

- 1.) The Math Team is trying to order t-shirts for their next competition. They have the option for short sleeves or long sleeves; red, blue, black, or white; design on front only, back only, or on front and back; V-neck or round.

$$\underline{2} \cdot \underline{4} \cdot \underline{3} \cdot \underline{2} = 48$$

How many different ways can the t-shirts can be customized? 48

- 2.) Tim and Alan want to surprise their dates by taking them to a really expensive restaurant, Pizza Hut. They can order a pizza with a choice of pepperoni, sausage, or green pepper; a choice of thin or deep-dish for crust; and a choice of small, medium, or large for size.

$$\underline{3} \cdot \underline{2} \cdot \underline{3} = 18$$

How many different ways can Tim and Alan order a pizza? 18

- 3.) The new i-phone 8 will allow you to create a password that has 8 spots which will contain letters (A-Z) and numbers (0-9). Find the number of possibilities for the new i-phone 8 password if the following restrictions are placed:

- a.) Numbers are to be used in the first 4 spots and letters in the last 4 spots with no repeats allowed.

$$\underline{10} \cdot \underline{9} \cdot \underline{8} \cdot \underline{7} \cdot \underline{26} \cdot \underline{25} \cdot \underline{24} \cdot \underline{23} =$$

- b.) Repeats are allowed, but only letters can be used.

$$\underline{26} \cdot \underline{26} \cdot \underline{26} \cdot \underline{26} \cdot \underline{26} \cdot \underline{26} \cdot \underline{26} \cdot \underline{26} =$$

- c.) The first two spots must be numbers (repeats allowed), and the last 6 spots are used for letters (repeats not allowed).

$$\underline{10} \cdot \underline{10} \cdot \underline{26} \cdot \underline{25} \cdot \underline{24} \cdot \underline{23} \cdot \underline{22} \cdot \underline{21} =$$

- d.) No repeats are allowed and the first 6 spots are to be numbers and the last two are to be letters.

$$\underline{10} \cdot \underline{9} \cdot \underline{8} \cdot \underline{7} \cdot \underline{6} \cdot \underline{5} \cdot \underline{26} \cdot \underline{25} =$$

- 4.) How many different ways can the letters from the words below be arranged?

A.) Mathematics

$$= \frac{11!}{2! \cdot 2! \cdot 2!}$$

A T H

$$= 4,989,600$$

B.) Pokemon

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

O

$$= 2520$$

C.) Mississippi

$$= \frac{11!}{4! \cdot 4! \cdot 2!}$$

$$= 34650$$

Decide if the following circumstance is a "Combination" and/or a "Permutation". Then find the number of possible outcome for the following circumstances.

- 5.) How many different ways can a chairperson and an assistant chairperson be selected for a research project if there are seven scientists available?

Combination or Permutation ${}^7P_2 = 42$

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- 6.) Given the letters A, B, C, D in how many ways can you choose 2 letters?

Combination or Permutation ${}^4C_2 = 6$

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- 7.) A combination lock has 36 numbers on it. How many different 3-number combinations are possible if no number may be repeated?

Combination or Permutation ${}^{36}P_3 = 42,840$

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- 8.) Elections are being held for student representatives, and next year's freshman class will determine which two students will be chosen. If five students are running for election, how many different groups of two can be elected to represent the freshman class?

Combination or Permutation ${}^5C_2 = 10$

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- 9.) For a study group, 4 people are chosen at random from a group of 10 people. How many ways can this be done?

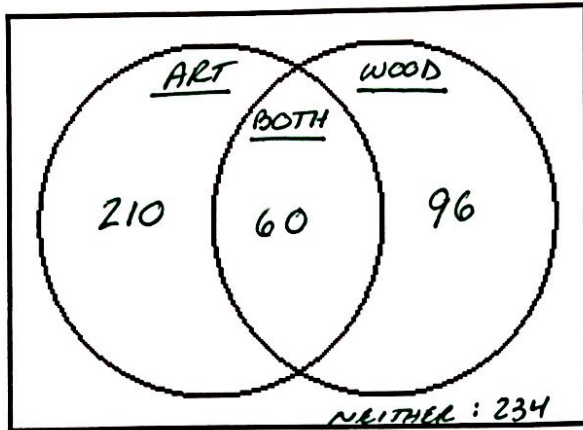
Combination or Permutation ${}^{10}C_4 = 210$

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- 10.) Dundee-Crown is making a new committee called Lady Glitter Sparkle that will be in charge of the dance themes for the dances. The Lady Glitter Sparkle committee will need to be a committee of 8 students. There are 12 girls and 12 guys that are the group will be selected from. Find the probability of each if they are chosen at random.

