

Mathematics for Elementary School Teachers

Exam 2

April 4, 2001

The point value of each problem is given in the margin.

- (9) 1. Use tests to determine whether 10101014 is divisible by the following numbers. (Show how the test works.)

a) 6 $1+1+1+1+4=8$ Thus 3 is not a divisor, so $6 \nmid 10101014$

b) 4 NO, since $4 \nmid 14$

c) 11 $1-0+1-0+1-0+1-4=0$ so yes 11 is a divisor.

- (8) 2. Find the prime factorization of 500 and then make an array to illustrate all of the divisors of 500.
- $500 = 5 \cdot 10^2 = 5 \cdot 2^2 \cdot 5^2 = 2^2 \cdot 5^3$

x	1	5	5^2	5^3	
1	1	5	25	125	}
2	2	10	50	250	
2^2	4	20	100	500	

- (6) 3. Use the Euclidean Algorithm to find GCF(847,861).

$$= \text{GCF}(847, 14)$$

$$= \text{GCF}(7, 14)$$

$$= 7$$

$$14 \overline{) 847}$$

$$\underline{84}$$

$$7$$

- (5) 4. State the Fundamental Theorem of Arithmetic.

A composite number can be expressed in one and only one way as a product of primes (except for the order of the primes.)

- (5) 5. Determine whether 97 is a prime and explain how you can be sure.

2, 3, 5 and 7 are not factors so 97 is a prime. It is not divisible by any prime $\leq \sqrt{97}$.

(5) 6. Order the fractions from smallest to largest. (Avoid calculation.)

$$\frac{5}{9}, \frac{1}{2}, \frac{101}{99}, \frac{5}{7}, \frac{3}{3}$$

$$\frac{1}{2} < \frac{5}{9} < \frac{5}{7} < \frac{3}{3} < \frac{101}{99}$$

$\frac{5}{10}$ \nearrow larger denom. makes fraction smaller \uparrow 1 \uparrow bigger than 1

(9) 7. Calculate and express your final answers in simplified form.

a) $\frac{7}{15} \div \frac{21}{5} = \frac{7}{15} \cdot \frac{5}{21} = \frac{1}{9}$

b) $\left(\frac{125}{7}\right) \cdot 14 = 250$

c) $\frac{7}{45} + \frac{1}{6} = \frac{7}{45} \cdot \frac{2}{2} + \frac{1}{6} \cdot \frac{15}{15} = \frac{14+15}{90} = \frac{29}{90}$

(9) 8. a) Write in expanded form $200.1005 = 2 \times 10^2 + 1 \times 10^{-1} + 5 \times 10^{-4}$

b) Express as a decimal $5 \cdot 10^3 + 7 \cdot 10^{-2} = 5000.07$

c) Express in words $4.0205 =$ *Four and two-hundred-five ten-thousandths.*

(5) 9. Calculate and express final answer in scientific notation.

$$\frac{1.8 \times 10^{12}}{.006 \times 10^4} = \frac{1.8 \times 10^{12}}{6 \times 10^{-3} \times 10^4} = .3 \times 10^{12-4+3} = 3 \times 10^{-1} \times 10^{11} = 3 \times 10^{10}$$

(9) 10. Estimate. (Do not calculate exact values.)

(a) $\frac{35013}{71} \approx \frac{35000}{70} = 500$

(b) 4.97 percent of 1013 $\approx .05 \times 1000 = 50$

(c) $\frac{49}{99} + \frac{98}{102} + \frac{97}{48} \approx \frac{1}{2} + 1 + 2 = 3\frac{1}{2}$

(9) 11. Calculate exactly

a) $36.24 - 6.007$

$$\begin{array}{r} 36.240 \\ - 6.007 \\ \hline 30.233 \end{array}$$

b) $.017 \times 20.1$

$$\begin{array}{r} 20.1 \\ \times .017 \\ \hline 1407 \\ 201 \\ \hline .3417 \end{array}$$

.3417

move 4 places left

c) $2.01 \div .015$

= 134

$$\begin{array}{r} 134. \\ \overline{) 2.010} \\ \underline{15} \\ 51 \\ \underline{45} \\ 60 \end{array}$$

(5) 12. Two-fifths of a third grade class were girls. What was the ratio of boys to girls in the class? (Use whole numbers.) ~~2~~ 3:2 or 3 to 2

What percentage of the class were boys?

$\frac{3}{5} = .6 = 60\%$



(6) 12. Convert the given decimal to a fraction in simplified form: $2.0\overline{5}$

$$\begin{array}{l} x = 2.0555\dots \\ 10x = 20.5555\dots \\ 100x = 205.555\dots \\ \hline 90x = 185 \end{array} \quad x = \frac{185}{90} = \frac{37}{18}$$

(5) 13. A recipe calls for 2 cups of flour and $\frac{1}{3}$ cup of milk. If you only have $1\frac{2}{3}$ cups of flour, how much milk should you add? $x = \text{amount of milk}$.

$\frac{\text{milk}}{\text{flour}}, \frac{x}{1\frac{2}{3}} = \frac{\frac{1}{3}}{2} \Rightarrow x = 1\frac{2}{3} \times \frac{1}{6} = \frac{5}{3} \times \frac{1}{6} = \frac{5}{18} \text{ cups}$

$\frac{1}{3} = \frac{1}{3} \cdot \frac{1}{2} = \frac{1}{6}$

(5) 14. The morning temperature was 40° . It went up 50 percent by mid-afternoon and then down 20 percent (from the mid-afternoon temp.) by early evening. What was the early evening temperature?

$$\begin{aligned} 40^\circ + .5(40^\circ) &= 40 + 20 = 60^\circ = \text{afternoon temp} \\ 60 - .2(60^\circ) &= 60 - 12 = \boxed{48^\circ} = \text{evening temp} \end{aligned}$$