



4. (a) [3 pts] Draw a picture representing  $3 \div \frac{1}{4}$ , explaining how to see the answer from your diagram.

(b) [1 pt] Which model of division did you have to use above?

5. [5 pts] Which part of a fraction can never equal zero, and why? (Note: “You can’t divide with zero.” is not an adequate answer; such a claim must be justified itself.)

6. [4 pts] Perform the indicated computation entirely by hand, showing clear precancelling wherever possible.

$$\frac{45}{54} \times \frac{30}{49} \div \frac{15}{14}$$

7. [4 pts] Arrange the following fractions in *decreasing* order, **without converting to decimals**. Show clear work or else verbally explain your reasoning.

$$71/61 \quad 7/6 \quad 71/60$$

8. [4 pts] Make up a fraction equivalent to  $\frac{7}{9}$  but whose numerator is between 300 and 319. Briefly explain what you did to create your fraction.

9. [5 pts] Clearly and thoroughly explain why “invert-and-multiply” produces the correct answer to

$$\frac{5}{6} \div \frac{1}{3}$$

10. (a) [3 pts] Subtract entirely in mixed notation:  $5\frac{2}{9} - 3\frac{8}{15}$ .

- (b) [2 pts] Convert your answer above to an improper fraction.

11. [6 pts] Arrange the following in decreasing order:

$$5.\overline{45} \quad 5.4\overline{5} \quad 5.454454445\dots \quad 5.\overline{4} \quad 5.45$$

12. A recipe calls for  $5\frac{1}{2}$  cups of flour,  $2\frac{2}{3}$  cups of water, and 4 tablespoons of salt.

(a) [3 pts] Express the ratio of flour to water in lowest terms. Show clear work.

(b) [6 pts] Use your choice of the unit-rate or scaling methods to tell how much water you'd need if you accidentally used 6 tablespoons of salt. Clearly explain your work, and specify which method you are using.

13. [4 pts] Make up a decimal that is strictly between  $4\frac{64}{99}$  and  $4.\overline{6464}$ . Show clear work, but you need not explain.

14. [4 pts] Demonstrate the use of exponent rules to simplify  $\frac{(a^{14})^5}{a^{10}} \cdot a^2$ .

15. (a) [2 pts] Write the number 0.000405 in expanded notation.

(b) [2 pts] Write the number 0.000405 in scientific notation.

16. (a) [2 pts] Perform the following division by hand:  $7 \div 1.4$ .

(b) [4 pts] Use the Fundamental Law of Fractions to explain why you treated both decimal points as you did.

17. (a) [3 pts] Convert  $\frac{1}{8}$  to a percent.

(b) [5 pts] Convert 0.12222222... to a fraction.

(c) [3 pts] Make up a decimal that cannot be written as a fraction, telling how you know.

18. [5 pts] I bought an airline ticket for a total of \$300, which included a 25% surcharge. What was the price of the ticket alone, without the surcharge?

19. [12 pts] Find both the area and the perimeter of the figure on the board, rounding to the nearest tenth if necessary. Show clear work, and tell which is which.  
(trapezoid with quarter circle removed)

20. (a) [2 pts] Convert 4.56 cg to dag.

(b) [3 pts] Convert 78.9 square feet to square inches, rounding to the nearest tenth if needed.

(c) [3 pts] Convert 15 miles per hour to feet per second, rounding to the nearest tenth if needed.

(d) [5 pts] I lost 32 pounds in 17 weeks this semester. How many ounces per hour is that? Round to the nearest tenth; show clear work.

21. Consider the following graph:

<u>Grades on the Ice Cube Making Exam</u>	
9	1 2
8	3 5 7 0
7	4 4 2 9 8
6	3 7

(a) [6 pts] Make and clearly label a box-and-whisker plot for this data.

(b) [4 pts] Make and clearly label a bar graph for this data.

22. [6 pts] Make up a collection of five scores from 0 to 100 for which the mean is 60, the median 50, and the mode 40. Explain your reasoning for each of these qualities.
23. [3 pts] The lifespan of a certain type of beetle is normally distributed with a mean of 37 days and a standard deviation of 3 days. What percent of these beetles live 40 days or less? Show clear work, but you need not explain.
24. [6 pts - 2 each] Identify each problem below as a permutation situation, a combination situation, or neither. Do not actually solve.
- (a) I have several skirts and twice that many matching blouses. How many different outfits can I make?
  - (b) How many ways can we choose 5 toppings from Alario's list to put on our deluxe pizza?
  - (c) How many ways can we elect a president and vice president to represent all the elementary education majors on campus?
25. [4 pts] Evaluate the expression  ${}_{16}C_2$  by hand, showing clear work.