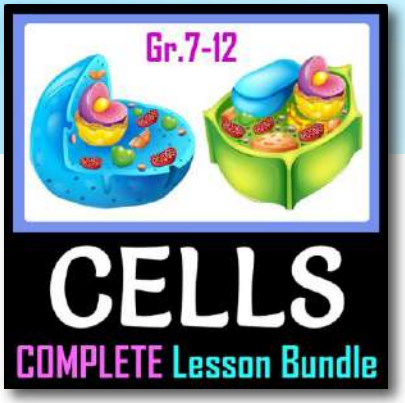
OTHER CELL RESOURCES by Tangstar Science



These **24 RESOURCES** are sold individually or found in the **CELLS BUNDLE** for over **40% OFF**.

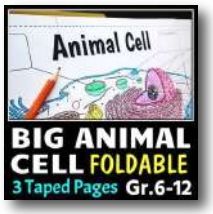
20 OF THESE RESOURCES HAVE OPTIONS FOR GOOGLE DRIVE / CLASSROOM.

Science Article

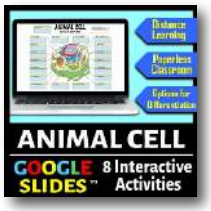
Science Article

Science Article

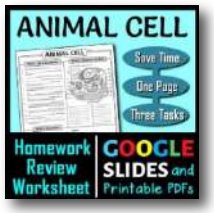
Teaching the Topic



Interactive Learning/Review

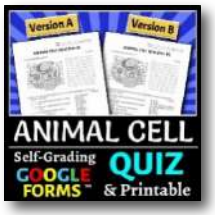


Homework, Review, Test Prep



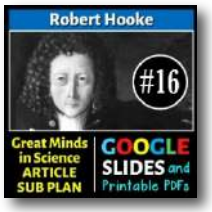
Early Finishers, Bonus Work

Assessment

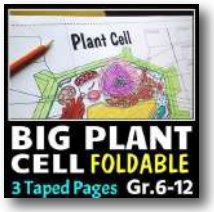


Group Review Game

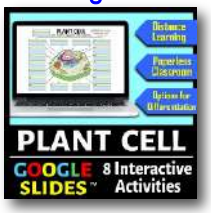
Science Article



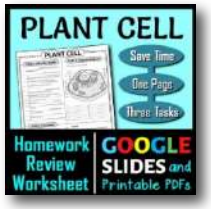
Teaching the Topic



Interactive Learning/Review

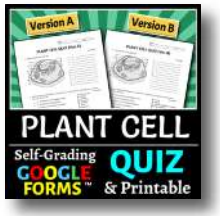


Homework, Review, Test Prep



Early Finishers, Bonus Work

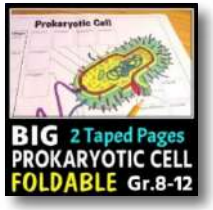
Assessment



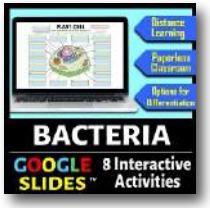
Pair/Group Review Game

Science Article

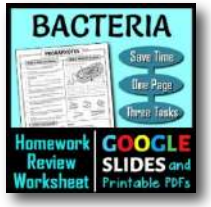
Teaching the Topic



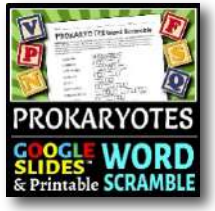
Interactive Learning/Review



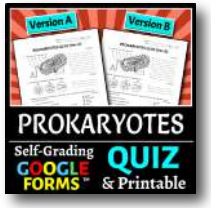
Homework, Review, Test Prep



Early Finishers, Bonus Work

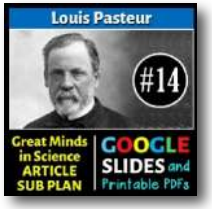


Assessment



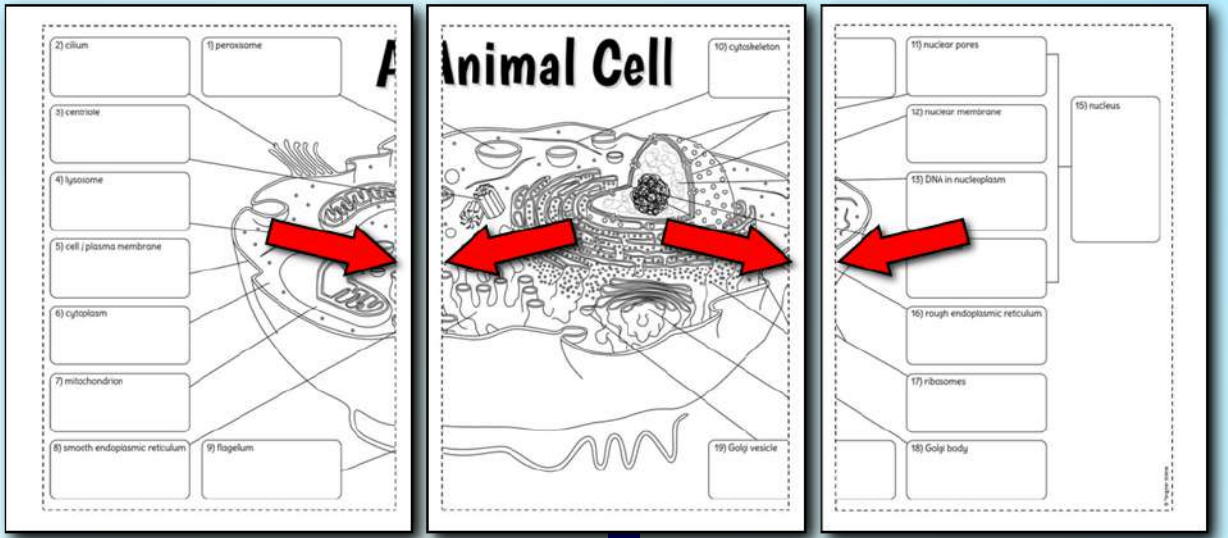
Solo/Pair Review Game

Science Article



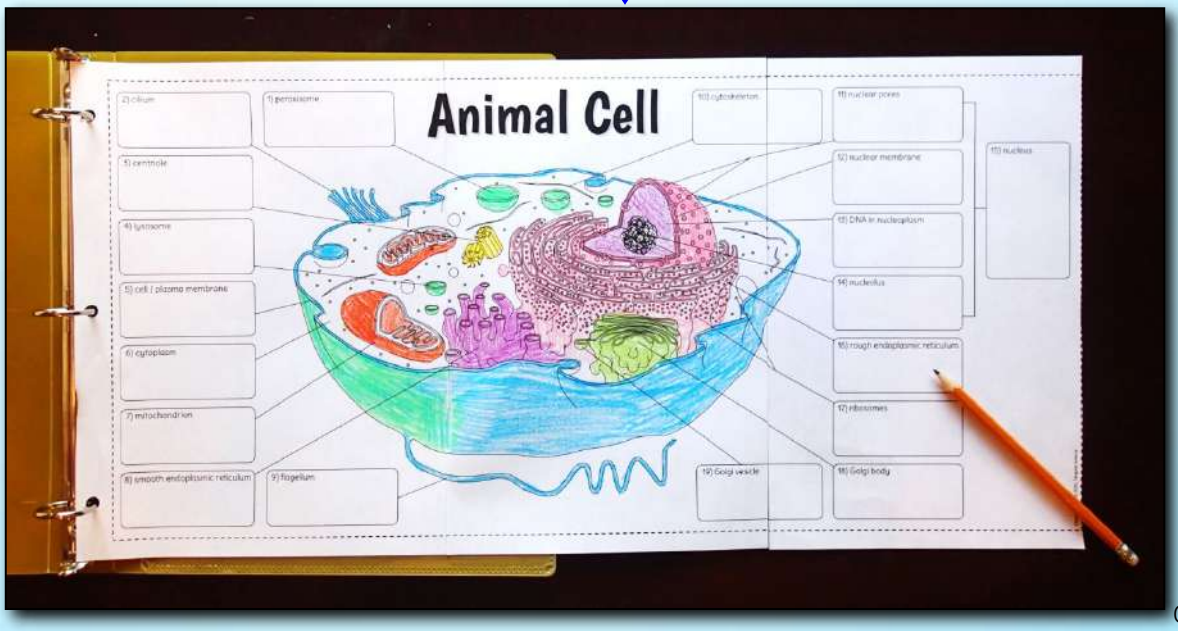
RESOURCE 1: TEACHING THE TOPIC - Big Animal Cell Foldable

3 pages **cut out** and **taped** together.



then...

Put in a **Binder**.
OR
Put in an **INB**.

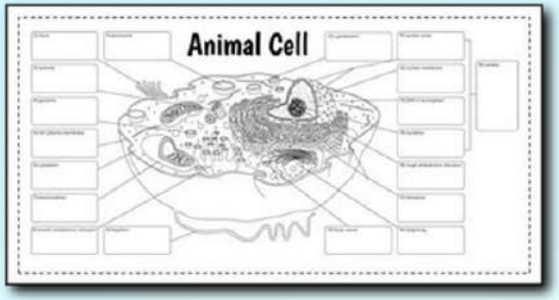


Printable PDFs

RESOURCE 1: TEACHING THE TOPIC - Big Animal Cell Foldable

There are many **foldable options** for differentiation and **full answer keys** are provided for all options.

Image, Boxes and Labels



Image, Boxes and Underlines

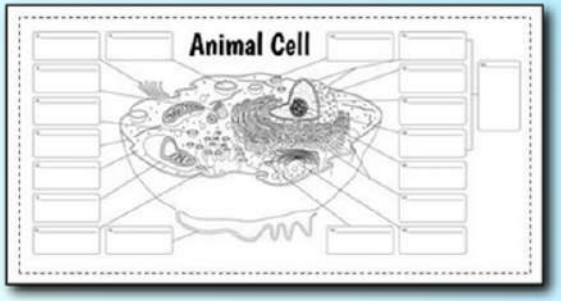


Image and Boxes

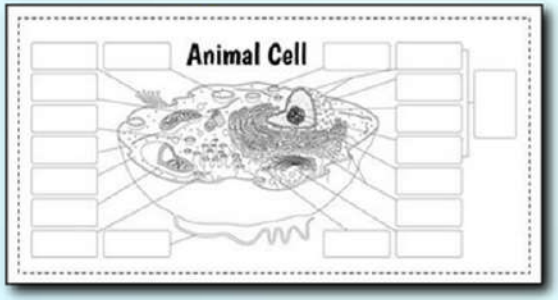


Image Only

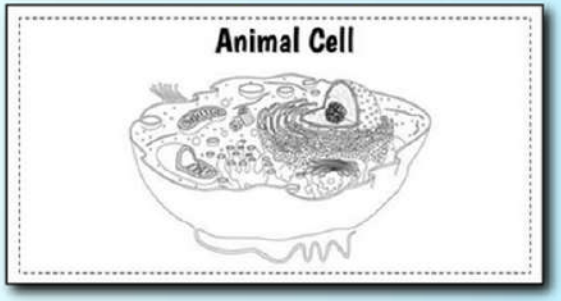
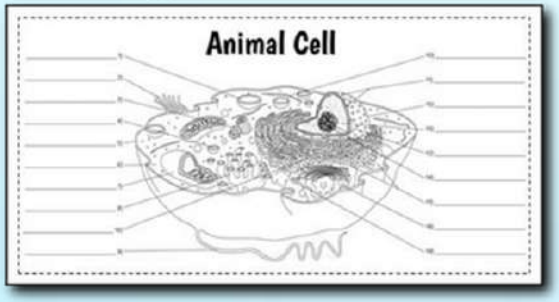


Image and Underlines



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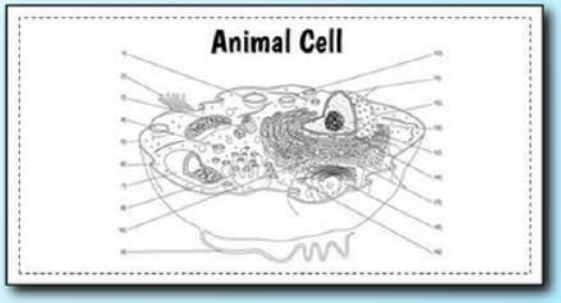
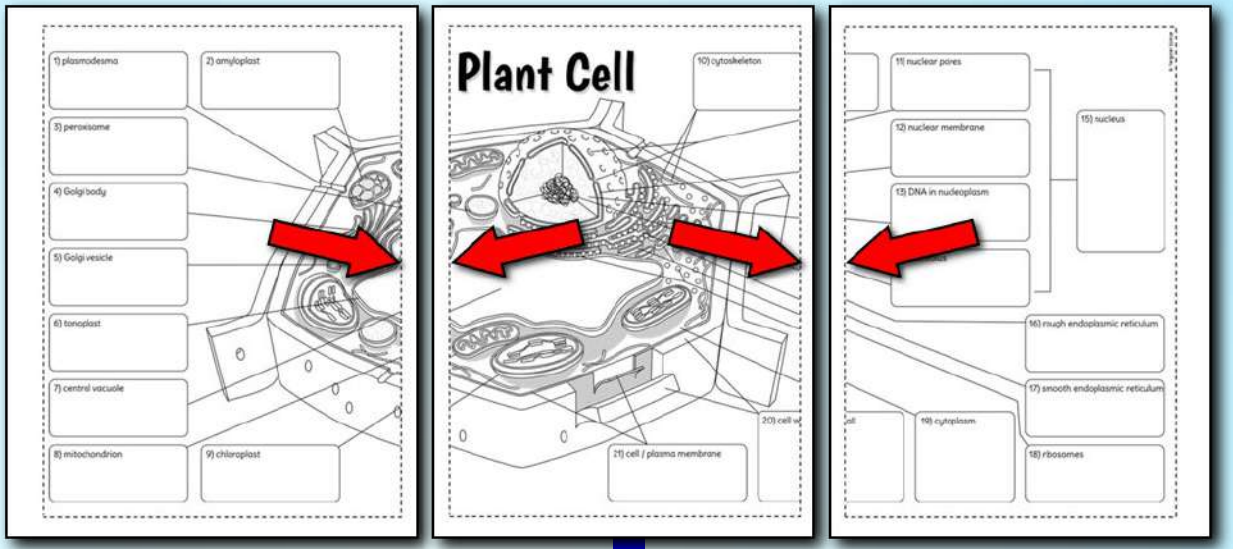


