# ARTS IMPACT LESSON PLAN

Visual Arts and Math Infused Lesson

Lesson Three: Picturing Equations: Missing Variable Stories

Author: Meredith Essex Grade Level: Sixth

Enduring Understanding

A story posing a mathematical problem can be expressed by combining pictures, symbols, writing, and

algebraic expressions in a balanced composition.

Lesson Description (Use for family communication and displaying student art)

Students analyze and generate ideas for story problems using art as a starting point. Students invent story

problems with characters and situations that pose mathematical problems to solve. They explore representing

their story problems through images, symbols, writing, and missing variable equations. Last, students create a

final composition representing their story problem combining images (in sticker form), descriptive writing, and

missing variable equations, then switch compositions with a partner and solve each other’s equations.

Learning Targets and Assessment Criteria

Target: Creates a story problem.

Criteria: Invents characters and a situation that pose a mathematical problem to solve.

Target: Illustrates story problem using words and images.

Criteria: Combines symbols, pictures, and writing to communicate a context in sketchbook and

final composition.

Target: Writes a missing variable equation for story problem.

Criteria: Combines known numbers, operations symbols, and a variable for an unknown number to

represent story problem equation.

Target: Makes a balanced composition.

Criteria: Arranges elements in all areas of the space.

Target: Solves a peer’s missing variable story equation.

Criteria: Uses written and visual information to find the unknown number in equation.

Vocabulary

Arts infused:

Action

Character

Context

Narrative

Symbol

Math:

Algebraic Expression

Equation

Variable

Arts:

Balance

Composition

Illustrate

Materials

Museum Artworks or Performance

Seattle, WA

Seattle Art Museum

Tacoma, WA

Tacoma Art Museum

Materials

Drawing pencil: 4H; Arts Impact

sketchbook; Stickers: small, fun pictures

(ex.: ice cream cones, puppies, shoes,

bananas, basketballs, and lower case

letters and number stickers); Card stock:

8.5x11”, various colors, cut into

4.25x5.5” pieces, one per student; Pens:

fine-tipped metallic, white, and various

colors; Class Assessment Worksheet

continued

Learning Standards

WA Arts State Grade Level Expectations

For the full description of each WA State Arts

Grade Level Expectation, see:

http://www.k12.wa.us/Arts/Standards

1.1.4 Elements: Space

2.3.1 Responding Process

2.1.1 Creative Process

3.2.1 Communicate for Specific Purpose:

Illustrate story problem

4.2.1 Connection between Visual Arts and Math

Common Core State Standards(CCSS) in

Math For a full description of CCSS Standards by

grade level see:

http://www.k12.wa.us/CoreStandards/Mathstand

ards/

6.EE. Reason about and solve one-variable

equations and inequalities.

continued

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Seattle Art Museum images:

Codex Chicon Alvarez/Cuando El

Oportunista Es Rey En El Barrio las

Calles Estan Pavimentadas Con Oro y

Sangre (Codex Chicon Alvarez/When

the Opportunist is King in the

Neighborhood, the Streets Are Paved

With Gold and Blood), 1992, Cecilia

Concepcion Alvarez, 93.51

A Feast, 2001, Li Jin, 2003.119

A Park In A Room, 1966, Michael

Lawson, 68.204

6.EE.6. Use variables to represent numbers and

write expressions when solving a real world or

mathematical problem; understand that a variable

can represent an unknown number, or,

depending on the purpose at hand, any number

in a specified set.

CCSS Mathematical Practices

MP.2. Reason abstractly and quantitatively.

MP.4. Model with mathematics.

MP.7. Look for and make use of structure.

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Pre-Teach

Review equivalency and strategies for solving missing variable equations.

Facilitate discussion of math story problems and ask students to identify

situations in the classroom that could be translated into story problems.

Lesson Steps Outline

1. Introduce and guide art analysis of Codex Chicon Alvarez/Cuando El

Oportunista Es Rey En El Barrio las Calles Estan Pavimentadas Con Oro y Sangre

by Cecilia Concepcion Alvarez, A Feast by Li Jin, and A Park In A Room by

Michael Lawson from The Seattle Art Museum collection. Facilitate discussion

about how artists communicate stories through words and images.

Criteria-based teacher process assessment: Participates in math and art

visual analysis.

2. Introduces artistic and mathematical creative process through reflection on

prior knowledge about the characteristics of math story problems.

3. Brainstorm story problem ideas with students using silly stickers as inspiration.

Document ideas, record expressions, and note missing variable algebraic

equations for story problems and examine ways to solve them.

Criteria-based teacher process assessment: Participates in brainstorming ideas

for story problems.

