

3 - Medium amount of compression

4 - Large amount of compression

Vote!

Scenario 2: You are a crime-scene photographer and this image is part of a crime-scene photo

1 - No compression (original image)

2 - Small amount of compression

3 - Medium amount of compression

4 - Large amount of compression

Vote!

Scenario 3: This image is part of a satellite imaging assignment for the military, being used for intelligence gathering

1 - No compression (original image)

2 - Small amount of compression

3 - Medium amount of compression

4 - Large amount of compression

Vote!

Scenario 4: You are a Social Media manager posting this to an Instagram story for an event happening right now

1 - No compression (original image)

2 - Small amount of compression

3 - Medium amount of compression

4 - Large amount of compression

Vote!

Scenario 5: This image will be part of a collage where 100 copies will be stitched together to make a larger image

1 - No compression (original image)

2 - Small amount of compression

3 - Medium amount of compression

4 - Large amount of compression

Vote!

Scenario 6: You are a professional photographer submitting to a design competition where your submission will be carefully judged for color & composition

1 - No compression (original image)

2 - Small amount of compression

3 - Medium amount of compression

4 - Large amount of compression

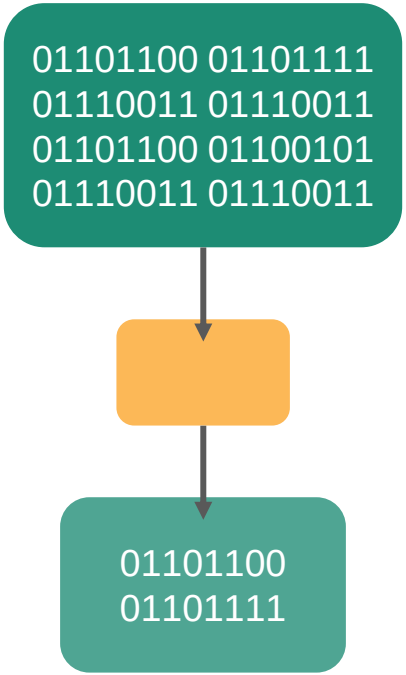
Vote!

Wrap Up

Prompt:

1. When is it a good idea to use lossless compression?
2. When should you use lossy compression?
3. What are the important factors in making that decision?

Lossy Compression: A process for reducing the number of bits needed to represent something in which some information is lost or thrown away. This process is not reversible.



Unit 1 - Lesson 11
Intellectual Property

Warm Up

Prompt:

Imagine you were using some of our pixelation tools to create an image and you posted it online for your friends to see - but, a week later you find out someone took that image and put it on a T-shirt that they're selling for $10 each. How would you feel in this situation?

Activity

Copyright Investigation

Is Fortnite stealing black dance culture? The creator of the 'Milly Rock' argues yes in a new lawsuit.

washingtonpost.com/nation/2018/12/06/is-fortnite-stealing-black-dance-culture-creator-milly-rock-argues-yes-new-lawsuit/

By Meagan Flynn
Meagan Flynn
Morning Mix reporter

December 6, 2018
In the summer of 2015, rapper 2 Milly went "Milly Rocking" on every block in Brooklyn, turning the hip-hop two-step into the viral dance of the summer. People started doing the "Milly Rock" on fire escapes, on top of cars, in the end zone after scoring touchdowns. Rihanna was doing it. Travis Scott did it. "If you ain't Milly Rockin', you ain't doing nothing," 2 Milly, whose real name is Terrence Ferguson, told Vice in 2015.

But then one day last July, some unwanted "Milly Rockers" were brought to the rapper's attention: Fortnite avatars.