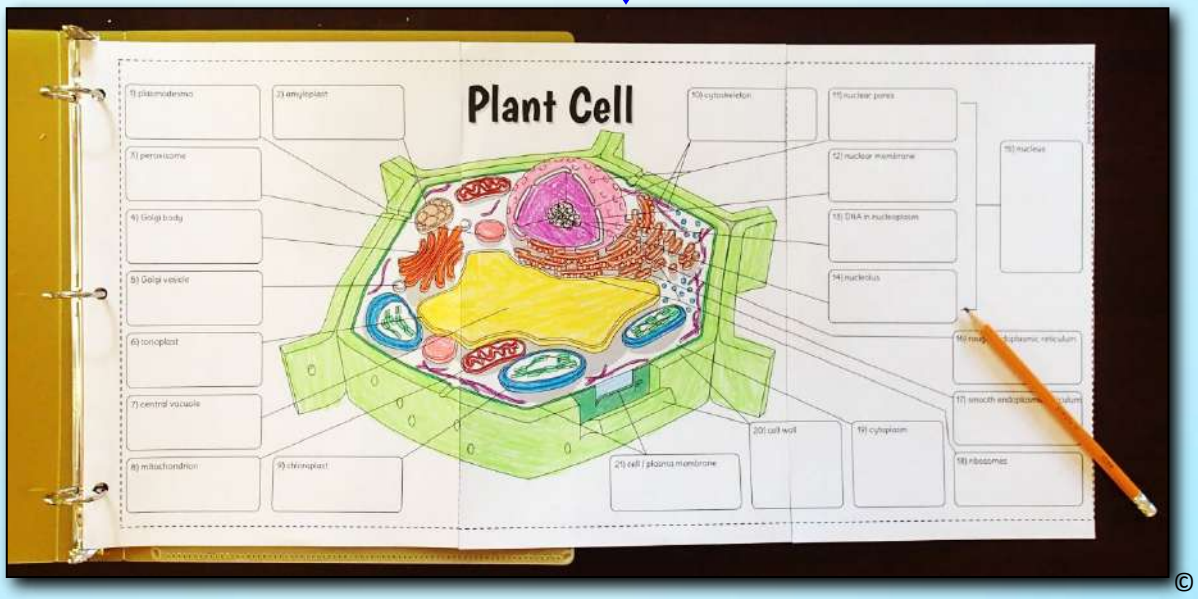
RESOURCE 2: TEACHING THE TOPIC - Big Plant Cell Foldable

3 pages **cut out** and **taped** together.



then . . .

Put in a **Binder**.
OR
Put in an **INB**.

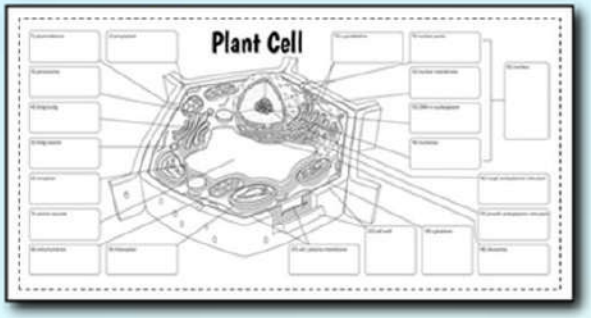


Printable PDFs

RESOURCE 2: TEACHING THE TOPIC - Big Plant Cell Foldable

There are many **foldable options** for differentiation and **full answer keys** are provided for all options.

Image, Boxes and Labels



Image, Boxes and Underlines

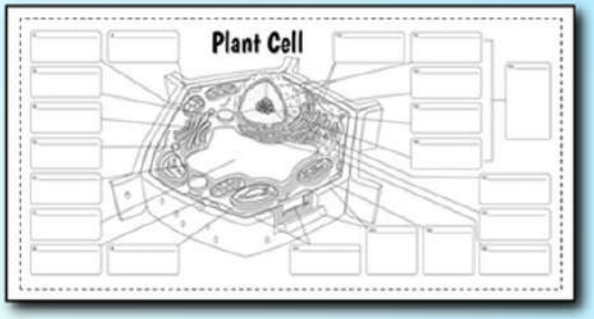
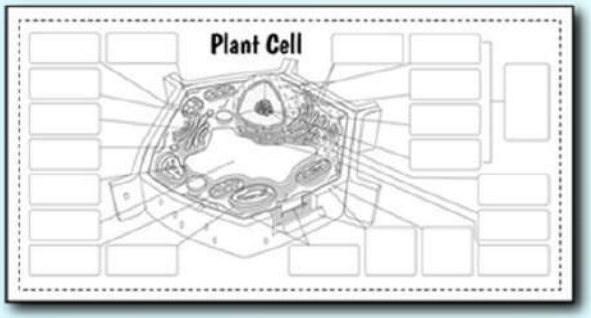


Image and Boxes



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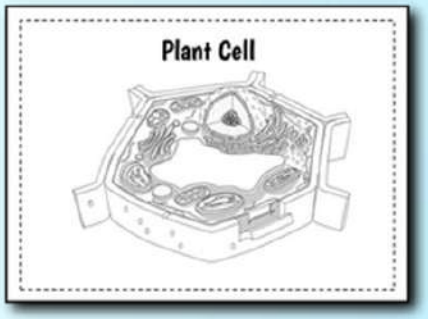
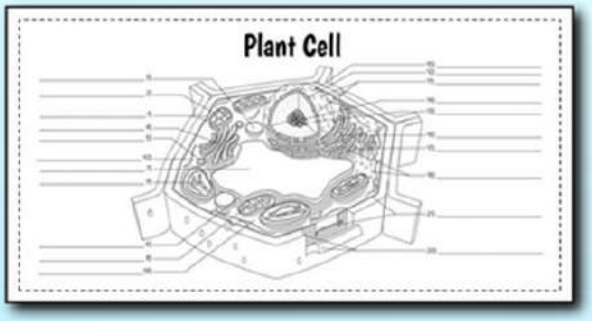


Image and Underlines



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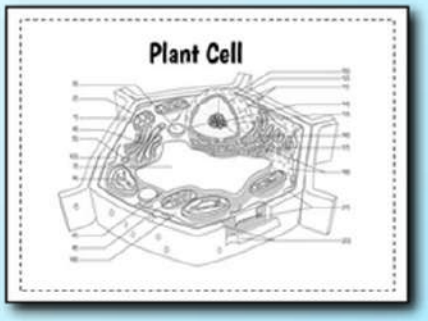
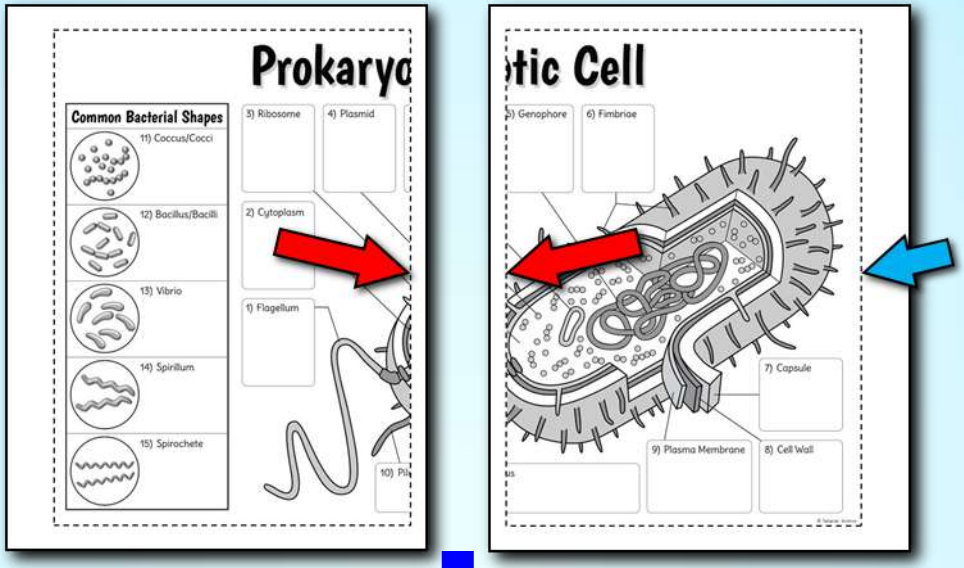


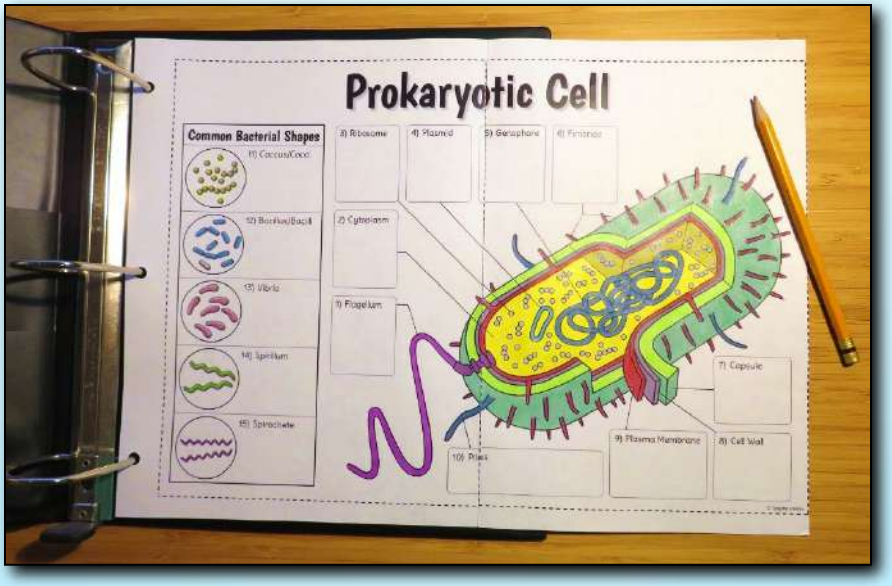
RESOURCE 3: TEACHING THE TOPIC - Big Prokaryotic Cells Foldable

2 pages **cut out** and **taped** together.



then . . .

Put in a **Binder**.
OR
Put in an **INB**.

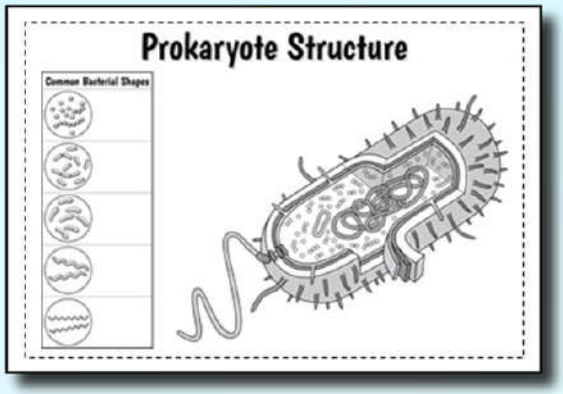


Printable PDFs

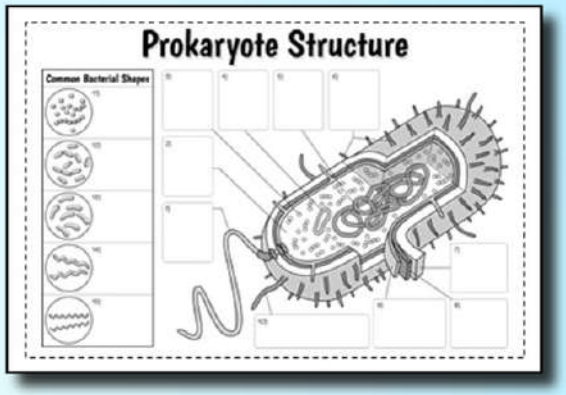
RESOURCE 3: TEACHING THE TOPIC - Big Prokaryotic Cells Foldable

There are many **foldable options** for differentiation and **full answer keys** are provided for all options.