4. Guide students in generating draft ideas for story problems through sketching,

writing, and/or mapping out ideas in their sketchbook. Distribute stickers to help

generate ideas. Support students in writing missing variable equations for

story problem.

Criteria-based teacher checklist: Invents characters and a situation that

pose a mathematical problem to solve. Combines symbols, pictures, and writing

to communicate a context in sketchbook. Combines known numbers,

operations symbols, and a variable for an unknown number to represent story

problem equation.

ICON KEY:

3 = Indicates note or reminder for teacher

= Embedded assessment points in the lesson

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5. Guide students in reflecting with a peer on a draft idea for story problem.

Demonstrate combining sticker images, symbols, and writing to illustrate a

story problem.

Criteria-based peer process assessment: Reflects on story problem idea

artistically and mathematically with a partner and refines based on feedback.

6. Guide students in planning and creating story problem composition combining

pictures/symbols, written description, and missing variable equation. Encourage

students to balance elements in composition, using the whole space.

Criteria-based teacher checklist: Combines symbols, pictures, and writing to

communicate a context in final composition. Combines known numbers,

operations symbols, and a variable for an unknown number to represent story

problem equation. Arranges elements in all areas of the space.

7. Guide criteria-based peer and group assessment.

Criteria-based peer assessment and teacher checklist: Uses written and visual

information to find the unknown number in equation. Reflects on process of

generating a story problem.

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LESSON STEPS\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. Introduce and guide art analysis of Codex Chicon Alvarez/Cuando El Oportunista Es Rey

En El Barrio las Calles Estan Pavimentadas Con Oro y Sangre by Cecilia Concepcion Alvarez,

A Feast by Li Jin, and A Park In A Room by Michael Lawson from The Seattle Art Museum

collection. Facilitate discussion about how artists communicate stories through words

and images.

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3 The Seattle Art Museum’s collection is available on-line at:

http://www.seattleartmuseum.org/emuseum/code/collection.asp. To find the images in this lesson,

enter the accession number for the work of art in the search box on the collections page of SAM’s

website. Accession numbers for these works of art are listed in the materials box at the beginning of

the lesson.

• How do the artists tell a story or suggest ideas in these artworks?

• Who are the characters? What is happening? What clues do you see that support your ideas?

What story do you see in Cecelia Alvarez’s artwork?

• What additional information about the artwork do the titles provide?

• In Li Jin’s (60 foot!) scroll combining writing in Chinese along with images of food, what do you

think is being communicated?

• Can you imagine finding a math story problem in one of these pictures? What might that story

problem be?

Criteria-based teacher process assessment: Participates in math and art visual analysis.

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2. Introduces artistic and mathematical creative process through reflection on prior

knowledge about the characteristics of math story problems.

• Instead of giving you a story problem to solve, your job today is to invent your own

story problem.

• What are the characteristics of the math story problems you are familiar with? What sorts of

things are often happening in them?

• Like any story, there are usually characters, objects, parts of a setting or a context, and some

sort of action or interaction.

• Often people are making things, buying things, selling things, dividing things up, going places,

eating stuff… just like what everybody does every day in math problems.

• We are going to each invent a story problem, bring it to life with words and pictures, and then

write an algebraic equation for it.

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3. Brainstorm story problem ideas with students using silly stickers as inspiration.

Document ideas, record expressions, and note missing variable algebraic equations for

story problems and examine ways to solve them.

3 Teachers can differentiate by identifying equations of varying complexity within the

brainstorming process.

• Let’s look to some silly stickers for ideas. We have bicycles, ice cream cones, flowers, butterflies,

cupcakes, kitties, spiders, etc.

• How can we invent characters and made-up situations involving some of these things?

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• What if Alfred bought a bicycle and a pet spider for $72? We know the spider was $19.50. How

much did the bicycle cost? How can we represent this equation or problem to solve? (b + 19.5

= 72 where b is the cost of the bicycle.) How do we solve it now? 72 – 19.5 = b (b =52.5)

• Lets invent a more complicated one: Evangelina bought 3 cupcakes, an ice cream cone, and a

very small toy boat. The cupcakes (that were all the same price) plus the ice cream cone cost

the same amount as the boat. The boat cost $12.00, and the ice cream cone cost $4.50. How

much were the cupcakes each? What mathematical equation could we write to represent this

problem to solve? (3c + $4.50 = $12.00 where c is the cost of the cupcake.) How do we figure

out what c is?

• One strategy is to “undo” the equation by removing the same number from both sides of the

equal sign. If we remove $4.50 from both sides of the equation, then 3c = $7.50. What is

multiplied by three to obtain $7.50? Or what is $7.50 divided by 3?

Criteria-based teacher process assessment: Participates in brainstorming ideas for story problems.

