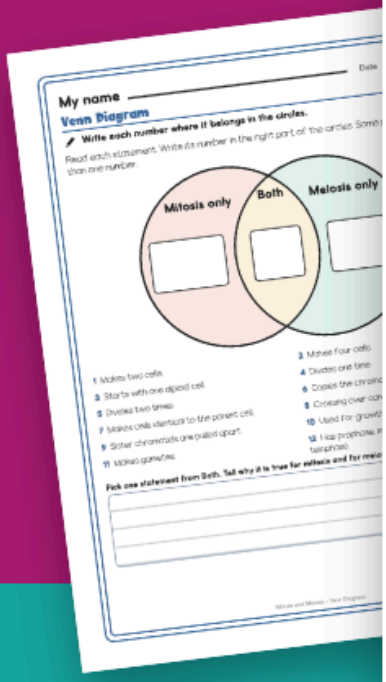
Bright Path Sped



My name _____ Date _____

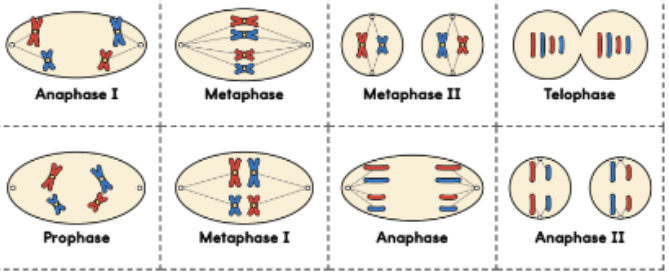
Cut and Sort: Stage Pictures

Cut out the pictures. Is each one Mitosis or Meiosis?

Look at the chromosomes in each picture. Do they pair up and line up as pairs (meiosis I)? Glue each picture in a box.

Mitosis	Meiosis

Cut on the dashed lines: eight pieces, one cut across and three cuts down.



Which picture was hardest to sort? Why?

Mitosis and Meiosis - Cut and Sort: Stage Pictures

CUT AND PASTE

GRADES 6-8





MITOSIS AND MEIOSIS

COMPARE · COUNT · SORT · KEY

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- Open it in a PDF reader (Adobe Acrobat Reader, Preview, or your browser), click into a line or a box, type, and Save As.
- The name line, every answer box, every ruled work box and every check box on the student pages are type-in fields, and so are the tracker, class grid, team note and family page. You can also print any page and write by hand.
- It works offline. No account, no subscription, no internet connection needed after you download it.

Print at 100 percent

Turn off fit to page and shrink to fit so the ruled lines stay 0.34 inch apart. Every student page is black and white inside a colored border, so it still reads when copied in black and white. The red and blue chromosomes copy as two shades of gray.

Student work

A filled-in tracker, class grid or team note carries a real student's name. Keep it in the data folder, and use a first name only on any page that leaves your hands.

Need help?

If a field will not behave or a page will not print the way you expect, use Ask a Question on the product page before leaving a review. Every question is read, and a fix to the file ships as a free update: re-download it any time from My Purchases.

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PREVIEW

Preview · Bright Path Sped

How To Read a Page

The parts of a student page, then the kinds of sheet in the order they come.

The parts of a page

- **The answer box.** A bordered box for a letter, a number or a word. Click it to type, or print and write in it.
- **The ruled work box.** Lines 0.34 inch apart for sentences. Write one idea to a line.
- **The check box.** True or false, mitosis or meiosis, haploid or diploid: click or mark.
- **The word bank.** A box of words to use. Some words are used once, some more than once.
- **The cut line.** Pieces in a short grid, edge to edge: a few straight cuts across and down.