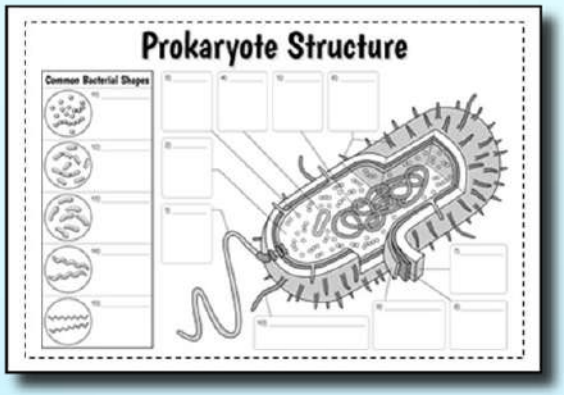
Image Only



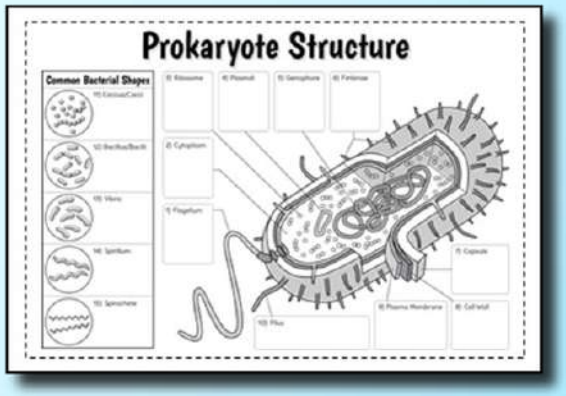
Image, Boxes & Numbers



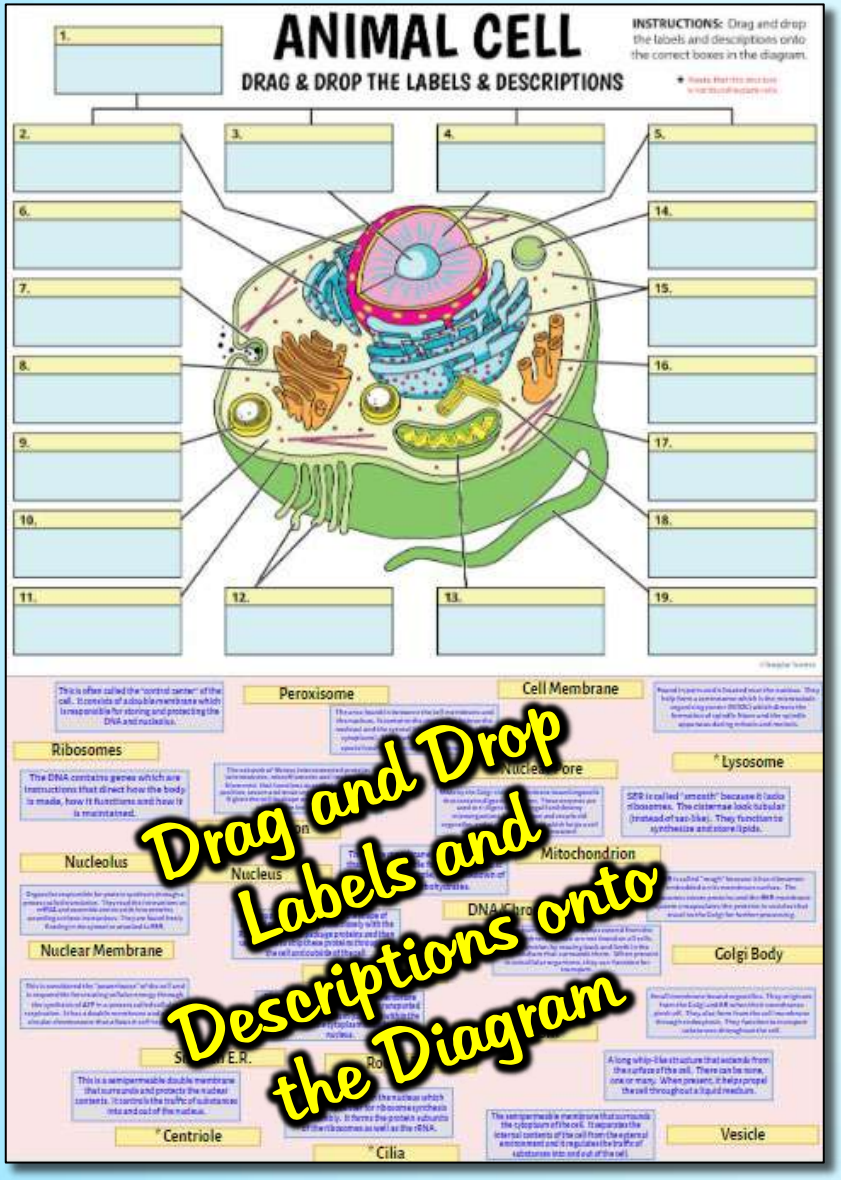
Image, Boxes, Numbers & Underlines



Image, Boxes, Numbers & Labels



RESOURCE 4: INTERACTIVE GOOGLE SLIDE - Animal Cell



CONCEPTS

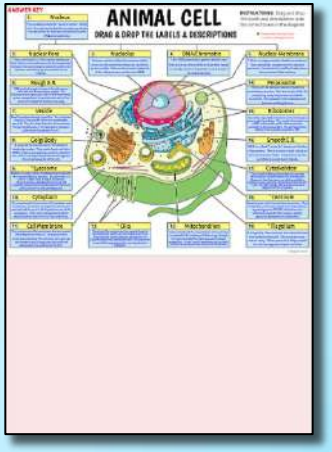
- Nucleus
- Nuclear membrane
- Nuclear pore
- Nucleolus
- Chromatin/DNA
- Cell Membrane
- Cilia
- Flagellum
- Cytoplasm
- Cytoskeleton
- Mitochondria
- Ribosomes
- Rough Endoplasmic Reticulum
- Smooth Endoplasmic Reticulum
- Golgi Body/Apparatus
- Lysosome
- Vesicle
- Centrioles

GOOGLE SLIDES™

OPTIONS FOR DIFFERENTIATION

- There **EIGHT** options for differentiation that are a mix of drag and drop and fill in the text boxes for both the **LABELS** and the **DESCRIPTIONS** of the structures.

ANSWER KEY



RESOURCE 5: INTERACTIVE GOOGLE SLIDE - Plant Cell

CONCEPTS

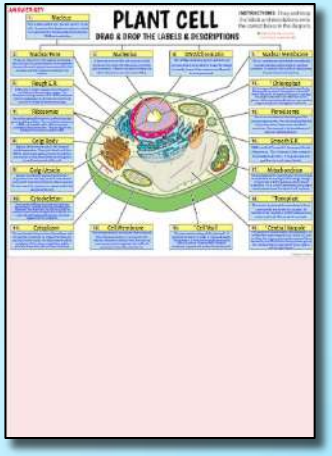
- Nucleus
- Nuclear Membrane
- Nuclear Pore
- Nucleolus
- Chromatin/DNA
- Cell/Plasma Membrane
- Cytoplasm
- Cytoskeleton
- Mitochondrion
- Chloroplast
- Ribosomes
- Rough Endoplasmic Reticulum
- Smooth Endoplasmic Reticulum
- Golgi Body/Apparatus
- Central Vacuole
- Tonoplast
- Cell Wall

OPTIONS FOR DIFFERENTIATION

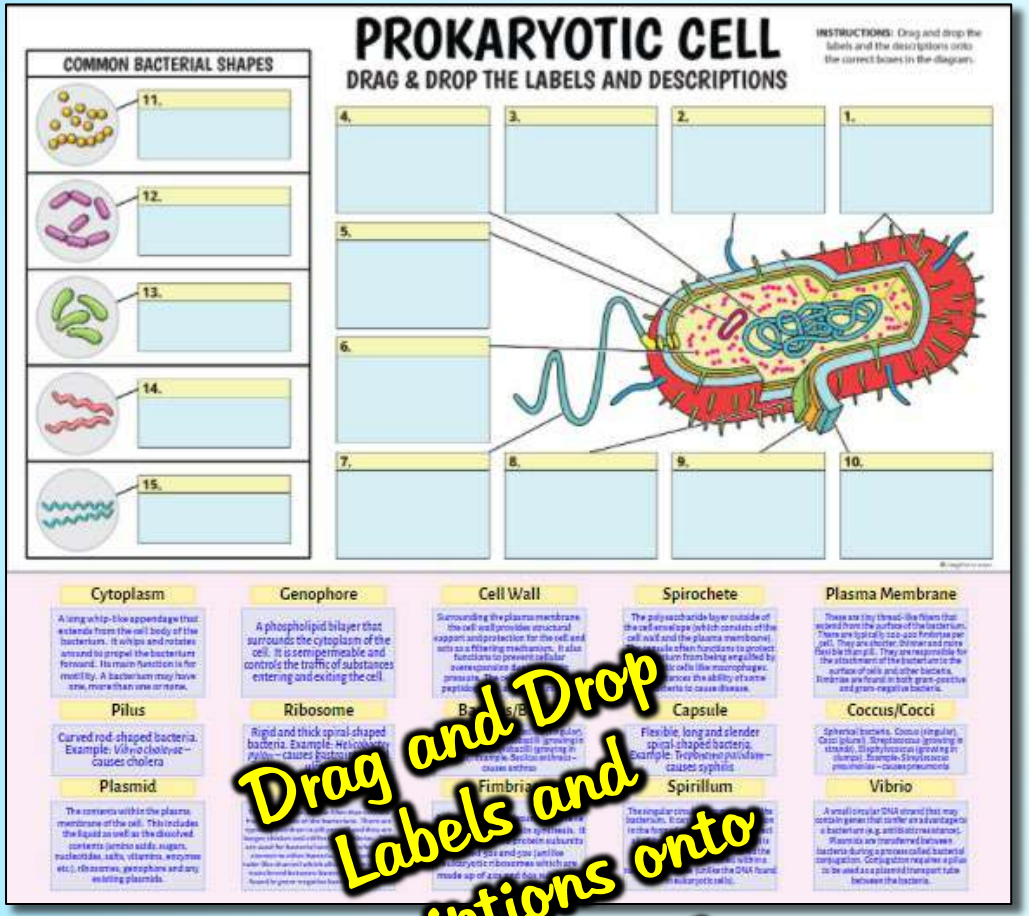
- There **EIGHT** options for differentiation that are a mix of drag and drop and fill in the text boxes for both the **LABELS** and the **DESCRIPTIONS** of the structures.

GOOGLE SLIDES™

ANSWER KEY



RESOURCE 6: INTERACTIVE GOOGLE SLIDE - Prokaryotic Cell



Drag and Drop Labels and Descriptions onto the Diagram

GOOGLE SLIDES™

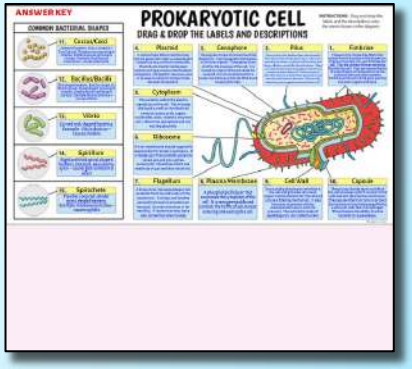
CONCEPTS

- Pilus
- Fimbriae
- Flagellum
- Capsule
- Cell wall
- Cell Membrane
- Cytoplasm
- Ribosomes
- Plasmids
- Genophore
- Coccus
- Bacillus
- Vibrio
- Spirillum
- Spirochete

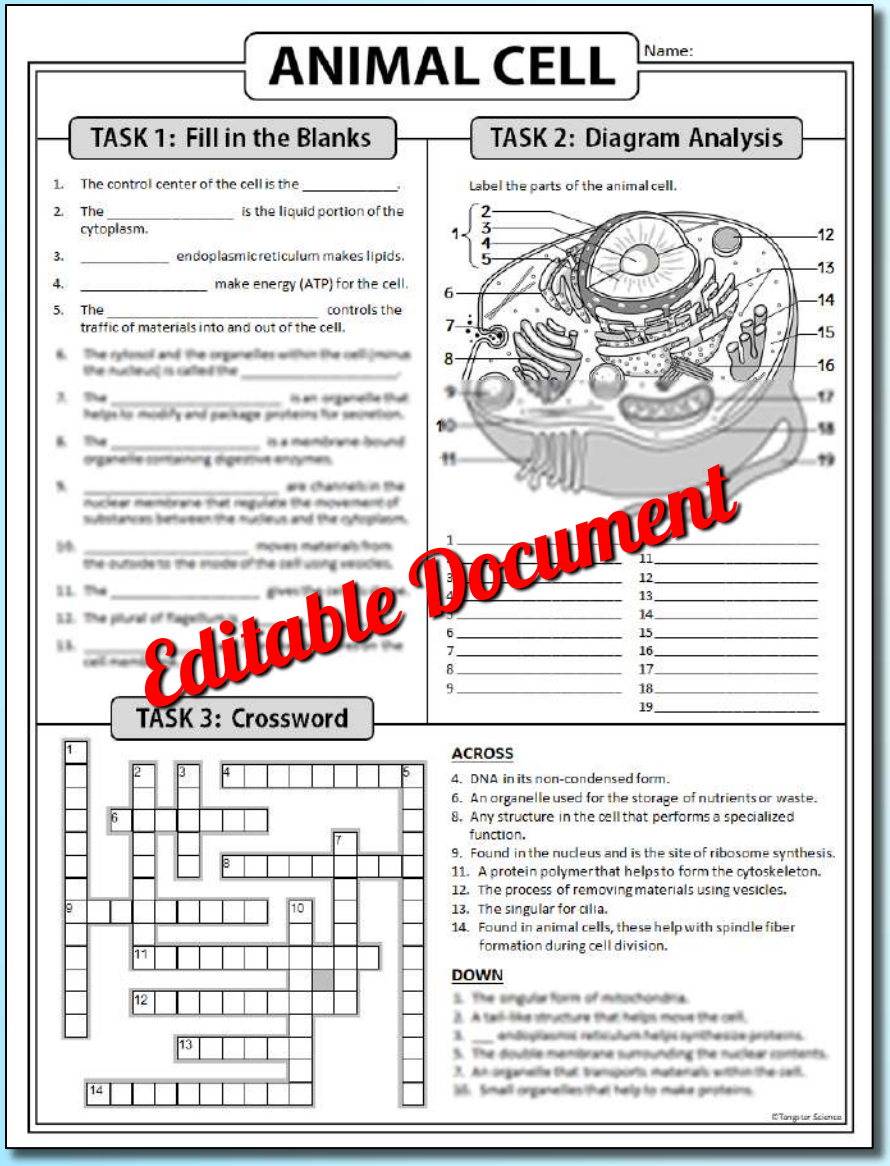
OPTIONS FOR DIFFERENTIATION

- There **EIGHT** options for differentiation that are a mix of drag and drop and fill in the text boxes for both the **LABELS** and the **DESCRIPTIONS** of the structures.

