

Meiosis

Interactive Lesson

PRINT and DIGITAL

Meiosis I

Prophase I

- Chromosomes **condense and thicken**.
- **Crossing over occurs** (transfer of genetic information).
- Each homologous pair has one chromosome from the mother and one from the father.



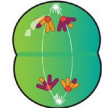
Metaphase I

- Chromosomes **line up in pairs** in the middle.
- Spindle fibers **attach**.



Anaphase I

- Chromosomes are **pulled away by the spindle fibers** to opposite sides of the cell.



Telophase I and Cytokinesis

- Two new nuclei **form**.
- Cells **split into two**.
- There are 23 chromosomes → 46 chromatids in each cell.



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Compatible with Google Slides and PPT

Mitosis
PMAT x 1

```
graph TD; A((46)) --> B((46)); A --> C((46))
```

Meiosis
PMAT x 2

```
graph TD; A((46)) --> B((46)); A --> C((46))
```

A key is also included!

Mitosis is preceded by interphase. ←

Drag the arrow to the correct answer.

True

False

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Drag and Drop

Drag the circle to the correct response.

How many chromosomes
does a human body cell
have?

- ☐ 12
- ☐ 24
- ☐ 40
- ☐ 46

Drag and drop the following
into the correct category.

makes sex cells

Mitosis

Meiosis

makes body cells

makes non-
identical cells

makes identical
cells

haploid cells

diploid cells

Type in the Text Box

Fill in the blank.
How many divisions occur
in meiosis?

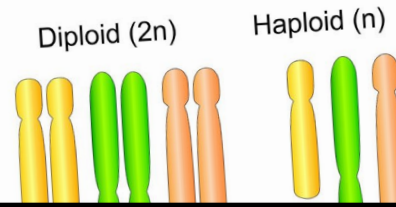
Fill in the blanks.

	Mitosis	Meiosis
Types of Cells Produced	Type here.	makes non-identical sex cells (gametes)
Number of Cells Produced	Type here.	4
Function	growth and repair	Type here.
PMAT	x 1	x 2
Haploid or Diploid?	diploid (2n)	haploid (n)
Chromosome # in Daughter Cells	46	Type here.

and more!

