



## DIGITAL GAME PROPOSAL



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## **RESCUE =!**

**Grades 6-8**  
**Ages 11-14**

**Educational / Mathematics / Pre-Algebra / Adventure**

**Rated E for Everyone**

### **Curriculum Connection:**

Taken from [Common Core Standards](#)

#### [CCSS.Math.Content.7.EE.B.4](#)

Use variables to represent quantities in a real-world or mathematical problem, and construct simple equations and inequalities to solve problems by reasoning about the quantities.

#### [CCSS.Math.Content.7.NS.A.3](#)

Solve real-world and mathematical problems involving the four operations with rational numbers.

#### [CCSS.Math.Content.7.EE.B.4.a](#)

Solve word problems leading to equations of the form  $px + q = r$  and  $p(x + q) = r$ , where  $p$ ,  $q$ , and  $r$  are specific rational numbers. Solve equations of these forms fluently. Compare an algebraic solution to an arithmetic solution, identifying the sequence of the operations used in each approach.

#### [CCSS.Math.Content.8.F.A.1](#)

Understand that a function is a rule that assigns to each input exactly one output. The graph of a function is the set of ordered pairs consisting of an input and the corresponding output.

### **Game Manipulation:**

Rescue =! Is a non-linear PowerPoint game. Players can interact by using their mouse to click on icons in order to progress through the game and answer questions. Keyboard input is also needed for mathematical responses. The game is designed to be fun and attractive to pre-teens/ middle school students and the manipulation requires basic computer skills present in this age range.

### **Game Trailer:**

[Rescue =!](#) (link to YouTube, can also copy/paste <https://youtu.be/P4AWf7rrnR4>)



## Storyline Elements:

While returning home from Matics Academy, the students see a balloon in the distance. Inside is the evil  $\neq$ ! He swoops down and captures  $=$ . The students must make it to  $\neq$  castle and rescue  $=$ . The students cannot agree on which path to take, players can choose a character and their unique landscape to travel to the castle. Along their journey, players encounter obstacles in the form of animals, monsters and mythical creatures who will not allow passage without helping them to answer a mathematics question. Players who complete all the obstacles will reach  $\neq$ 's castle where they find  $=$  dangling over lava and tied to an input/output machine. Player's must figure out the correct values to pull  $=$  to safety, or risk dunking him into the lava! If successful, students will have, Rescued  $=$ !

## Characters and Settings:

Rescue  $=$ ! provides players with the opportunity to customize their game play, as they are able to choose from a variety of characters and unique storylines/settings.



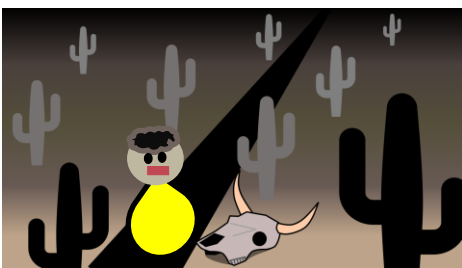
### *Addy - The Dark Forest*

*Sweet, smart and determined, Addy decides to take perhaps the spookiest path to save her friend! Help her navigate monsters, ghosts and titans to reach the castle.*



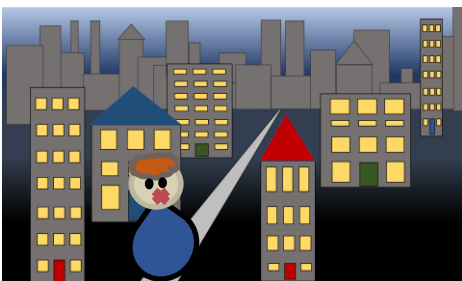
### *Divie - The Divided Way*

*Kind, intelligent and indecisive, Divie is always dividing himself between tasks. Not being able to decide if the mountains or the grassland was the best way, he chose the Divided Way, the narrow path that splits the two.*



### *Subba - The Deserted Desert*

*Funny, lovable, and cautious, Subba thinks the safest way to reach the castle is through the Deserted Desert. But is it? Find out what lurks in the sand as you attempt to Rescue  $=$ !*



### *Kation - Square Root City*

*Energetic, witty and "product"ive, Kation thinks travelling through the city is the right choice. But it isn't without obstacles! Help him navigate  $\neq$ 's minions, dark alleys and more to arrive at the castle safely!*



### **Rules:**

- Players begin by choosing the character/setting that appeals to them
- As players advance through scenes, obstacles will appear in their path. Using the mouse and action buttons as defined in the Instructions (see Appendix A), they must answer questions correctly to pass.
- Incorrect answers cause players to become “stuck” at an obstacle. They can use the information screen for advice on how to solve the problem.
- Players are motivated to “beat” the game. Short term rewards are present for conquering each obstacle, while still encouraging players to continue to achieve their goal.
- After overcoming all obstacles, players are reunited with the other characters at ≠’s castle.
- If players can successfully deduce how to “solve” the input/output machine to pull = to safety, they will have won the game.
- Players can play again, choosing a new character/setting with unique obstacles and questions.

