Digital Information ('21-'22)

Welcome to CSP

Resources

Name(s)_____ Period _____ Date _____

Activity Guide - Personal Innovations

Technological innovation is about recognizing a problem that needs to be solved, or recognizing something needs improving and then building a tool to solve it.

As a class we're going to see how innovative we can be, and we'll share our ideas through something called "rapid prototyping." ***(Prototype*** *is a fancy word that means a preliminary sketch of an idea or model for something new. It's the original drawing from which something real might be built or created.)*

First: Looking at the list of 4 interests at your table, let's **think about how technology is impacted by, or related to, those interests.**

How could **technology** improve your interest to make it **better, faster,** or **easier** to use?

What is a **problem**, or aspect of your interest, that a **creative or innovative technology might help solve**, or at least make better?

Interest	Improvements	Problems

Next: 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 it out on a poster. Make a visual representation of your ideas. Remember this is a rapid prototype, just something to quickly convey the idea. Feel free to jot down ideas or sketches in the space below:

Brainstorming and Notes

Name(s)_____ Period _____ Date _____

Rubric - Personal Innovations

Evaluate your group presentation according the following criteria. Justify each rating.

Criteria	Yes	Almost	No	Comments
What is the technological innovation? The report specifically identifies the innovation and explains the role computing plays in the innovation.				
What is the most important thing that it enables you to do? The report precisely describes the personal significant impacts experienced.				
How did people do this before the technology existed? The report fully identifies how people used to perform the identified task.				
What was a problem or issue with the way it was done before that this technology solved or made better? The report precisely describes significant impacts felt before the innovation became available and identifies how those impacts have been eliminated or reduced by the innovation.				
What new problems were created by the technology? The report presents a rich analysis of problems created by the innovation.				

Reflection: Reflect on the richness of technology in your life. Compare it with teenagers in other parts of the country or the world. How is your life “better” than theirs because of technology? Are there ways that their lives are better without certain technologies?

Digital Information ('21-'22)

Circle Square Patterns

Resources

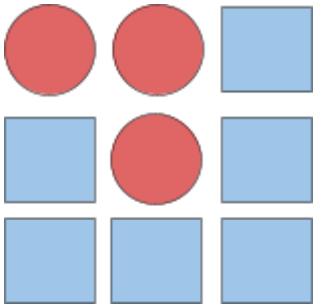
Name(s)_____ Period _____ Date _____

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) ____ ____ ____

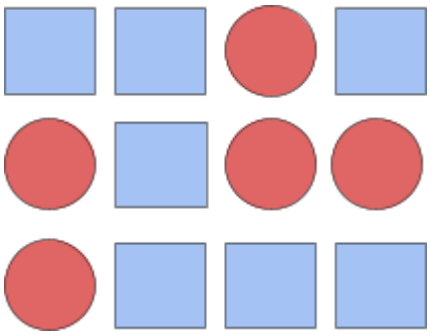
8) ____ ____ ____

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.