Kind of sheet	How many	What the student does
Readings and cards	4 sheets	Read, answer, and keep the stage cards to look things up.
Words	1 sheet, 6 items	Match six words to what they mean.
Compare	3 sheets, 32 items	A chart, a Venn diagram, and look-alike stages side by side.
Count	2 sheets, 38 items	Count chromosomes before and after mitosis and meiosis.
Label and decide	4 sheets, 22 items	Name stages, pick the process, put steps in order.
True or false and mistakes	2 sheets, 12 items	Check sentences, fix false ones, find Theo's mistakes.
Writing	2 sheets, 5 questions	Short answers with ruled lines, then explain-it boxes with room to write.
Quizzes, exit tickets, sorts	12 items, 3 tickets, 22 pieces	Two quizzes, one exit sheet, three cut-and-sort pages.

Untimed, unscored on the page

No student page has a timer or a score on it. The keys and the tracker are for you. The answer keys are on pages 30 to 36.

Short answers and explain-its

Their keys (page 35) say what to look for, not one right sentence. Accept any answer that uses a fact from the readings or the stage cards.

Printing and the type-in fields

Every page prints clean in black and white. The name line, every answer box, every ruled box and every check box are type-in fields in any PDF reader: click one, type, then save. This is a fillable PDF, not a slideshow or a word-processor file.

Room to work

Short-answer and explain-it boxes have plenty of ruled lines. If a student needs more room, hand over one page a day, or let students write on scrap paper and copy their best sentences into the box.

PREVIEW

Preview · Bright Path Sped

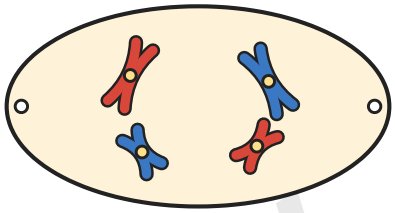
My name _____ Date _____

Reading 1: Two Ways a Cell Divides

Read about how cells divide. Then answer.

Why cells divide

Cells divide for different jobs. **Mitosis** makes two new cells that are exact copies of the parent cell. Your body uses mitosis to grow and to repair itself, for example when new skin cells fill in a scrape. **Meiosis** makes **gametes**, the sex cells such as sperm and egg. Before either one starts, the cell copies its chromosomes. A body cell has two sets of chromosomes, so it is **diploid**, written 2n. A gamete has one set, so it is **haploid**, written n. Meiosis makes four haploid cells. Mitosis makes two diploid cells.



A diploid cell, 2n = 4: four chromosomes, two pairs. Red and blue are the two parents.

Main idea: What is this reading mostly about?

Check what you read. Write the letter in the box.

1. What does mitosis make from one cell?
   - **A** Two identical cells
   - **B** Four different cells
   - **C** One bigger cell

2. What are gametes?
   - **A** Body cells with two sets
   - **B** Cells that cannot divide
   - **C** Sex cells with one set of chromosomes

3. What happens to the chromosomes before a cell divides?
   - **A** They are thrown away
   - **B** They are copied
   - **C** They are cut in half

4. Which job is done by mitosis?
   - **A** Growth and repair
   - **B** Making gametes
   - **C** Making four haploid cells

PREVIEW

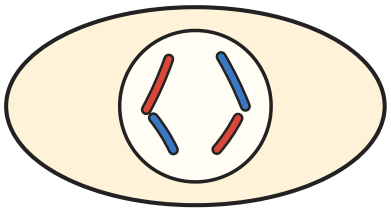
Preview · Bright Path Sped

My name _____ Date _____

Stage Cards: Mitosis

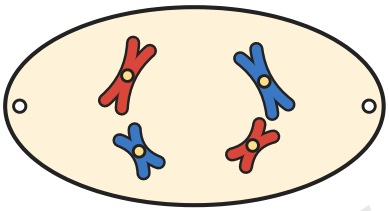
Read the cards. Keep them all week.

Interphase



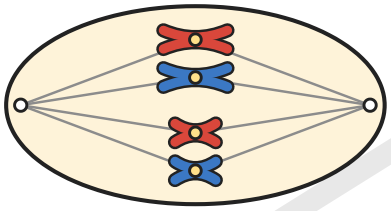
The cell grows and copies its chromosomes. Each chromosome becomes two sister chromatids.

