

The image is a colorful, hand-drawn style graphic on a light green grid background. A large, light green, rounded rectangular shape in the center contains the main text. The text 'AP Bio' is in a large, dark green, bubbly font with a pink shadow. Below it, 'FRQ Fridays' is in a large, purple, bubbly font with a pink shadow. Underneath that, '2015 #4' is in a smaller, black, sans-serif font, followed by 'Mitosis & Meiosis' in a black, sans-serif font. To the right of the text is a small, cute penguin character with a black body, white belly, and a small black bow tie. The penguin has a speech bubble above it that says 'Hi!'. The entire graphic is surrounded by various biological and school-related icons: a DNA double helix in red and blue, a yellow pencil with a pink eraser, a purple spiral notebook with 'NOTES' written on it, yellow paper clips, and teal exclamation marks. There are also some teal cloud-like shapes and orange and green squiggly lines.

2015 #4
Mitosis & Meiosis



FRQ Friday #12

2015 #4

Both mitosis and meiosis are forms of cell division that produce daughter cells containing genetic information from the parent cell.

(a) **Describe** TWO events that are common to both mitosis and meiosis that ensure the resulting daughter cells inherit the appropriate number of chromosomes.

Description (1 point each; 2 points maximum)

- Spindle elements (microtubules) form/attach to chromosomes
- Chromatin condenses
- Alignment of chromosomes across center of cell prior to chromosome separation
- Separation of chromatids/centromeres to daughter cells
- G2/M checkpoint occurs in both processes
- Replication or synthesis of DNA precedes mitosis/meiosis
- Cytokinesis separates daughter cells after mitosis/meiosis



FRQ Friday #12

2015 #4

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- (a) **Describe** TWO events that are common to both mitosis and meiosis that ensure the resulting daughter cells inherit the appropriate number of chromosomes.

(4a) The separation of sister chromatids in both mitosis and meiosis II ensure that each daughter cell receives the appropriate number of chromosomes. Also, the lining up of the chromosomes along the middle of the cell ensures that the chromosomes will separate properly.



FRQ Friday #12

2015 #4

Both mitosis and meiosis are forms of cell division that produce daughter cells containing genetic information from the parent cell.

(b) The genetic composition of daughter cells produced by mitosis differs from that of the daughter cells produced by meiosis. **Describe** TWO features of the cell division processes that lead to these differences.

Feature	Description (1 point each row; 2 points maximum)	
	Mitosis	Meiosis
Number of divisions/ number of resulting cells	1 division/ 2 cells result	2 divisions/ 4 cells result
Ploidy of daughter cells	<ul style="list-style-type: none">• Same as parent cell• Diploid• ($2n \rightarrow 2n$ or $n \rightarrow n$)	<ul style="list-style-type: none">• Half of parent cell• Haploid• ($4n \rightarrow 2n$; $2n \rightarrow n$)
Chromatids separate	Occurs	Not in meiosis I/only in meiosis II
Crossing over	Does not occur	Occurs
Homologous chromosomes separate/independently assort	Does not occur	Occurs



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- (b) The genetic composition of daughter cells produced by mitosis differs from that of the daughter cells produced by meiosis. **Describe** TWO features of the cell division processes that lead to these differences.

(4b) Unlike mitosis, meiosis results in 4 haploid cells rather than 2 diploid cells because cell division occurs twice to produce gametes. Also, the chromosomes in ^{the cells that have undergone} meiosis are recombinants of each other because of the synapsing that occurs in prophase I.
↳ unlike those in mitosis.

