Algebra 1B Name_____

Probability, Odds, Counting Principle, Permutations and Combinations Practice

1. While getting dressed one morning, you have a difficult time deciding between 5 different shirts, 2 different pairs of pants, and 3 different pairs of shoes to wear. How many different outfits are possible?

$5 \cdot 2 \cdot 3 =$ **30 outfits**

2. How many license plates of 5 symbols can be made using a letter (cannot use O) for the first symbol and digits that cannot repeat for the remaining symbols?

$25 \cdot 10 \cdot 9 \cdot 8 \cdot 7$

126,000

3. What is the value of ${}_{12}C_2$?

$\frac{12!}{(12-2)!\,2!} = \frac{12!}{10!\,2!} =$ **66**

Give a specific example of when you would need to use a combination with n = 12 and r = 2.

Out of 12 students, 2 will be chosen to represent the group.

4. What is the value of ${}_7P_3$?

$\frac{7!}{(7-3)!} = \frac{7!}{4!} =$ **210**

Give a specific example of when you would need to use a permutation with n = 7 and r = 3. Pictures of 7 students will be taken in groups of 3. How many ways can they line up?

5. A red, a green, and a yellow die are tossed. What is the probability that the red die shows a 4, the green die shows an odd number, and the yellow die shows a 1 or 2?

$\frac{1}{6} \cdot \frac{3}{6} \cdot \frac{2}{6} = \frac{6}{216} =$ **$\frac{1}{36}$**

6. A dessert cart features 10 desserts, and customers are allowed to pick 3 for a sampler plate. How many different sampler plates are possible?

${}_{10}C_3 = \frac{10!}{(10-3)!\,3!}$

$= \frac{10!}{7!\,3!}$

= 120 plates

7. How many ways can 5 different books out of a choice of 8 books be arranged on a book shelf?

$${}_8P_5 = \frac{8!}{(8-5)!}$$

$$= \boxed{6,720 \text{ ways}}$$

8. A biology class of 12 girls and 16 boys are forming study groups. How many different groups of 2 girls and 3 boys can be formed?

$${}_{12}C_2 \cdot {}_{16}C_3$$

$$\frac{12!}{(12-2)!\,2!} \cdot \frac{16!}{(16-3)!\,3!}$$

$$\frac{12!}{10!\,2!} \cdot \frac{16!}{13!\,3!} = 66 \cdot 560 = 36,960$$

A box contains 2 scalene triangles, 3 equilateral triangles, 6 circles, and 4 squares. Use this information for problems 9-14. Be sure to think carefully about whether you must add or multiply probabilities of compound events:

9. What are the odds in favor of pulling out a square on the first try?

$$\boxed{\frac{4}{11}}$$

10. What is the probability of not pulling out a triangle on the first try?

$$\frac{10}{15} = \boxed{\frac{2}{3}}$$

11. What are the odds against pulling out a circle on the first try?

$$\frac{9}{6} = \boxed{\frac{3}{2}}$$

12. What is the probability of picking out a circle, a square, and another circle (in that order) without replacing each?

$$\frac{6}{15} \cdot \frac{4}{14} \cdot \frac{5}{13} \rightarrow \frac{2}{5} \cdot \frac{2}{7} \cdot \frac{5}{13}$$

Dependent. $= \boxed{\frac{20}{455}}$

13. What is the probability of picking out a circle, square and triangle (in that order), replacing each after it is pulled?

$$\frac{6}{15} \cdot \frac{4}{15} \cdot \frac{5}{15} \rightarrow \frac{3}{5} \cdot \frac{4}{15} \cdot \frac{1}{5}$$

$$= \boxed{\frac{12}{375}}$$

14. What is the probability of pulling out a triangle or a polygon with all congruent sides?

Triangles = 5

Polygon w/ congruent sides = 7

of Triangles w/ ≥ sides = 3

$$\frac{5}{15} + \frac{7}{15} - \frac{3}{15} = \frac{9}{15} = \boxed{\frac{3}{5}}$$