Prophase



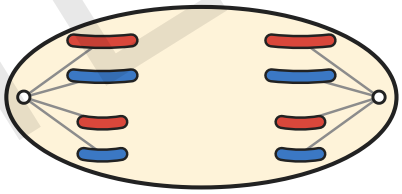
The chromosomes coil up into X shapes. The nucleus breaks down. The chromosomes do not pair up.

Metaphase



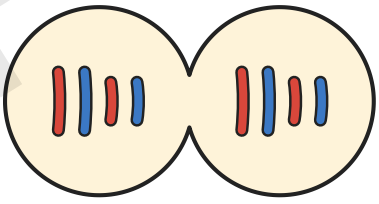
The X shapes line up in one row across the middle. Spindle fibers attach to each one.

Anaphase



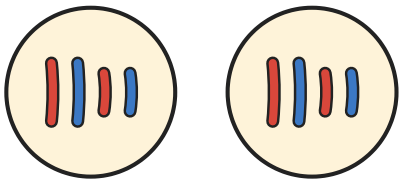
Spindle fibers pull the sister chromatids apart. Each chromatid is now its own chromosome.

Telophase



The chromosomes reach the ends of the cell. The cell starts to pinch in the middle.

Cytokinesis



The cell splits in two. Each new cell has the same chromosomes as the parent cell.

Pick one stage. Tell what happens in your own words.

PREVIEW

Preview · Bright Path Sped

My name _____ Date _____

Comparison Chart

Fill in the chart for Mitosis and Meiosis.

Use the readings and the stage cards. Pick words from the bank. A word can be used more than one time.

different	2	haploid (n)	growth and repair	1 diploid cell	does not happen

4	making gametes	diploid (2n)	identical	can happen	1

	Mitosis	Meiosis
Cells it starts with		
Number of divisions		
Cells made at the end		
Chromosomes in each new cell		
Are the new cells identical?		
Crossing over?		
What it is for		

PREVIEW

Preview · Bright Path Sped

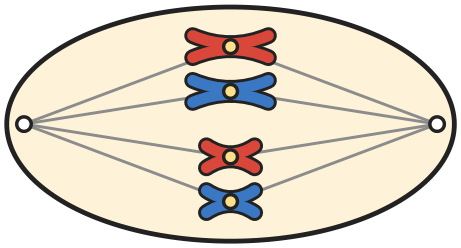
My name _____ Date _____

Side by Side: Look-Alike Stages

Look at each picture. Check what you see.

Each picture is one stage. Look at the chromosomes (red and blue are the two parents). Check one box for each picture.

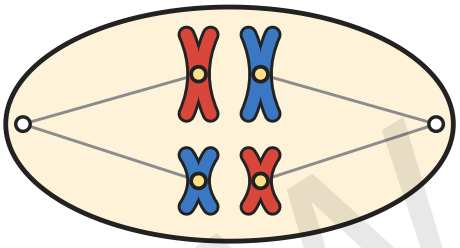
Mitosis: metaphase



How are the chromosomes lined up?

☐ single file ☐ in pairs

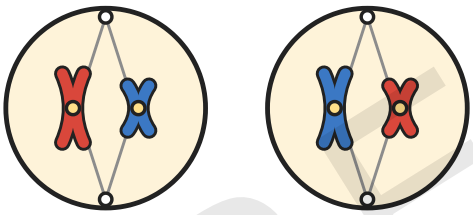
Meiosis I: metaphase i



How are the chromosomes lined up?

☐ single file ☐ in pairs

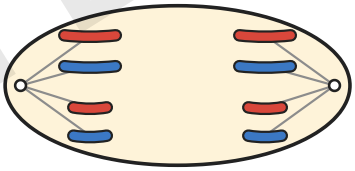
Meiosis II: metaphase ii



How are the chromosomes lined up?

☐ single file ☐ in pairs

Mitosis: anaphase

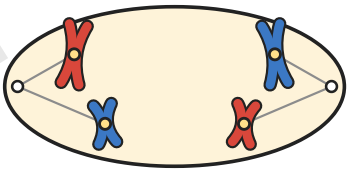


What is pulled apart?