ANSWER KEY



RESOURCE 7: INDIVIDUAL REVIEW - Animal Cell Homework Review Worksheet

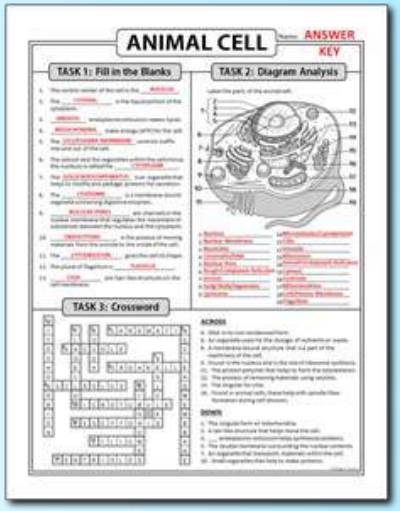


CONCEPTS

- Nucleus
- Nuclear membrane
- Nuclear pore
- Nucleolus
- Chromatin
- Cell/Plasma Membrane
- Cilia, Cilium
- Flagella, Flagellum
- Cytoplasm
- Cytosol
- Organelles
- Cytoskeleton
- Microtubules
- Mitochondrion, Mitochondria
- Ribosomes
- Rough Endoplasmic Reticulum
- Smooth Endoplasmic Reticulum
- Golgi Body/Apparatus
- Lysosome
- Vesicle
- Vacuole
- Centrioles
- Endocytosis
- Exocytosis

Comes with Editable PPT, Printable PDFs & GOOGLE SLIDES™ Options

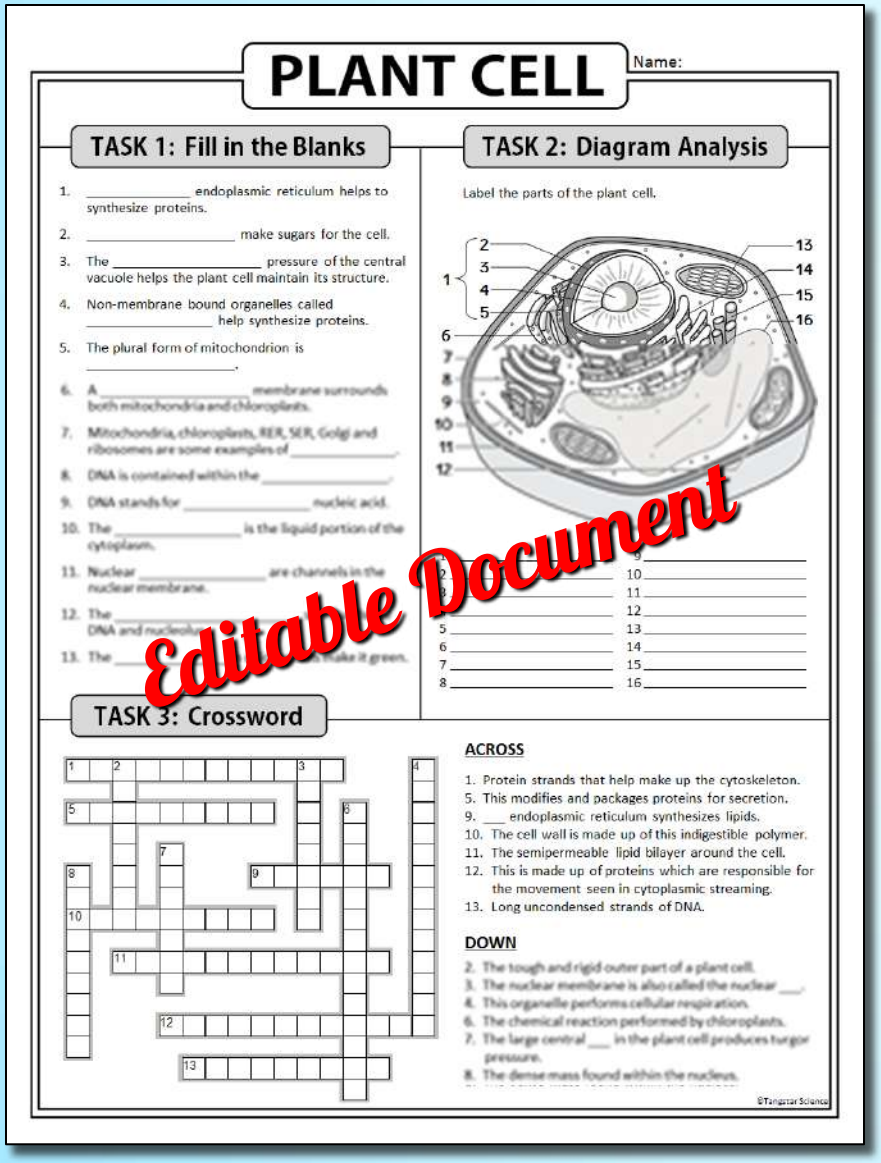
ANSWER KEY



3 TASKS

- Assign the whole page, or break it up into in class tasks, exit tickets and homework tasks.
- The variety of different tasks helps students review in different ways and holds their interest.

RESOURCE 8: INDIVIDUAL REVIEW - Plant Cell Review Worksheet

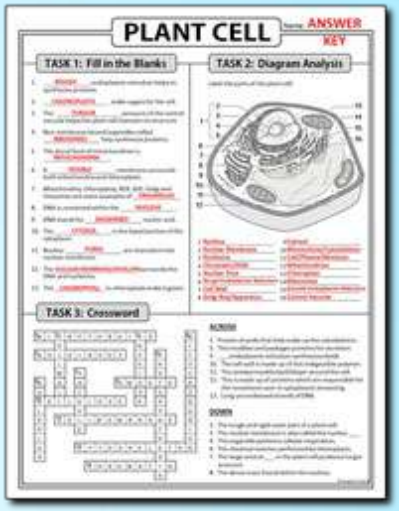


CONCEPTS

- Nucleus
- Nuclear Membrane
- Nuclear Pore
- Nucleolus
- Chromatin
- Cell/Plasma Membrane
- Cytoplasm
- Cytosol
- Organelles
- Cytoskeleton
- Microtubules
- Mitochondrion, Mitochondria
- Cellular Respiration
- Chloroplast
- Chlorophyll
- Photosynthesis
- Ribosomes
- Rough Endoplasmic Reticulum
- Smooth Endoplasmic Reticulum
- Golgi Body/Apparatus
- Vacuole
- Turgor Pressure
- Cell Wall
- Cellulose

Comes with Editable PPT, Printable PDFs & GOOGLE SLIDES™ Options

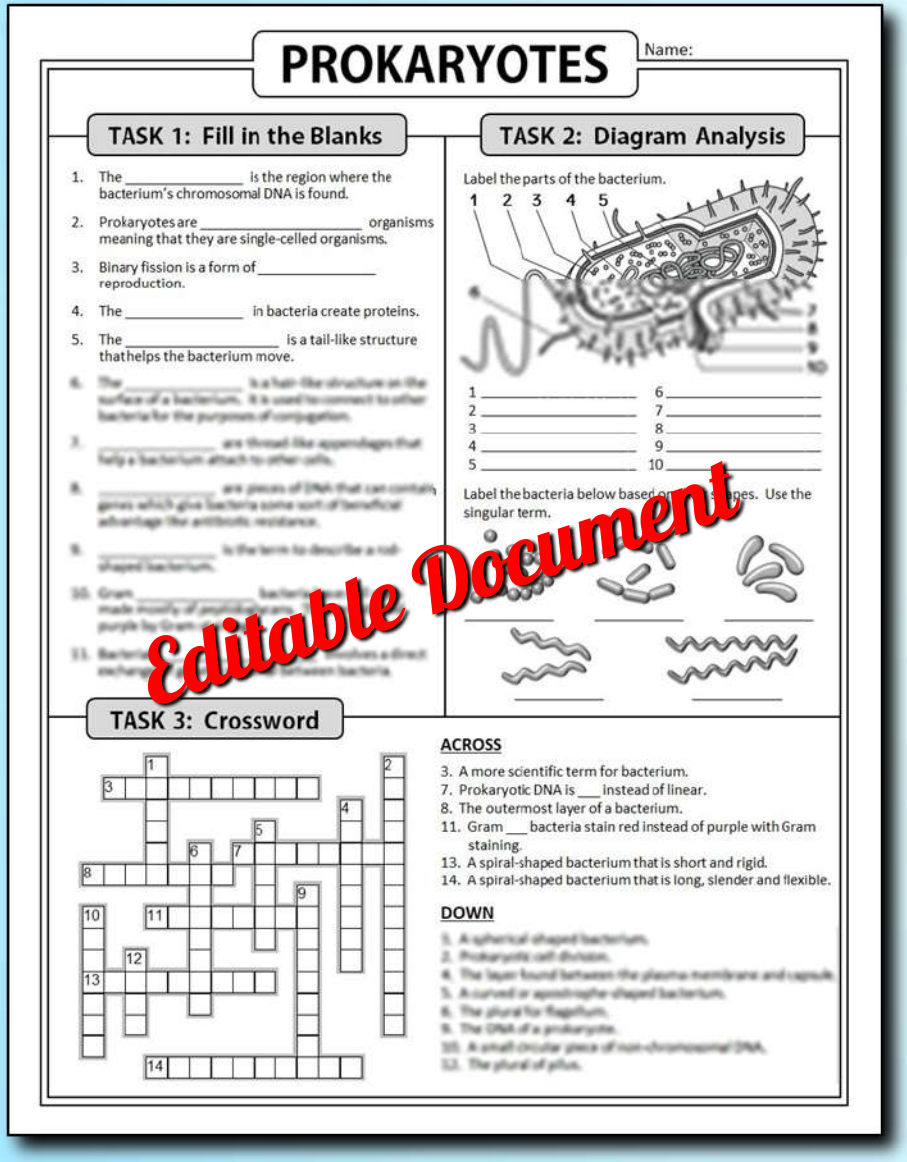
ANSWER KEY



3 TASKS

- Assign the whole page, or break it up into in class tasks, exit tickets and homework tasks.
- The variety of different tasks helps students review in different ways and holds their interest.

RESOURCE 9: INDIVIDUAL REVIEW - Prokaryotes Review Worksheet



CONCEPTS

- Prokaryote
- Pilus
- Pili
- Fimbriae
- Flagellum
- Flagella
- Capsule
- Cell wall
- Ribosomes
- Plasmids
- Nucleoid
- Genophore
- Unicellular
- Circular DNA
- Coccus
- Bacillus
- Vibrio
- Spirillum
- Spirochete
- Conjugation
- Binary fission
- Asexual reproduction
- Gram positive bacteria
- Gram negative bacteria

Comes with Editable PPT, Printable PDFs & GOOGLE SLIDES™ Options

ANSWER KEY

3 TASKS

- Assign the whole page, or break it up into in class tasks, exit tickets and homework tasks.
- The variety of different tasks helps students review in different ways and holds their interest.

RESOURCE 10: EXTRA PRACTICE/EARLY FINISHERS - Animal Cell Diagram Crossword

FULLY EDITABLE WORD DOC INCLUDED

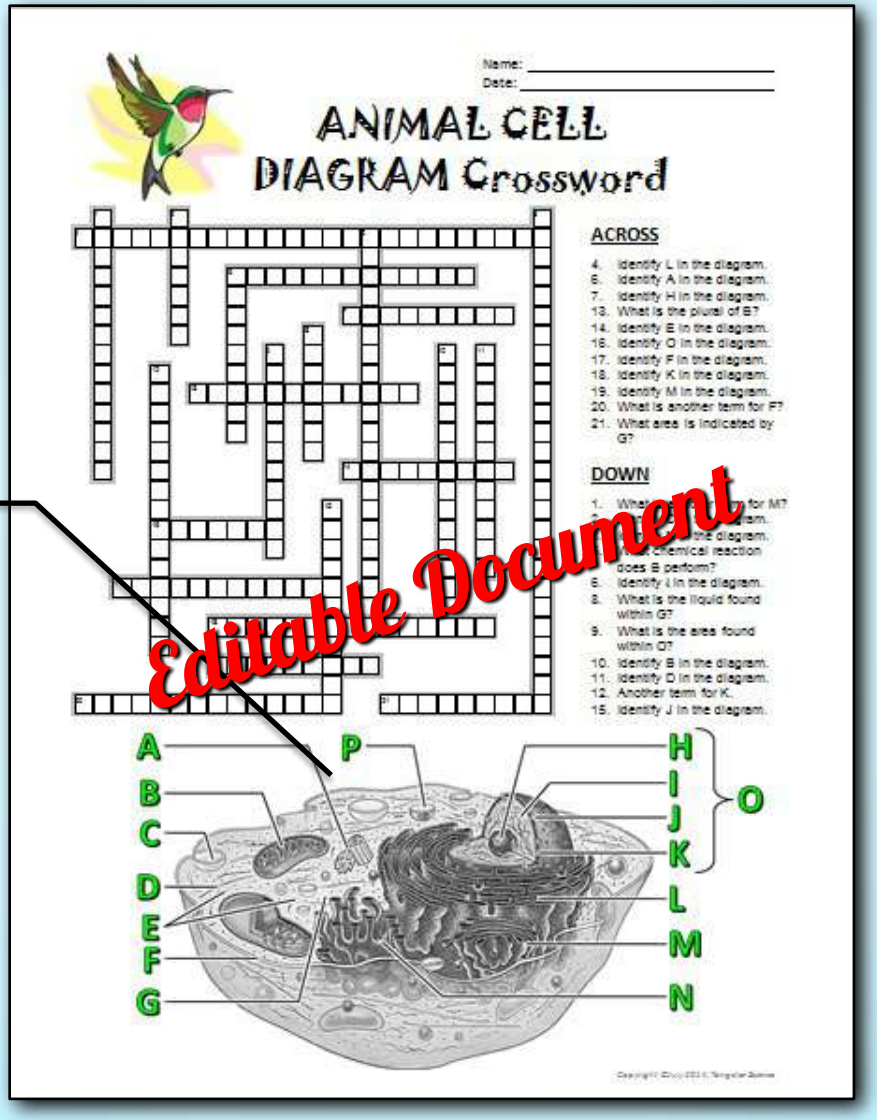
- Reword questions according to your classroom needs.

