



Pixel Art Arithmetic Puzzle

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CONCEPT OVERVIEW

Pixel Art Arithmetic Puzzle is a problem-solving oriented, storytelling based learning experience.

STATEMENT OF NEED

Whenever kids are motivated, they learn better. That is also true for practicing basic arithmetic skills!

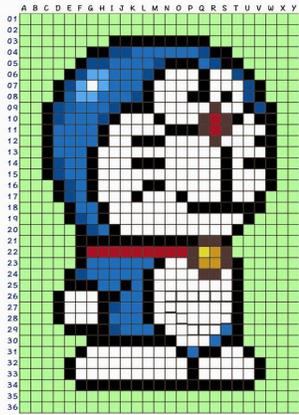
CONCEPT STATEMENT

Math appears difficult and boring to many students. Our Pixel Art Arithmetic Puzzle is redesigning the learning experience by giving the students an “important mission” to complete using their weapon (i.e math), which encourages the students to find the correct result by doing the arithmetic calculation because they want to fulfill the mission!

This is how it works: In classroom, teacher guides students to solve the following sample Pixel Art Arithmetic Puzzle in following steps:

1. Observe the art and read the narrations, let students tell what is missing from the image;
2. Have the students work out arithmetic questions;
3. Help student find the starting pixel grid, and fill in certain numbers of pixels. Then the students move on to the next arithmetic questions, get the result and fill in pixels and so on.
4. When student gets all the answers correct, the missing part of the art will be found! And the puzzle will be solved!

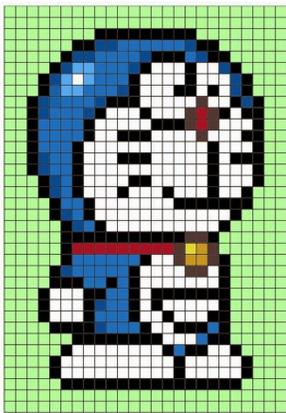




Doraemon has lost something! Please help him by the following steps:

1. $(2+4)*5 - 25 = \underline{\quad}$? Start from Grid S26, fill in the appropriate number of pixels from right to left(horizontally);
2. $9 + 6/2 - 10 = \underline{\quad}$? Start from Grid N26, fill in the appropriate number of pixels from to bottom(vertically);
3. $10 - 3*3 = \underline{\quad}$? Start from Grid O28, fill in the appropriate number of pixel;
4. $14/2 - 2*2 = \underline{\quad}$? Start from Grid P29, fill in the appropriate number of pixels from left to right (horizontally);
5. $15 - (2+6*2) = \underline{\quad}$? Start from Grid S28, fill in the appropriate number of pixel;

Now do you know what Doraemon was missing? _____



Answers:

1. $(2+4)*5 - 25 = 5$
2. $9 + 6/2 - 10 = 2$
3. $10 - 3*3 = 1$
4. $14/2 - 2*2 = 3$
5. $15 - (2+6*2) = 1$

Now do you know what Doraemon was missing? **Answer Key:** Pocket

TARGET AUDIENCE

Students who are practicing mixed operations in Grade 3.

LEARNING GOALS

1. The student should be able to practice performing multiple operations with whole numbers.
2. The students should be able to do their own answer checking based on the feedback from pixel art, and reflect their problem-solving progress.

LEARNING THEORIES

1. Constructivism: In the process of puzzle solving, students are learning with creating a solution in the meaningful context. When students are more active in learning, they are more engaged and motivated. Students' knowledge and skills of multiple operations are transferred into a meaningful situation.
2. Affordance theory: The affordances are the relationship between every single pixel and children who are learning basic arithmetics. The property of pixels -- being able to be counted by learners and being filled in grid one by one is perfect for puzzle solving.
3. Discovery learning: This learning experience is a creative activity that students are able to actively solve the problem by using their prior knowledge and skills to discover. Teacher's role tend to be more like a scaffolding that helps the students to fill in the gaps(finding the starting grid points) with instruction.