☐ sister chromatids

☐ homologous pairs

Meiosis I: anaphase i

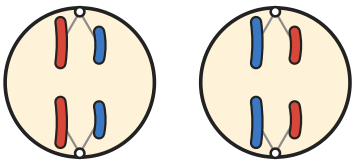


What is pulled apart?

☐ sister chromatids

☐ homologous pairs

Meiosis II: anaphase ii



What is pulled apart?

☐ sister chromatids

☐ homologous pairs

Which two pictures look the most alike? Tell why.

PREVIEW

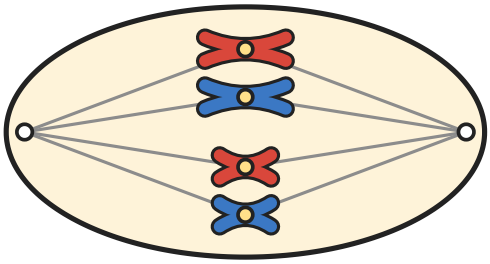
Preview · Bright Path Sped

My name _____ Date _____

Follow One Cell

Follow one cell. Count at each step.

Follow the cell with 2n = 4 from the first cell to the last. The picture shows its chromosomes before it divides.



Remember:
copying makes sister chromatids. It does not change how many chromosomes the cell has.

	How many cells?	Chromosomes in each cell	Haploid or diploid?
At the start			☐ haploid ☐ diploid
After copying (interphase)			☐ haploid ☐ diploid
After mitosis			☐ haploid ☐ diploid
After meiosis I			☐ haploid ☐ diploid
After meiosis II			☐ haploid ☐ diploid

PREVIEW

Preview · Bright Path Sped

My name _____ Date _____

Which Process?

Which process is it? Check one.

Read each one. Is it mitosis or meiosis? Check one.

1	A scraped knee grows new skin cells.	☐ mitosis	☐ meiosis
2	A cell makes sex cells (gametes) with half the chromosomes.	☐ mitosis	☐ meiosis
3	A seedling grows taller as its cells make more cells.	☐ mitosis	☐ meiosis
4	One diploid cell makes four different haploid cells.	☐ mitosis	☐ meiosis
5	A cut leaf heals with new cells just like the old ones.	☐ mitosis	☐ meiosis
6	Homologous chromosomes swap pieces.	☐ mitosis	☐ meiosis
7	A cell divides one time to make two identical cells.	☐ mitosis	☐ meiosis
8	A cell divides two times in a row with no copying in between.	☐ mitosis	☐ meiosis

Pick one. Tell the clue that helped you decide.

PREVIEW

Preview · Bright Path Sped

My name _____ Date _____

True or False

Is it true or false? Check one.

Check true or false for each sentence.

1. Mitosis makes two cells from one cell. ☐ true ☐ false
2. Meiosis makes two cells from one cell. ☐ true ☐ false
3. The cells made by mitosis are identical to the parent cell. ☐ true ☐ false
4. Crossing over happens in mitosis. ☐ true ☐ false
5. Gametes are made by meiosis. ☐ true ☐ false
6. Meiosis divides the cell only one time. ☐ true ☐ false
7. Mitosis and meiosis both start by copying the chromosomes. ☐ true ☐ false
8. A cell made by meiosis is diploid. ☐ true ☐ false

Pick one false sentence. Fix it so it is true.

PREVIEW

Preview · Bright Path Sped

My name _____ Date _____

Explain It

Explain your thinking in sentences.

Use what you know about mitosis and meiosis. Say why.

Start with: I know that ____ because ____.

1. A skin cell has 2n = 6. It divides by mitosis. Tell how many cells are made and how many chromosomes each one has.

2. A cell with 2n = 6 divides by meiosis. Tell how many cells are made and how many chromosomes each one has.

PREVIEW

Preview · Bright Path Sped

My name _____ Date _____

Quiz B

Pick the best answer. Write its letter.