Challenge 3: More Patterns



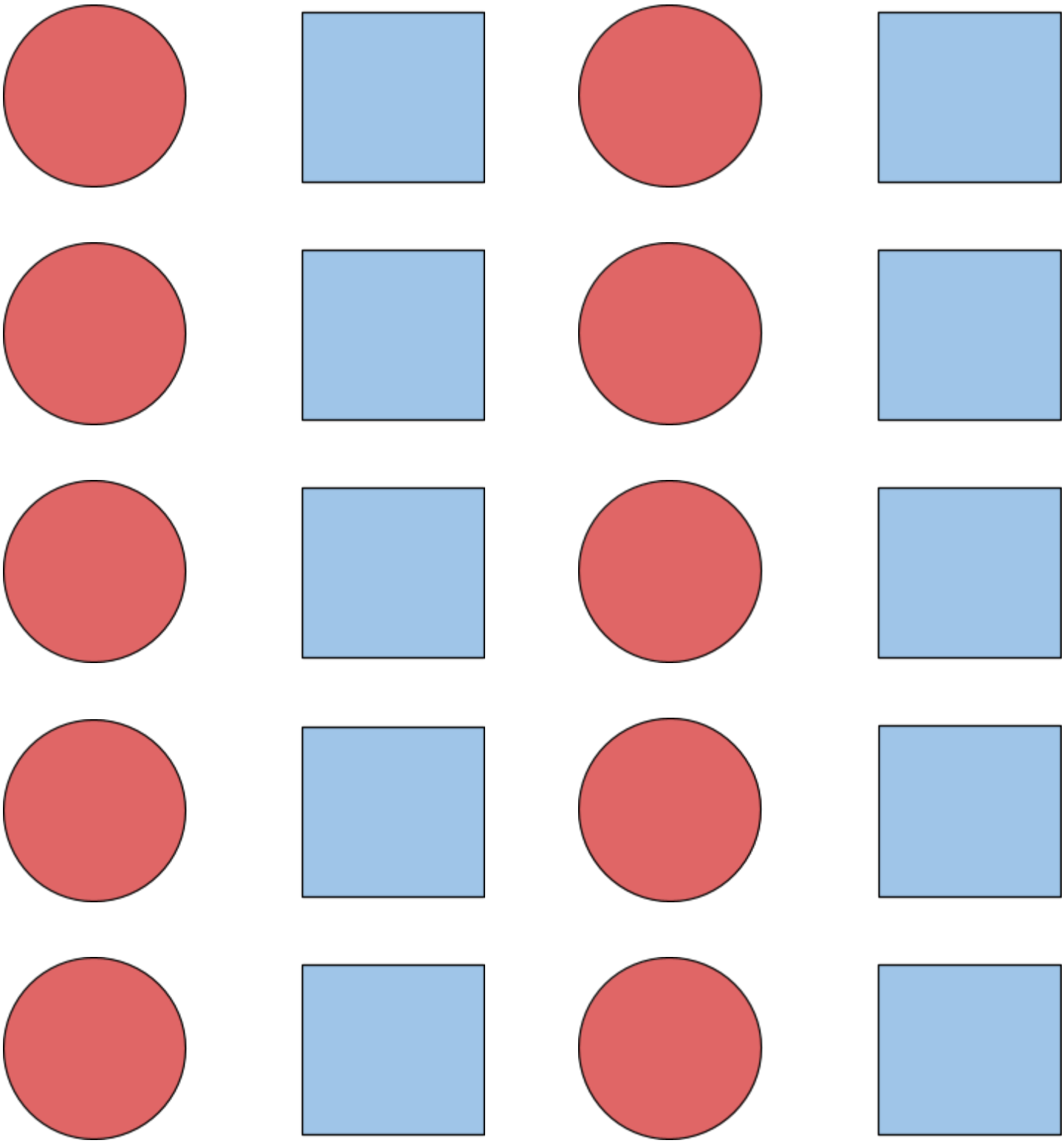
Use your rules from the last page to try and generate all possible four place value patterns using only circles and squares. Three examples are listed to the right.

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.

All Possible Four Place Value Patterns:

Name(s)_____ Period _____ Date _____

Resource - Shape Cutouts



Digital Information ('21-'22)

