RULE BOOK

SURVIVAL OF THE SMARTEST : BIO STYLE

Details of the Game (Players, Time to Play, Ages):

There can be a minimum of two players and a maximum of four players. The time to play this game should be a minimum of an hour. This game is designed for high school students in biology classes. These students can be taking regular, honors, or advanced placement biology.

Explanation of the Game:

To create a board game where high school students have to answer a variety of questions about the different areas of biology. Players will get to use special cards and land on special spots to interact with each other and achieve the goal of winning the game. This game's main intention is helping high school students improve their understanding of biology.

Game Overview:

Players must play in a board game that is set up based on the process of mitosis. All players start with one big cell and must answer a question correctly within the time limit to be able to roll a die to move. All players must pass through a variety of spots on the board game that will have effects, will cause you to draw cards that have effects, or no effects at all. The players must reach the Cell Split spot at which point their big cell splits into two small cells. The players then must advance a few more spots to reach the START spot again at which point the two small cells become two big cells. The players must repeat this process multiple times to achieve the goal of having over seven big cells at which point the player who achieves this feat will be declared the winner.

Setup:

There will be the game board that shows a large oval-like shape with multiple spots the players must pass through to gain big cells. There will also be characters that the players can play as that each have their own artistic design. There will be one die that the player rolls each turn to see how far they get. There will be a deck of cards that contain a variety of questions about biology. There will also be a deck of special cards
that have special abilities for the players to use on their next turns after they land on the Draw a Card spot on their previous turns with the exception of the Immunity card. And there will be a sand hourglass timer that will be used to time the players on their answers. And lastly, each player will have a pile of big chips to represent big cells and a pile of small chips to represent small cells along with a piece of paper and writing utensil for each player to keep track of the progress of all players throughout the game and to write down answers to questions.

**Description of the Game Structure:**

The players will all roll a die first to determine the order that players go in. The structure of the game is set up so that the players represented by the game character pieces will all start at the START spot. The players must first answer the questions given to them within the time limit to see if they can roll the die and move through the game board. If the player gets the question correct within the time limit, the player can roll the die and then advance. If the player gets the question incorrect or does not answer the question within the time limit, the player ends up not rolling the die at all and stays in the same spot until the next turn. Along the way, as players move, there will be special spots that players can land on when they advance their characters after rolling the die. If a player lands on a special spot after rolling the die and moving their character through the game board, the player or players can possibly be affected by the effect of the special spot on their next turns. On their next turns, the player must answer a question correctly within the time limit to be able to use the special effect or else the player must wait until the next turn. In addition, players can land on particular special spots after rolling the die and advancing their characters through the game board where they draw a card from a deck of special cards. The effects of the cards that the player draws from landing on the Draw a Card spot could also be activated on their next turns with the exception of Immunity which they can use at any time. Like the Special Spots, the player must answer a question correctly within a time limit on their next turn to be able to use the Special Card or else they must wait until their next turn. The players must be able to advance through all of these aspects of the game to split their cells and keep making big cells until one player eventually has seven big cells and wins the game.

**What Happens on a Turn:**

For an example explanation of the summary of a round of turns, the characters can be referred to as the players to make the explanation easier:
Say Mitosis Max begins his turn and gets a multiple choice question about the cell membrane. He must answer this question correctly to roll a die and move or else he stays at START. Mitosis Max gets the question right and moves up four spots to the Super Hot spot which could cause his next roll to be doubled if he answers the question correctly within the time limit on his next turn.

Now let’s say Insect-O gets a question where he must fill in the blank for a biology sentence. He guesses the wrong word so he ends up staying at the same place at START.

The character Princess Jean gets a question where she must identify a part of a picture for biology. Princess Jean gets the question correct. She rolls the die and gets the number five, she then moves up five spots. She lands on a Draw a Card spot. She draws a Immunity Card to keep for future usage to negate against a negative effect.

The character Captain Ox gets a multiple choice question. Captain Ox gets the question correct. Captain Ox rolls the die and gets the number three and moves up three spots and gets onto a Battle spot. Captain Ox waits until his next turn to see if he can activate the Special Card. On his next turn, Captain Ox answers a multiple choice question correctly and he thus uses the Battle Special Card. An impartial person or a teacher reads out a question and all four players try to answer the question. Mitosis Max and Insect-O get the question right and roll the die and both get two spots. They both move two spots. Captain Ox and Princess Jean get it wrong and roll the die and both get two. They both move back two spots. This ends his turn.

**Special Cases:**

There are no real special occasions for the game. The one special occasion one must keep in mind of is that while all the draw card spots are activated when a player draws a card from the Draw a Card spot, one exception is that the Immunity card is a special card that a player can hold onto until a negative effect is inflicted on them at which point the card must be put back into the deck and the deck is thoroughly shuffled.

