

## Elementary Number Systems I

### Practice Final

You are responsible for learning all of the content your teacher has assigned, even if it is not included on this practice final. Calculators are not allowed on the Final exam.

**True/False: Justify all your answers.**

1. If  $\frac{a}{b}$  is expressed in simplified form (where  $b$  is a nonzero integer different from  $a$ ),

then  $\frac{a+1}{b+1} = \frac{a}{b}$ .

True                  False

2. There are no fractions  $\left(\frac{\textit{Whole \#}}{\textit{Whole \#}}\right)$  that are between  $\frac{5}{17}$  and  $\frac{6}{17}$ .

True                  False

3. In estimating  $23 \times 66$ , using  $23 \times 60$  gets you closer to the exact answer than  $20 \times 66$ .

True                  False

4.  $\frac{99}{100} = \frac{98}{99}$  since both are “one” away from 1.

True                  False

5. Multiplication of fractions is associative.

True                  False

6. The sum of the two largest prime factors of 510 is 20.

True                  False

**Short Answer:**

7. a. Circle the greater fraction:

$\frac{47}{874}$       or       $\frac{49}{875}$

b. How are you making this comparison? Explain.

8. If the sequence below shows counting in base  $b$ , what is the value of  $b$ ?

$254_b, 255_b, 300_b, 301_b, 302_b, 303_b, 304_b, 305_b, \dots$

9. Find a number between  $3.158374$  and  $3.158373$

10. a. Use fractional benchmarks to estimate:  $3\frac{9}{16} + 1\frac{14}{15} \approx$

b. Is your estimate too large or too small? How can you tell without doing the actual computation?

11. Make up a story problem that can be solved by calculating  $\frac{2}{3} - \frac{1}{2}$ .

Story:

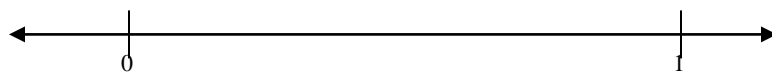
Question:

Answer:

Interpretation of subtraction involved:

12. Place each of the following on the number line below, as accurately as you can. Do this without converting each fraction to decimals. Pay careful attention to the placement of each number in relation to benchmarks. Show your work!

a.  $0.734$    b.  $\frac{10}{39}$    c.  $102\%$    d.  $0.515\%$    e.  $\frac{43}{41}$



13. A student turns in the following work. If it is correct, tell which property/properties of integers are being used. If it is incorrect, describe what went wrong, and correct it.

$$\begin{aligned} &(4 \div 6) \div 3 \\ &= 4 \div (6 \div 3) \\ &= 4 \div 2 \\ &= 2 \end{aligned}$$

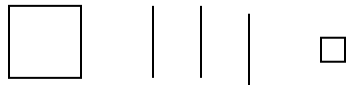
14. Convert the following decimal number to a fraction in simplest form. Show work!

$$0.625 =$$

15. Write the following decimal in fraction form  $\left(\frac{\textit{Whole \#}}{\textit{Whole \#}}\right)$  if possible. Show work.

$$0.44\overline{8} =$$

16. The picture below represents standard base five blocks, with the small square defined to be the unit.



a. How is this number written in base five? \_\_\_\_\_ five

b. What is the value of the number in base ten? \_\_\_\_\_ ten

17. a. What is the *greatest common factor* (aka *divisor*) of 12 and 18? Show work.

b. What is the *least common multiple* of 12 and 18? Show work.

18. A little girl is knitting Christmas bonnets. She has  $\frac{8}{9}$  of a yard of yarn. It takes  $\frac{2}{3}$  of a yard to make one bonnet. How many can be made? Solve by illustration.

The  $\frac{8}{9}$  refers to \_\_\_\_\_

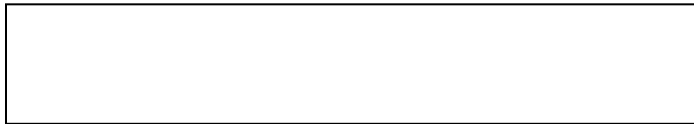
The  $\frac{2}{3}$  refers to \_\_\_\_\_

[My answer] refers to \_\_\_\_\_

19. Show with one picture that  $\frac{2}{3}$  is equivalent to  $\frac{10}{15}$  in a continuous case. Explain how your illustration shows that these two fractions are equal.

20. a. The region below shows  $2\frac{1}{2}$  yards of carpet. Show as accurately as possible

$1\frac{1}{8}$  yards of carpet.



b. If  $2\frac{1}{2}$  yards of carpet cost \$4.40, how much do  $1\frac{1}{8}$  yards of carpet cost?

21. Mentally compute the following:

a. 20% of 45 = \_\_\_\_\_

Description of method used:

b.  $16 \times 42 =$  \_\_\_\_\_

Description of method used:

c.  $1000 - 567 =$  \_\_\_\_\_

Description of method used:

d.  $5.174 \times 888 + 5.174 \times 112 =$  \_\_\_\_\_

Description of method used:

22. Use benchmarks to estimate each of the following and describe your thinking:

a.  $0.12487 \times (32.557\% \text{ of } 119.935) \approx$  \_\_\_\_\_.

Thinking:

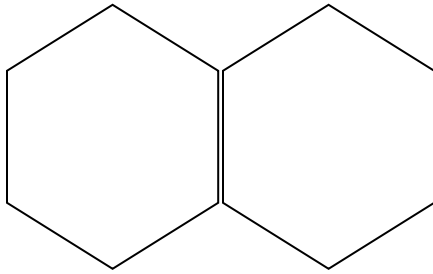
b.  $67.22\% \text{ of } (48.88\% \text{ of } 37.27) \approx$  \_\_\_\_\_.

Thinking:

23. Make up a story problem that can be solved by calculating  $7 \times \frac{2}{5}$ . Interpretation of multiplication used: \_\_\_\_\_

Story problem:

24. Using the *two* hexagons as your unit, draw  $\frac{5}{6} \div \frac{1}{3}$ :



The  $\frac{5}{6}$  refers to \_\_\_\_\_

The  $\frac{1}{3}$  refers to \_\_\_\_\_

[My answer] refers to \_\_\_\_\_

25. Perform the calculation below.

$$\begin{array}{r} 4 \ 6 \ 7_{\text{nine}} \\ + \underline{5 \ 6 \ 8_{\text{nine}}} \end{array}$$

26. Determine the value of the base  $b$  used below. Tell how you determined it.

$$\begin{array}{r} 4 \ 2 \ 3_b \\ - \underline{1 \ 5 \ 4_b} \\ 2 \ 3 \ 6_b \end{array}$$

27. The last part of the triathlon is a 10K (10 kilometer, or 10,000 meter) run. When runner Aña starts this last running part, she is 500 meters behind Bea. But Aña can run faster than Bea can: Aña can run (on average) 200 meters per minute, and Bea can run (on average) 175 meters per minute. Who wins the race, Aña or Bea? If Aña wins, when does she catch up with Bea? If Bea wins, how far behind is Aña when Bea finishes?

- a) Think about how to solve this problem. Identify at least four relevant quantities and list them below. Also indicate their corresponding values.

Quantity

Value

- b) Put your work here. This could include an informative illustration, a chart of values, records of any calculations you perform, etc.

- c) Explain *quantitatively* your reasoning about this problem: What did you do and why? (Be sure to clearly state your answer.)