Haploid and Diploid

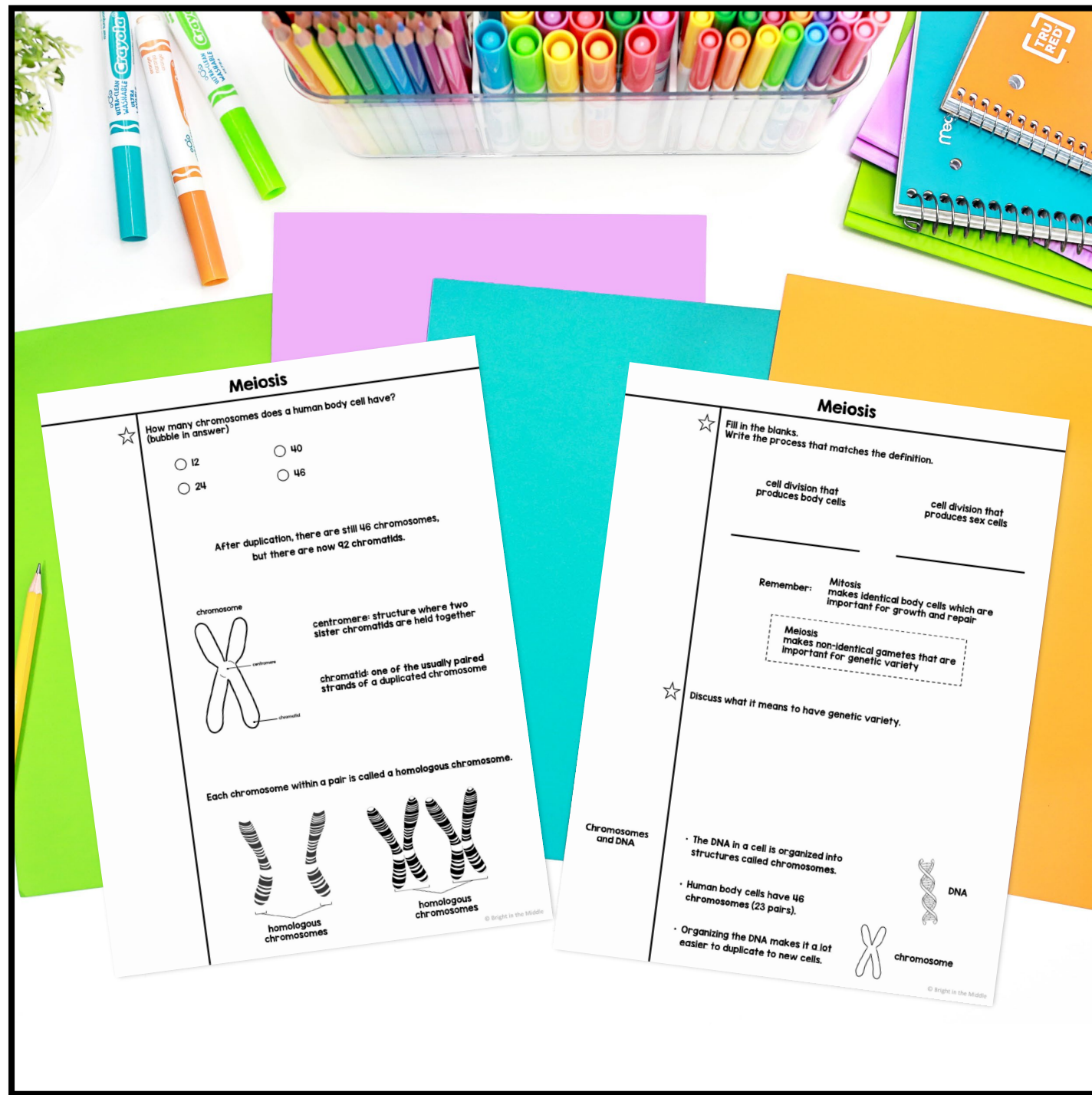
Both mitosis and meiosis **begin** with a **diploid** cell ($2n$). This means that has two sets chromosome



