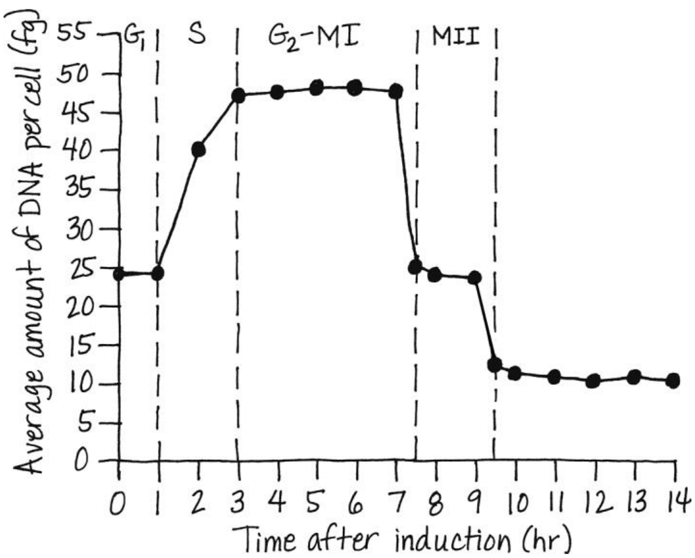
**1.** (a) The independent variable is time, which goes on the *x*-axis, measured in hours (hr). The dependent variable is average amount of DNA per cell, which goes on the *y*-axis and is measured in femtograms (fg). (b) The *x*-axis has data points over 14 hours, so it makes sense to label a tick for each hour. (It would also be fine to label a tick for each half-hour, as long as all were labeled, but this could look cluttered.) The *y*-axis has data points as high as 48.0 fg, so a logical decision would be to label tick marks every 5 fg up through 50 or 55 fg. See the graph in the answer to question 3.

**2.** See the graph in the answer to question 3.

**3.** (a) There are 24 fg of DNA in $G_1$ (at 0.0 hr). (b) There should be 48 fg in $G_2$; 24 fg at the end of MI; and 12 fg at the end of MII. (c)




(d) Because the *y*-axis is the amount of DNA per cell, the cell will have the duplicated amount of DNA (48 fg) in one cell until two cells form at the end of meiosis I. Therefore, the "corner" in the data line represents the stage at which the cell divides at the end of meiosis I (cytokinesis). At this point, the DNA content in each cell drops in half. If you were graphing the DNA content of a single cell, this line would drop vertically to about 24 fg. Because this is a population of cells—and they are completing MI at slightly different times—given that the line represents the *average* of the population, it gradually decreases as a diagonal rather than a vertical drop.

**4.** (a) Each haploid cell has 12 fg of DNA. (12 fg of DNA) x ($9.78 \times 10^5$ base pairs per fg) = $1.2 \times 10^7$ or $12 \times 10^6$ base pairs, therefore there are 12 megabase pairs (Mb) of DNA in each haploid cell. (b) The answer for this will depend on the length of the S phase in the student's graph. The answer is $1.2 \times 10^7$ base pairs (haploid value) x 2 (for diploid value) divided by the number of minutes of the S phase. For the example shown, ($1.2 \times 10^7$ base pairs)(2)/120 minutes = 200,000 (or $2.0 \times 10^5$) base pairs per minute.