

## 9.1 Practice

Tuesday, May 12, 2015  
9:22 AM

### Precalculus

#### Section 9.1 Practice – Counting, Permutations, and Combinations

Name: \_\_\_\_\_

1. How many possible ways can a tennis player customize the Dunlop iDapt racquet?

4 HEAD SIZES (98, 100, 100S, 105)  
3 COSMETIC OPTIONS per head  
3 LEVELS OF COMFORT (soft, medium and firm)  
2 LENGTHS (27" or 27.5")  
6 GRIP SIZES (0-5)

= 432  
POSSIBLE CONFIGURATIONS

2. Evaluate each of the following without a calculator!

a.  ${}_5P_2 = \frac{5 \cdot 4}{1} = 20$  or  $\frac{5!}{3!} = \frac{5 \cdot 4 \cdot 3!}{3!}$

c.  ${}_5C_2 = \frac{5 \cdot 4}{2} = 10$  or  $\frac{5!}{3!2!} = \frac{5 \cdot 4}{2}$

e.  ${}_6P_0 = \frac{6!}{6!} = 1$

g.  ${}_6C_0 = \frac{6!}{6!0!} = 1$

b.  ${}_5P_3 = \frac{5 \cdot 4 \cdot 3}{1} = 60$  or  $\frac{5!}{2!}$

d.  ${}_5C_3 = \frac{5 \cdot 4 \cdot 3}{3!} = 10$  or  $\frac{5!}{2!3!}$

f.  ${}_6P_6 = 6!$

h.  ${}_6C_6 = \frac{6!}{6!} = 1$

3. At the annual Math Nerd conference, 8 presentations are delivered. The awards committee then selects up to 3 presentations for special recognition. (They always select at least one.) How many different choices could the awards committee make?

$${}_8C_3 + {}_8C_2 + {}_8C_1 = 56 + 28 + 8 = 92$$

4. How many distinguishable permutations, aka "words", can be made from the letters in each of the following Precalculus terms?

a. TANGENT

$$\frac{7!}{2!2!} = 1260$$

b. CONJUGATE

$$\frac{9!}{2!} = 362,880$$

c. SINUSOIDAL

$$\frac{10!}{2!2!} = 907,200$$

5. Which of the following doesn't belong? Why not?

$$\frac{7!}{2!5!}$$

$${}_{71}C_5$$

$${}_{71}C_2$$

$$\frac{7!}{(7-2)!} P_2$$

$$\frac{7!}{2!5!}$$

$$= \frac{{}_7C_5}{2!5!} = \frac{7!}{2!5!}$$

$$= \frac{{}_7C_2}{5!2!} = \frac{7!}{5!2!}$$

$$\frac{7!}{(7-2)!} = {}_7P_2$$

6. Which of the following lotteries would you rather play? Why?

a. You must correctly select 6 numbers, each of which is a different integer from 0 to 29. The order in which you select the numbers is not important.

OR

$${}_{30}C_6 = 593,775$$

There are fewer choices, so it's more likely I'd pick the correct one.

b. You must correctly select 4 numbers, each of which is a different integer from 0 to 29. The order in which you select the numbers is important.

$${}_{30}P_4 = 657,720$$

7. 24 students in Precalculus are competing in a Unit Circle Speed contest. In how many ways can students be recognized for finishing first, second, and third? (Assume no ties.)

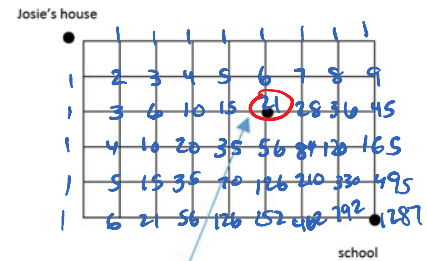
order matters P

$${}_{24}P_3 = 12,144$$

8. Josie is so excited to be heading to school to take her ACT test! If she only travels east and south, how many possible routes can she take from her house school?

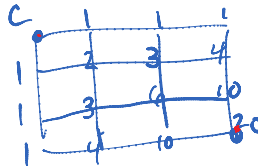
$$\frac{13!}{5!8!} = 1287$$

$$\begin{array}{r} 8 \text{ East} \\ + 5 \text{ South} \\ \hline 13 \end{array}$$



Uh-oh! Josie forgot her calculator! How many paths can she take if she needs to stop at the calculator store on the way?

$$21 \cdot 20 = 420$$



9. Yummy! You are at the local burrito shop, ordering some much needed lunch. If each burrito comes with exactly two main ingredients and exactly three toppings, how many different burritos are possible?

order wouldn't matter C

exactly two main ingredients and exactly three toppings, how many different burritos are possible:

order wouldn't matter C

$${}^6C_2 \cdot {}^8C_3 = 15 \cdot 56 = 840$$

<u>Main Ingredients</u>		<u>Toppings</u>	
Chicken	Black Beans	onions	cheese
Steak	Pork	salsa	guacamole
Carnitas	Barbacoa	tomatoes	peppers
		lettuce	pico de gallo