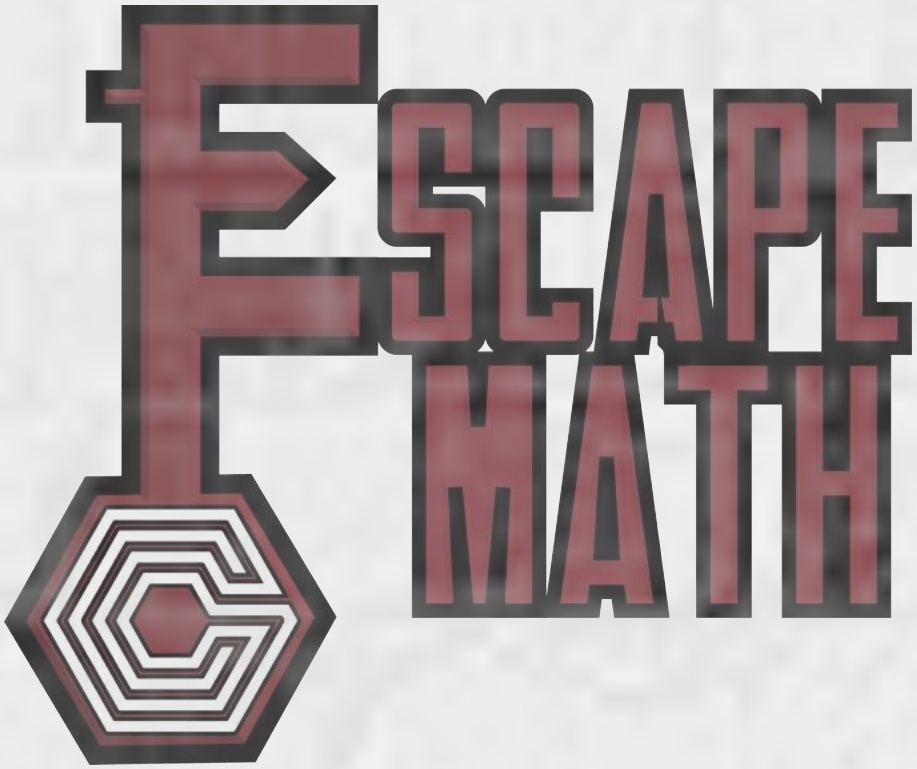
# LITERAL EQUATIONS




vocabulary/conceptual understanding/skill practice
small group activity

# LITERAL EQUATIONS

| **Ideal Unit:** Equations | **Time Range:** 1 Period | **Supplies:** Envelopes, Pencil & Paper |
|---|---|---|

**Topics of Focus:** Solving for specific variables in an equation

## Common Core Alignment:

| | |
|---|---|
| 8.EE.7 | Solve linear equations in one variable. |
| A-REI.3 | Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters. |
| A-CED.4 | Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations. For example, rearrange Ohm's law V = IR to highlight resistance R . |

## Procedures:

A.) You will need to determine the number of student groups you plan to have. This will work best with student groups of 3-5. You will need to have one set of envelopes and set of all the clues for each student group. You will need 4 envelopes for each student group. There are seven pages of clues. These will need to be cut apart in advance and placed in the correct envelopes. It would be wise to have an extra copy of this for you as teacher (not cut up).

B.) To begin, give each student group "Envelope 1". Students are given some pieces of clues that they will need later. Like in an Escape Room, this isn't always obvious. Let them struggle! If a group is falling behind, you can always provide a hint. After they have figured out how their clue fits together and solve the problems correctly. They will discover a "code". This is like a lock. Once they give you the correct code, you can give them their next envelop. If they are incorrect, you can make them wait 2 minutes before they can reapproach you. Can students escape the topic before time runs out? We'll find out.

As an option, you can use the Escape Math app for interactive locks! See the next page for links and the Class Code!

Options.) Should you want to have alternate endings, although the docs are not editable, you can use teacher magic tricks to change numbers to make different codes. I wouldn't recommend this until you've done the activity a few times. You may also find it works well to laminate the cutout and number them on the back with the envelope they are supposed to go in.

# FOR INTERACTIVE LOCKS

CLASS CODE: 3-6-5-4

## WANT A SPOOKY COUNTDOWN TIMER?

HTML

ESCAPE COUNTDOWN

CLICK THE BUTTONS TO GO THERE!