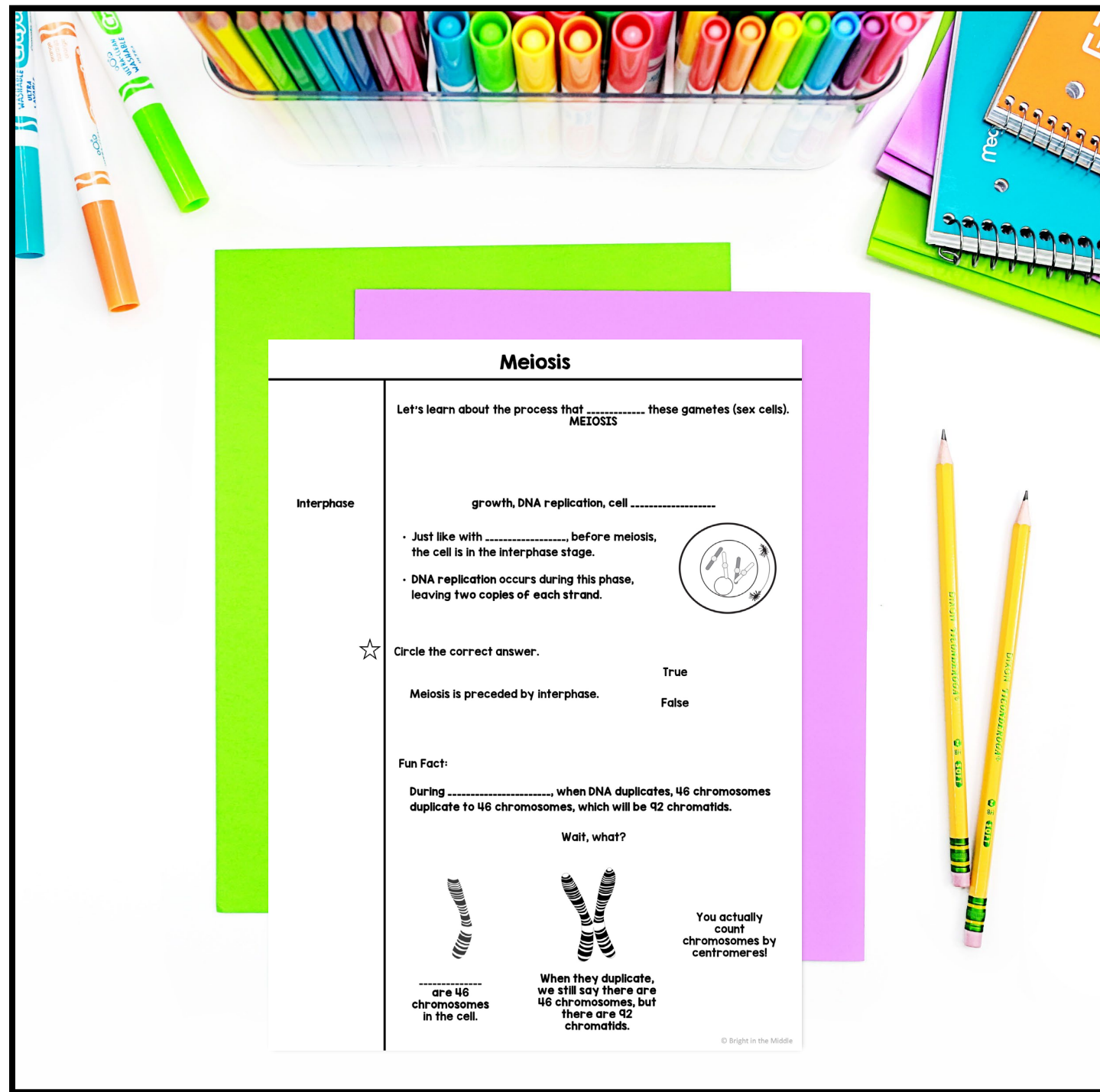
Drag the arrows to match the vocabulary word with its definition.

DNA →	organized packages of DNA and protein
chromosome →	pair of chromosomes that are similar in structure
centromere →	parent cell divides to produce four non-identical gametes
chromatid →	deoxyribonucleic acid; carries genetic information
meiosis →	structure where two sister chromatids are held together
homologous chromosome →	one of the usually paired strands of a duplicated chromosome

A paper version is also included with interactive activities embedded.



**Guided
Cornell
notes are
included as
well!**



Meiosis

Let's learn about the process that these gametes (sex cells).
MEIOSIS

Interphase

growth, DNA replication, cell

- Just like with, before meiosis, the cell is in the interphase stage.
- DNA replication occurs during this phase, leaving two copies of each strand.



Circle the correct answer.

Meiosis is preceded by interphase.

True

False

Fun Fact:

During, when DNA duplicates, 46 chromosomes duplicate to 46 chromosomes, which will be 92 chromatids.

Wait, what?



.....
are 46
chromosomes
in the cell.



When they duplicate,
we still say there are
46 chromosomes, but
there are 92
chromatids.

You actually
count
chromosomes by
centromeres!

Ways to Use Digital Interactive Lessons

Science digital interactive lessons are a great way to teach or review science content with your students for many reasons.

They are fun. They are engaging. Another reason, which I think is the most important, is that they help decrease the cognitive load. The way that digital interactive lessons are set up is first, a little bit of content, and then practice with that content, and repeat the process.

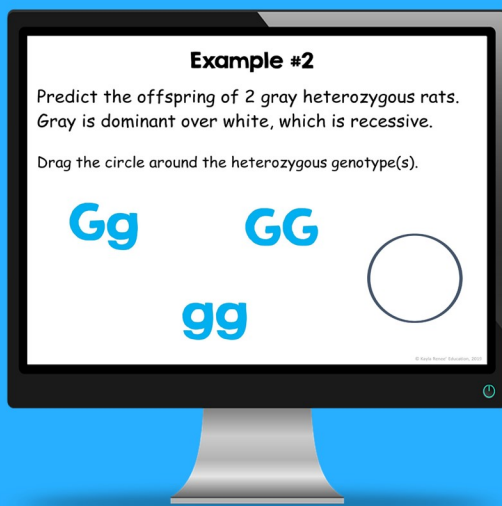
Students can digest small chunks of information a little at a time, apply that information, and then learn more! This will help keep their attention.