ONE PAGE

- For easy and economical printing.

CLEAR DIAGRAMS

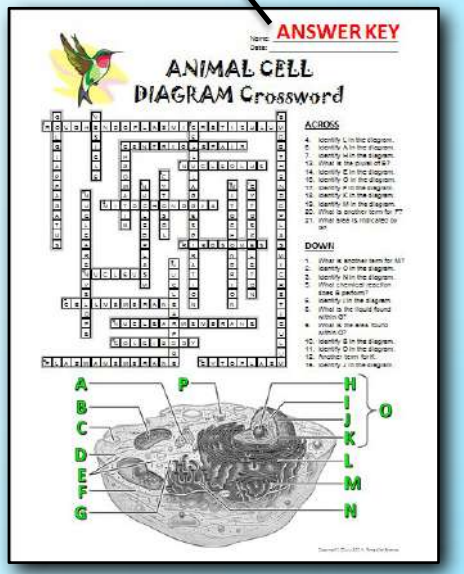
- Helps students practice labeling biological diagrams. Diagram crosswords are a fun twist on the usual labeling worksheet.
- **BONUS ACTIVITY:** After completing the crossword, have students cut out the diagram, paste it in their notes and then label the structures for extra reinforcement.



Comes with Editable Word Doc, Printable PDFs & GOOGLE SLIDES™ Options

FULL ANSWER KEY

- Easy for you or your students to take up the answers.



RESOURCE 11: EXTRA PRACTICE/EARLY FINISHERS - Plant Cell Diagram Crossword

FULLY EDITABLE WORD DOC INCLUDED

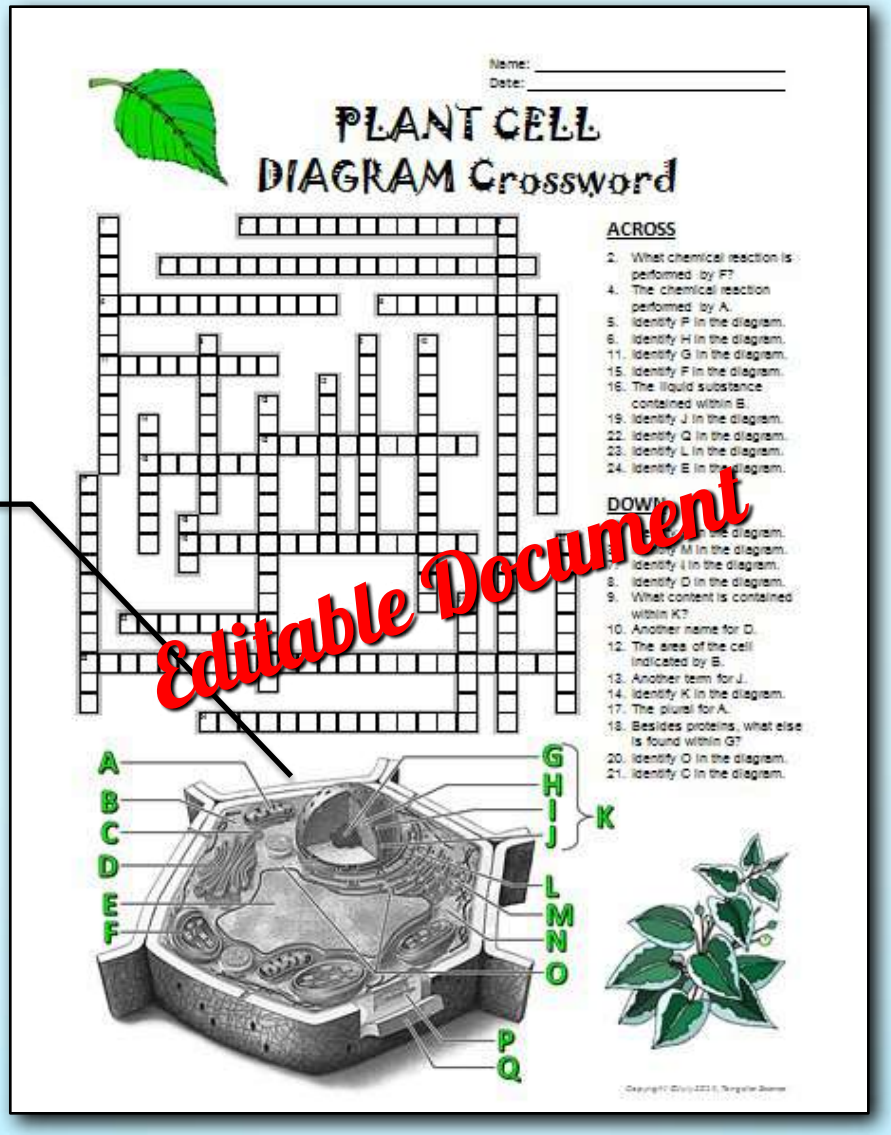
- Reword questions according to your classroom needs.

ONE PAGE

- For easy and economical printing.

CLEAR DIAGRAMS

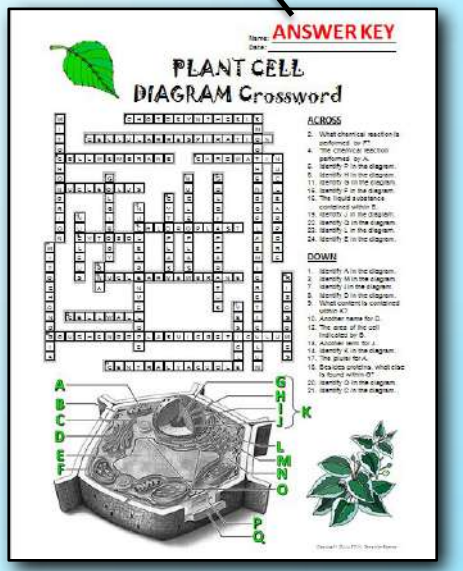
- Helps students practice labeling biological diagrams. Diagram crosswords are a fun twist on the usual labeling worksheet.
- **BONUS ACTIVITY:** After completing the crossword, have students cut out the diagram, paste it in their notes and then label the structures for extra reinforcement.



Comes with Editable Word Doc, Printable PDFs & GOOGLE SLIDES™ Options

FULL ANSWER KEY

- Easy for you or your students to take up the answers.



RESOURCE 12: EXTRA PRACTICE/EARLY FINISHERS - Prokaryotes Word Scramble

Fun Group (or Solo) Activity

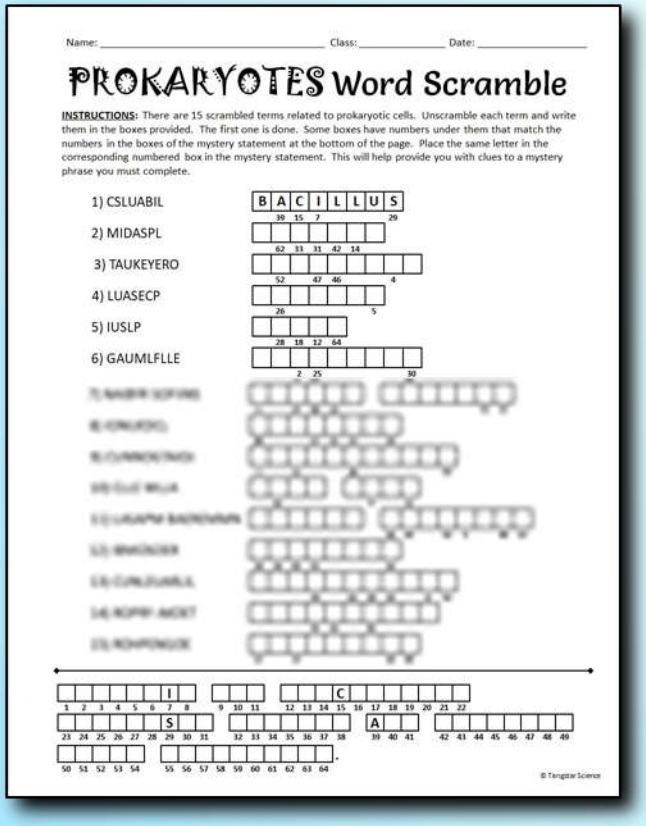
- Several students can work together to decipher the terms and figure out the final mystery phrase.
- You can turn it into a fun competition with prizes or bonus marks for the first group who finishes correctly.
- Great for early finishers too!

1 Page Printing

- Saves you time and money.
- Easy materials management

Answer Key

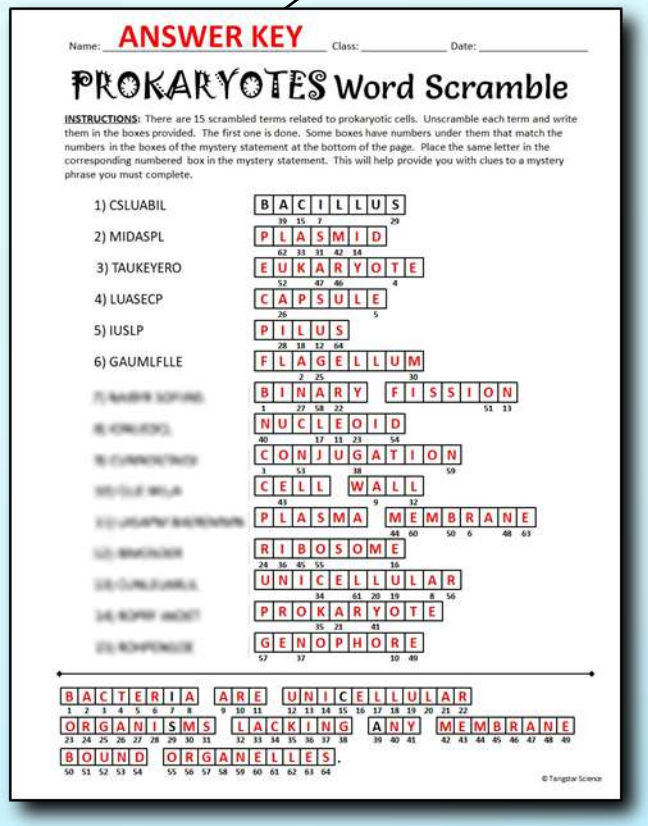
- Gives you or your students an easy and fast way to check their work.


Name: _____ Class: _____ Date: _____

PROKARYOTES Word Scramble

INSTRUCTIONS: There are 15 scrambled terms related to prokaryotic cells. Unscramble each term and write them in the boxes provided. The first one is done. Some boxes have numbers under them that match the numbers in the boxes of the mystery statement at the bottom of the page. Place the same letter in the corresponding numbered box in the mystery statement. This will help provide you with clues to a mystery phrase you must complete.

1) CSLUABIL — B A C I L L U S
2) MIDASPL
3) TAUKEYERO
4) LUASECP
5) IUSLP
6) GAUMLFLLE


Name: ANSWER KEY Class: _____ Date: _____

PROKARYOTES Word Scramble

INSTRUCTIONS: There are 15 scrambled terms related to prokaryotic cells. Unscramble each term and write them in the boxes provided. The first one is done. Some boxes have numbers under them that match the numbers in the boxes of the mystery statement at the bottom of the page. Place the same letter in the corresponding numbered box in the mystery statement. This will help provide you with clues to a mystery phrase you must complete.

1) CSLUABIL — B A C I L L U S
2) MIDASPL — P L A S M I D
3) TAUKEYERO — E U K A R Y O T E
4) LUASECP — C A P S U L E
5) IUSLP — P I L U S
6) GAUMLFLLE — F L A G E L L U M
BINARY FISSION
NUCLEOID
CONJUGATION
CELL WALL
PLASMA MEMBRANE
RIBOSOME
UNICELLULAR
PROKARYOTE
GENOPHORE

BACTERIA ARE UNICELLULAR ORGANISMS LACKING ANY MEMBRANE BOUND ORGANELLES.

