Teacher D

Lesson 1

**Teacher:** So today we are going to study cell division, where cells divide and in order

for that to happen, briefly so, these threads shorten and thicken, all right?

**Learners:** Yes **(chorus)**

**Teacher:** So that is the process we are supposed to look at, are we together?

**Learners:** Yes **(chorus)**

**Teacher:** In cell division, there are different phases that you find, there is the first one,

the initial phase. This is where the DNA starts to replicate itself, right? And

then, these chromatids (the teacher makes a drawing on the board) make

copies of themselves. When we get to look at the handouts this will make

more sense. So that is the initial stage called interphase. Are we together?

What do we call it? (initiation move- closed-ended question)

**Learners:** Interphase (short/limited) **(chorus)**

**Teacher:** Interphase, all right. After the interphase, then mitosis starts. Mitosis has four

phases. The first one is prophase, metaphase, anaphase, and telophase. So

basically, the cell cycle occurs in five phases, right?

**Learners:** Interphase, **p**rophase, metaphase, anaphase, and telophase. **(chorus)**

**Teacher:** So that is the sequence of the phases of the cell cycle. Are we together?

**Learners:** Yes **(chorus)**

**Teacher:** All right, let us take down notes (the teacher writes notes on the board).

Lesson 2

**Teacher:** So for today’s lesson we will start by referring back to our cells when we

started studying cells. We spoke about the nucleus, right? So mitosis is a

process that occurs in the nucleus, right? But this process requires other

organelles from the cell itself. This will require you to recall the differences

between plant and animal cells we spoke about the centrosome. The

centrosome plays a very important role in the cell division of animal cells. If

you remember correctly, the centrosome is only found in animal cells, right?

Let’s start with our notes then. Cells have the ability to divide continuously,

remember that cells are required for the repairing and growth of tissues. Do

you remember that?

**Learners:** Yes **(chorus)**

**Teacher:** So they have to divide. The division of somatic cells which results in growth is

known as mitosis. Uncontrolled mitosis can result in cancer. Now what is a

somatic cell? Do we know what a somatic cell is?

(initiation move- closed-ended question)

**Learners:** No **(chorus)**

**Teacher:** All right, so we as human beings have two types of cells, have germ cells as

well as somatic cells. When we speak of germ cell cells we are referring to

cells that are able to produce offspring, they germinate and then they form a

baby. So males have what? (initiation move- closed-ended question)

**Learners:** Germ cells (short/limited) **(chorus)**

**Teacher:** Sperms. And females have? Ova.

**Learner:** Germ cells (short/limited)

**Teacher:** Girls have eggs and boys have sperm. Those are our germ cells. And then

somatic cells are other cells of the body, not the ones responsible for

reproduction. Any cell that you find in your body besides the reproductive

cells, right?

**Learners:** Yes **(chorus)**

**Teacher:** Moving on to a chromosome. What is a chromosome? A chromosome is found

in the nucleus of a cell, right? When cells are not dividing the chromosomes

appear as a mass of threads which is known as what?

(initiation move- closed-ended question)

**Learners:** Chromatin network (short/limited)

**Teacher:** Chromatin network, right?

(eliciting and acknowledging rejoinder move- affirming)1

**Learners:** Yes **(chorus)**

**Teacher:** Yes. A chromosome consists of nucleic acid and proteins. Before a cell

divides, the DNA has to be duplicated, the process during which the DNA

molecule makes an identical replication is known as DNA replication. All

right?

**Learners:** Yes **(chorus)**

**Teacher:** Then, we carry on. After replication has taken place, the single-stranded

chromosome consists of two strands which are called chromatids. The two

chromatids of a double-stranded chromosome are joined by a centromere. So

let us go back to when we were talking about the chromatic network, I said to

you, when the cell is about to divide, the chromatin network shortens, and

what? Thickens. So this is our chromosome after shortening and thickening all

right? (Teacher draws a structure of a chromosome on the board).