Take your time. Guess if you are not sure.

7 A body cell has 2n = 10. How many chromosomes does each new cell have after mitosis?

- **A** 5
- **B** 20
- **C** 10

8 A body cell has 2n = 10. How many chromosomes does each gamete have?

- **A** 5
- **B** 10
- **C** 20

9 Which stage lines up homologous pairs in the middle?

- **A** Metaphase of mitosis
- **B** Metaphase I
- **C** Telophase II

10 Which cells does meiosis make?

- **A** Gametes
- **B** Skin cells
- **C** Muscle cells

11 What can make the four cells from meiosis different from each other?

- **A** Cytokinesis
- **B** Copying the chromosomes
- **C** Crossing over

12 What happens right before mitosis or meiosis starts?

- **A** The chromosomes are copied
- **B** The cell loses its chromosomes
- **C** Gametes join

PREVIEW

Preview · Bright Path Sped

My name _____ Date _____

Check My Own Work

Check your own work. Mark yes or not yet.

1	I can say what mitosis makes and what it is for.	☐ yes	☐ not yet
2	I can say what meiosis makes and what it is for.	☐ yes	☐ not yet
3	I can tell haploid from diploid.	☐ yes	☐ not yet
4	I can name the stages of mitosis in order.	☐ yes	☐ not yet
5	I can tell what is pulled apart in mitosis and in meiosis I.	☐ yes	☐ not yet
6	I can explain what crossing over is.	☐ yes	☐ not yet
7	I can count chromosomes before and after dividing.	☐ yes	☐ not yet
8	I can tell mitosis from meiosis in a picture.	☐ yes	☐ not yet

The part I can explain best is...

The part I still need help with is...

PREVIEW

My name _____ Date _____

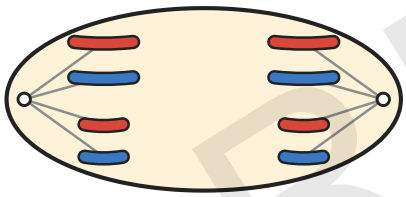
Cut and Sort: Mitosis in Order

Cut out the six pictures. Glue them in order, 1 to 6.

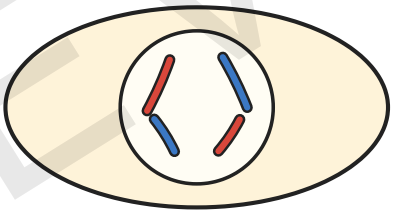
Look at each picture and name. Glue the stages of mitosis in order, from the first to the last.

1	2	3
4	5	6

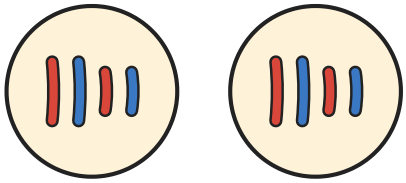
Cut on the dashed lines: six pieces, one cut across and two cuts down.



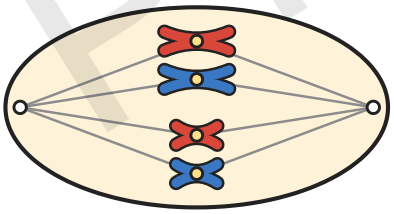
Anaphase



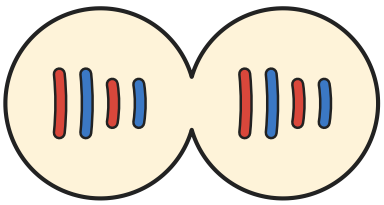
Interphase



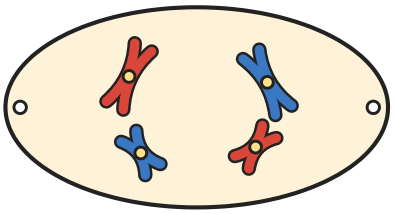
Cytokinesis



Metaphase



Telophase



Prophase

Which stage was hardest to place? Tell why.

PREVIEW

Answer Key: Venn, Side by Side, Which Process?