Binary Numbers

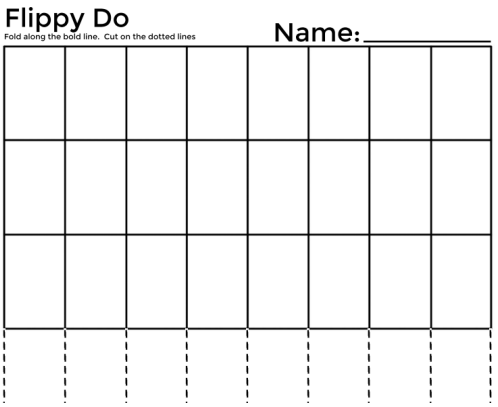
Resources

Name(s)_____ Period _____ Date _____

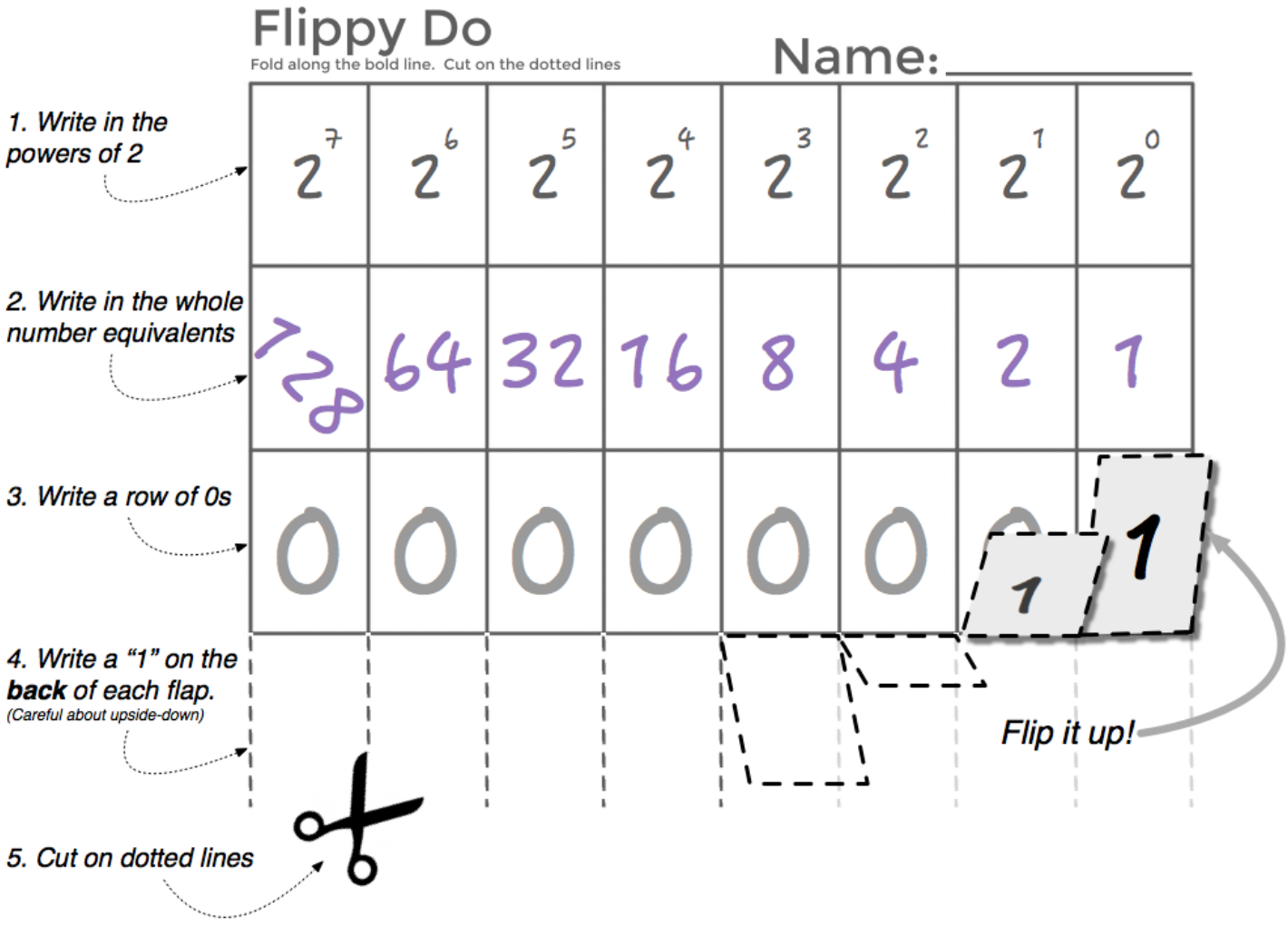
How to Make a Flippy Do

Instructions for how to make the Flippy Do

BEFORE →
Blank Template



AFTER
↴



Name(s)_____ Period _____ Date _____

Activity Guide - Flippy Do Part 1

Directions

Use your Flippy Do 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
0000	0
0001	1
0010	2

Binary: 4-bit number	Decimal

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
0000 0001	1
0000 0010	2
0000 0100	

Binary: 8-bit number (with exactly one *1*)	Decimal

What do you notice about the decimal equivalents above?