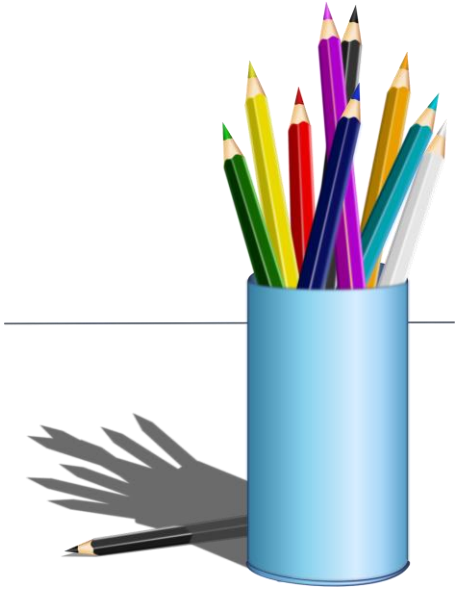
"Everybody was like, 'Yo, your dance is in the game,' " 2 Milly told CBS News last month.

The moves appeared unmistakable, 2 Milly said. The dancing avatar swung her left arm, then her right, spun her fists in a circular motion, then twisted her hips and did it all again. In Fortnite, the massively popular battle-royal video game, the "dance emote" was not called the "Milly Rock." Instead, the move was called "Swipe It," a victory dance that players could unlock after purchasing an add-on package for 950 "V-bucks," or about $9.50. Players recognized the dance immediately — just as they had so many other popular viral dances that appear to be included in Fortnite but were made famous by mostly black artists.

Now, 2 Milly is suing over it.

The lawsuit, filed Wednesday in federal court in Los Angeles, accuses Epic Games, the maker of Fortnite, not only of stealing 2 Milly's dance moves and his likeness without permission

You should have:
A copy of the article
Pens or pencils



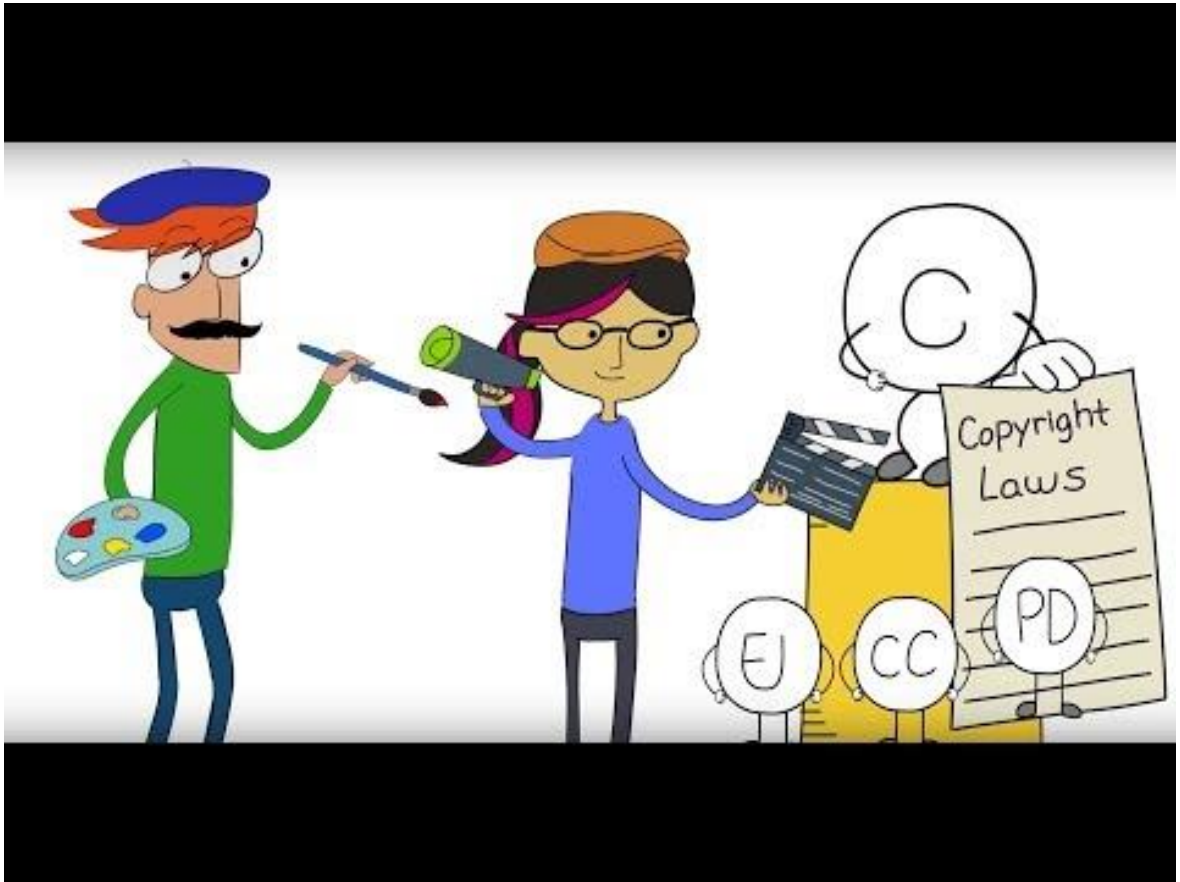
Do This:

- **Read the article.**
- **Highlight/Underline:** Any information in this article that you want to know more about
- **At The End:** Write a 10-word summary of the article

This article brings up issues around copyright. Based on what you've read and your own experiences, what questions do you have about copyright?

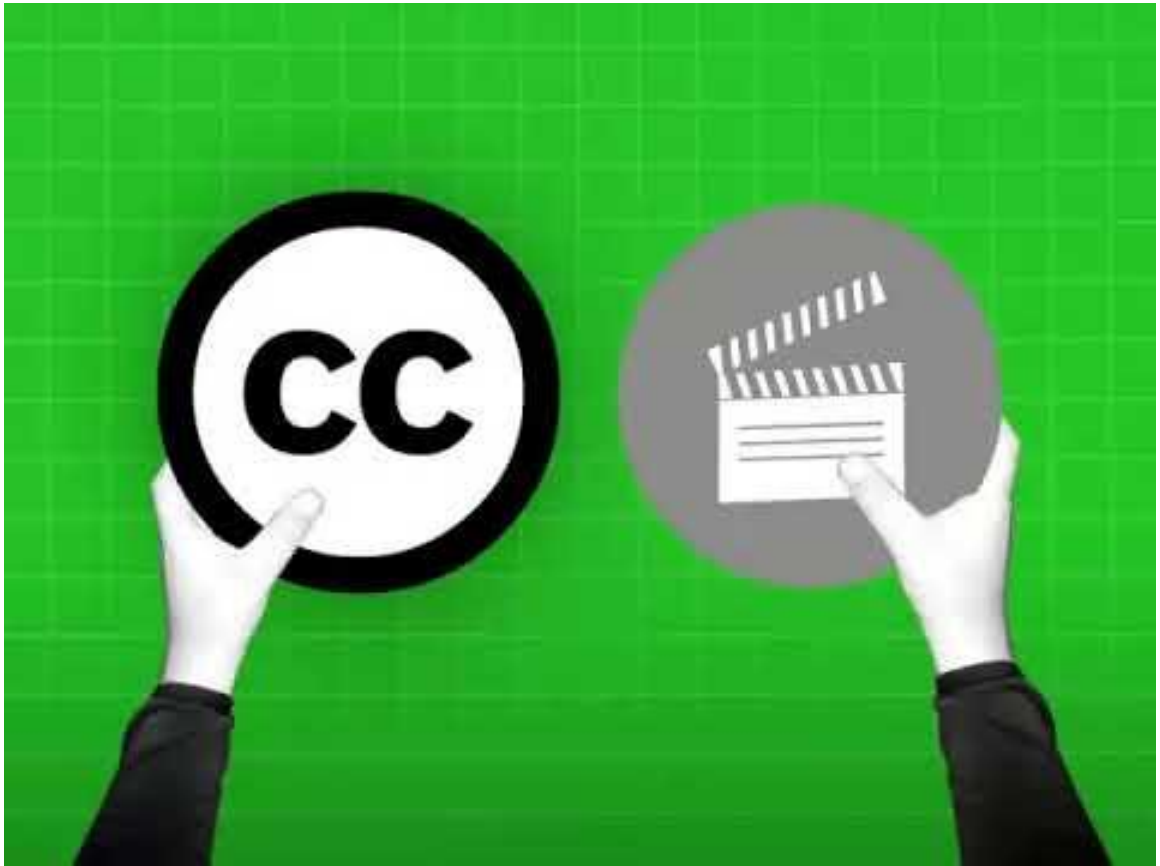
Are our current copyright policies helping society or hurting society?

