Name: Key

Math 221: Final Worksheet 2

Instructions: Complete this as review for the Test 2 material. It is not a standalone review, so be sure to also review old tests, quizzes, homework, etc, as well as the final theory review sheet.

1. Determine which model is being described in each problem. Match the question to the given choices below.

   ii 1. Shawn worked a 24 hour shift and then worked another 12 hours immediately thereafter. How many hours did he work?

   v 2. Alan watched 8 hours of TV, and David watched 5 hours of TV. How much more TV did Alan watch than David?

   i 3. Sharon has 3 cats and 2 birds. How many animals does she have altogether?

   iii 4. Tina had a bookshelf with 50 books on it, but one of her mischievous catss knocked one off. How many books are left on the bookshelf?

   x 5. A poster on the wall of the Russell house is 3 feet by 5 feet. How much area on the wall does it cover?

   iv 6. Sarah went to the Chinese restaurant with $7 and ordered way more food than she could actually eat, costing $12. How much more money does she need to borrow from her mom to pay for her Chinese food?

   xiii 7. For the pen pal party, we will had 200 slices of pizza. If we planned to give 2 slices to each person, how many people were we able to serve?

   xi 8. If Danny has 12 different colored socks and 4 different white socks to choose from, how many ways can he put on black socks on his left food and white socks on his right foot?

   vi 9. Michael drove the 1000 mile drive to Texas to see his grandparents in 2 days. If he drove 600 miles in the second day, how many miles did he drive on the first day?

   viii 10. Travis wrote a program that took 5 hours to run. If the computer did 1 billion calculations per hour, how many calculations did Travis make the computer do?

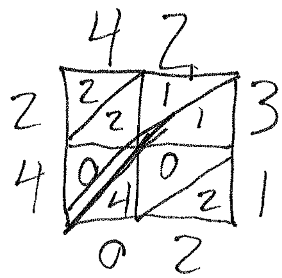
   ix 11. A marching band is neatly lined up in 10 rows of 4. How many people are in the marching band?

   xii 12. bought a bag of Easter candy for her kindergarten class. If the bag of candy has 75 pieces of candy in it and she has 25 students, how many pieces of candy does each student get?

   vii 13. A loaf of bread has 20 slices. If Holly bought 3 loaves of bread, how many slices of bread did he have?

~~i.~~ Set Model	~~vi.~~ Number Line Subtraction	~~xi.~~ Cartesian Product
~~ii.~~ Number Line Addition	~~vii.~~ Repeated Addition	~~xii.~~ Partition
~~iii.~~ Take Away	~~viii.~~ Number Line Multiplication	~~xiii.~~ Measurement
~~iv.~~ Missing Addition	~~ix.~~ Array	
~~v.~~ Comparison	~~x.~~ Area	

2. Use the lattice algorithm to calculate $42_{\text{five}} \times 31_{\text{five}}$.



$\boxed{2402_{\text{five}}}$

3. Use the specified algorithm to solve the given problem. Show your work here. **All numbers are base 5.**

(a) Long Division (with remainder)

$$\begin{array}{r|l} & 1300_{\text{five}}\ R\ 1_{\text{five}} \\ \hline 3 & 4401 \\ & -3 \\ & \overline{14} \\ & -14 \\ & \overline{\ 00} \\ & -\ 01 \\ & \overline{\ \ \ 1} \end{array}$$

(b) Standard Algorithm

$$\begin{array}{r} {}^{2}\cancel{3} \\ 14 \\ \times 34 \\ \hline 121 \\ +1020 \\ \hline 1141_{\text{five}} \end{array}$$

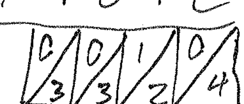
(c) Standard Algorithm

$$\begin{array}{r} 111\ \\ 1142 \\ +1343 \\ \hline 3040_{\text{five}} \end{array}$$

(d) Lattice Algorithm

$$\begin{array}{r} 2032 \\ +1342 \\ \hline \end{array}$$

$$\begin{array}{r} 2032 \\ +1342 \\ \hline \end{array}$$



3424_{five}

(e) Standard Algorithm

$$\begin{array}{r} \overset{1}{\cancel{2}}\overset{\overset{4}{\cancel{10}}}{\cancel{0}}\overset{\overset{10}{\cancel{0}}}{\cancel{1}}\overset{11}{\cancel{1}} \\ -1112 \\ \hline 344_{five} \end{array}$$

(f) Long Division (with remainder)

$$\begin{array}{r} 33_{five}\ R3_{five} \\ 23\overline{\big)\,1\overset{3}{\cancel{4}}\overset{12}{\cancel{2}}2} \\ -124 \\ \hline 1\overset{2}{\cancel{3}}\overset{12}{\cancel{2}} \\ -124 \\ \hline 3 \end{array}$$

$$\begin{array}{r} \overset{1}{2}3 \\ \times\ 3 \\ \hline 124 \end{array} \qquad \begin{array}{r} \overset{3}{2}4 \\ \times\ 4 \\ \hline 211 \end{array}$$

(g) Equal Additions

$$\begin{array}{r} 2011 \\ -1112 \\ \hline \end{array} \begin{array}{c} \xrightarrow{+3} \\ +3 \end{array} \begin{array}{r} 2014 \\ -1120 \end{array} \begin{array}{c} \xrightarrow{+30} \\ +30 \end{array} \begin{array}{r} 2044 \\ -1200 \end{array} \begin{array}{c} \xrightarrow{+300} \\ +300 \end{array} \begin{array}{r} 2344 \\ -2000 \\ \hline 344_{five} \end{array}$$

Problems are slightly off pages.