Conversion Practice: Find the equivalent binary or decimal numbers below.

Binary	Decimal
100	
101	
1101	
0001 1111	
0010 0000	
1010 1010	
1111 1111	

Binary	Decimal
	5
	17
	63
	64
	127
	256
	513

.

When you add a zero to the right of a decimal number, it multiplies its value by 10 (For example, “15” becomes “150”). What similar result happens to the value of a binary number when you add a zero on the right? (For example, “11” would become “110”).

Do the binary numbers “0011” and “000011” have the same value or different values? Explain.

Would two bits be enough to assign a unique binary number to each vowel in the English language? Explain.

How many bits would you need if you wanted to count up to the decimal number 1000?

Digital Information ('21-'22)

Representing Text

Resources

ASCII Reference Sheet

What is ASCII?

ASCII (American Standard Code for Information Interchange) is a widely used system for character encoding. It was originally developed in 1963 as a 7-bit system allowing for 128 characters. Symbols 0-31 and 127 were reserved for control characters (e.g. “Backspace” or “Delete”) with the numbers 32-126 being used for printable characters. As the 8-bit “byte” became standardized, ASCII was extended to the 8-bit format you see below.

Num.	Bits	Char.
32	00100000	Space
33	00100001	!
34	00100010	"
35	00100011	#
36	00100100	$
37	00100101	%
38	00100110	&
39	00100111	'
40	00101000	(
41	00101001	)
42	00101010	*
43	00101011	+
44	00101100	,
45	00101101	-
46	00101110	.
47	00101111	/
48	00110000	0
49	00110001	1
50	00110010	2
51	00110011	3
52	00110100	4
53	00110101	5
54	00110110	6
55	00110111	7
56	00111000	8
57	00111001	9
58	00111010	:
59	00111011	;
60	00111100	<
61	00111101	=
62	00111110	>
63	00111111	?

Num.	Bits	Char.
64	01000000	@
65	01000001	A
66	01000010	B
67	01000011	C
68	01000100	D
69	01000101	E
70	01000110	F
71	01000111	G
72	01001000	H
73	01001001	I
74	01001010	J
75	01001011	K
76	01001100	L
77	01001101	M
78	01001110	N
79	01001111	O
80	01010000	P
81	01010001	Q
82	01010010	R
83	01010011	S
84	01010100	T
85	01010101	U
86	01010110	V
87	01010111	W
88	01011000	X
89	01011001	Y
90	01011010	Z
91	01011011	[
92	01011100	\
93	01011101	]
94	01011110	^
95	01011111	_

Num.	Bits	Char.
96	01100000	`
97	01100001	a
98	01100010	b
99	01100011	c
100	01100100	d
101	01100101	e
102	01100110	f
103	01100111	g
104	01101000	h
105	01101001	i
106	01101010	j
107	01101011	k
108	01101100	l
109	01101101	m
110	01101110	n
111	01101111	o
112	01110000	p
113	01110001	q
114	01110010	r
115	01110011	s
116	01110100	t
117	01110101	u
118	01110110	v
119	01110111	w
120	01111000	x
121	01111001	y
122	01111010	z
123	01111011	{
124	01111100	|
125	01111101	}
126	01111110	~

Digital Information ('21-'22)

Black and White Images

Resources

Name(s)_____ Period _____ Date _____

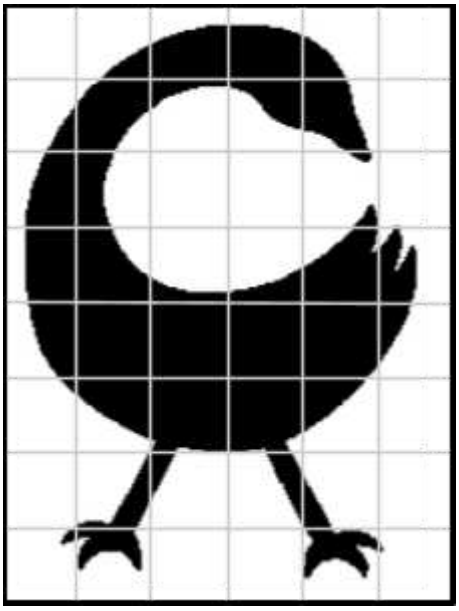
Activity Guide - Black and White Images

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?