Copyright Overview



Copyright in Practice

Creative Commons Copyright



Reread the article in order to answer these questions:

- What was digitized?
- What was the goal or purpose of digitizing this thing?
- Is someone benefiting from this situation? If so, who?
- Is someone being harmed in this situation? If so, who?
- Are these impacts intended or unintended? How do you know?

Annotate the article by adding the following symbols:

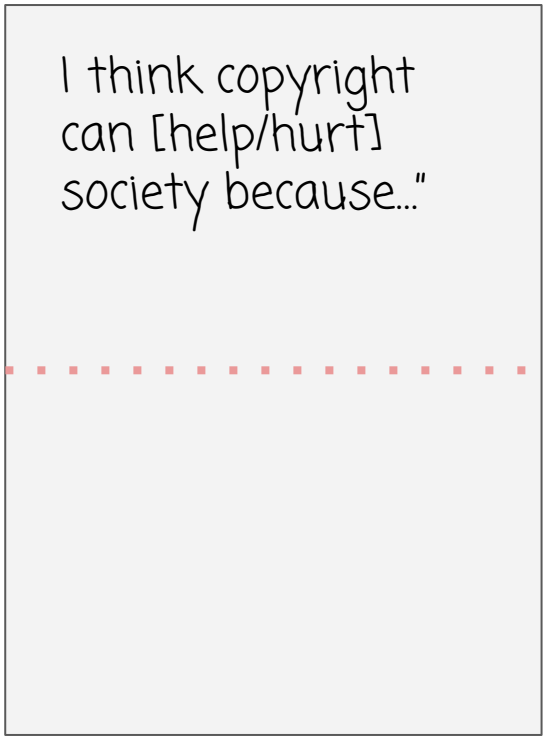
- Add a + next to sentences that show benefit
- Add a - next to sentences that show harm
- Add a face next to sentences that show impact

Prompt:

Share some of the sentences you annotated.

Did everyone identify the same areas?

Wrap Up



← Complete this sentence. Choose help or hurt.

← fold

← Add a quote from the text that helps justify the sentence you wrote in the top

Unit 1 - Lesson 12
Project - Digital Dilemmas Part 1

Warm Up

Prompt:

Is our world better or worse because of digital representation?

worse

better

Activity

Digital Dilemmas, pt 1

The Ethics of Computer-Generated Actors

CASE STUDY: The Ethical Challenges of CGI Actors in Films

Case Study I Additional Case Studies

PHOTO: LUCASFILM

Long-dead actors continue to achieve a sort of immortality in their films. A new controversy over dead actors is coming to life based upon new uses of visual effects and computer-generated imagery (CGI). Instead of simply using CGI to create stunning action sequences, gorgeous backdrops, and imaginary monsters, film makers have started to use its technological wonders to bring back actors from the grave. What ethical problems circle around the use of digital reincarnations in film making?

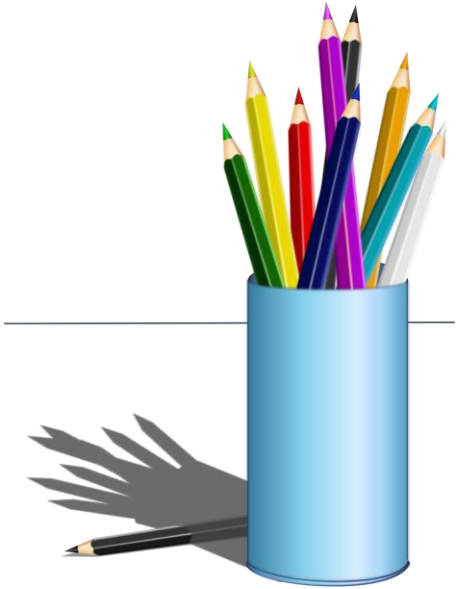
The use of CGI to change the look of actors is nothing new. For instance, many films have used such CGI methods to digitally de-age actors with striking results (like those found in the Marvel films), or to create spectacular creatures without much physical reality (such as "Golem" in *The Lord of the Rings* series). What happens when CGI places an actor into a film through the intervention of technology? A recent example of digital reincarnation in the film industry is found in *Fast and Furious 7*, where Paul Walker had to be digitally recreated due to his untimely death in the middle of the film's production. Walker's brothers had to step in to give a physical form for the visual effect artists to finish off Walker's character in the movie, and the results brought about mixed reviews as some viewers thought it was "odd" that they were seeing a deceased actor on screen that was recreated digitally. However, many argue that this was the best course of action to take in order to complete film production and honor Paul Walker's work and character.