For the Cancer card, the player who draws the card, keeps losing one small cell per turn for each turn he goes above his time limit until the player reaches the Cell Split spot.

For the Virus card, the player who gets affected by the card holds onto the card while passing through the board one more time and when the player reaches the START spot after that second time around the board, the player can put the Virus card back
into the deck which then gets thoroughly shuffled again.

All players will have at least one big cell throughout the entire game. This means that players who have just one big cell cannot be affected by negative effects that cause cells to be taken away by other players.

For the Battle occasion, if all of the players either get the question right or wrong, the players don’t roll the die at all and just stay in the spots they were in before battle.

**End of the Game and Victory Conditions:**

The player must get over seven big cells and this will make the player the winner of the game.

**Appendix of Elements such as Special Spots, Special Cards, etc:**

**SPOTS:**

**Battle Spot:** If a player lands on this spot, all four players must answer a question and write their answer down on a piece of paper. Once the time is up everyone shows their answer. The players who get it right get to roll a die and move forward the amount they got. The players who get it wrong roll a die and move back the amount they got. If all the players in the game get the question right/wrong, then all the players stay in their spots.

**Super Hot:** If a player lands on this spot, their next roll is doubled.

**Freeze:** If a player lands on this spot, they cannot roll next turn even if the player gets the question correct on their next turn.

**Plague:** If a player lands on this spot, all four players lose half their amount of cells (Big cells = 2 cells, small = 1, round down).

**Clash:** If a player lands on this spot, the player can challenge another player on a question. The player who gets it right can either swap with the other player if the other player is ahead or the player who wins can take a small cell from the losing player.

**Steal:** If a player lands on this spot, the player can take one big cell or 2 small cells from another player.

**Cooperation:** If a player lands on this spot, the player must pick another player. The other player rolls a die. The amount that the other player gets, they both move this
amount forward.

**Draw a Card**: The player can draw a card which the player can use on their next turn. Below is a list of cards that players can use with the rules written above applied to all of them:

**Special Cards and Descriptions of What They Do (Explained Above):**

**Spawn**: Player rolls the die and gets half as many large cells as the die roll.

**Immunity**: Player can hold onto this card until a bad effect targets them. Player can use this card to negate the effect. Player must discard the card after one time usage. This is the only Special Card that a player can use at a different time other than automatically on their next turn after landing on the Draw a Card spot on their previous turn.

**Cooperation**: Player picks another player to roll a die. The other player rolls the die and both players move the same amount forward on the game board.

**Grow**: Player can grow a small cell into a big cell. If the player does not have a small cell, player helps another player grow a small cell into a big cell.

**Clash**: Player can choose another player to engage in a one on one face off. The player who answers the question correctly can either switch with the other player if the other player is further ahead on the game board or take a small cell from the other player.

**Battle**: All of the players engage in a battle for one question. The players who get it correct will roll the die and move forward that amount. The players who get it wrong roll a die and move back the amount that they rolled. As mentioned above, if all players get the question wrong or get the question right, nothing happens and all stay where they were before.

**Cancer**: Player rolls a die and must get to Cell Split within the number of the turns that the player rolled from die. Until player makes it to the Cell Split spot, the player keeps losing a small cell on each turn.

**Shrink**: Changes one big cell to a small cell, if no small cells are on the board, no effect.

**Predator**: Roll a die and take half the amount rolled in small cells from another person (big cell = 2 small cells).

**Virus**: Player can use this on another player to prevent the player's small cells from
growing at START and forces the other player to go through the game board one more time in order to grow their small cells into big cells. After this, the card is discarded.
SPAWN

Roll die and get half as many large cells as the die roll.
IMMUNITY

Negates effects of anything that harms you negatively.
*Discard after one use.
COOPERATION

Pick a player and roll the die. Both you and chosen player moves forward the same amount of spaces you rolled.
GROW

Turns one small cell into a big cell. If you don’t have a small cell, you may choose to use the effect on another player.

*Discard after one use.
CLASH

Choose a player to face off with. You and the chosen player will be asked one question. Whoever answers the question correctly first, can either swap places with other player or gain one small cell.
Roll die and take half as many large cells as the die roll.
VIRUS

Player can use this on another player to prevent small cells from growing at start. Player must go another round in order to grow these cells.