So, now, what are some ways that you can use them in your middle school science classroom?



Individual Learning

One way that interactive lessons can be used in the classroom is just for individual learning. These are digital lessons, so students can pull up the lesson on their computer, either via Google Classroom, Microsoft Teams, PowerPoint, or whatever you use in your classroom.



**Digital Science
INTERACTIVE
Lessons
for**

INDIVIDUAL LEARNING

Students read through the lessons themselves and **work through the practice** at their own pace.

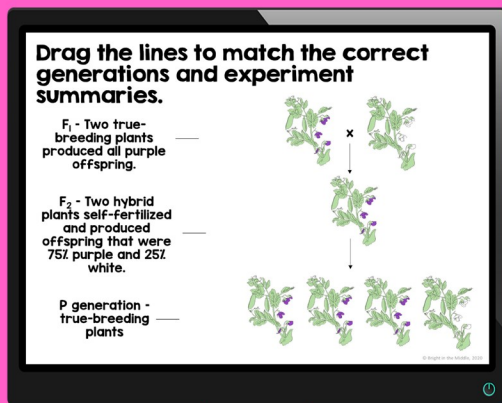
The benefits of doing this are that students can work at their own pace and you, as the teacher, can walk around the classroom as they are learning to answer any questions that they have. In addition, you can see what that particular student is learning. As you walk around the room and view their work, you can use it as a formative assessment to see if they are understanding the material.

You can also bump it up a notch. Since students will be working using the computer, you can embed related YouTube videos in the lesson for extra enrichment!



Distance Learning

Digital interactive science lessons are a great tool to use for individual learning at a distance for the middle school science classroom.



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for

DISTANCE LEARNING

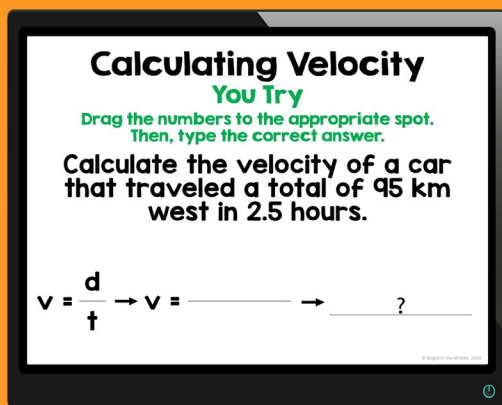
Students can read through the material, and after digesting chunks at a time, they can apply the information with embedded practice slides.

After completing the lessons, students can submit their work to their teacher.



Small Groups/ Partners

This works similarly to having students working as individuals except that students have the opportunity to work with one another. I think that this an awesome approach to differentiated learning in the classroom.



Digital Science
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for

**SMALL GROUPS/
PARTNERS**

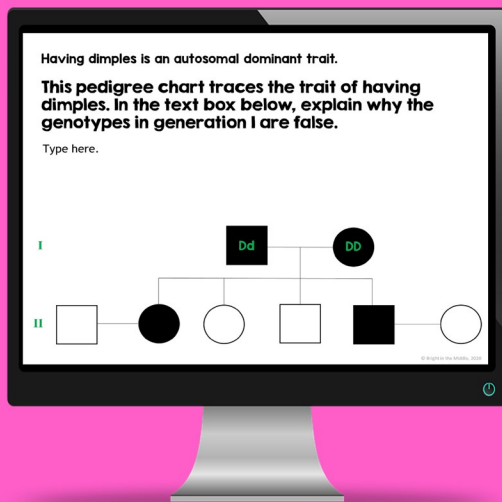
In small groups, or in partners, students are able to read the lesson together, discuss each practice slide, and apply the information together.

I prefer this method in many ways because I believe in the power of cooperative learning. As a teacher, you still have the opportunity to walk around and help the individual students as needed, but students also have each other for support.