Other recent films have continued to bet on using CGI to help recreate characters on the silver screen. For instance, 2016's *Rogue One: A Star War Story* used advanced CGI techniques that hint at the ethical problems that lie ahead for film-makers. Peter Cushing was first featured in 1977's *Star Wars: A New Hope* as Grand Moff Tarkin. In the Star Wars timeline, the events that take place in *Rogue One* lead directly into *A New Hope*, so the story writers behind the recent *Rogue One* felt inclined to include Grand Moff Tarkin as a key character in the events leading up to the next film. There was one problem, however: Peter Cushing died in 1994. The film producers were faced with an interesting problem and ultimately decided to use CGI to digitally resurrect Cushing from the grave to reprise his role as the Imperial officer. The result of this addition of Grand Moff Tarkin in the final cut of the film sent shockwaves across the

You should have:

A copy of an article

Pens or pencils



Do This:

Highlight/Underline: Any information in this article that you want to know more about

At The End: Write a 10-word summary of the article

Prompt:

Share your ten word summary with your group. Together look up any unfamiliar words or concepts.

Think:

Is our world better or worse because of digital representation?

Reread the article in order to answer these questions:

- What was digitized?
- What was the goal or purpose of digitizing this thing?
- Is someone benefiting from this situation? If so, who?
- Is someone being harmed in this situation? If so, who?
- Are these impacts intended or unintended? How do you know?

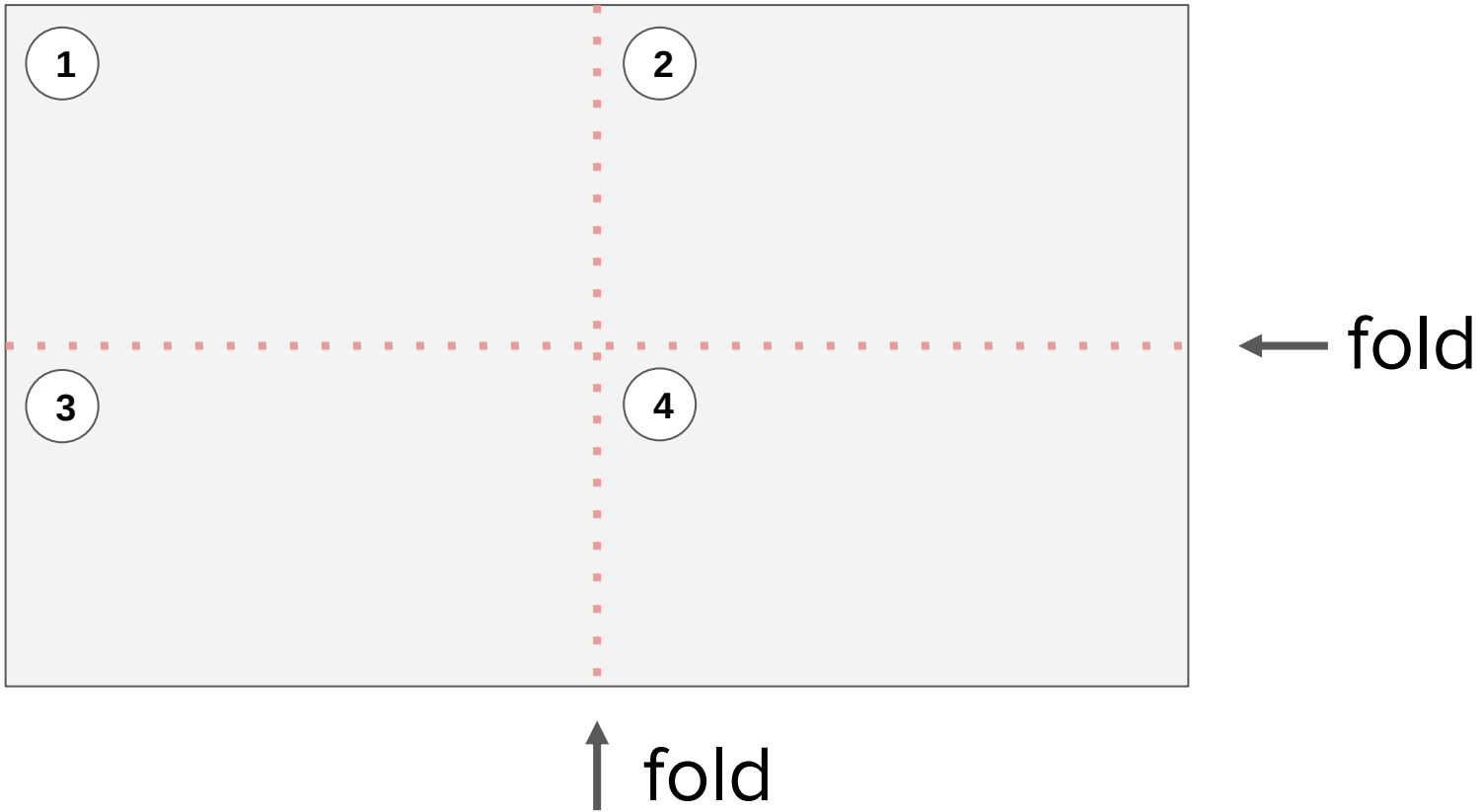
Annotate the article by adding the following symbols:

- Add a + next to sentences that show benefit
- Add a - next to sentences that show harm
- Add a face next to sentences that show impact
- Leave comments in the margin and text of the article addressing the questions to the left.

Prompt:

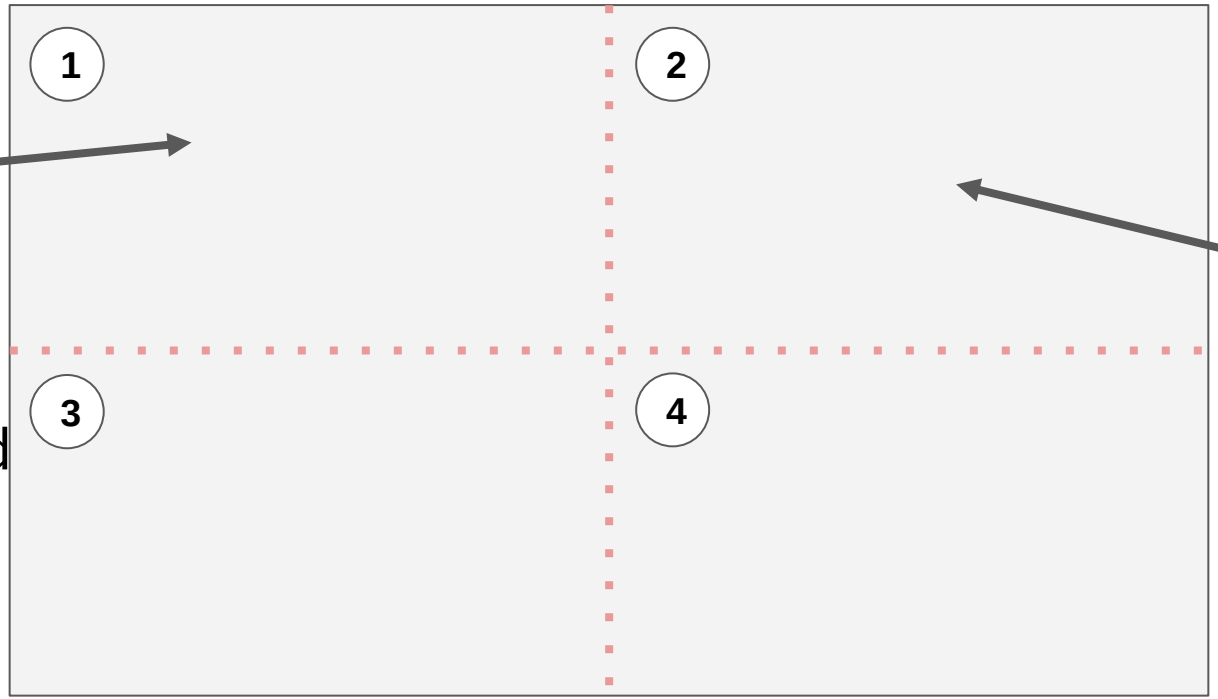
Check back in with your group. Share some of the sentences you annotated. Did everyone identify the same areas?