*Discard after one use.
Roll a die. You must reach the split spot within the amount you rolled. Otherwise, you continue to lose one small cell each turn. The card loses effect through immunity or when you run out of small cells.
SHRINK

Turns one big cell into a small cell.
Face off between all players. The first player to answer the question correctly, rolls the die and moves ahead that amount. Everyone who answers it wrong rolls the die and moves back that amount.
1) Which component of blood is directly responsible for transporting oxygen to body cells?
A) Plasma  
B) White blood cells  
C) Red blood cells

2) What is responsible for the red blood cells ability to carry oxygen?
A) Hemoglobin  
B) Mitochondria  
C) DNA

3) What is the basic function of the cell membrane?
A) To protect the cell from its surroundings  
B) To destroy other cells  
C) To store Genetic information

4) What is the general shape of a strand of DNA?
A) Sphere  
B) Helix  
C) Double Helix

5) Which of the following organisms has the simplest cellular structure?
A) Bacterium  
B) Earthworm  
C) Mushroom

6) What organelle is dubbed the “power house” of the cell?
A) Nucleus  
B) Nucleolus  
C) Mitochondria

7) Cytokinesis accompanies which stage of mitosis?
A) Metaphase  
B) Telophase  
C) Prophase

8) Which of the following is an example of a mutation?
A) A nucleotide is missing in a replicated DNA strand.  
B) A zygote receives two X chromosomes.  
C) A strand of mRNA is produced from DNA.

9) Yellow fever, encephalitis, and measles are diseases in humans. The disease-causing agents take over the machinery of the cells and use it to reproduce. Based on this information, the agents that cause these diseases are which of the following?
A) Fungi  
B) Ticks  
C) Viruses

10) The body structure of a reef-building coral consists of a hard skeleton covering soft tissue. Which of the following elements is most common in the coral’s soft tissue?
A) Carbon  
B) Chlorine  
C) Sodium

11) During the processes of respiration and photosynthesis in plant cells, what are the three primary elements that cycle between the mitochondria and chloroplasts?
A) More carbon dioxide is taken up by plants  
B) Carbon dioxide is trapped in the soil around plants  
C) Less carbon dioxide is removed from the atmosphere

12) Hot, humid weather and no seasonal changes are characteristic of which biome?
A) Tundra  
B) Tropical rainforest  
C) Desert

13) Tapeworms are sometimes found in the small intestines of sheep. A tapeworm attaches to the intestinal wall using suckers and then absorbs nutrients from the sheep’s intestine. Which of the following terms describes the relationship between the tapeworm and the sheep?
A) Competition  
B) Herbivory  
C) Parasitism

14) Short hairlike structures that protrude from the surface of a cell and are packed in tight rows are called?
A) Cilia  
B) Microtubules  
C) Microfilaments

15) Which of the following processes relies directly on the complementary base pairing of nucleotides?
A) Synthesis of ATP  
B) Replication of DNA  
C) Formation of peptide bonds

16) Which of the following carries nerve impulses from pressure receptors in the skin to the central nervous system?
A) Capillary  
B) Marrow  
C) Sensory neuron
17) A single nucleotide of DNA is composed of which of the following substances?
   A) Adenine, guanine, & cytosine
   B) Deoxyribose sugar, a phosphate group, & a nitrogenous base
   C) Ribose sugar, deoxyribose sugar, & thymine

18) Which of the following statements about a compound is true?
   A) The physical and chemical properties of a compound are usually very different from those of the elements from which it is formed
   B) Only the physical properties of a compound are usually the same as those of the elements from which it is formed
   C) Only the chemical properties of a compound are usually the same as those of the elements from which it is formed

21) What are the products of the light-dependent reactions?
   A) Oxygen gas and glucose
   B) ATP, NADPH, and oxygen gas
   C) ATP, carbon dioxide gas, and NADPH

29) Lactose is a
   A) Monosaccharide
   B) Disaccharide
   C) Oligosaccharide

25) PKU (phenylketonuria) is an example of an inborn error of metabolism. These "errors" refer to
   A) Congenital birth defects
   B) Hormonal overproduction
   C) Inherited lack of an enzyme

26) Hemophilia is a disease caused by a sex-linked recessive gene on the X-chromosome; therefore,
   A) Hemophilia is a disease caused by a sex-linked recessive gene on the X-chromosome; therefore,
   B) Mothers can pass the gene with equal probability to either a son or daughter
   C) Females can never have the disease, they can only be carriers

19) Which of the following is NOT a true statement about ATP?
   A) ATP consists of ribose, adenine, and three phosphate groups
   B) ADP is produced when ATP releases energy
   C) Used ATP is discarded by the cell as waste

23) As a result of diffusion, the concentration of many types of substances
   A) Always remains greater inside a membrane
   B) Eventually becomes balanced on both sides of a membrane
   C) Always remains greater outside of a membrane

32) The period of human gestation is divided into three trimesters. The event that is correctly matched to its trimester of occurrence is which of the following?
   A) The third trimester is characterized by development and differentiation
   B) The greatest growth in size occurs in the first trimester
   C) The limb buds develop in the first trimester

