

Write your questions and thoughts here!



You need a graphing calculator for this lesson!

Try and decode this message:

13, 1, 20, 8, 0, 18, 15, 3, 11, 19

Name three examples from the lesson when encryption has been used:

- 1.
- 2.
- 3.

Encoding (encrypting) a message:

$$\begin{array}{c} \boxed{\text{Original}} \\ \boxed{\text{Numbers}} \\ \text{--- x ---} \end{array} \times \begin{array}{c} \boxed{\phantom{\text{Original}}} \\ \boxed{\phantom{\text{Numbers}}} \\ \text{--- x ---} \end{array} = \begin{array}{c} \boxed{\phantom{\text{Original}}} \\ \boxed{\phantom{\text{Numbers}}} \\ \text{--- x ---} \end{array}$$



1. If the encoding matrix is $\begin{bmatrix} 3 & -2 \\ -5 & 4 \end{bmatrix}$, **encode** the following message:

“Algebra two is easy”

12.4 Encoding Messages

Write your questions and thoughts here!



Decoding (decrypting) a message:

$$\begin{array}{c} \boxed{\text{Encoded}} \\ \boxed{\text{Numbers}} \\ \text{--- x ---} \end{array} \times \begin{array}{c} \boxed{\phantom{\text{Encoded}}} \\ \boxed{\phantom{\text{Numbers}}} \\ \text{--- x ---} \end{array} = \begin{array}{c} \boxed{\phantom{\text{Encoded}}} \\ \boxed{\phantom{\text{Numbers}}} \\ \text{--- x ---} \end{array}$$



2. If the encoding matrix is $\begin{bmatrix} -1 & 5 \\ 3 & 1 \end{bmatrix}$, **decode** the following message:

1 11 13 15 54 18 39 125 -8 40

Space = 0

A = 1

B = 2

C = 3

D = 4

E = 5

F = 6

G = 7

H = 8

I = 9

J = 10

K = 11

L = 12

M = 13

N = 14

O = 15

P = 16

Q = 17

R = 18

S = 19

T = 20

U = 21

V = 22

W = 23

X = 24

Y = 25

Z = 26

Now
summarize
what you
learned!



12.4 Practice – Encoding Messages

Name: _____

Algebra 2

For 1-3, use the given encoding matrix to ENCODE the words or phrases.

1. Encoding Matrix = $\begin{bmatrix} -10 & 9 \\ 7 & 8 \end{bmatrix}$,
message = *Harry Potter*

2. Encoding Matrix = $\begin{bmatrix} 1 & 8 \\ 5 & -5 \end{bmatrix}$,
message = *Statue of Liberty*

3. Encoding Matrix = $\begin{bmatrix} -9 & 3 \\ -3 & -6 \end{bmatrix}$,
message = *Get help*

For 4-6, use the given encoding matrix to DECODE the numbers into a word or phrase.

4. Encoding Matrix = $\begin{bmatrix} -8 & 8 \\ -10 & 5 \end{bmatrix}$, encoded
message:
-206 131 -260 190 -122 97 -152 152

5. Encoding Matrix = $\begin{bmatrix} -7 & 9 \\ -2 & -9 \end{bmatrix}$, encoded
message:
-97 90 -16 -72 -33 -108 -101 72 -126 162

6. Encoding Matrix = $\begin{bmatrix} 4 & 6 \\ -10 & 9 \end{bmatrix}$, encoded
message:
-82 93 0 48 -160 192
42 87 -34 165 4 6

Algebra Skills

Simplify.

1. $(-2)^4$

2. $(4x^2)^3$

3. $(x - 2)^2$

4. $(2x - 3)^2 - 3$

12.4 Application and Extension

1. Mr. Kelly decides to send Mr. Sullivan a secret message, but he doesn't believe it is enough to just use a matrix to encode his message, so he first uses a Caesar Cipher by moving every letter forward three places before encoding the messages. For example, an A would become a D, an L would become an O, and a Z would become a B (don't forget to include the "space" as a letter). Mr. Sullivan received the following numbers from Mr. Kelly.

47, -5, 68, -24, 29, -23, 56, -12, 45, -3, 16, -8, 45, -15, 34, -28, 68, -22, 29, -21, 37, -17, 8, -8

If the encoding matrix was $\begin{bmatrix} 1 & -1 \\ 2 & 0 \end{bmatrix}$, what was the message?

12.4 Practice – Encoding Messages ANSWERS

1. -73 80 -54 306 -250 225 -55 264 -60 340 76 189
2. 119 52 101 -92 46 143 75 -75 6 48 57 51 27 -9 118 44 25 200
3. -78 -9 -180 60 -87 -6 -156 -60
4. Goonies
5. MC Hammer
6. Biebermania