### **Game Play:**

There are currently four levels of play. Each level addresses a different common core standard and the question associated is unique to each character (See Appendix B). The obstacles determine the type of real-world application that connects to the standard. Keep in mind that the game has been designed with the option for growth. This means that additional levels and standards can be added, as well as new characters and an algorithm to ensure repeated play offers unique content.

### **Game Data:**

Upon completion of the game (win or lose), a screen with logistics will appear. This includes the number of correct and incorrect responses. Educators can use this to determine the skill level of students for intervention.

### **Captology:**

- Fun characters and settings are enticing.
- Players will be encouraged to play multiple times to experience each unique pathway to the castle and differing obstacles.
- Students are encouraged to find the correct answer, even if this means multiple attempts to progress through the game.
- In playing each character, students will become familiar and comfortable with the Common Core Standards addressed.
- Each character level can be completed as many times as needed and with the help of the information screen conquering each obstacle is an obtainable goal. The castle level is structured so that one wrong answer means doom. This introduces a more difficult aspect of the game encouraging players to try again until they have won.



## Why develop Rescue =!?

I would like to propose a new, relevant, and exciting digital game for middle school mathematics. While there is a plethora of mathematics games available, I believe that Rescue =! is a game that explores a niche that has not yet been addressed. It is a game that contains specific content standards of middle school mathematics which can easily be expanded upon. In addition, Rescue =! can be readily adapted to classrooms as it can be completed within a reasonable amount of time as a supplement to existing lesson plans. The best part? Rescue =! is already developed! It has been created in such a way that it would only require a fraction of the resources needed for a new game. Developers can simply add content to the already existing format. Let's take a look at the specifics that make Rescue =! the perfect digital game to invest in.

### **Graphics**

Rescue =! is designed with simple but vibrant images. With our current technological capabilities, one might ask why not incorporate more realistic images and scenery? The answer is simple. In 2016 *Minecraft* sold more than 53,000 copies a day (Warren, 2016). It emerged as the most exciting game of a generation and yet it presents a pixelated world void of modern graphics that make many of its competitors seem more realistic. For the generation before, *Super Mario* was the big breadwinner, and is still popular today. Again, complicated graphics do not directly correlate to success. However, Rescue =! does incorporate bright, colorful, fun-loving characters and settings that is sure to draw in players to this captivating world. Schaff and Mohan describe the "importance of images and sound" in learning for the digital generation (p.37). Rescue =! uses text to develop the storyline but is flooded with fun imagery and scenery as well as music, unique to each character, that aids in creating an immersive world.

### **Attributes**

Like *Super Mario* and its contemporaries, Rescue =! offers an adventure storyline. Players must go on a quest to save their companion. On the way, they encounter various obstacles in the form of both real and imaginary animals and monsters. Each obstacle presents a mathematics question relevant to their world. Players must answer correctly in order to pass. This format differs from other similar mathematics games as each question has a real-world connection. This allows students to connect Common Core Standards with possible uses in life, which speaks to what Schaaf and Mohan identify as one of the key attributes of the digital generation, "Digital learners prefer learning that is simultaneously relevant, active, instantly useful and fun" (p.39). Rescue =! is inherently fun to play. It provides questions that both address Common Core Standards and are presented in a format in which students connect what they are learning to real-world applications.

Another important attribute of the digital generation presented by Schaff and Mohan is just-in-time learning. Rescue =! offers this via information pages. If a student answers incorrectly, an information screen is offered that helps walk students through the concept. As currently developed, these pages are strictly text but presented in an animated fashion to entice students. It is our goal that in further development, information pages will include audio and even video walk-throughs to address differing learning styles. This aligns with Universal Design for Learning Guideline I.1 (CAST, 2011) by providing options for

perception. Including text, audio and video ensure that all students can benefit from this just-in-time learning.

Lastly, Rescue =! provides both instant and deferred gratification, another attribute Schaff and Mohan (2017) identify. Students are given instant gratification as they tackle individual obstacles, but also must seek the long-term gratification of completing the quest. This motivates learners to continue game-play as they desire to “beat the game”.

**Universal Design for Learning (UDL)**

Rescue =! has both elements of UDL already built in, as well as ample opportunities to expand. As previously discussed, the information pages are ripe for the addition of multiple forms of explanation. Some aspects already built into the game include the unique storylines and characters. Below is a table that outlines UDL Guidelines and their incorporation into Rescue=!

| UDL Guideline  | Game Component  |
|--|---|
| 7. Provide options for recruiting interest                             | <ul style="list-style-type: none"> <li>• Character and storyline choice</li> <li>• After completing as one character, players are motivated to try different storylines and settings. (motivation)</li> </ul>                   |
| 1.2 Provide options for language, mathematical expression, and symbols | <ul style="list-style-type: none"> <li>• Symbols are used rather than text to advance through games which are clearly defined in instructions.</li> <li>• Use of symbols allows understanding over various languages</li> </ul> |
| III.8 Provide options for sustaining effort and persistence            | <ul style="list-style-type: none"> <li>• In-game scaffolding and just in time learning</li> </ul>   |

