



Math Olympiad and Problem Solving Programs  
E220 - Intermediate Math Competitions  
Problem Set 2.2 - Counting Numbers

Name:

Date:

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1.  $\boxed{90}$
2.  $\left\lfloor \frac{80}{2} \right\rfloor - \left\lfloor \frac{29}{2} \right\rfloor = 40 - 14 = 26$ .  $\left\lfloor \frac{80}{3} \right\rfloor - \left\lfloor \frac{29}{3} \right\rfloor = 26 - 9 = 17$ .  $\left\lfloor \frac{80}{2 \times 3} \right\rfloor - \left\lfloor \frac{29}{2 \times 3} \right\rfloor = 13 - 4 = 9$ .  
 $26 + 17 - 9 = \boxed{34}$ .
3.  $\boxed{40}$
4.  $\boxed{18}$
5. Count case wise. Count how many have 3 zeros: 9. Count how many have 2 zeros:  $3 \times 81 = 243$ .  $9 + 243 = \boxed{252}$ .
6. Pages 1-9 require 9 digits. Pages 10-99 require  $90 \times 2 = 180$  digits. Pages 100 - 156 require  $57 \times 3 = 171$ . Thus  $9 + 180 + 171 = \boxed{360}$
7. The numbers 1-99 have twenty of the digit 5. Now we count out the last nine 5's: 105, 115, 125, 135, 145, 150, 151, 152, 153. So there are pages.  $\boxed{153}$
8.  $\boxed{167}$
9.  $\boxed{12}$
10. The answer many of you put that is wrong is 12. But there is not such time as 07:70. So we must consider palindromes with the minutes less than 60. Thus there are 8: 01:10, 02:20, 03:30, 04:40, 05:50, 10:01, 11:11, 12:21.  $\boxed{8}$