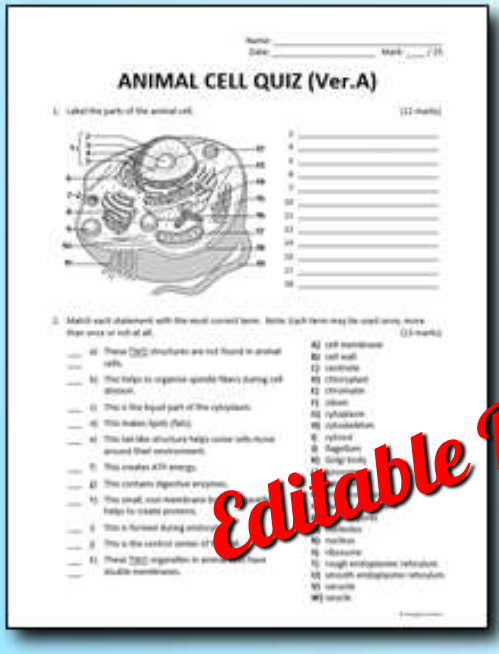
Comes with Printable PDFs & GOOGLE SLIDES™ Options

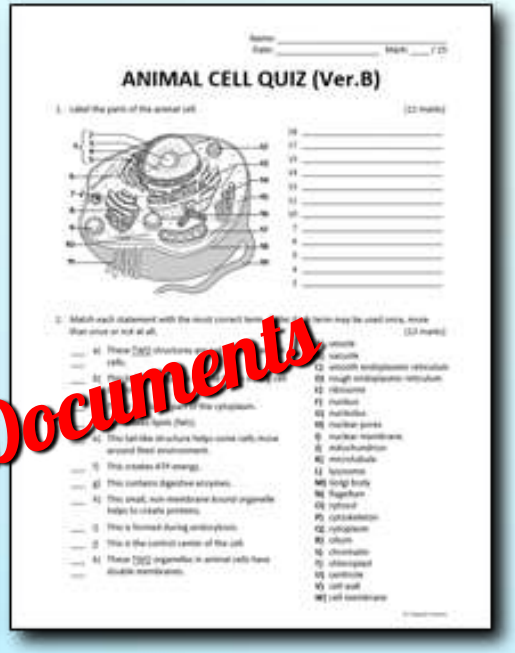
RESOURCE 13: ASSESSMENT - Animal Cell Quiz with Two Versions

TWO VERSIONS PREVENT CHEATING

- Version A and B contain the same questions but in mixed order.
- This allows you to alternate them between adjacent neighbours to deter cheating.

Version A **Version B**





Editable Documents

IT'S EDITABLE

- Allows you to customize, add or delete questions.

EASY PRINTING

- Single page quiz saves on printing, time and money.

25 MARKS, STRAIGHTFORWARD QUESTIONS

- 12 marks labelling a diagram.
- 13 marks matching questions.

DIAGRAM

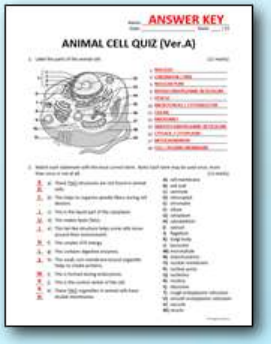
- I drew the diagram myself in Adobe Illustrator so that it would be clear and accurate.

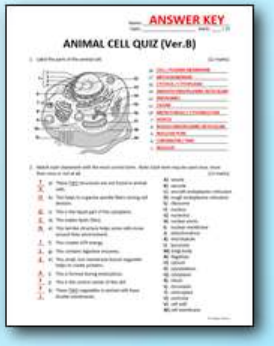
Comes with Editable Word Doc, Printable PDFs & GOOGLE FORMS™ Options

Self-Grading

ANSWER KEY

- Makes marking quick and easy.



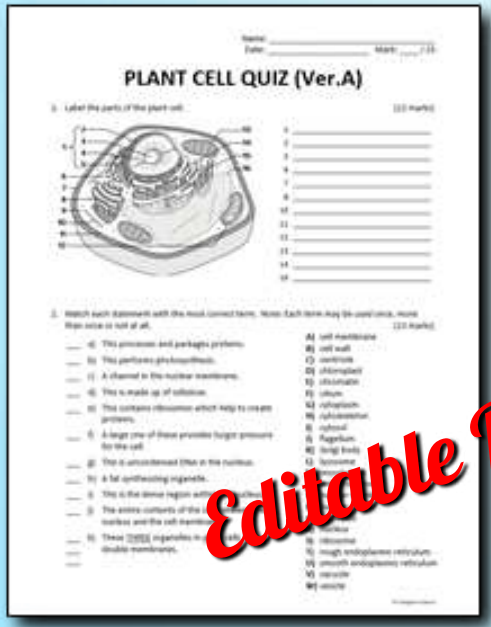


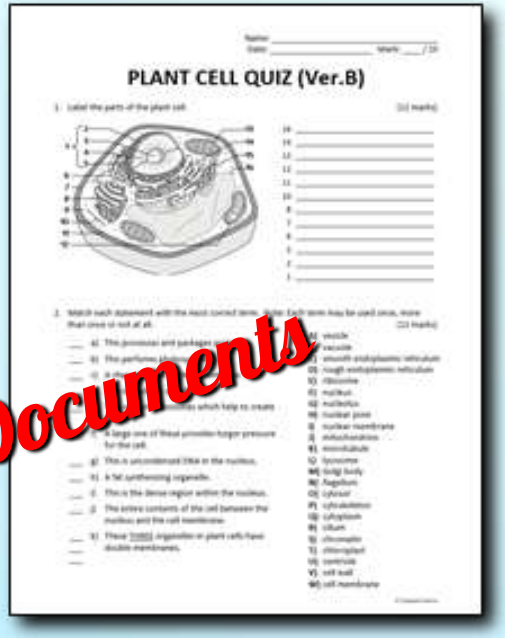
RESOURCE 14: ASSESSMENT - Plant Cell Quiz with Two Versions

TWO VERSIONS PREVENT CHEATING

- Version A and B contain the same questions but in mixed order.
- This allows you to alternate them between adjacent neighbours to deter cheating.

Version A **Version B**





Editable Documents

IT'S EDITABLE

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EASY PRINTING

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25 MARKS, STRAIGHTFORWARD QUESTIONS

- 12 marks labelling a diagram.
- 13 marks matching questions.

DIAGRAM

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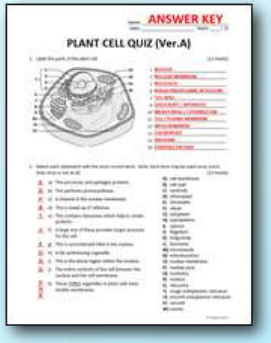
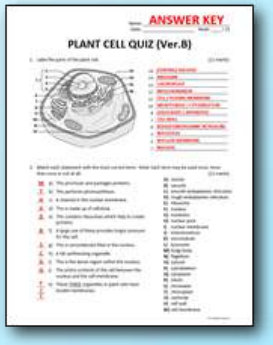
Comes with Editable Word Doc, Printable PDFs & GOOGLE FORMS™ Options

Self-Grading

ANSWER KEY

- Makes marking quick and easy.



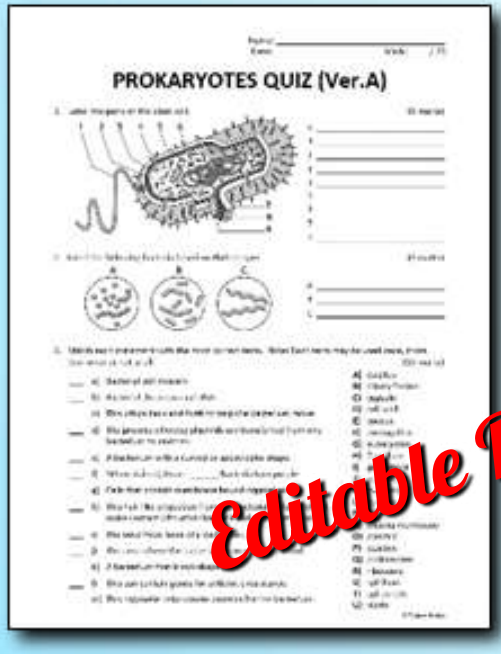


RESOURCE 15: ASSESSMENT - Prokaryotes Quiz with Two Versions

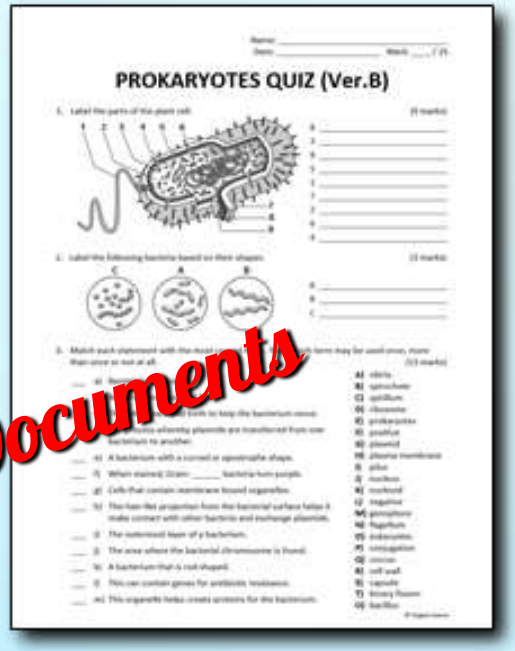
TWO VERSIONS PREVENT CHEATING

- Version A and B contain the same questions but in mixed order.
- This allows you to alternate them between adjacent neighbours to deter cheating.

Version A



Version B



Editable Documents

IT'S EDITABLE

- Allows you to customize, add or delete questions.

EASY PRINTING

- Single page quiz saves on printing, time and money.

25 MARKS, STRAIGHTFORWARD QUESTIONS

- 12 marks labelling a diagram.
- 13 marks matching questions.

DIAGRAM

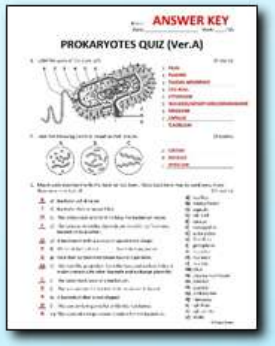
- I drew the diagram myself in Adobe Illustrator so that it would be clear and accurate.

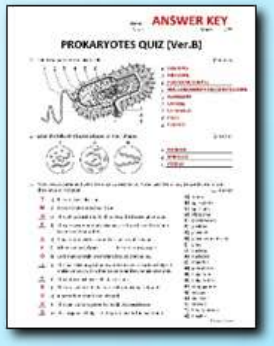
Comes with Editable Word Doc, Printable PDFs & GOOGLE FORMS™ Options

Self-Grading

ANSWER KEY

- Makes marking quick and easy.





RESOURCE 16: ARTICLE/SCIENCE LITERACY - "Robert Hook"

Zoom in to read.

♦ biology ♦ physics

ROBERT HOOKE

16

(1) Some historians call me the "Leonardo da vinci of England" because I made discoveries in numerous fields of study, even though many of you know little about me. This is partially my fault. In the later stages of my life, despite my significant contributions to astronomy, physics, chemistry and biology, I became involved in many jealous fights over who was the real inventor or discoverer of this or that idea and theory. Unfortunately one of scientists I had the most conflict with was Isaac Newton. I am sure you have heard of him and his famous apple! We argued over who should get the credit for discoveries in gravity, the planets and light. If these fights were happening today, we would be having a huge fight on Twitter over this! Since few people know my name, you can guess who won these battles. It is even rumored that Newton had the only known portrait of me destroyed after my death. No one knows what I really look like; they can only guess.

Robert Hooke
Physicist, Inventor (1635-1703)

(2) I was born on July 28th, 1635 in the town of Freshwater, on the Isle of Wight, England. I was the youngest of four children. My father was a minister for the Church of England and both of my brothers followed in his footsteps. It was expected that I would do the same, but I showed other interests as a child. Though I was very frail and sickly for most of my childhood, and stayed at home almost as much as I went to school because of my frailty, I had a very curious mind. I was interested in how machines worked, especially clocks. I would take them apart and put them back together. This would begin my long career in and fascination for scientific instruments and mechanical devices. I also became a fairly expert draftsman and loved to sketch various things I observed in nature as well as those I

(4) My time spent with Boyle earned me a reputation as an expert in experimentation and in 1662, at the age of 27, the members of the Royal Society (a London-based organization formed to promote excellence and public awareness in science) unanimously offered me a position as the Royal Society's curator. In this role, I was supposed to demonstrate experiments from my own research as well as the research of other members of the Royal Society. It was a role I was well suited for. I loved devising and conducting experiments! If a member had a hypothesis, I was there to help them prove or disprove it through experimentation. The Royal Society's motto was *Nullus In Verba* meaning "Take nobody's word for it". I was their curator until I died.

Great Minds in Scien

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RESOURCE 17: ARTICLE/SCIENCE LITERACY - "Alexander Fleming"

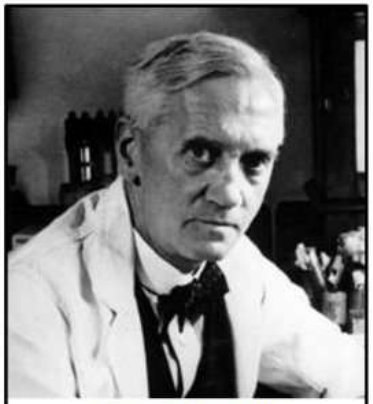
Zoom in to read.

♦ microbiology

ALEXANDER FLEMING

9

(1) I am most well known as the scientist who discovered the first antibiotic, penicillin, in 1928. Until this time, many people died prematurely from pneumonia, tuberculosis and *Staphylococcus* and *Streptococcus* infections that are easily treatable with antibiotics today. My discovery has saved the lives of hundreds of millions of people around the world. Not only that but since the advent of antibiotics, life expectancy has gone from an average of 50 years of age in the early 1900s to almost 80 years of age today. All of this happened because I chose not to become a doctor!