Both means the statement is true of mitosis and of meiosis. In the side-by-side pictures, red and blue are the two parents.

Venn Diagram page 11

Statement	Goes in
1. Makes two cells.	Mitosis only
2. Makes four cells.	Meiosis only
3. Starts with one diploid cell.	Both
4. Divides one time.	Mitosis only
5. Divides two times.	Meiosis only
6. Copies the chromosomes before it divides.	Both
7. Makes cells identical to the parent cell.	Mitosis only
8. Crossing over can happen.	Meiosis only
9. Sister chromatids are pulled apart.	Both
10. Used for growth and repair.	Mitosis only
11. Makes gametes.	Meiosis only
12. Has prophase, metaphase, anaphase and telophase.	Both

Side by Side page 12

Picture	Check
1. Mitosis: metaphase	single file
2. Meiosis I: metaphase i	in pairs
3. Meiosis II: metaphase ii	single file
4. Mitosis: anaphase	sister chromatids
5. Meiosis I: anaphase i	homologous pairs
6. Meiosis II: anaphase ii	sister chromatids

Which Process? page 17

Item	Answer	Why
1. A scraped knee grows new skin cells.	mitosis	Growth and repair use mitosis.
2. A cell makes sex cells (gametes) with half the chromosomes.	meiosis	Gametes are made by meiosis.
3. A seedling grows taller as its cells make more cells.	mitosis	Growth uses mitosis.
4. One diploid cell makes four different haploid cells.	meiosis	Four haploid cells is the result of meiosis.
5. A cut leaf heals with new cells just like the old ones.	mitosis	Repair makes identical cells: mitosis.
6. Homologous chromosomes swap pieces.	meiosis	Crossing over happens in prophase I of meiosis.
7. A cell divides one time to make two identical cells.	mitosis	One division, identical cells: mitosis.
8. A cell divides two times in a row with no copying in between.	meiosis	Meiosis I and meiosis II are two divisions.

PREVIEW

Answer Key: Quizzes and Mistakes

The student in Find the Mistake is invented. Accept any wording that fixes the mistake.

Quizzes pages 23, 24

Item	Letter	Answer
23.1	A	Two
23.2	B	Four haploid cells
23.3	C	Mitosis
23.4	A	A matching pair, one from each parent
23.5	B	Two sets of chromosomes
23.6	C	Sister chromatids
24.1	C	10
24.2	A	5
24.3	B	Metaphase I
24.4	A	Gametes
24.5	C	Crossing over
24.6	A	The chromosomes are copied

Find the Mistake page 20

Item	What went wrong	Right sentence
20.1	Mitosis makes two cells.	Mitosis makes two cells that are identical.
20.2	Meiosis divides two times.	Meiosis has two divisions, meiosis I and meiosis II.
20.3	Gametes are haploid.	Gametes are haploid. They have one set of chromosomes.
20.4	Crossing over is a meiosis event.	Crossing over happens in prophase I of meiosis, not in mitosis.

PREVIEW

Answer Key: Sorts

Pieces are named by their row and column in the cutting grid, left to right and top to bottom. Box numbers are the numbers on the mat.

Cut and Sort: Which Process? page 27

Piece (row, column)	Box
r1 c1: Used to make gametes	Meiosis only
r1 c2: Makes two identical cells	Mitosis only
r1 c3: Sister chromatids are pulled apart	Both
r1 c4: Divides one time	Mitosis only
r2 c1: Makes four different cells	Meiosis only
r2 c2: Copies the chromosomes first	Both
r2 c3: Crossing over can happen	Meiosis only
r2 c4: Used for growth and repair	Mitosis only

Cut and Sort: Stage Pictures page 28

Piece (row, column)	Box
r1 c1: Anaphase I	Meiosis
r1 c2: Metaphase	Mitosis
r1 c3: Metaphase II	Meiosis
r1 c4: Telophase	Mitosis
r2 c1: Prophase	Mitosis
r2 c2: Metaphase I	Meiosis
r2 c3: Anaphase	Mitosis
r2 c4: Anaphase II	Meiosis

