

Problems of the Week (POWs) Assignments

Instructions: Your solution will be graded according to the official Oregon Scoring Guide, and thus your write up should include all your reasoning, and not just a final answer.

*The **emphasis** of these assignments is on **clear, complete and precise explanations**. Please write your solutions in a way that a "typical" student in the 5-8th grade range will be able to follow it.*

If you do not like the score you receive on your POWS (scores above 20 would be what you should strive for), you could choose another one from each of the 6 assignments and turn in your second attempt in by 5/30. The scores of the 1st two attempts will then be averaged.

Some of these problems were taken from the following sources:

www.eduplace.com,

<http://www.cmc.uwaterloo.ca/english/contests/pascal.shtml>

A. POW 1 Due 4/21: Choose one of the following two problems:

How many different factors are there of the number $324000 = 2^5 \times 3^4 \times 5^3$?

What is the smallest number, greater than zero, that the first four prime numbers as well as the first four composite numbers evenly divide?

B. POW 2 Due 4/21: Choose one of the following two problems:

The people of Evenland never use odd digits. Instead of counting 1, 2, 3, 4, 5, 6, an Evenlander counts 2, 4, 6, 8, 20, 22. Therefore, we can say that 22 is the Evenland version of our integer 5. What is the Evenlander's version of our integer 111?

Starting with the 2, the number 2006 can be formed by moving either horizontally, vertically, or diagonally from square to square in the grid. How many different paths can be followed to form 2006? (Hint: It is between 70 and 100)

6	6	6	6	6
6	0	0	0	6
6	0	2	0	6
6	0	0	0	6
6	6	6	6	6

C. POW 3 Due 5/5: Choose one of the following two problems:

Cindy leaves school at the same time every day. If she cycles at 20 km/h, she arrives home at 4:30 in the afternoon. If she cycles at 10 km/h, she arrives home at 5:15 in the afternoon. At what speed, in km/h, must she cycle to arrive home at 5:00 in the afternoon?

Divide the number 3000...007 (there are 99 zeros in this number) by 37. What is the remainder? What are the 1st 9 and the last 9 digits of the quotient?

D. POW 4 Due 5/5: Choose one of the following two problems:

Before Napster was illegal, I used to copy entire CDs from the Internet. I made 10 Kenny Chesney CDs, 8 Rancid CDs and 12 Indigo Girls CDs. Unfortunately, I never put labels on my CDs (i.e. they are indistinguishable by LOOKING at them). Before my trip across country, I am going to load my multi-disc CD player. What is the **MINIMUM / LEAST / SMALLEST** number of CDs I must put in the CD player before I am **GUARANTEED, INSURED, ENSURED, ASSURED, POSITIVE BEYOND ALL DOUBT, KNOW THAT THERE IS NO CHANCE IT CANNOT HAPPEN** that I have at least 5 CDs from each of the 3 artists listed above?

The colors of M & Ms are: red, green, brown, yellow, blue, and orange. What is the least number of M & Ms you would have to grab from a package (BLINDFOLDED) to ensure that you have grabbed at least four of one color?

E. POW 5 Due 5/22: Choose one of the following two problems:

Find the sum of all positive integers less than 6000 that are divisible by 4 but not by 5.

The year 2000 is a leap year. The year 2100 is not a leap year. The following are the complete rules for determining a leap year:

- (i) Year Y is not a leap year if Y is not divisible by 4.
- (ii) Year Y is not a leap year if Y is divisible by 100 but not by 400.
- (iii) Every other Y is a leap year

How many leap years will there be from the years 2000 to 3016 inclusive?

F. POW 6 Due 5/22: Choose one of the following two problems:

A chicken and a half lays an egg and a half in a day and a half. How many eggs do 6 chickens lay in 12 days?

What Am I?

I'm divisible by 23 and 3.

Count from 1 to 100, and you'll meet the two-digit number in my thousands and hundreds place **just before** the two-digit number in my tens and ones place.

I'm greater than 2,000, but less than 9,000.

What number am I?