



Math Olympiad and Problem Solving Programs

F130 - Advanced Problem Solving

Problem Set 8.2 - Divisibility

Name: _____

Date: _____

1.
2. If the sum of the digits of the number are divisible by 9, then the number itself is as well.
949: $9 + 4 + 9 = 22$ is not divisible by 9.
712: $7 + 1 + 2 = 10$ is not divisible by 9.
111111111: $1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 = 9$ is divisible by 9.
191919191: $1 + 9 + 1 + 9 + 1 + 9 + 1 + 9 + 1 = 41$ is not divisible by 9.
 81×29867 : 81 is divisible by 9 so 81×29867 is divisible by 9.
 19×91 : Neither 19 nor 91 are divisible by 9 so 19×91 is not divisible by 9.
3.
4.
5. The last three digits of Rebecca's phone number is 269. The last three digits of Daniel's phone number is 892. How many numbers between the two are divisible by 3?
The numbers between 269 and 892 are the numbers from 270 to 891 inclusive. There are $891 - 270 + 1 = 622$ numbers from 270 to 891 inclusive. Every three consecutive numbers has one number that is divisible by 3. So there are $622 \div 3 = 207$ numbers divisible by 3, BUT our endpoints, 270 and 891 are also divisible by 3. To compensate for this we add 1 to get .
6.
7.
8. There are 24 counting numbers less than 25. One of every two numbers is divisible by 2 so there are $24 \div 2 = 12$ numbers divisible by 2. One of every five numbers is divisible by 5 so there are $24 \div 5 = 4$ numbers divisible by 5. However, this counts the numbers divisible by 10 twice. We have $24 \div 10 = 2$ numbers divisible by 10 so we really have $12 + 4 - 2 = 14$ numbers divisible by 2 or 5.
9.
10. (a)
(b)
(c)
(d)
(e)
(f)