

# Answers to Sample Test

Math 141 - Summer '04

TEST II

Chapters 3, 4, 5, 6 and 7.

Show all your work! Partial credit is based on work shown!

9pts

1. Without actually dividing, use the divisibility tests to determine if 7051 is divisible by each of the following numbers.

a. Does  $9 \mid 7051$ ? No Show the divisibility test for 9: sum of digits must be divisible by 9  
 $2 \text{ pts } 7+0+5+1 = 13$

b. Does  $11 \mid 7051$ ? yes Show the divisibility test for 11:  
 $2 \text{ pts } (7+5) - (0+1) = 12 - 1 = 11$

c. Does  $7 \mid 7051$ ? No Show the divisibility test for 7:

$$2 \text{ pts } \begin{array}{r} 705 \\ - 2 \\ \hline 703 \end{array} \quad \begin{array}{r} 70 \\ - 6 \\ \hline 64 \end{array} \quad 7 \nmid 64$$

3pts

2. Complete this four digit number so that it is divisible by 6. Explain the divisibility test for 6.

1pt or 8520 or 8526

$$8+5+2+[\quad] = 15$$

\* must be div by 2 + 3  
 \* Thus last digit must be even +  
 \* Sum of digits div. by 3.

5pts

3. How could you create a test for divisibility by 12? Write out your test and give an example of a four-digit number and show that your test works.

3pts Must be divisible by 4 + 3 thus the <sup># from</sup> last two digits must be div by 4  
 + sum of digits must be div by 3.  
 2pts (8520 would work since  $4 \mid 20$  and  $(8+5+2+0) = 15$  and  $3 \mid 15$ ,

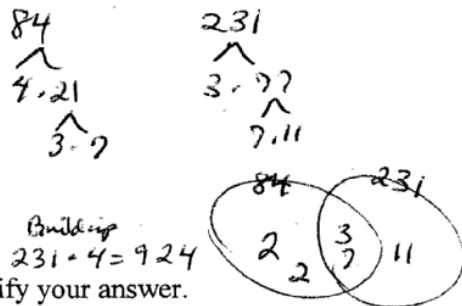
8pts (2pts each)

4. a. The prime factorization of 84 is  $3 \cdot 2^2 \cdot 7$

b. The prime factorization of 231 is  $3 \cdot 7 \cdot 11$

c. The greatest common factor of 84 and 231 is 21

d. The least common multiple of 84 and 231 is 924



4pts.

5. Show all your steps in the following subtraction problem and simplify your answer.

$$\frac{17}{231} - \frac{1}{84} = \frac{4}{4} \cdot \frac{17}{231} - \frac{1}{84} \cdot \frac{11}{11} = \frac{68}{924} - \frac{11}{924} = \frac{57}{924} = \frac{19}{308}$$

5pts

6. a. Which fraction is larger  $\frac{7}{11}$  or  $\frac{5}{8}$ ?  $\frac{7}{11}$  Explain using one of the methods we discussed in class.

use LCD or any common denominator  
 $\frac{7}{11} = \frac{56}{88}$   
 $\frac{5}{8} = \frac{55}{88}$

or cross multiply  
 $7 \cdot 8 > 5 \cdot 11$   
 $56 > 55$

change to decimals  
 $\frac{7}{11} = .63$   
 $\frac{5}{8} = .625$

b. Find one fraction between the fractions  $\frac{7}{11}$  or  $\frac{5}{8}$ . Show your work.

$\frac{112}{176}$   $\frac{111}{176}$   $\frac{110}{176}$

or  $\frac{7+5}{11+8} = \frac{12}{19}$

or  $.63 = \frac{63}{100}$

6pts

7. Write each decimal as a fraction:

a.  $0.538 = \frac{538}{1000}$

b.  $0.538538538... = \frac{538}{999}$

$1000N = 538.538538... - N = 0.538538... \implies 999N = 538$

or  
 $1000N = 4.272727... - N = 0.4272727... \implies 999N = 423$

6pts

8. Without dividing to change the following fractions to decimals, explain how to determine whether each fraction will be a terminating decimal.

a.  $\frac{15}{60} = \frac{5}{20} = \frac{1}{4}$  terminate

b.  $\frac{5}{60} = \frac{1}{12}$  not terminating dec. because has factor of 3.

4pts

9. Show your steps to illustrate an easy way to divide these numbers; write answer in scientific notation.

$$\left(\frac{5.4 \times 10^{12}}{9.0 \times 10^7}\right) = \frac{5.4}{9.0} \times \frac{10^{12}}{10^7} = .6 \times 10^5 = 6.0 \times 10^4$$

3pts

10. Give a number example to illustrate each of the following properties:

a. Associative  $(5+2)+3 = 5+(2+3)$  etc. + or x.