Position Posters



Position Posters

What is being digitized? How is the information represented digitally?



What is the goal or purpose of digitizing this thing?

***Don't worry about quadrants 3 or 4 today!*

Wrap Up

Prompt:

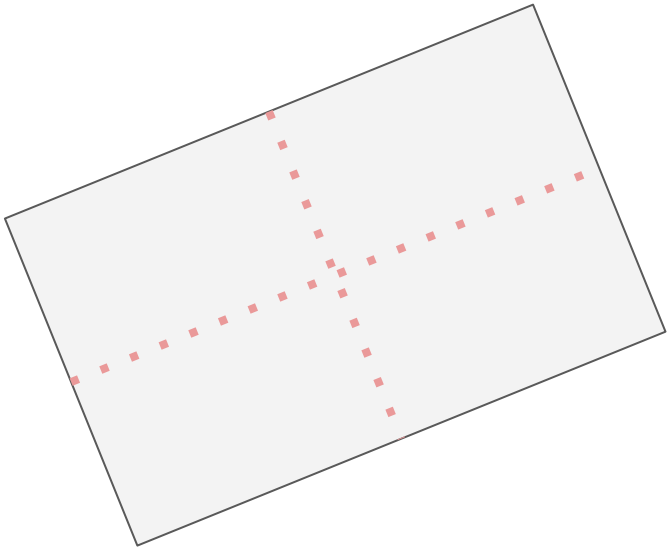
Do you think there is always both a benefit and a harm to digitizing analog content?