# THE STORY

*As an option, you can read this to your class to prepare them for the activity.*

*You've been taken in the middle of an ordinary day and are now locked in a math class. This isn't your fault – this is what the law tells us needs to happen. Unfortunately you are not allowed to leave until you have an understanding of solving for variables and demonstrate the skill. You have ____ minutes to do so. If you know a bit about a Renaissance Artist, that can help.*

*There are four sets of envelopes with clues. You must determine the correct code to receive the next envelope. If you cannot Escape Math in the time allowed, you will be stuck in here forever.*

ESCAPE MATH

# VOCABULARY

Cut into 12 pieces **ENVELOPE 1**

**Answer: as displayed**

| | |
|---|---|
| a. Equation | 6. Two expressions, equated with an equal sign. A statement of equality. |
| b. Variable | 5. symbol for an unknown value. Usually a letter, such as a, x, or y, is the symbol used. |
| c. Solution | 4. The value of a variable that satisfies an equation. |
| d. Inverse Operations | 2. Operations that undo each other. |
| e. Term | 3. Either a number, a variable, or numbers and/or variables multiplied together. |
| f. Isolate the Variable | 1. When the variable is by itself on one side of the equals sign. |

Cut out and place in **ENVELOPE 1**

# 1 VOCABULARY

Match the word with the definition. Substitute the numbers from the definition in for the correct letter. Simplify the expressions to get the four digit code.

| | | | |
|---|---|---|---|
| | | | |
| a – b | c | d + e | 2f |
| 6-5=1 | 4 | 2+3=5 | 2(1)=2 |

**(da Vinci's birthyear)**

Cut and place into

**ENVELOPE 2**

# IMAGE & CLUE

Piece together the two parts to the image. How many letters are in the name of the person in the painting? (it's just the "second" part of her name the "first" part is like 'Ma'am')?

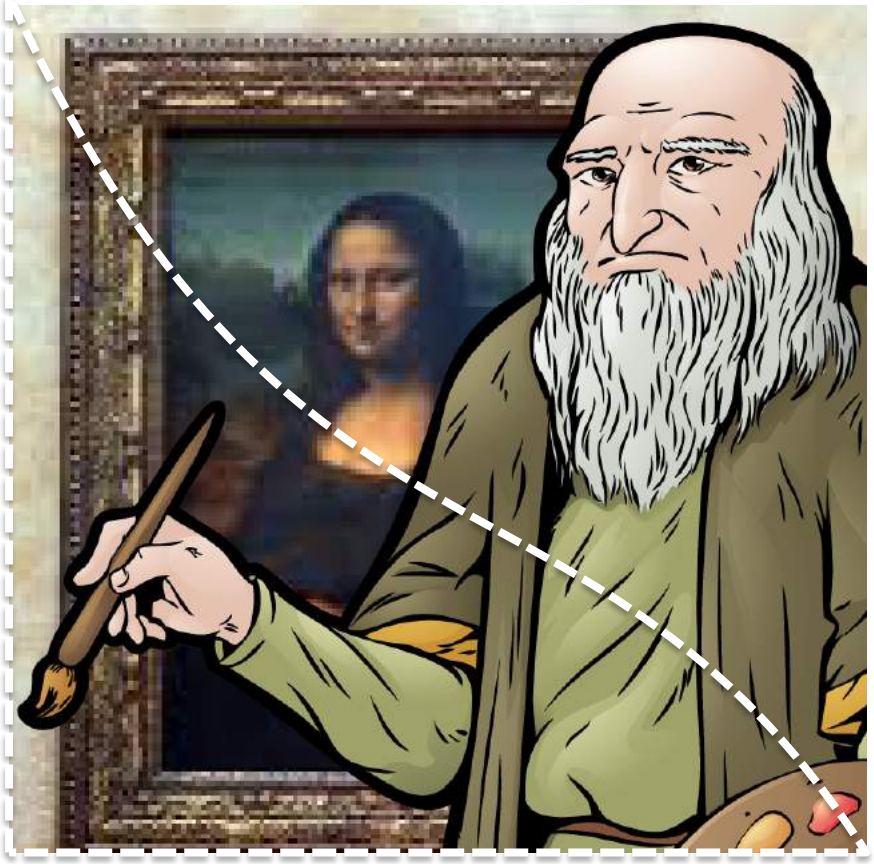
?

**LISA Answer: 4 letters**

Cut and place into

**ENVELOPE 1**

This info (?) is needed for the CONCEPTUAL UNDERSTANDING puzzle.