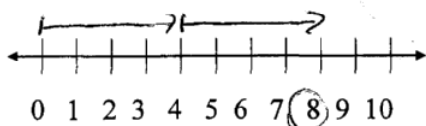
b. Commutative  $7+8 = 8+7$  etc.

c. Distributive  $6(2+3) = 6(2) + 6(3)$

4pts

11. Illustrate that  $2 \times 4 = 8$ , using the following:

a. number line



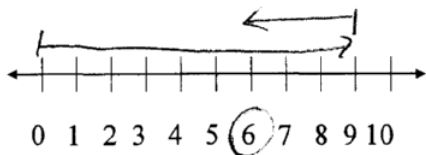
b. set model two sets of four  
- 1, if either or both show  $4 \times 2 = 8$



4pts

12. Illustrate that  $9 - 3 = 6$ , using:

a. number line



b. set model Start with 9, take out 3, leaves 6.



6pts

13. Fill in the blanks using the **definition of division**, writing each division equation as a multiplication equation. (If there is no answer say "undefined" and show why.)

a.  $21 \div 7 = 3$  because  $3 \times 7 = 21$

b.  $0 \div 7 = 0$  because  $0 \times 7 = 0$

c.  $0 \div 0 =$  undefined because  $\square \times 0 = 0$   
*no unique soln.*

2pts

14. Fill in the blank using the **definition of less than**:  $5 < 16$  because  $5 + 11 = 16$

*-1 pt if said 5 is before 16 on # line or in counting or used + corresp*

6pts

15. Write out the steps to show how you would **mentally calculate** each of the following:

Give the exact answer, not an estimate and do not use standard paper and pencil methods.

a.  $99 \times 28 = (100-1) 28$   
 $= 2800 - 28$   
 $= 2772$

b.  $(20)(6.25) = 20(6 + \frac{1}{4})$   
 $= 120 + 5$   
 $= 125$

*ok if used decimals  
10 x 6.25 x 2  
6.25 x 2  
12.5*

6pts

16. a. **Estimate** using compatible numbers.

$178 \div 23 \approx 175 \div 25 = 7$

*(ok if  $180 \div 20 = 9$ )*

b. **Estimate** the following using front-end with adjustment.

$3\frac{4}{7} + 6\frac{9}{15} \approx (3+6) + (\frac{1}{2} + \frac{1}{2}) = 9 + 1 = 10$

8pts

17. A school fund-raising project has collected \$1700, which is 68% of its goal. What is the amount of the goal for this project? *2500* Solve using a proportion or a simple algebraic equation, showing your work.

*ks  
nope  
x amount  
ok if*

$\frac{1700}{x} = \frac{68}{100}$

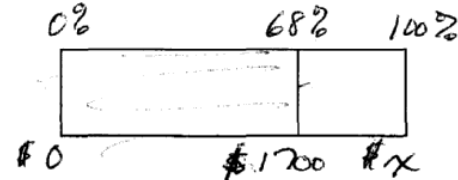
$68x = 170000$   
 $x = \frac{170000}{68}$

$x = 2500$

*answer just have*  
 $68x = 1700$   
 $x = \frac{1700}{.68}$   
 $x = 2500$

b. Illustrate this problem by putting appropriate numbers on this diagram.

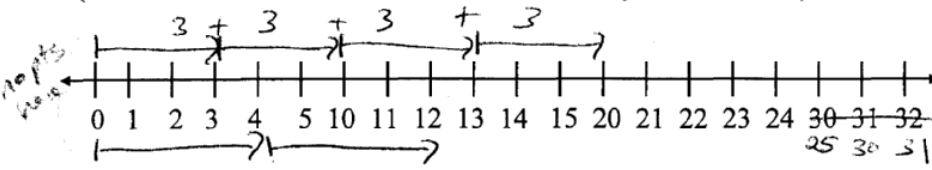
*3pts*



11pts

18. Do each of these problems in **base six** arithmetic:

(Use this number line to determine the necessary number facts.)



*10 pts  
100%*

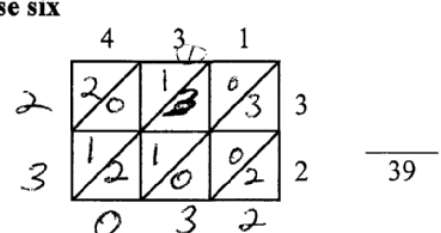
3pts a. Subtract  $341_6 - 143_6$

$12 - 3 = 5$   
 $10 - 4 = 2$

$225_6$

8pts b. Multiply:  $431_6 \times 32_6$  in base six using lattice multiplication.

$2 \times 3 = 10$   
 $3 \times 3 = 13$   
 $4 \times 3 = 20$   
 $2 \times 4 = 12$



*-2 pts if added in base ten  
2302*