**Learners:** Yes **(chorus)**

**Teacher:** So this is a chromosome, then there is a process that takes place, we just read

about. It is called? DNA

**Learners:** Replication(short/limited) **(chorus)**

**Teacher:** Yes. So what happens in DNA replication? So after shortening and thickening

it becomes a chromosome, right? Single-stranded and then, DNA replication

takes place. What is happening with replication?

**Learner:** After replication has taken place, a single-stranded chromosome consists of

two strands that are called chromatids. The two chromatids of a double-

stranded chromosomes are joined by a centromere. **(chorus)**

**Teacher:** All right, so, it means that this (teacher points at the structure of a

chromosome) is no longer one, after replication we get how many?

(initiation move- closed-ended question)

**Learners:** Two (short/limited) **(chorus)**

**Teacher:** What do they consist of then? (initiation move- closed-ended question)

**Learner 1:** Double strand (short/limited)

**Teacher:** What do they consist of? (initiation move- closed-ended question)

**Learner 2:** Centromere (short/limited)

**Teacher:** Centromere, right?

**Learner:** Yes **(chorus)**

**Teacher:** Which means these two are now called?

(initiation move- closed-ended question)

**Learners:** Centromere (short/limited) **(chorus)**

**Teacher:** Chromatid, and the middle piece? (initiation move- closed-ended question)

**Learners:** Centromere (short/limited) **(chorus)**

**Teacher:** Got it!

**Learners:** Yes **(chorus)**

**Teacher:** Good, okay so single-stranded goes through DNA replication, and then

becomes double-stranded, right? These threads (the teacher points at the

structure of a chromosome) become chromatids and the mid part becomes a

centromere. Right?

**Learners:** Yes **(chorus)**

**Teacher:** All right, so then we carry on. The cell cycle. The cell cycle is a series of

events that take place in a cell that results in DNA replication and cell

division. There are two stages in the cell cycle. The first stage is interphase.

Remember yesterday I said interphase is the preparation stage. It is where the

cell starts to prepare for what? Cell division. Right? So in the preparation

stage, the chromatin network is shortened and thickened to form what? The

chromosomes. Then there is DNA replication, this is where the strands

become two, right? One becomes

**Learners:** Two (short/limited) **(chorus)**

**Teacher:** This is basically the interphase. Are you with me?

**Learners:** Yes **(chorus)**

**Teacher:** All right, so here you are told about the interphase being the phase during

which the cell grows and replicates its DNA. That is our first process, which is

called DNA replication. The second phase is the mitotic phase, during which

the cell divides and transfers one copy of its DNA to two identical cells. So

basically, at the end of mitosis, how many cells are formed from one?

(initiation move- closed-ended question)

**Learners:** Two (short/limited) **(chorus)**

**Teacher:** Two, right? It starts with one, then at the end of the process, two cells are

formed. This is cell division. Right? Everything found in one cell will also be

also found in the second cell. That's why they say identical copy, are we

together?

**Learner:** Yes **(chorus)**

**Teacher:** If an identical copy of myself was to be made, the body, spectacles, and

hairstyle will also be found in my identical copy. So then, interphase is the

phase between two consecutive cell divisions. Meaning every time cell

division occurs, interphase will occur first then mitosis follows. Interphase, mitosis, right?

**Learners:** Yes **(chorus)**

**Teacher:** All right, so, cell growth and DNA replication take place during this phase.

After replication has taken place, the chromosome now consists of two

chromatids, as we've already said, and are joined by a centromere. All right.

There are four phases that can be distinguished during mitosis. The first one is

prophase. What is happening during prophase

**Learners:** Each chromosome consists of two chromatids joined together by a centromere,

nuclear membrane and nucleolus start to disappear centrioles separate and

move to opposite poles of the cell. Spindle fibers are formed from the

centrioles. **(chorus)**

**Teacher:** Right, ok. From the structures we did in cells, you remember we looked at the

nucleus which has a nuclear membrane surrounding it. How does the nuclear

membrane look? It has pores. Right?

**Learners:** Yes **(chorus)**

**Teacher:** This is where ribosomes move in and out of the cell to the nucleus. So in this

phase, prophase, the first thing you must know, the nuclear membrane starts to

disappear. Right? Why is that? The chromatin network needs space to

separate, right? Go through mitosis. Are we together?