**Modern Learning**

Lastly, Rescue =! addresses many of what Schaff and Mohan (2017) (taken from Ted McCain) identify as the “nine I’s of modern learning” (p.93). It encourages players to sharpen their problem-solving skills, information investigation skills, and innovation creativity skills. However, the game can easily be adapted to include multiplayer options as well as an internet community, tackling even more of these concepts. Problem-solving is found as players must take real-world type problems and connect them to mathematical concepts. Information investigation is connected to the just-in-time learning, as information screens are designed to dissect the problem and locate the vital facts and their meaning while disregarding unnecessary information. And creativity is found as players can take different paths to win the game.

Overall, Rescue =! is a great game to consider developing. With so much already in place, it would require less time and money to complete. We note that while Rescue =! is currently formatted as a PowerPoint game, expansion into an application or web-based game is possible. It has been developed using VBA and thus can be easily translated into Java or C++ or another programming language to increase its use across multiple



platforms. Rescue =! addresses the needs of the digital learner, aspects of UDL as well as many essential skills for the modern world. It incorporates Common Core Standards and its format allows for an endless possibility of updates, additional characters, storylines, and content. Rescue =! will appeal to classroom teachers interested in infusing digital games into their lesson plans as it is not time consuming, and connects directly to material being covered. Perhaps our most difficult challenge in mathematics is to show students how concepts connect to the real-world. Rescue =! provides a fun, innovative way to do this, allowing students to simultaneously advance in Bloom's taxonomy while developing real-world application skills.

Thank you for your consideration.



## Appendix A

### Instructions

Below are the action buttons used in the game to advance game play.



Home - Click on this at any time to return to the main menu.



Info - Provides link to help screen with information on how to solve.



Play - Appears after correct answer has been recorded. Click to continue your journey.



Question - Click to receive and answer question presented by obstacles.



Video - This icon means there is a video on the topic available. Clicking will redirect players to the internet site that hosts the video.





## Appendix B

### Levels

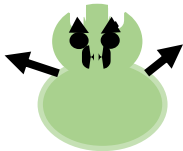
We have provided some short examples of the different levels, obstacles and questions aligned to Common Core Standards present in the game.

#### Level 1:

CCS - 7.EE.B.4

Players will be asked a real-world type problem where they must create an equation and solve for an unknown.

Example: Character - Addy / Obstacle - Ogre



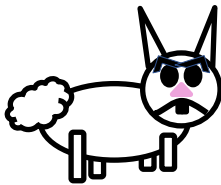
*There are 32 Ogres in the forest. 4 are too old to guard.  
There are 4 sections of the forest. If each section has an equal number of Ogres, how many are assigned to each section?*

#### Level 2:

CCS 7.NS.A.3

Players will be asked a question that is a real-world type problem. They will have to apply different operations using rational numbers to solve.

Example: Character – Subba / Obstacle – Grumpy Rabbit



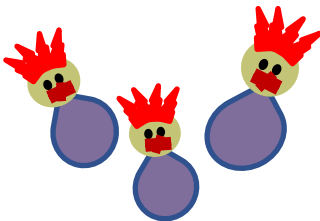
*I have 108 children. Every week  $\frac{1}{2}$  of them eat  $\frac{1}{6}$  lb. of carrots each.  $\frac{1}{6}$  of them eat  $\frac{1}{2}$  lb. of carrots each and  $\frac{1}{3}$  eat  $\frac{1}{3}$  lb. of carrots each. The bags we get are  $30\frac{1}{4}$  lbs. Whatever is left my wife has  $\frac{2}{3}$  of. How much do I get each week?*

#### Level 3:

CCS 7.EE.B.4.a

In this final character level, players will solve a perimeter/area problem.

Example: Character – Kation / Obstacle - ≠ minions



*We are tired of doing everything for ≠ and getting nothing!  
He has 42 Acres of land and we have none! There are 5 of us and we want to divide the land equally with ≠. If each plot has a width of 2 acres for each of us minions and ≠, what is the length of our land?*

#### Level 4:

CCSS. 8.F.A.1

In order to win, players must choose the correct Input/Output of different functions to raise = to safety. One wrong answer will drop = into a pot of lava.



*I am controlled by the function  $f(x) = 2x + 3$ . Choose the correct input and output in order to raise the rope.*



## References

All images are self-created by Shayla K. Heavner

Center for Applied Special Technology. (2011). *Universal Design for Learning guidelines version 2.0*. Wakefield, MA:Author.

Schaaf, R., & Mohan, N. (2016). *Game on: Using digital games to transform teaching, learning, and assessment*. Bloomington, IN. | Solution Tree Press.

Warren, T. (2 June 2016). Minecraft sales top 100 million. Retrieved from <https://www.theverge.com/2016/6/2/11838036/minecraft-sales-100-million>