

## Advanced Challenge Puzzles

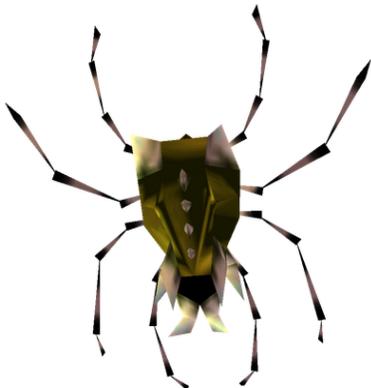
I build custom, interactive, online challenge puzzles that utilize concepts from the previous lesson to solve a math mystery. The puzzles are part of a story line where students must destroy all the golden spiders to break a curse on an ancient family. The spiders are found only through completing secret, compelling, and complex math problems. These problems are completely my own creation. I build custom templates, buttons, images, and create my own math problems and integrate them into online assessments. They are motivational, fun, and bring a different kind of excitement into the classroom. These problems are great for the advanced/GT student, or for small groups working together to unlock the mystery.

### Back Story:

[Link!](#) You've got to help us. My entire family has been cursed! All 6 of us have been turned into Skulltulas. The only way to break this curse is to destroy all 100 Golden skulltulas that lurk across Schoology. They hide in difficult and cryptic math problems. Do you have what it takes to help us break this curse? In return, I can make you very rich....

[\(Click here\)](#)

Below is what a "Golden Skulluta" looks like.



When you defeat a Golden Skulltula, you will collect a token and the curse will weaken. [\(Click Here\)](#) Do you understand?

- a Yes
- b No.

### Short Video Clips:

Video #1) [Obtaining A Spider Token in the Game](#)

Video #2) [The Cursed Family](#)

## Advanced Challenge Puzzles

### 1<sup>st</sup> Puzzle: "Gold Skulltula #1 – A Cryptic Discovery!"

In this puzzle, students practice using substitution, order of operations, and review how to evaluate expressions. They also learn about cryptography and shift ciphers, as they must rotate the dials by the "key" to reveal the true password to unlocking the room. If students are stuck, they can highlight the "hint" text with the mouse which is normally invisible.

#### Question 2 (1 point)

You approach a door. Behind this door, you hear the faint sound of a golden skulltula scrawling in the dark. On this door, you notice 5 dials, each which can be turned to one letter of the alphabet. Currently, the dials are set on "SGRUT".

Below is what appears to be some ancient formula, a formula to provide the key to unlocking the true password. Use it to rotate the dials and reach the golden skulltula. hint: **A=1**

$$\left( \sqrt{\frac{\left( \frac{U}{G} - (R-T) \right)^{T-R}}{G+R} - G} \right)^{R-T} \frac{RT}{S-G+R-T}$$

Password: \_\_\_\_\_

Answer:

Students can highlight "secret" hint.

### Reward for Completion:

#### "Gold Skulltula Token #1" Badge

I also award extra credit on quizzes for completing these puzzles.

+4 Quiz points per problem



#### Gold Skulltula #1

Awarded for unlocking the ancient crypt using a cipher and destroying your first Gold Skulltula! You have received a token to prove your awesomeness!

## Advanced Challenge Puzzles

### 2<sup>nd</sup> Puzzle: "Gold Skulltula #2 – Fibonacci's Repeating Decimal!"

In this puzzle, students have just learned about the sets of real numbers, and specifically for this problem, how to convert infinite repeating decimals to rational numbers. They first have to figure out the pattern to reveal the next number in the sequence, which hopefully leads them to learning about the Fibonacci sequence. They must also be familiar with converting between improper and proper fractions to figure out the solution to the sum. It isn't an especially difficult problem, yet many students feel a great sense of satisfaction from this particular puzzle.

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#### Question 1 (1 point)

As you are venturing through the forest with Navi, you pause. You think you hear the scrawling of another gold Skulltula, but it's faint. Slowly and steadily you approach the direction of the eerie noise but see no sign of the cursed arachnid, but you do see a large stone that appears unnatural in the wooded landscape. With all your might you push the stone a few feet to the left. To your surprise, there lies a large rectangular metal plate on the ground where the stone once stood. Etched on top is a sacred equation. Upon a further inspection, you notice 4 dials, each set to 0. It seems that they can be rotated to any digit 0 through 9.

$$1.\overline{111} + 1.\overline{111} + 2.\overline{222} + 3.\overline{333} + 5.\overline{555} + ? = \frac{000}{0}$$

You aren't sure if the plate is a trap, but you risk your life anyways and try to solve the equation because math is life. What do you turn the dials to? [hint: \(click here\)](#)

Answer:

Students can highlight "secret" hint.



#### Gold Skulltula #2

Awarded for solving the ancient Fibonacci Equation to unlock the secret entrance! You truly are the hero Hyrule needs! You have received a token to prove your awesomeness!

#### Reward for Completion:

"Gold Skulltula Token #2" Badge

## Advanced Challenge Puzzles

### 3<sup>rd</sup> Puzzle: "Gold Skulltula #3 – Lost Interval of Time"

Assessments allow for click-able parts of images to be scored. I created more interactive puzzles as the course grew. This puzzle is about the intersection of sets of real numbers. There is more than one possible solution, either is counted correct.

**Deep within the Deku tree**, you enter a dark room filled with an intense heat. You notice an unlit torch in the center of the room, just asking to be lit. Using a Deku stick, you light the torch with fire from the lamp at the entrance of the cavern. All of a sudden, a wall collapses, and the source of the heat is finally apparent. A large chamber of magma separates you from a gold skulltula that appears to be guarding a large treasure chest. At the front of the magma, a small pillar rest with an engraved message:

" THE INTERVAL OF TIME "

$$T < I < M < E$$

$$(T, M) \cap (-M, E) \cap (I, T) \cap (-E, -I)$$

$$M > -M, I < -I$$

Hovering above the lava are 8 large boulders, each with a character of "TIME" carved into them. You could easily jump from stone to stone to reach the gold skulltula, but you are weary of the fine print:

**"Beware - The Interval of Time has a beginning and an end. Failure to choose the right boundaries results in your end!"**

...You think carefully before jumping onto stones hovering above a pool of lava as your grade in Algebra II...as well as your life, depends once again on math. Hint: ["Click Here"](#)



Interactive,  
clickable buttons.  
The students must  
choose the correct  
two stones to  
pass safely!