6. Determine whether 2, 3, 4, 5, 6, 7, 8, 9, 10, and 11 divide 5280. Briefly justify each one.

$2 \mid 5280$ since 5280 ends in 0

$5+2+8+0=15$

$3 \mid 5280$ since $3 \mid 15$.

$9 \nmid 5280$ since $9 \nmid 15$

$4 \mid 5280$ since $4 \mid 80$

$5 \mid 5280$ since 5280 ends in 0

$6 \mid 5280$ since $2,3 \mid 5280$

$\boxed{2,3,4,5,6,8,10,11}$

$528-2\cdot 0=528$

$52-2\cdot 8=36$

$7 \nmid 5280$ since $7 \nmid 36$

$8 \mid 5280$ since $8 \mid 280$

$10 \mid 5280$ since 5280 ends in 0

$5-2+8-0=11$

$11 \mid 5280$ since $11 \mid 11$.

7. Determine if the following numbers are prime or composite. You do not have to justify your divisibility tests, but write down what you check. Circle your answer.

(a) 161 $(\sqrt{161} \approx 12.69)$

$\cancel{2}$ $\cancel{3}$ $\cancel{5}$

$16-2=14$, so $7 \mid 161$

$161=7\cdot 23$

$\boxed{\text{Composite}}$

(b) 163 $(\sqrt{163} \approx 12.77)$

$\cancel{2}$ $\cancel{3}$ $\cancel{5}$

$16-2\cdot 3=10$ $\cancel{7}$

$1-6+3=-2$ $\cancel{11}$

$\boxed{\text{Prime}}$

8. Find the greatest common divisor of the following numbers using the indicated method.

(a) 70 and 42 (Prime Factorization)

$70 = 2 \cdot 5 \cdot 7$ $\qquad GCD(70, 42) = 2 \cdot 7 = \boxed{14}$

$42 = 2 \cdot 3 \cdot 7$

(b) 96 and 108 (Intersection of Sets)

$D_{96} = \{1, 2, 3, 4, 6, 8, 12, 16, 24, 32, 48, 96\}$

$D_{108} = \{1, 2, 3, 4, 6, 9, 12, 18, 27, 36, 54, 108\}$ $\qquad GCD(96, 108) = \boxed{12}$

9. Find the least common multiple of the following numbers using the indicated method.

(a) 60 and 25 (Prime Factorization)

$60 = 2^2 \cdot 3 \cdot 5$ $\qquad LCM(60, 25) = 2^2 \cdot 3 \cdot 5^2 = \boxed{300}$

$25 = 5^2$

(b) 36 and 30 (Intersection of Sets)

$M_{36} = \{36, 72, 108, 144, 180, \ldots\}$

$M_{30} = \{30, 60, 90, 120, 150, 180, \ldots\}$ $\qquad LCM(36, 30) = \boxed{180}$

10. Determine if the following statements are true or false. If it is true, then explain why, and if it is false, give a specific example that shows why.

(a) $\mathbb{Z}$ has the commutative property with multiplication.

True, multiplication of two integers gives the same answer regardless of the order they are multiplied.

(b) $\mathbb{N}$ has the identity property with addition.

False, $0 \notin \mathbb{N}$.

(c) $\mathbb{W}$ has the zero product property.

True, $0 \in W$ and $0 \times$ any whole number is 0.
or any whole number $\times\ 0$

11. KJ runs the Sieve of Eratosthenes to find all the prime numbers up to 200. He first crosses out the 1 since he knows that it is neither prime nor composite. Next, he circles the 2 then crosses out all multiples of 2, then circles the 3 and crosses out all remaining multiples of 3, and does the same for 5, 7, and 11. He then circles all of the remaining numbers and claims that they are all prime. Is the student correct? How would you respond to this student?

Not quite. $\sqrt{200} \approx 14.14$, so he also needs to check 13. I would show KJ that he circled 169, but it is actually $13 \cdot 13$. I would then explain how he can stop once he has done this for all primes less than $\sqrt{200}$.

12. Jackie is working on finding the least common multiple of 6 and 9 and writes out some very long lists. She notices that the least common multiple is 18, but that the other common multiples are 36, 54, 72, and 90. She also notices that 36, 54, 72, and 90 are all multiples of 18. Jackie asks you if the common multiples of two numbers are always a multiple of the least common multiple. How would you respond to this student?

Jackie is correct! The next common multiple will appear after the same number of steps for each set, so you will have added the same amounts as you did to get the least common multiple. This repetition is why all common multiples come from the least common multiple.