Alexander Fleming
Bateriologist (1881-1955)

(2) I was born on August 6th, 1881 in Ayrshire, Scotland. I had a countryside upbringing that nurtured an ability to keenly observe nature. My powers of observation would become one of the biggest assets in my career. My early childhood education was very humble. I walked for 8 miles every day to go to and from school. At the age of 11, my potential was recognized and I got awarded a scholarship to Kilmarnock Academy for two years before moving to live with my older brother Tom in London, where I attended school. Tom was a successful doctor and under his influence I wanted to be one as well. In 1901, I wrote my medical school entrance exams and passed with the highest marks in the United Kingdom. In 1906, when I was 25, I graduated London's St. Mary's Hospital Medical School with a Bachelor of Medicine and Bachelor of Surgery. I seemed destined to become a prosperous doctor one day.

(3) At the time, I was also a voluntary member of the London Scottish Regiment of the British Army. My rifle captain suggested that I work with Sir Almroth Wright, who was a pioneering researcher of vaccines and immunology at St.

to use antiseptic agents (e.g. boric acid, carbolic acid and hydrogen peroxide) to kill the infectious agents. Since antiseptics were effective at killing bacteria on surfaces, they should kill them in the wound. However, I didn't believe they were working because many of the soldiers died. I investigated the effect of the antiseptics in deep wounds and discovered that the antiseptics were killing the immune system's white blood cells. Using salt water instead of an antiseptic would clean a deep wound without killing the white blood cells. I tried to convince other army doctors to restrict the use of antiseptics only to superficial (surface) wounds and use salt water for deep wounds. Most of them refused to listen to me and this resulted in many preventable deaths.

Great Minds in Scien

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RESOURCE 18: ARTICLE/SCIENCE LITERACY - "Louis Pasteur"

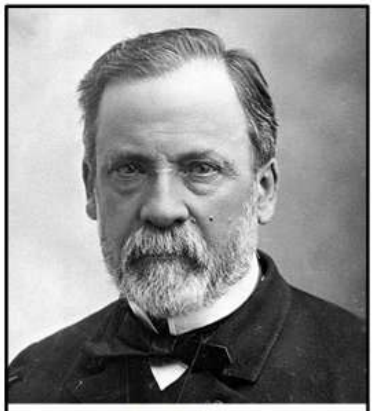
Zoom in to read.

♦ microbiology

LOUIS PASTEUR

14

(1) If my name sounds familiar, it's probably because you know about the process of pasteurization, which is named after me. Pasteurization is the process of killing microorganisms using low heat. I developed this technique which has become widely used to ensure the safety of various foods, most notably, milk products. In my day, scientists had no idea that microorganisms were responsible for many diseases. It wasn't until I came up with my "germ theory" of disease that doctors understood that certain microbes could make people sick. For this, I am considered the father of microbiology.



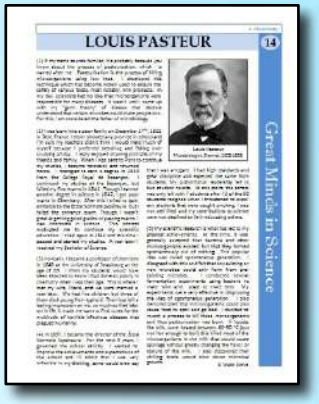
Louis Pasteur
Microbiologist, Chemist (1822-1895)

(2) I was born into a poor family on December 27th, 1822 in Dole, France. I never showed any promise in school and I'm sure my teachers didn't think I would make much of myself because I preferred sketching and fishing over studying all day. I really enjoyed drawing portraits of my friends and family. When I was sent to Paris to continue my studies, I became homesick and returned home. I managed to earn a degree in 1840 from the Collège Royal de Besançon. I continued my studies at the Besançon, but failed my first exams in 1841. Though I earned another degree in science in 1842, I got poor marks in Chemistry. After this I tried to gain entrance to the *École Normale Supérieure* but I failed the entrance exam. Though I wasn't great at getting good grades or passing exams, I was interested in science. This interest motivated me to continue my scientific education. I tried again in 1844 and this time I passed and started my studies. A year later I received my Bachelor of Science.

(3) Ironically, I became a professor of chemistry in 1848 at the University of Strasbourg at the age of 26. I think my students would have that I was arrogant. I had high standards and great discipline and expected the same from students. My authoritarian leadership led to two student revolts. At one point, the school was only left with 7 students after 73 of the 80 students resigned when I threatened to expel any students that were caught smoking. I was not well liked and my contributions to science were not destined to lie in educating others.

(5) My scientific research is what has led to my greatest achievements. At the time, it was generally accepted that bacteria and other microorganisms existed, but that they formed spontaneously out of nothing. This popular idea was called spontaneous generation. I disagreed with this and felt that any existing or new microbes could only form from pre-

Great Minds in Scien



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RESOURCE 19: ARTICLE/SCIENCE LITERACY - "Stem Cell Science"

Zoom in to read.

♦ cells ♦ genetics

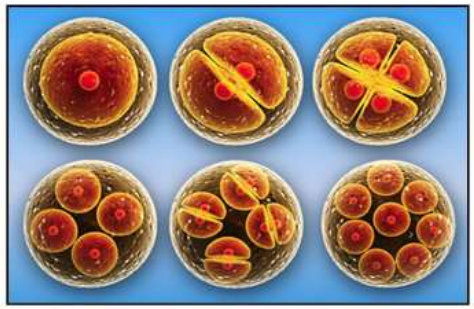
STEM CELL SCIENCE

50

(1) Stem cells have been a hot area of research for over the last three decades and researchers have been making very interesting medical advances recently. Let's look at the fundamentals of stem cell science before we get into the newest research. There are three different types of stem cells: embryonic stem cells, adult stem cells and induced-pluripotent stem cells (IPSCs), though all share common traits. First, all can divide for long periods of time. Second, stem cells are not specialized, meaning that they have not become a specific type of cell yet (e.g. neurons and skeletal muscle cells are specific and specialized cells). Third, they have plasticity, so they are capable of becoming more than one cell type.

(2) Embryonic stem cells were first isolated in human embryos in 1998. Stem cells are used in the research of diseases, like cancer and birth defects, as well as drug research and medical treatments where stem cells can be used to make new tissues. However, obtaining these stem cells is the most controversial part of stem cell research as they are harvested from embryos which are destroyed in the process.

(3) Embryos are obtained by using the unused embryos from IVF (*in vitro* fertilization) treatments. IVF helps infertile couples have a child. In this process, several eggs are harvested from a woman and mixed with the sperm taken from her partner. If fertilization results and produces embryos, often only one or two embryos are transplanted back into the woman's uterus. The couple can consent for the unneeded and leftover embryos to be



(4) Embryonic stem cells obtained from early embryos are totipotent, which literally means "totally powerful". They have the ability to become any cell type in the body and any one of these cells, in isolation, can form an entire human. Four days after fertilization the cells divide into a blastocyst with two cell layers. The surrounding layer forms the placenta and the inner layer are the stem cells that form the tissues of the fetus. At this point, stem cells are no longer totipotent. Though they can still form any and all the tissues of the body, they have lost the ability to form an entire individual if removed from the embryo, thus instead of being totipotent, they are now considered pluripotent. As an embryo continues to develop, the pluripotent stem cells increasingly lose their plasticity.

(5) As adult stem cells are even less plastic than pluripotent stem cells, they are called multipotent stem cells. This means they only have the ability to become a small and limited selection of related cell types. A good example are the multipotent stem cells found in your

Science Literacy Warm

Comes with Printable PDFs & GOOGLE SLIDES™ Options

RESOURCE 20: ARTICLE/SCIENCE LITERACY - "Immortal Cancer Cells"

Zoom in to read.

cell biology ♦ medical ♦ bioethics

IMMORTAL CANCER CELLS

19

Science Literacy Warm Up

(1) Henrietta Lacks was an African American woman born on August 1st 1920 in Virginia. In 1951, while pregnant with her fifth child, she was diagnosed with cervical cancer at Johns Hopkins Hospital, which was the only hospital in her area that would treat black patients. She underwent radiation therapy for the cancer and during this time, two samples of the tumor were removed. Unfortunately, the treatment failed and she died on October 4th 1951, nine months after being diagnosed. Though Henrietta Lacks has now been dead for over six decades, her cells still live on and have proved to be one of the most important tools used in medical science.

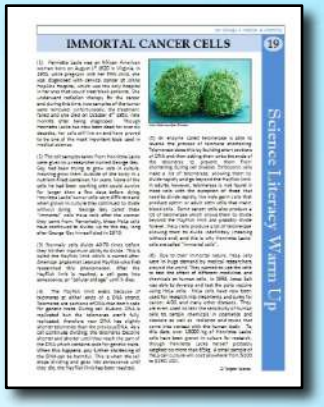
(2) The cell samples taken from Henrietta Lacks were given to a researcher named George Gey. Gey had been trying to grow cells in culture, meaning grow them outside of the body in a nutrient-filled container, for years. None of the cells he had been working with could survive for longer then a few days before dying. Henrietta Lacks' tumor cells were different and when grown in culture they continued to divide without dying. George Gey called these "immortal" cells HeLa cells after the woman they came from. Remarkably, these HeLa cells have continued to divide, up to this day, long after George Gey himself died in 1970.

(3) Normally cells divide 40-70 times before they hit their maximum ability to divide. This is called the Hayflick limit which is named after American anatomist Leonard Hayflick who first researched this phenomenon. After the Hayflick limit is reached, a cell goes into

HeLa Cells Just After Division

(5) An enzyme called telomerase is able to reverse the process of telomere shortening. Telomerase does this by building short sections of DNA and then adding them onto the ends of the telomeres to prevent them from shortening during cell division. Embryonic cells make a lot of telomerase, allowing them to divide rapidly and go beyond the Hayflick limit. In adults, however, telomerase is not found in most cells with the exception of those that need to divide rapidly, like male germ cells that produce sperm or adult stem cells that make blood cells. Some cancer cells also produce a lot of telomerase which allows them to divide beyond the Hayflick limit and possibly divide forever. HeLa cells produce a lot of telomerase allowing them to divide indefinitely (meaning without end) and this is why Henrietta Lacks' cells are called "immortal cells".

(6) Due to their immortal nature, HeLa cells were in huge demand by medical researchers around the world. They wanted to use the cells to test the effect of different medicines and



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RESOURCE 21: ARTICLE/SCIENCE LITERACY - "Antibiotics: Penicillin and Beyond"

Zoom in to read.

microbiology ♦ medical ♦ public health

ANTIBIOTICS: PENICILLIN AND BEYOND

29

(1) Most of us have taken antibiotics at some point in our lives and the majority of us will need to take them multiple times before we die. Antibiotics are prescription drugs used to treat infections caused by bacteria like strep throat, ear infections, pneumonia, cholera, syphilis and tuberculosis. Some antibiotics also work against certain infections caused by fungi and protozoans. Antibiotics don't work on colds and flus because these are infections caused by viruses, though some doctors still wrongly prescribe antibiotics for these illnesses.

(2) Antibiotics either work by being bactericidal, meaning they kill bacteria, or by being bacteriostatic, meaning that they prevent bacteria from replicating. Bactericidal antibiotics destroy bacterial cell walls and cell membranes and can interfere with bacterial enzymes vital to the bacteria's survival; these include penicillin, sulfonamides and polymyxins. Bacteriostatic antibiotics work by disrupting the ability of bacteria to make proteins; these include tetracyclines and lincosamides.

(3) Antibiotics can also be classified as either narrow spectrum, meaning they kill only specific types of bacteria, or broad spectrum, meaning they can kill a wide range of bacteria. You might think that broad spectrum antibiotics are superior because they can kill many types of bacteria, but this means that they are also capable of killing good bacteria that do not cause infection. Broad spectrum antibiotics can kill the beneficial bacteria in

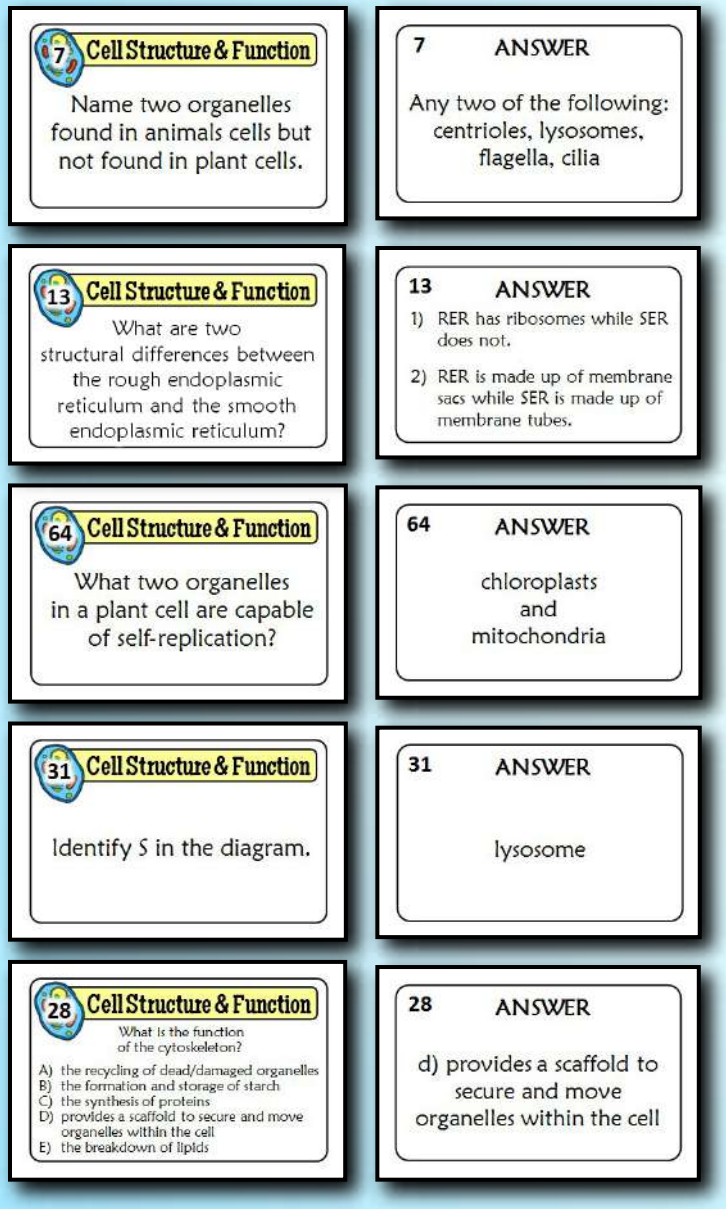
was an empty area where none of the bacteria seemed to grow. Fleming concluded that the mould must be secreting a chemical capable of killing or preventing the bacteria's growth. On further analysis, he discovered that the mould produced a bactericidal compound and Fleming named it penicillin after the mold growing in the dish, which was called *Penicillium*. Though penicillin was discovered in 1928, the technology to mass produce it wasn't developed until the 1940s. This is when antibiotics became the number one treatment for bacterial infections. Antibiotics were a huge advancement for medicine and Fleming, along with Howard Florey and Ernst Boris Chain, the two scientists who helped create the mass production method, were awarded the Nobel Prize in Medicine in 1945 for their work. Before the use of antibiotics, life expectancy was lower and childhood death rates were much higher. Infections easily cured by today's antibiotics killed many children during that era.