_____

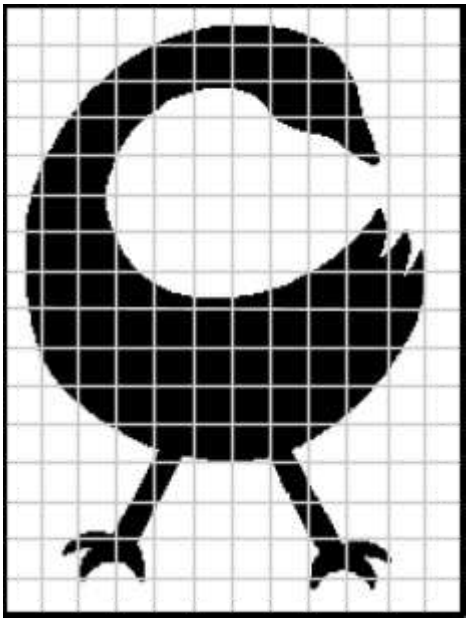
_____

_____

_____

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?

_____

_____

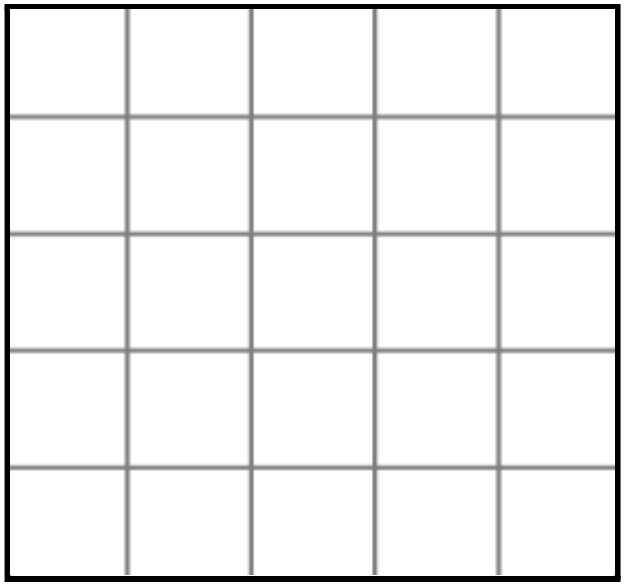
_____

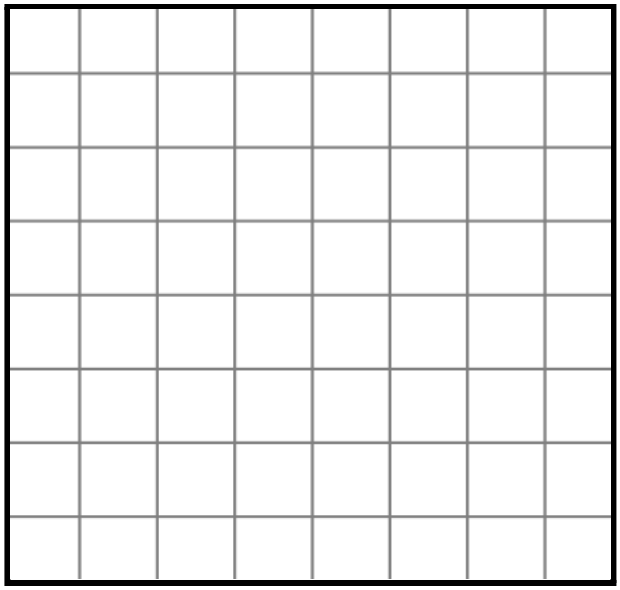
_____

Challenge C

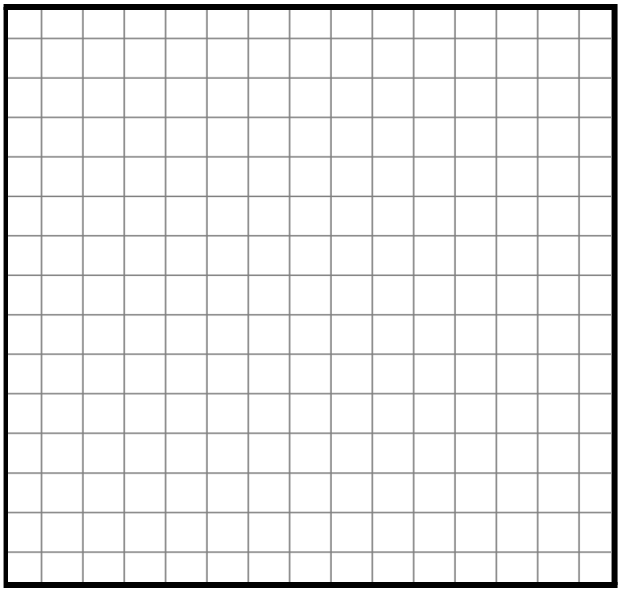
Select your favorite company logo. Decide how you are going to sample this logo - use one of the grids below. Draw the logo.

Low Sampling Frequency





High Sampling Frequency



Digital Information ('21-'22)

Project Digital Information Dilemmas Part 2

Resources

Name(s)_____ Period _____ Date _____

Unit 1 Project Rubric

Rubric

Category	Extensive Evidence	Convincing Evidence	Limited Evidence	No Evidence
Annotated Article: Symbols	Extensive use of symbols (+, -, 😐) thoughtfully used throughout the article.	Some use of symbols (+, -, 😐) thoughtfully used throughout the article.	A few symbols (+, -, 😐) thoughtfully used throughout the article.	No symbols used to annotate the article.
Annotated Article: Written Annotations • 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?	Extensive notes in the margins and text of the article that address most of the questions in the lesson plan.	Some notes in the margins and text of the article that address most of the questions in the lesson plan.	A few notes in the margins and text of the article that address most of the questions in the lesson plan.	No notes in the margins and text of the articles.