Direct Instruction

As mentioned, digital interactive lessons are set up as a lesson with embedded practice to help decrease the cognitive load. If teachers choose to, they can pull up the lesson and teach it to their students and still take pieces of content and digest them bit by bit.



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DIRECT INSTRUCTION

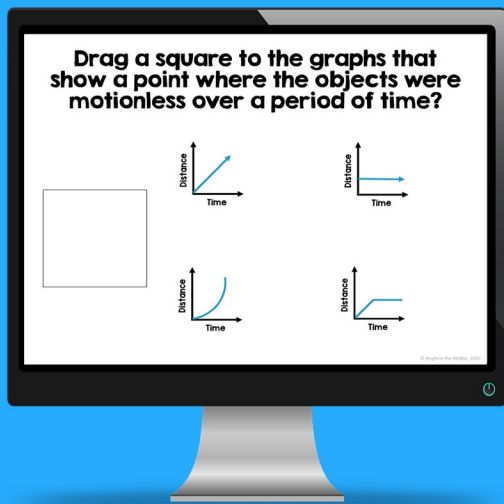
For example, when teaching about **pedigree charts**, the teacher can first discuss what a square and a circle represent in a pedigree chart.

After students digest this material, the teacher can ask students to discuss how they will remember this information and then apply the information in practice.



Science Centers

Digital interactive science lessons can be used in one of two ways for science centers. First, science centers on a particular topic. For example, say you are teaching distance-time graphs, and you are ready for students to complete science centers on this topic. You can have a center for a [digital interactive lesson](#) (make groups in Google Classroom, or another platform), [task cards](#), [story match](#), and a reading passage.



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Lessons**
for

SCIENCE CENTERS

Another way that you can use interactive science lessons for science centers is only using digital interactive lessons. Time to review for a [genetics](#) test? You can have stations set up where students will move around the room.

They can work through individual lessons such as Gregor Mendel and an Introduction to Genetics, Asexual and Sexual Reproduction, Mitosis and the Cell Cycle, Meiosis, Punnett Squares, Pedigree Charts, and Variation of Traits and Genetics Disorders. This route may take more than one day. It just depends on how long your classes are and how much time you can devote to review. I personally like the first approach to using digital interactive lessons as a science center.



For ELL Students

With technology, there are so many awesome opportunities for students that do not speak English as their primary language to learn science content in schools that speak predominantly English. That goes vice versa as well. If you are trying to learn in any language you are unfamiliar with, technology is here to help!



**Digital Science
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Lessons**
for

ELL STUDENTS

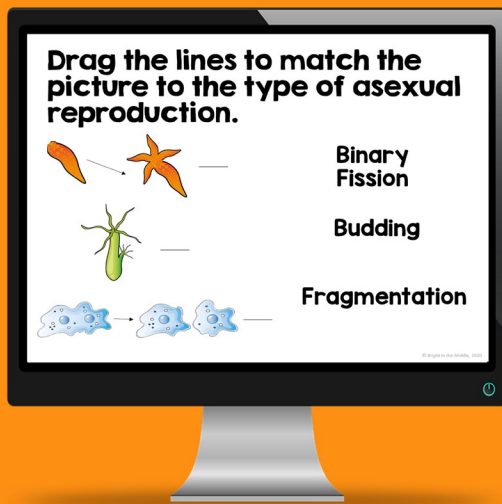
There are many options that students can use to learn science material. As a teacher that only speaks English, you can imagine how difficult it is to teach a student that speaks another language. I'm sure there are other teachers out there with the same dilemma.

With technology, I have been able to give my students the science lesson and have them use Google translate in order to understand what the lesson is saying. Now, I'm working on creating digital science lessons in Spanish, so that one step is taken out.



Enrichment/ Tutoring

I know that many schools set up a time during the day just for enrichment/tutoring.



**Digital Science
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Lessons**
for

**ENRICHMENT/
TUTORING**

Many schools only set up this time for reading/math, but some do science too! Especially those that test in science. Interactive lessons are a great way to review standards-based science material and practice!

