1) (3 points) Write the first 10 counting numbers (starting with 1) in base 4. You do not have to write the subscript:

1, 2, 3, 10, 11, 12, 13, 20, 21, 22

2) (3 points) Count from 63_{seven} to 101_{seven}. You do not have to write the subscript:

63, 64, 65, 66, 100, 101.

3) (4 points *a*, *b*; 6 points *c*) Convert the following numbers to the given base:

a) 5322_{eight} to base 10

$5 \cdot 8^3 + 3 \cdot 8^2 + 2 \cdot 8^1 + 2 \cdot 8^0$

$= 2770$

b) 2,001 to base 7

$7^3 = 343$ $\quad 2001 \div 343 = 5$ R 286

$7^2 = 49$ $\quad 286 \div 49 = 5$ R 41

$7^1 = 7$ $\quad 41 \div 7 = 5$ R 6

$7^0 = 1$ $\quad 6 \div 1 = 6$ R 0

5556_{seven}

c) 11110010_{two} to base 16

$1 \cdot 2^7 + 1 \cdot 2^6 + 1 \cdot 2^5 + 1 \cdot 2^4 + 1 \cdot 2^1 = 242$

$16^1 = 16$ $\quad 242 \div 16 = 15$ R 2

$16^0 = 1$ $\quad 2 \div 1 = 2$ R 0

$F2_{sixteen}$

4) (3 points) List the first 10 prime numbers starting with 2:

2, 3, 5, 7, 11, 13, 17, 19, 23, 29

5) (3 points each) Write the prime factorization for the following numbers:

a) 228

4 · 57

2 · 2 · 3 · 19

$2 \cdot 2 \cdot 3 \cdot 19 = 2^2 \cdot 3 \cdot 19$

b) 1075

5 · 215

5 · 43

$5 \cdot 5 \cdot 43$

6) (3 points each) Label the following as either true or false. Use the word "true" or "false" to mark your answer. If false, explain why or give a counter-example:

a) $16 \mid 4$ False $16 > 4$

b) $4 \mid 16$ True

c) If 3 divides into a number and 4 divides into the same number, then 12 also divides into that number.

True

d) If 2 divides into a number and 4 divides into the same number, then 8 also divides into that number.

False! $2 \mid 4$ $4 \mid 4$ but $8 \nmid 4$

7) (3 points) What is the divisibility test for...

a) 4?

b) 5?

Lemonadeeeee...

8) (4 points each) Label the following numbers as perfect, abundant, or deficient. Be sure to show supportive work:

a) 6

1 | \
1 2 3

perfect

$1+2+3=6$

b) 17

1

$1 < 17$

deficient

c) 24

1 |

$1+2+3+4+6+8+12=36$

$36 > 24$

abundant

9) (4 points each) A Goldbach number is a positive integer that is the sum of two odd prime numbers. The following numbers are Goldbach numbers. Determine two odd primes that add up to them:

a) 36

$5+31$	4 Answers
$7+29$	$17+19$
$13+23$	

b) 50

$3+47$	$19+31$
$7+43$	Also 4 answers
$13+37$	

c) Why must a Goldbach number be an even number?

Huh?

d) Why isn't 2 a Goldbach number where $1 + 1 = 2$?

Wha?

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10) (5 points) Sally ordered McChickens from McRutrohs®. She had a total of 96 McChickens total from ordering some 6-packs, 9-packs, and 20-packs. (That is, at least one pack of each was ordered). Determine how many of each pack she ordered.

6 9 20

111 11 111

3 6's
2 9's
3 20's

11) (5 points) For the numbers 140 and 550, find the GCF and the LCM using your favorite method. Be sure to label your answers:

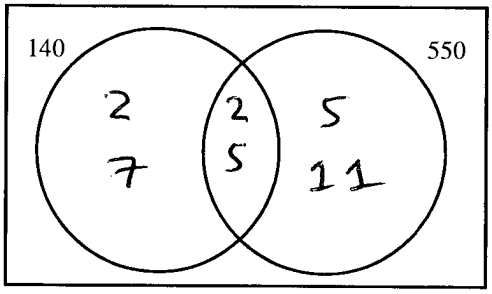
$140 = 2^2 \cdot 5 \cdot 7$

$550 = 2 \cdot 5^2 \cdot 11$

GCF: $2 \cdot 5 = 10$

LCM $2^2 \cdot 5^2 \cdot 7 \cdot 11 = 7700$

12) (3 points) Using your work above, fill in the Venn Diagram for the numbers 140 and 550. The numbers in the 140 circle should multiply to 140. The numbers in the 550 circle should multiply to 550.



13) (4 points) Border guards are checking cars as they pass into Mathland, the happiest place on Earth. Border Guard Bell checks every 14th car, Border Guard Biv checks every 10th car, and Border Guard DeVoe checks every 4th car. What will be the first car checked by...

a) Bell and DeVoe?

LCM of 14 (2·7) & 4 (2·2)

$2^2 \cdot 7 = 28^{th}$ car

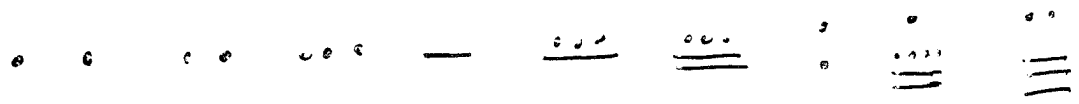
b) All three?

14 10 4

2 7 2 5 2 2

$2^2 \cdot 5 \cdot 7 = 140^{th}$ car

14) (4 points) Write the first 10 terms of the Fibonacci Sequence:



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