**Learners:** Yes **(chorus)**

**Teacher:** That is why the nuclear membrane starts to disappear. Secondly, there are

centrioles, which stem from centrosomes. Do we still recall centrosomes?

**Learners:** Yes **(chorus)**

**Teacher:** Where do we find centrosomes? x 2 Where? x2, where do we find

centrosomes? (initiation move- closed-ended question)

**Learner 1:** Animal cells (short/limited)

**Teacher:** Animal cells! (eliciting and acknowledging rejoinder move- affirming)1 Right?

So basically this is the first difference between the two. Plant cell division and

animal cell division, meaning these divisions will not be the same. Plant cells

will not have a centriole, that stems from a

centrosome. Right?

**Learners:** Yes **(chorus)**

**Teacher:** And on animal cells there will be a centriole, right?

**Learner:** Yes **(chorus)**

**Teacher:** Centrioles are the things that go to different sides of the cell to create a spindle

fibers. Right? So let me make a drawing (the teacher draws the structure of a

cell on the board). So this is our cell, and this is our chromatin network that

has shortened and thickened (the teacher points at the chromatin network on

the board). Are we together?

**Learners:** Yes **(chorus)**

**Teacher:** In this phase, we are going to have two centrioles that will move to different

poles of the cell, meaning different sides of the cell. All right?

**Learners:** Yes **(chorus)**

**Teacher:** Yes, they will start to form spindle fibers, all right? Spindle fibers are just the

things that attach to the centromere of the chromosome. Are we together?

**Learners:** Yes **(chorus)**

**Teacher:** So that it can separate, we are creating two duplicates of the cells, right?

**Learner:** Yes **(chorus)**

**Teacher:** So there must be a separation so that how many cells will be formed?

(initiation move- closed-ended question)

**Learners:** Two (short/limited) **(chorus)**

**Teacher:** Two, right? (eliciting and acknowledging rejoinder move- affirming)1

**Learners:** Yes **(chorus)**

**Teacher:** So I make an identical copy first so that two cells can be produced. Right? Are

we together?

**Learners:** Yes **(chorus)**

**Teacher:** So what is the role of the spindle fibers?

(initiation move- closed-ended question)

**Learner:** (silence)

**Teacher:** They attach with the chromosomes, where?

(initiation move- closed-ended question)

**Learners:** Centromere (short/limited) **(chorus)**

**Teacher:** In the centromere, (eliciting and acknowledging rejoinder move- affirming)1

all right? Are you with me?

**Learners:** Yes **(chorus)**

**Teacher:** Are you sure?

**Learners:** Yes **(chorus)**

**Teacher:** Any questions? None? All right let us continue. Let me repeat myself. All right

so the prophase is the first phase of mitosis. So we did say that mitosis is the

division of the nucleus and then we mentioned that during prophase, the first

thing that happens is that the nuclear membrane starts to disappear. Why must

the nuclear membrane disappear? (initiation move- closed-ended question)

**Learner1:** To make space (short/limited)

**Teacher:** To make space for the chromosomes

(eliciting and acknowledging rejoinder move- affirming)1

that has shortened and thickened so that

they can separate properly. All right?

**Learners:** Yes **(chorus)**

**Teacher:** Then what happens, the centrioles in animal cells go to opposite poles all

right? To form what?

**Learner1:** Spindle fibers (short/limited)

**Teacher:** Spindle fibers, (eliciting and acknowledging rejoinder move- affirming)1 right?

**Learners:** Yes **(chorus)**

**Teacher:** After forming the spindle fibers, what do the spindle fibers attach themselves

to? (initiation move- closed-ended question)

**Learners:** Centromere **(chorus)**

**Teacher:** Centromere, (eliciting and acknowledging rejoinder move- affirming)1 right?

**Learners:** Yes **(chorus)**

**Teacher:** After attaching themselves to the centromere, what happens? The next phase

starts to happen, right?

**Learners:** Yes **(chorus)**

**Teacher:** So how many events can we expect to occur during prophase? The Nuclear

membrane disappears right? And then? Centriole forms spindle fibers.