(5) We have now figured out that all

Science Literacy Warm

Comes with Printable PDFs & GOOGLE SLIDES™ Options

RESOURCE 22: FUN GROUP REVIEW - 80 Cells Task Cards with Game Board



THIS TASK CARD SET INCLUDES:

1) 80 Question Cards
2) 80 Answer Cards
3) 1 Game Board
4) 1 Cell Diagram Card
5) 1 Cover Card
6) Student Worksheet & Answer Key
7) Editable Template Cards

Comes with Printable PDFs & GOOGLE SLIDES™ Options

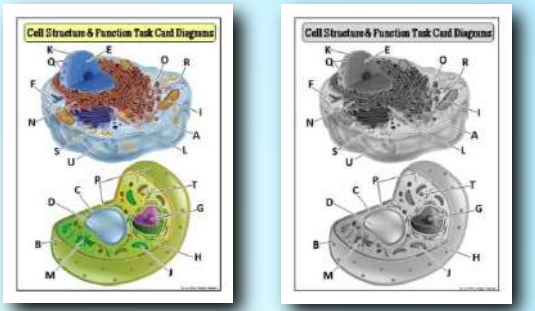
OTHER CELL RESOURCES by Tangstar Science

RESOURCE 22: FUN GROUP REVIEW - 80 Cells Task Cards with Game Board

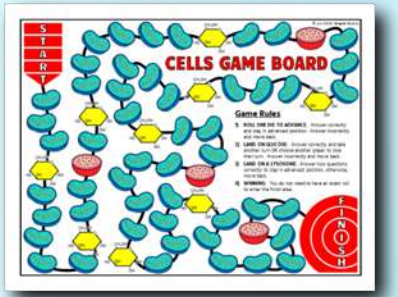
80 Question Cards

80 Answer Cards

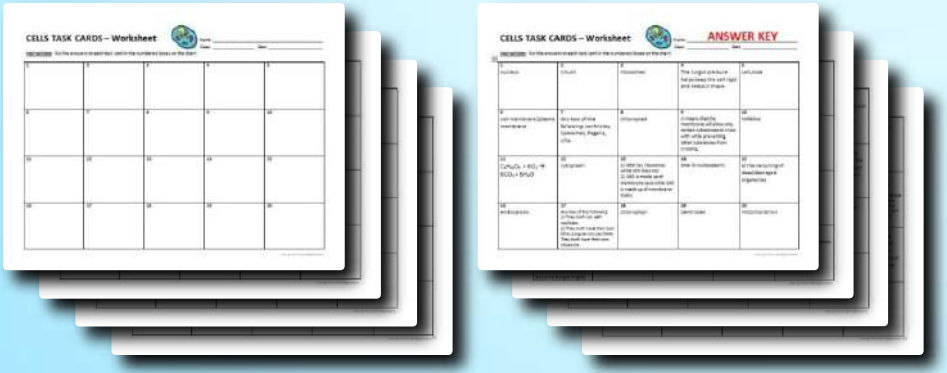
Cell Diagram Cards



Game Board



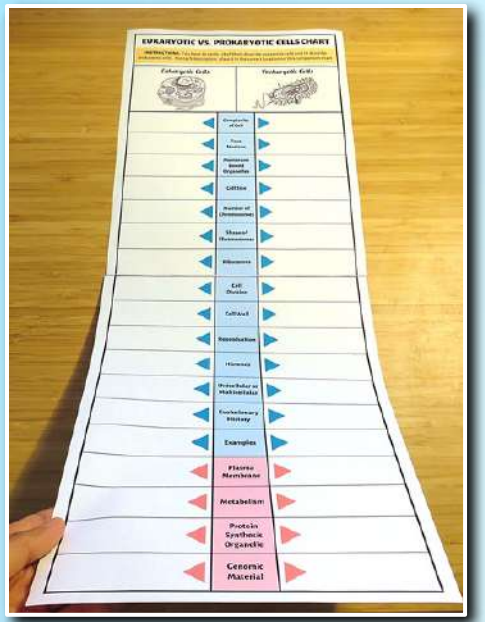
Student Worksheets & Answer Keys



Cover Cards

Editable Template

RESOURCE 23: FUN GROUP REVIEW - Eukaryotes vs. Prokaryotes Card Sort Review Game

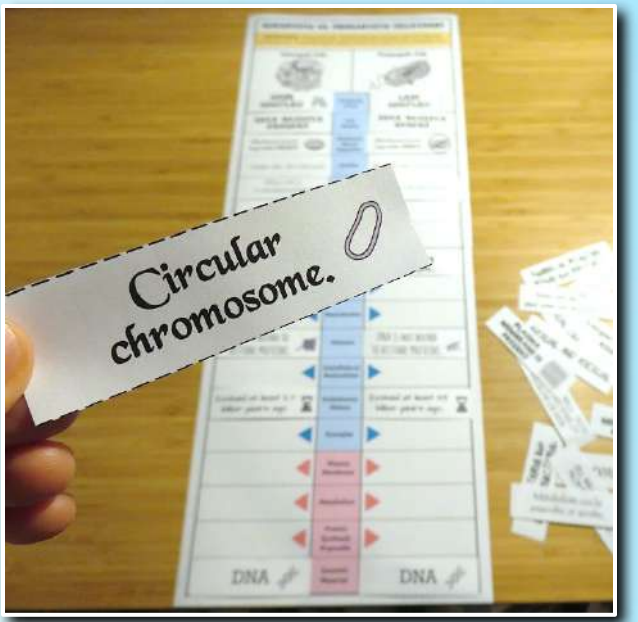


STEP 1:

Assemble the eukaryotes vs. prokaryotes chart.

STEP 2:

Cut out cards containing descriptions of eukaryotes and prokaryotes.



STEP 3:

Sort the cards on the chart on either the eukaryotes or the prokaryotes side.

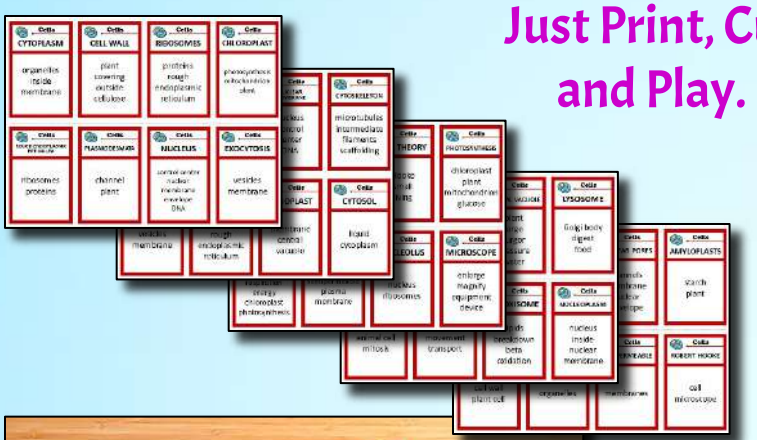
THIS RESOURCE INCLUDES:

1) 36 Cards
2) Eukaryotes vs. Prokaryotes Chart (two 8.5"x11" pages taped together)
3) Student Worksheet
4) Answer Key

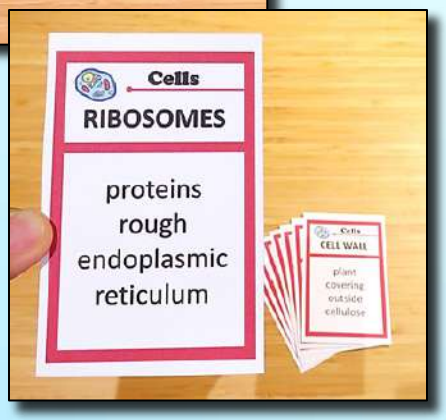
Comes with Printable PDFs & GOOGLE SLIDES™ Options

RESOURCE 24: FUN PAIR/GROUP REVIEW - Cells Taboo Card Game

40 CARDS ON 5 PAGES



Just Print, Cut and Play.

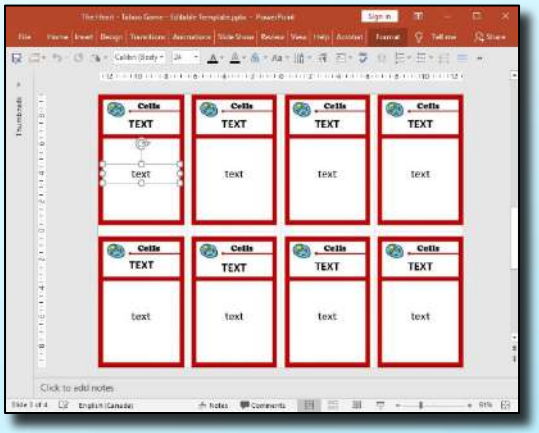


Printable PDFs

40 TERMS

- Organelles
- Cytoplasm
- Cytosol
- Cytoskeleton
- Mitochondria
- Cellular respiration
- Cell membrane
- Semipermeable
- Lysosome
- Peroxisome
- Centrioles
- Ribosomes
- Chloroplast
- Photosynthesis
- Chlorophyll
- Cell wall
- Cellulose
- Turgor pressure
- Tonoplast
- Central vacuole
- Flagella
- Cilia
- Nucleus
- Nuclear membrane
- Nuclear pores
- Nucleolus
- Nucleoplasm
- Proteins
- Golgi body
- Rough endoplasmic reticulum
- Smooth endoplasmic reticulum
- Amyloplasts
- Endocytosis
- Exocytosis
- Plasmodesmata
- Cytoplasmic streaming
- Robert Hook
- Cell Theory
- Microscope
- Endosymbiotic theory

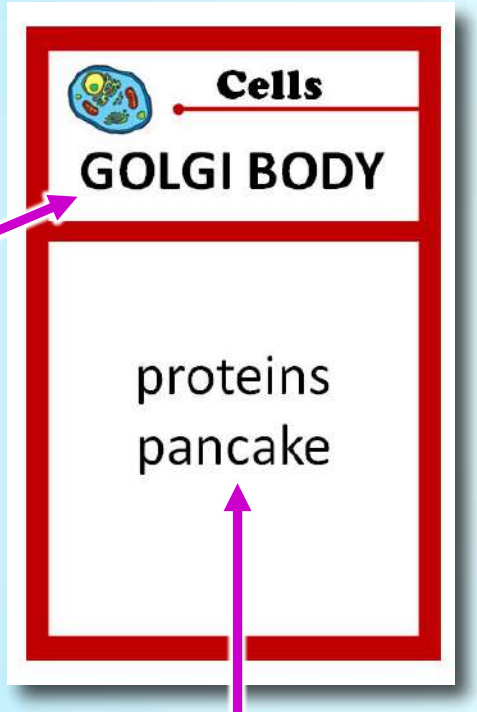
EDITABLE TEMPLATE



Make Your Own Cards in PowerPoint.

RESOURCE 24: FUN PAIR/GROUP REVIEW - Cells Taboo Card Game

HOW TO PLAY TABOO



The guesser needs to guess this term.

The clue givers cannot use these taboo terms in their clues.

Step 1: Form groups (or pairs) where one person is the **guesser** and the remaining students are the **clue givers**. Group members take turns being the guesser.

Step 2: The **guesser needs to guess the term** on the card (in this case it's "GOLGI BODY"). Clue givers will give descriptions of the term to help the guesser guess the right term. Use a timer to limit the guessing time.

Step 3: The **clue givers have to describe the term without using the taboo words** on the card (in this case the taboo words are "proteins" and "pancake"). Also, clue givers cannot use root words found in the term or the taboo words. For example, if the term was "kicking", the root word "kick" cannot be used in the clue giving.

ASSIGNING POINTS: **3 points are given to the guesser** for every correct term guessed. **2 points are deducted from any clue giver that uses a taboo word OR root word** during clue giving. Alternatively they can choose to lose their next turn as the guesser.

Created by Anh-Thi Tang – Tangstar Science

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