Project - Quadrant 1 • What is being digitized? How is the information represented digitally?	Prompt is fully addressed using text or images. Response is realistic and connects to unit concepts.	Prompt is fully addressed using text or images. Response is realistic but does not connect to unit concepts.	Prompt is not fully addressed using text or images. Response is mostly realistic and somewhat connects to unit concepts.	Prompt is not addressed. Response is not realistic and does not connect to unit concepts.
Project - Quadrant 2 • What is the goal or purpose of digitizing this thing?	Prompt is fully addressed using text or images. Response is realistic and supported by the article.	Prompt is fully addressed using text or images. Response is mostly realistic, but unsupported by the article.	Prompt is not fully addressed using text or images. Response is somewhat realistic, but unsupported by the article.	Prompt is not addressed. Response is not realistic.
Project - Quadrant 3 • What are the benefits and harms of digitizing this content?	Prompt is fully addressed using text or images. Response is realistic and supported by the article.	Prompt is fully addressed using text or images. Response is mostly realistic, but unsupported by the article.	Prompt is not fully addressed using text or images. Response is somewhat realistic, but unsupported by the article.	Prompt is not addressed. Response is not realistic.
Project - Quadrant 4 • Is our world better or worse because of digital representation? Explain why, giving examples from the article.	Prompt is fully addressed using text or images. Response is realistic and supported by the article.	Prompt is fully addressed using text or images. Response is mostly realistic, but unsupported by the article.	Prompt is not fully addressed using text or images. Response is somewhat realistic, but unsupported by the article.	Prompt is not addressed. Response is not realistic