**Learners:** Centriole forms spindle fibers. **(chorus)**

**Teacher:** Then the spindle fibers attach themselves to what?

(initiation move- closed-ended question)

**Learner:** Centromere (short/limited) **(chorus)**

**Teacher:** Is there anyone who explain now? No one, all right, and then we have our

second phase of mitosis, which is metaphase. What are they saying with

metaphase?

**Learners:** Chromosomes move to the equator and arrange themselves in a single row at

the equator. Each chromosome is attached to the spindle fiber by the

centromere. **(chorus)**

**Teacher:** Okay, we are going to our centrioles right? In this case, in our metaphase, we

now have the chromosomes at the equator of the cell. Are you with me? These

are our chromosomes (the teacher points at the structure of the chromosomes

on the board), they contain two chromatids and a centromere. Then, centrioles

have attached themselves to the what? The centromere, right? (The teacher

draws the structure of a cell on metaphase on the board). This is what happens

in metaphase. The chromosomes align themselves in the middle of the cell.

The spindle fibers are connected to the centromere. Those are the only two

things that occur during metaphase. The chromosomes form a line at the

equator of the cell and then the spindle fibers are attached to the centromere.

**Learners:** Centromere (short/limited) **(chorus)**

**Teacher:** Are we together?

**Learners:** Yes **(chorus)**

**Teacher:** All right, where are the other organelles as this is happening?

(initiation move- closed-ended question) The mitochondrion, chloroplast if it

was a plant cell, where are they?

**Learners:** They disappear. (short/limited)

**Teacher:** They disappear? Where are they? All right so that is your homework for today.

Homework one, where are the other organelles during cell division? So that is

your homework question, right?

**Learners:** Yes **(chorus)**

Lesson 3

**Teacher:** So we are fine with metaphase right? Two things happen in metaphase, what

happens?

**Learners:** Chromosomes arrange themselves at the equator.(lengthy) **(chorus)**

**Teacher:** Exactly, and then?

**Learner:** The spindle fibres attach themselves to the centromere. **(chorus)**

**Teacher:** They are still attached to the? (initiation move- closed-ended question)

**Learner:** Centromere (short/limited) **(chorus)**

**Teacher:** All right, they arrange themselves in a line in the center of the cell, then the

centromeres are still attached to the spindle fibres. Right?

**Learner:** Yes

**Teacher:** Then we move to anaphase. What happens during anaphase?

**Learner:** The centromere of each chromosome divides into two, and the two chromatids

separate, the spindle fibres contract pulling the chromatids to opposite poles.

The two chromatids move to opposite poles. **(chorus)**

**Teacher:** Okay, what happens here, is the centromere of each chromosome divides, due

to the splitting of the centromere. That is why the spindle fibres were

connected to the centromere so that they can pull to the opposite side resulting

in the separation of the chromatids. All right, so they say the two chromatids

separate, and the spindle fibre contracts which make the chromosomes, the

single-stranded chromosomes now, to what? Go to the opposite sides. Right?

Here now (the teacher makes a few changes to the structure of a cell on the

board), the cell is preparing for? What is the cell preparing for?

(initiation move- closed-ended question)

**Learner1:** Separate (short/limited)

**Teacher:** To separate, all right? (The teacher draws a cell on anaphase). So what

happens during anaphase? So spindle fibres contract, and they shrink. So as

they start shrinking, the chromosomes separate at the centromere, right? And

then what happens? (initiation move- closed-ended question)

**Learners:** They move to the opposite poles. (lengthy)

**Teacher:** They move to the opposite sides, right? Are you with me?

**Learners:** Yes **(chorus)**

**Teacher:** So those are the 3 things that happen. Our spindle fibres contract, which

means they shrink right, and then the chromosomes separate and then they

move to different sides. Right. So what happens during anaphase?

**Learners:** Spindle fibres contract and the chromatids separate. (lengthy) **(chorus)**

**Teacher:** One at a time. What happens during anaphase? Did you all hear me? Are you

sure?