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4. Guide students in generating draft ideas for story problems through sketching, writing,

and/or mapping out ideas in their sketchbooks. Distribute stickers to help generate ideas.

Support students in writing missing variable equations for story problem.

• Think about a situation and character for your story problem. Use our group brainstorming as a

point of inspiration. Have some fun with it! Be silly!

• Take a look at our sticker choices; we will be combining them with writing in a final illustrated

version of our story problem.

• In your sketchbook, do not adhere any stickers; identify the ones you will use and sketch,

diagram, map, and write notes to help develop your idea.

• Write an equation that matches your story problem and solve it. Now write the equation using a

missing variable that represents an unknown number. Be sure to indicate what letter represents

that missing variable and what that letter stands for.

• You will create final illustrations of your story problems on colorful paper using stickers, writing,

and equation using decorative pens in a moment.

Criteria-based teacher checklist: Invents characters and a situation that pose a mathematical

problem to solve. Combines symbols, pictures, and writing to communicate a context in sketchbook.

Combines known numbers, operations symbols, and a variable for an unknown number to represent

story problem equation.

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5. Guide students in reflecting with a peer on a draft idea for story problem. Demonstrate

combining sticker images, symbols, and writing to illustrate a story problem.

• Share your story problem idea and the way you are thinking about representing it both

artistically and mathematically with a partner. Have your partner check for correctness of your

math. Use their feedback to help refine your ideas.

• Select the stickers and edit your narrative/description of characters and situation expressed in

the story problem.

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• You will create a final illustration of your story problem on colorful paper using stickers, a

written description of your story problem, and a missing variable expression that represents

your story problem. Be sure to indicate what the variable in the story problem stands for.

Criteria-based peer process assessment: Reflects on story problem idea artistically and

mathematically with a partner and refines based on feedback.

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6. Guide students in planning and creating story problem composition combining

pictures/symbols, written description, and missing variable equation. Encourage students

to balance elements in composition, using the whole space.

• Select a color cardstock paper and plan your composition. Identify where the stickers/symbols

that illustrate your story will go, where your written description of characters and

situation/context will go, and where you will write your missing variable expression for your

story problem.

• Think about “balancing” all of the elements of your composition through placement of writing,

stickers, and equation so that all parts of the paper are used. Crowding some areas and leaving

large gaps in other areas will be less effective visually.

• Attach stickers/symbols to illustrate your story problem then carefully add your written

description and missing variable equation based on your plan for your composition.

Criteria-based teacher checklist: Combines symbols, pictures, and writing to communicate a context

in final composition. Combines known numbers, operations symbols, and a variable for an unknown

number to represent story problem equation. Arranges elements in all areas of the space.

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7. Guide criteria-based peer and group assessment.

• Switch compositions with a partner and solve their missing variable equation. Check with them

for correctness of answer.

• Look at the story problem compositions as a group. Where do you see illustrations and/or

written descriptions that convey the equation effectively?

• As solvers of many story problems in math over your school careers, what were the challenges

of inventing and illustrating a story problem instead of just solving one?

Criteria-based peer assessment and teacher checklist: Uses written and visual information to find the

unknown number in equation. Reflects on process of generating a story problem.

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ARTS IMPACT LESSON PLAN Visual Arts and Math Infusion

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3 Teachers may choose to use or adapt the following self-assessment tool.

STUDENT SELF-ASSESSMENT WORKSHEET

Disciplines MATH AND VISUAL ARTS MATH Total

Concept Story Problems 6

Composition

Missing Variable Equations

Criteria

Student

Name

Invents

characters and

a situation that

pose a

mathematical

problem to

solve.

Combines symbols,

pictures, and writing to

communicate a context.

Arranges

elements

in all

areas of

the

space.

Combines known

numbers, operations

symbols, and a variable

for an unknown number

to represent story problem

equation.

Uses written

and visual

information to

find the

unknown

number in

equation.

in

sketchbook.

in

final

composition.

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ARTS IMPACT LESSON PLAN Visual Arts and Math Infusion

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CLASS ASSESSMENT WORKSHEET

Disciplines MATH AND VISUAL ARTS MATH Total

Concept Story Problems 6

Composition

Missing Variable Equations

Criteria

Student Name

Invents

characters and

a situation that

pose a

mathematical

problem to

solve.

Combines symbols,

pictures, and writing to

communicate a context.

Arranges

elements

in all

areas of

the

space.

Combines known

numbers, operations

symbols, and a variable

for an unknown number

to represent story

problem equation.

Uses written

and visual

information to

find the

unknown

number in

equation.

in

sketchbook.

in final

composition.

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Total

Percentage

What was effective in the lesson? Why?

What do I want to consider for the next time I teach this lesson?

What were the strongest connections between visual arts and math?

Teacher: Date:

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