

Quiz 5A, MTH 2010 - No Calculators

Dr. Graham-Squire, Spring 2015

Name: Key

1. (2 points) Suppose the difference between two counting numbers is odd. What can you say about the *sum* of the two numbers? Explain why your answer is always correct, and make your answer general—just giving one example is NOT a full explanation.

If $A - B = \text{odd}$, then one of them is odd and the other even (if both were even, or both were odd, the subtraction would leave you with an even #). If you add an odd and an even, you always get an odd #, because the even is all paired up, and the odd has one left over, so the result will have one left \Rightarrow odd.

2. (3 points) A chocolate distributor is trying to divide an order of chocolate candies into equally sized groups for shipping in boxes. The candies can be divided into groups of 12 or groups of 45, with no candies left over. Which of the following inequalities is satisfied if C is the smallest possible total number of candies? Show/explain your work!

(a) $C < 50$

(b) $50 \leq C < 150$

(c) $150 \leq C < 250$

(d) $250 \leq C$

Need LCM of 12, 45

$$12 = 2^2 \cdot 3$$

$$45 = 3^2 \cdot 5$$

$$\begin{aligned} \Rightarrow \text{LCM} &= 2^2 \cdot 3^2 \cdot 5 \\ &= 180 \end{aligned}$$

3. (2 points) Is 163 a prime number? State yes or no, and explain how you know it is or is not a prime.

163 \rightarrow Not divisible by 2 (163 is odd)
 \rightarrow " " by 3 ($1+6+3=10$)
 \rightarrow " " " 5

check primes
 Divisibility rules

check

$$\begin{array}{r} 23 \\ 7 \overline{)163} \\ -14 \\ \hline 23 \\ -21 \\ \hline 2 \\ \times \end{array}$$

$$\begin{array}{r} 14 \\ 11 \overline{)163} \\ -11 \\ \hline 53 \\ -44 \\ \hline 9 \\ \times \end{array}$$

$$\begin{array}{r} 12 \\ 13 \overline{)163} \\ -13 \\ \hline 33 \\ -26 \\ \hline 7 \\ \times \end{array}$$

Prime

\rightarrow because 2, 3, 5, 7, 11, and 13 do not divide it, and when you divide by 13, you get a

smaller than 13

4. (3 points)

smaller # (so you can stop there)

The letters A and B represent digits (possibly equal) in the ten digit number $x = 1,438,152, A3B$. For which values of A and B is x divisible by 12, but not by 9? Show/explain your work!

(a) $A=0, B=4$ \times Not divisible by 3 or 4 $\downarrow \nabla$
 divisible by 3 and divisible by 4

(b) $A=7, B=2$ $\times \rightarrow$ No, because would be divisible by 9

(c) $A=0, B=6$

(d) $A=4, B=8$ $\times \rightarrow$ No, would not be divisible by

$$1+4+3+8+1+5+2+3 = 27$$

4 b/c last two digits are 38.