**Learners:** Yes **(chorus)**

**Teacher:** Anaphase, the spindle fibres do what?

(initiation move- closed-ended question)

**Learners:** Contract (short/limited) **(chorus)**

**Teacher:** Contracts, right? What happens to the chromosomes?

(initiation move- closed-ended question)

**Learners:** They separate (short/limited) **(chorus)**

**Teacher:** They separate, right, and what do they do after separating?

(initiation move- closed-ended question)

**Learners:** They move to the different poles (lengthy) **(chorus)**

**Teacher:** They move to different sides of the cell, right?

**Learners:** Yes **(chorus)**

**Teacher:** They are separating now, all right? Let us continue. What happens during

telophase?

**Learners:** The chromosomes now move to arrange themselves at the poles. The spindle

fibres disappear. The nuclear membrane forms around each newly formed

chromosome and the nucleus forms. The cytoplasm divides. Cytokinesis. Two

identical cells with the same chromosome number as the original cells are

formed. **(chorus)**

**Teacher:** Which means we now have two cells, right? So what happens during

telophase? So as we have mentioned, during prophase, that plant cells are

different from animal cells. Here you will also get to see another difference

between the two. Right?

**Learners:** Yes **(chorus)**

**Teacher:** So here in telophase, they are saying the nuclear membrane starts to form

again on different sides, right?

**Learner:** Yes **(chorus)**

**Teacher:** Here (the teacher points at the structure of a cell on the board) in an animal

cell cleavage is formed. You can see this looks like a cleavage, right?

**Learner:** Yes **(chorus)**

**Teacher:** This is where cytokinesis will occur. Cytokinesis is the division of the cell. Do

you remember when I mentioned that mitosis only occurs in the nucleus? So

this one is the division of the cell, which we refer to as what?

(initiation move- closed-ended question)

**Learners:** Cytokinesis (short/limited) **(chorus)**

**Teacher:** Right, highlight or underline this term. Cytokinesis is the division of a cell,

right, cytoplasm, right? So then our cell has been formed. Our chromosomes

are becoming the chromatin network again. Right?

**Learner:** Yes **(chorus)**

**Teacher:** Then, what else happens? (initiation move- closed-ended question)

**Learner:** The spindle fibres disappear. (lengthy)

**Teacher:** The spindle fibres disappear. Everything that was working during mitosis

starts to disappear. Then, the nuclear membrane comes back because it had

disappeared, and now it comes back. All right?

**Learners:** Yes **(chorus)**

**Mary Lesson 3 Episode 1**

**Teacher:** Yes, which is the outline of the nucleus that is formed. The chromosomes that

were separated and are now covered. And then, two identical cells with the

same chromosome number as the original cell is formed. Right? This means, if

started with seven chromosomes, how many are we going to have here?

(initiation move- closed-ended question)

**Learner1:** Seven (short/limited)

**Teacher:** If we initially had six, six chromosomes, how many chromosomes will we

expect to find here?

**Learners:** Six (short/limited) **(chorus)**

**Teacher:** Six or three (clarifying rejoinder move- requesting clarification2/

extending rejoinder move- asking an extended question3)

**Learner:** Six/ three (short/limited) **(chorus)**

**Teacher:** Why? (extending rejoinder move- elaborating)3

**Learner1:** They divide (short/limited)

**Teacher:** They divide right? Okay, so you are saying there will be three here?

**Learners:** Yes **(chorus)**

**Teacher:** What happened to identical?x2

**Teacher:** Listen carefully now, that means there is a bit of confusion here with the

number of chromosomes.

**Learners:** Yes **(chorus)**

**Teacher:** You know what happens, the chromosomes were a chromatin network, it then

formed short ad thick chromosomes, you remember right?

**Learners:** Yes **(chorus)**

**Teacher:** All right, during the DNA replication how many of these threads do we get?

They have mates. This means that they multiply first and then when they start

separating, if we for example had four chromatids, two will go on the other

cell while two remain in this cell. Do we understand?

**Learners:** Yes **(chorus)**

**Teacher:** You are with me?

**Learner:** Yes **(chorus)**

**Teacher:** These separate, since they were joined by the?

**Learner:** Centromere(short/limited) **(chorus)**

**Teacher:** Yes, so when they separate, the centromere has split and they now appear

single-stranded. Right? Do you get it?