33) Which pathway represents the flow of electrons during photosynthesis?
   A) H2O  Photosystem I  Photosystem II
   B) H2O  NADP+  Calvin cycle
   C) Photosystem I  Calvin cycle  NADP+

37) What phase of mitosis is this?
   A) Anaphase
   B) Telophase
   C) Metaphase

41) What phase of mitosis is this?
   A) Metaphase
   B) Telophase
   C) Anaphase
49) Which number is the stippling?
50) Which number is the food vacuole?
51) Which number is the Chloroplast?
52) Which number is the septum?
53) Guess the cellular process
   A) C _ o s _ _ _  _ - _ v _ r
54) Guess the cellular process
   A) D _ _ _ s _ _ n
55) Guess the artifact
   A) F _ _ s _ l
56) Guess the classification process
   A) G _ _ u _
57) Guess the cell in which a virus would reproduce
   A) H _ _ t
58) Guess the distinct bacteria shape
   A) C _ _ c _ _
59) Guess the biological unit
   A) _ e l _
60) Guess the biological process
   A) E _ _ l _ _ i _ _
61) Guess the element
   A) _ _ d _ _ g _ n
62) Guess the energy making process
   A) P _ o _ _ s _ _ _ _ _ _
63) Guess the word:
   A) Imrshzoe
64) Guess the word:
   A) Yoeagthspetm
65) Guess the word:
   A) Uogclse
66) Guess the word:
   A) Enorgnti
67) Guess the word:
   A) Tmuntaio
68) Guess the word:
   A) Eoilicnrapt
69) Guess the word:
   A) Tyeroanmlipizo
70) Guess the word:
   A) Seidnlrt
71) Guess the word:
   A) Apvantert
72) Viruses can vary in size and in the spaces called the ____________________ and ______________ environment
73) Viruses can vary in size and in the spaces called the ____________________ and ______________ environment
74) Zebras, gazelles, and lions usually live in the biome called the ____________________ and ______________ environment
75) The struggle among organisms for the same limited natural resources is called ____________________
76) An ecosystem consists of the living and ____________________ environment
77) Organisms that do not regulate their internal conditions are called ____________________, while those that do are called ____________________
78) By studying a(n) ____________________, genetic counselors can study how a trait was inherited over several generations
79) A table used to determine and diagram the results of a genetic cross is called a ____________________
80) ____________________ is a biochemical pathway of cellular respiration that is anaerobic
81) Eukaryotic cells are much larger and have more specialized functions than prokaryotic cells because they contain __________________, which carry out specialized activities.

82) The loss of electrons from a molecule is called __________________, while the gain of electrons by a molecule is called __________________.
1. C. Red blood cells
2. A. Hemoglobin
3. A. To protect the cell from its surroundings
4. C. Double Helix
5. A. Bacterium
6. C. Mitochondria
7. B. Telophase
8. A. A nucleotide is missing in a replicated DNA strand
9. C. Viruses
10. A. Carbon
11. B. Carbon dioxide is trapped in the soil around plants
12. B. Tropical rainforest
13. C. Parasitism
14. A. Cilia
15. B. Replication of DNA
16. C. Sensory neuron
17. B. Deoxyribose sugar, a phosphate group, & a nitrogenous base
18. A. The physical and chemical properties of a compound are usually very different from those of the elements from which it is formed
19. C. Used ATP is discarded by the cell as waste
20. A. Autotrophs
21. B. ATP, NADPH, and oxygen gas
22. A. Channel proteins
23. B. Eventually becomes balanced on both sides of a membrane
24. C. Must consume other organisms to get energy
25. C. Inherited lack of an enzyme
26. B. Mothers can pass the gene with equal probability to either a son or daughter
27. C. Echinodermata
28. C. Emulsify the fat into smaller globules
29. B. Disaccharide
30. A. Porifera
31. A. Synapsis
32. C. The limb buds develop in the first trimester
33. D. H2O NADP+ Calvin cycle
34. 12
35. 5
36. 6
37. Prophase
38. Prometaphase
39. Metaphase
40. Anaphase
41. Telophase & CytoKinesis
42. 3
43. 2
44. 10
45. 5
46. 9
47. 5
48. 5
49. 1
50. 3
51. 10
52. 4
53. Crossing-over
54. Division
55. Fossil
56. Genus
57. Host
58. Coccus
59. Cell
60. Evolution
61. Hydrogen
62. Photosynthesis
63. Rhizomes
64. Gametophytes
65. Glucose
66. Homo sapiens
67. Nitrogen
68. Replication
69. Polymerization
70. Tendrils
71. Mutation
72. Anaphase
73. Shape
74. Shape
75. Competition
76. Nonliving
77. Conformers, regulators
78. Pedigree
79. Punnett square
80. Glycolysis
81. Organelles
82. Oxidation, reduction