Cut and place into **ENVELOPE 2**

Cut into 4 pieces and put in **ENVELOPE 2**

# ② CONCEPTUAL UNDERSTANDING

One of these show an equation that is not correct. If you can figure out which one, you will learn your next clue.

**This one is incorrect**

Solve for a.

$3a+2=b$

$3a=b-2$

$a=\dfrac{b-2}{3}$

9

4

?

Solve for p.

$\dfrac{2p+3}{2}=q+1$

$2p+3=2q+2$

$2p=2q-1$

$p=\dfrac{2q-1}{2}$

6

?

3

Solve for m.

$4-5m=n$

$-5m=n-4$

$m=\dfrac{n-4}{5}$

?

1

5

**Recall the ? = 4 (from Lisa)**

**Answer: Code to receive Envelope 3: 4-1-5**

**(Da Vinci's birthday is April 15th)**

# SKILL PRACTICE

Cut into 20 pieces and place in **ENVELOPE 3**

**ANSWERS AS DISPLAYED. INCORRECT PIECES ON NEXT PAGE.**

| | | | | |
|---|---|---|---|---|
| $\frac{x}{y}=z$ | $xy=z$ | $x+y=z$ | $2x-y=z$ | $-3x+2y=z$ |
| $x=yz$ **0** | $x=\frac{z}{y}$ **0** | $x=z-y$ **2** | $x=\frac{z+y}{2}$ **2** | $x=\frac{2y-z}{3}$ **3** |

| | | | | |
|---|---|---|---|---|
| $\frac{2x}{3y}=z$ | $x-y+z=0$ | $\frac{x}{y}+2=z$ | $4x-y=x+z$ | $2x+yx=z$ |
| $x=\frac{3yz}{2}$ **6** | $x=y-z$ **6** | $x=yz-2y$ **4** | $x=\frac{y+z}{3}$ **4** | $x=\frac{z}{2+y}$ **3** |

Cut into 6 pieces and place in the envelopes below.

## ENVELOPE 3

| | | | |
|---|---|---|---|
| $x = 2yz$ | $x = 2z - y$ | $x = \dfrac{z-3}{y}$ | $x = 6yz$ |
| **1** | **5** | **1** | **5** |

**INCORRECT PIECES ABOVE.**

## ENVELOPE 2

## 3 SKILL PRACTICE

## THE DA VINCI CODE

*Solve each literal equation for x. Find the matches. There will be four answers left out. Use the special numbers to write the code in this form*

*W-Y-X-Z*

*Where W, X, Y, Z are assigned from the leftovers from least to greatest.*

## ENVELOPE 3

ENVELOPE 4

# 4 FINAL CHALLENGE

Piece together and solve for the variables. The final code is a golden number found in Da Vinci's work. If you can find it, you may, just may--

**ESCAPE MATH.**

Cut into 5 pieces and place in four different envelopes

**ENVELOPE 1**

**ENVELOPE 4**

$$D \cdot A = V + 1 + N \cdot C + 1$$

| SOLVE FOR A | SOLVE FOR C | SOLVE FOR D | SOLVE FOR N | SOLVE FOR V |
|---|---|---|---|---|
| Code Part 1 | Code Part 2 | Code Part 3 | Code Part 4 | Code Part 5 |

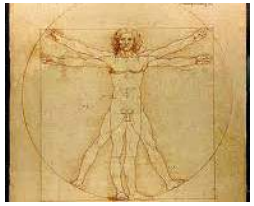
**ENVELOPE 3**

**ENVELOPE 2**

# FINAL CHALLENGE

Cut into 10 pieces and place in **ENVELOPE 4**

**ANSWER IS TOP ROW. INCORRECT PIECES ON BOTTOM ROW.**

| | | | | |
|---|---|---|---|---|
|  |  |  |  |  |
| $A = \frac{V + NC + 2}{D}$ | $C = \frac{DA - V - 2}{N}$ | $D = \frac{V + NC + 2}{A}$ | $N = \frac{DA - V - 2}{C}$ | $V = DA - NC - 2$ |
| **1** | **6** | **1** | **8** | **0** |

| | | | | |
|---|---|---|---|---|
|  |  |  |  |  |
| $A = DV + NC + 2$ | $C = \frac{V - DA - 2}{N}$ | $D = \frac{V + NC - 2}{A}$ | $N = \frac{DA - V + 2}{C}$ | $V = DA + NC - 2$ |
| **9** | **8** | **0** | **9** | **6** |

# I HAVE