**Learner:** Yes **(chorus)**

**Teacher:** This is why we still remain with six chromosomes even in this cell. Do you

understand?

**Learners:** Yes **(chorus)**

**Teacher:** This is where identical comes in. The first cell is identical to the two resultant

cells. Everything found in the original cell will also be found in the resulting

cell. Are you with me?

**Learners:** Yes **(chorus)**

**Teacher:** It must be identical. So telophase in an animal cell right, forms cleavage.

Think of a balloon, when you squeeze it like this, what is going to happen? It

forms cleavage, all right?

**Learner:** Yes **(chorus)**

**Teacher:** So even the cell is going to have this, where cytokinesis occurs. Then the

difference between these cells is a plant cell will not have cleavage. It will

remain the same, right? But it will start forming a cell wall here (the teacher

indicates the cell drawn on the board). What forms the cell wall? X2. Do you

remember when we did the cell organelles and we spoke about the vacuole?

**Learners:** Yes **(chorus)**

**Teacher:** What is the function of a vacuole?x2 (initiation move- closed-ended question)

**Learners:** Stores (short/limited)

**Teacher:** It stores, (eliciting and acknowledging rejoinder move- affirming)1 right?

**Learner:** Yes **(chorus)**

**Teacher:** It is a storage organelle, but there are specific storage organelles, its vesicles.

Do you remember that there are other types of vacuoles, right?

**Learner:** Yes **(chorus)**

**Teacher:** The vesicles are round and membranous, right? They form the cell wall

because they contain storage substances. And we know that starch is stored in

the plants, right?

**Learner:** Yes **(chorus)**

**Teacher:** So this starch starts coming together from vesicles, to form what? Cellulose,

which is another type of carbohydrate. Are you able to see the links?

**Learner:** Yes **(chorus)**

**Teacher:** This is why you need your organic and inorganic substances to interact with

your cells. Are you with me?Okay, classwork?

**Learner:** (The learners write classwork)

**Teacher:** Let us mark the classwork. Define the following terms, cytokinesis. What is

cytokinesis?

**Learner1:** It is a process

**Teacher:** A process, yes! Whereby what happens? Whereby the cytoplasm divides,

right? So there are two types of division, right? We have mitosis which is a

division of the nucleus and then we have cytokinesis which is a division of the

cytoplasm.

**Learner1:** Yes

**Teacher:** Yes, and then what is DNA replication?

**Learners:** It is a process

**Teacher:** The process, yes, whereby what?

**Learners:** Whereby DNA makes an identical copy of itself (Lengthy)

**Teacher:** Whereby?

**Learners:** DNA molecule makes an identical copy of itself (Lengthy)

**Teacher:** DNA molecule makes an identical replication of itself. Right? Then our

drawing. The first thing in our drawing is?

**Learner1:** Heading

**Teacher:** Heading, what is the heading?

**Learner:** A structure of a double-stranded chromosome.

**Teacher:** Thank you. Structure of a double-stranded chromosome. (Teacher draws the

correct structure of a chromosome on the board). All right, so we are done

with the cell cycle. This is what we have done, we know that cell division

starts with interphase, interphase is where the cell or chromosomes or

chromatin network prepares for the division of the cell. Then we did prophase,

in prophase, we said the nucleus disappears and then spindle fibres attach

themselves to the centromere. And then there is metaphase, which is our

second phase of mitosis. Right? What happens during metaphase? The

chromosomes align at the equator. Right?

**Learner1:** Yes

**Teacher:** They are still connected by the centromere to the spindle fibres

**Learners:** Spindle fibres, (short/limited)yes. **(chorus)**

**Teacher:** Right and then we have anaphase, what happens during anaphase? They start

separating, right?Our spindle fibres contract. Our chromosomes separate and

they go the different sides. Right? Then we have telophase, what happens

during telophase? Cytokinesis. And then the nuclear membrane reappears. Any

questions? So everyone understood.

**Learner:** Yes. **(chorus)**