Cut and Sort: Mitosis in Order page 29

Piece (row, column)	Glue in
r1 c1: Anaphase	Box 4
r1 c2: Interphase	Box 1
r1 c3: Cytokinesis	Box 6
r2 c1: Metaphase	Box 3
r2 c2: Telophase	Box 5
r2 c3: Prophase	Box 2

A note on the sorts

Mitosis in order: interphase, prophase, metaphase, anaphase, telophase, cytokinesis. In the stage-picture sort, mitosis pictures show single-file or scattered chromosomes with no pairs; the meiosis I pictures show homologous pairs together or pulled apart; metaphase II and anaphase II look like mitosis but are drawn as two smaller cells. Accept the stage name as printed.

PREVIEW

Class Progress Grid

Every student on one grid: items right by kind of sheet.

Class or group _____ Month _____

Student	Readings (of 8)	Words (of 6)	Chart and Venn (of 26)	Side by side (of 6)	Counting (of 38)	Labels (of 8)	Which process (of 16)	Order, mistakes (of 10)	Quizzes (of 12)	Sorts (of 22)

PREVIEW

How to fill this in

For each column, add up how many items that student has right with no prompt (the tracker rows). One glance across a row shows which skill is easiest and which is next.

Grouping for small-group time

Students low in Readings or Words need the readings, the stage cards and the words first (pages 5 to 9). Students low in Chart and Venn or Counting need pages 10 to 14 again, with the cards beside them. Students near full marks can move to the sorts and the quizzes (pages 27 to 29 and 23 to 24).

Casey's Tracker (Invented Student)

Casey L. is invented; nothing on this page describes a real student. The blank tracker is on page 37.

Student: Casey L. (an invented student)

Teacher: Ms. Patel (invented)

Month: October

Page	Page type and set	Items	Right	Date	Notes
5	Reading 1: Two Ways a Cell Divides	4	3	10/6	Mixed up diploid and haploid
6	Reading 2: Same Steps, Different Results	4	4	10/7	-
9	Cell Division Words	6	5	10/8	Swapped gamete and daughter cell
10	Comparison Chart	14	11	10/9	Wrote 2 for divisions in meiosis I
11	Venn Diagram	12	9	10/10	Put copying in Mitosis only
12	Side by Side: Look-Alike Stages	6	4	10/13	Mixed up the two anaphase pictures
13	Chromosome Count Table	23	19	10/14	Halved the mitosis numbers
14	Follow One Cell	15	12	10/15	Said diploid after meiosis I
15	Label the Mitosis Stages	4	3	10/16	Swapped telophase and anaphase
16	Mitosis or Meiosis? Name the Stage	4	4	10/17	-
17	Which Process?	8	7	10/20	Called crossing over mitosis
18	Put the Steps in Order	6	4	10/21	Put the split before the lining up
19	True or False	8	6	10/22	Thought meiosis makes two cells
20	Find the Mistake	4	-	-	-
23	Quiz A	6	-	-	-
24	Quiz B	6	-	-	-
27	Cut and Sort: Which Process?	8	-	-	-
28	Cut and Sort: Stage Pictures	8	-	-	-
29	Cut and Sort: Mitosis in Order	6	-	-	-

How to read it

Casey L. has done **13 of 19** scored sheets and got **91 of 114** items right with no prompt. **2** sheets were all right and **11** carry a note. Every number comes from the table.

What the table points to

The lowest sheet is Side by Side: Look-Alike Stages (4 of 6) and Put the Steps in Order (4 of 6). That is where the next practice goes. The 6 sheets left blank are not tried yet, never wrong.

PREVIEW

Binder Cover

Slide this into the front of a binder. The divider tabs and a spine label to cut out are on the next page (page 44).

Science - Biology

MITOSIS AND MEIOSIS

Compare, Count, Sort and Answer Keys

Mitosis | **Meiosis** | **Compare**

Teacher _____

Class or student _____

PREVIEW