Unit 1 - Lesson 13
Project -Digital Dilemmas Part 2

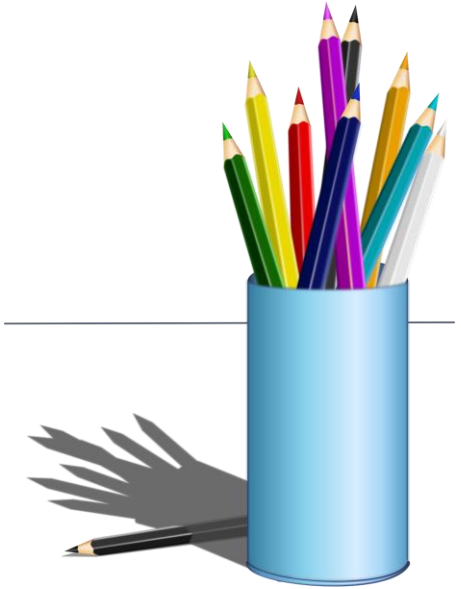
Warm Up

Activity

Digital Dilemmas, Pt 2

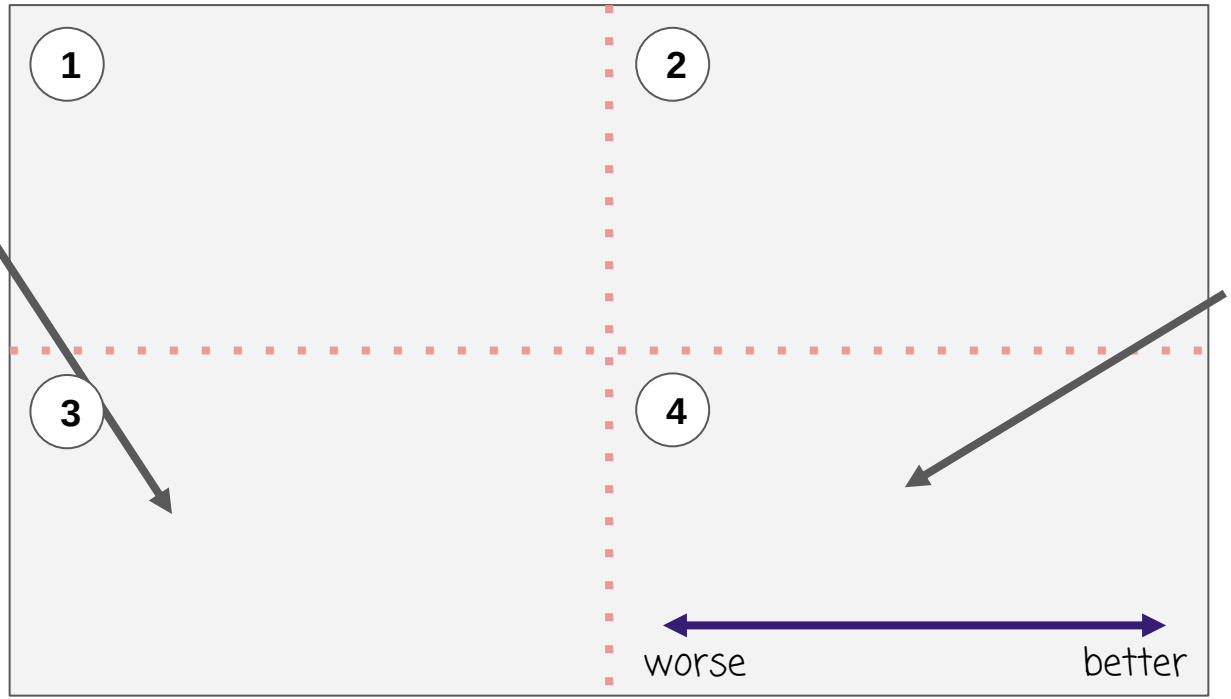


You should have:
Your position poster
Pens/Pencils



Position Posters

What are the benefits and harms of digitizing this content?



Is our world better or worse because of digital representation? Explain why giving examples from the article.

Check the project rubric on Code Studio!

Group Up:

Join a group with others who read different articles.

Do This:

Share your position papers and discuss the articles with your group.

Digital Dilemma - Where do you stand?

Is our world better or worse because of digital representation?

worse

better

Digital Dilemma Debate - Where does our class stand?

Is our world better or worse because of digital representation?

worse

better

Wrap Up

Prompt:

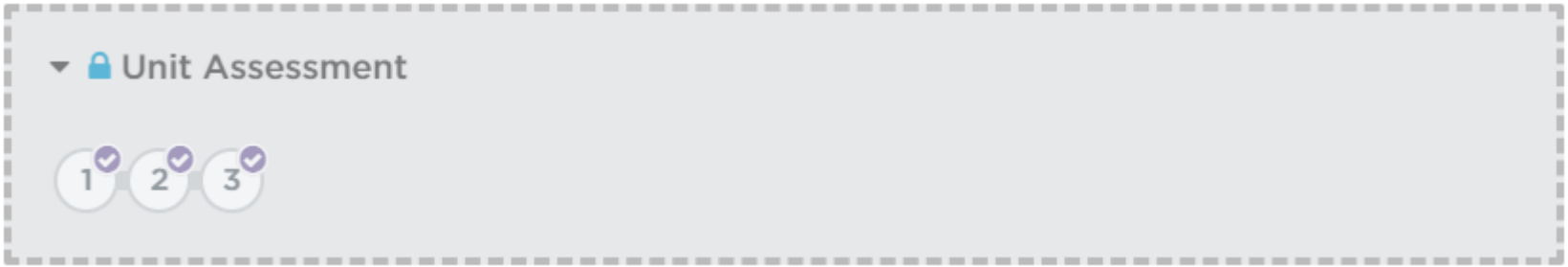
Why should we care about information being represented digitally? How does this impact you personally?

Unit 1 - Lesson 14
Assessment Day

Warm Up

Activity

Unit Assessment



Wrap Up