A.) $P(6 \text{ girls and } 2 \text{ guys}) = \frac{{}^{12}C_6 \cdot {}^{12}C_2}{{}^{24}C_8} = 0.0829 = 8.29\%$

B.) $P(4 \text{ girls and } 4 \text{ guys}) = \frac{{}^{12}C_4 \cdot {}^{12}C_4}{{}^{24}C_8} = .333 = 33.3\%$

- 11.) The senior class at Dundee-Crown High School has 600 students. In a recent survey asking students about which elective they are taking (art or woods), 35% students checked the box for only art, of which 10% checked both the boxes for art and woods, and 39% students checked the box for neither. Use this information to fill in and label the Venn diagram with actual numbers and then answer the questions. (Assume that no students checked "art" or "woods" in addition to "neither")



- A.) How many students are taking only art?

210

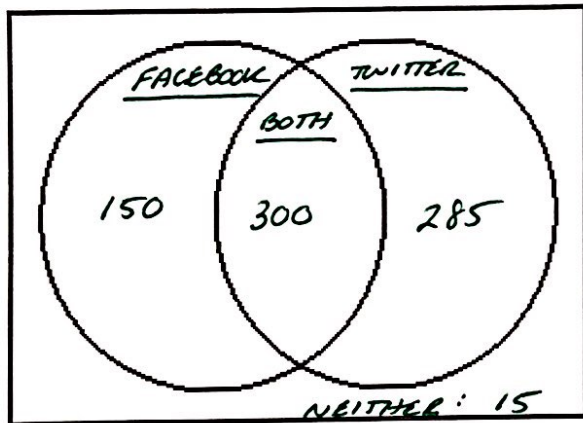
- B.) How many students are taking only woods?

96

C.) $P(\text{art}) = \frac{270}{600} = \frac{9}{20} = .45 = 45\%$

D.) $P(\text{woods}) = \frac{156}{600} = \frac{39}{150} = .26 = 26\%$

- 12.) A recent survey given to 750 high school students asking them about which social media they prefer to use showed that 20% preferred only to use Facebook, 40% preferred to use both Facebook and Twitter, and 2% of students do not use any type of social media.



- A.) How many students prefer to only use Twitter?

285

- B.) How many students prefer Facebook?

450

C.) $P(\text{Use Only Twitter}) = \frac{285}{750} = \frac{57}{150} = \frac{19}{50} = .38 = 38\%$

D.) $P(\text{Use Facebook}) = \frac{450}{750} = \frac{3}{5} = .60 = 60\%$

- 13.) Janice is an apple-fiend. Each day she can be seen carrying 8 red apples, 5 yellow apples, and 3 green apples in a bag. If Janice reaches in the bag to pull out an apple to devour, find the probability of each.

- A.) P (red, yellow, green in order w/o replacement)

$$\frac{8}{16} \cdot \frac{5}{15} \cdot \frac{3}{14} = \frac{120}{3360} = \frac{1}{28} = .036 = 3.6\%$$

- B.) P (red, yellow, yellow, with replacement)

$$\frac{8}{16} \cdot \frac{5}{16} \cdot \frac{5}{16} = \frac{200}{4096} = \frac{25}{512} = .049 = 4.9\%$$

- C.) P (3 Reds w/o replacement)

$$\frac{8}{16} \cdot \frac{7}{15} \cdot \frac{6}{14} = \frac{336}{3360} = \frac{1}{10} = .1 = 10\%$$

- 14.) A national phone survey was taken to find the nation's favorite kind of ice cream among adults between the ages of 18 and 60.

Types of Ice Cream	Men	Women	Total
Strawberry	14	26	40
Chocolate	98	111	209
Vanilla	76	53	129
Cookie Dough	47	25	72
Mint Choc. Chip	2	4	6
Total	237	219	456

- A.) Find the probability that a randomly selected person likes chocolate best.

$$= \frac{209}{456} = .458 = 45.8\%$$

- B.) Find the probability that a randomly selected woman likes cookie dough ice cream best.

$$= \frac{25}{219} = .114 = 11.4\%$$

- C.) Find the probability that a randomly selected person that favors vanilla ice cream is a man.

$$= \frac{76}{129} = .589 = 58.9\%$$

- D.) Find the probability that a randomly selected person that favors mint choc. chip is a woman.

$$= \frac{4}{6} = \frac{2}{3} = .67 = 67\%$$

- 15.) George Badnature is looking to recruit an Evil Army. The new Evil Army will consist of 7 individuals. If there are 8 girls and 10 guys to choose from, what is the probability the Army will consist of...

- A.) 5 girls and 2 guys

$$= \frac{8^C_5 \cdot 10^C_2}{18^C_7} = .079$$

$$= 7.9\%$$

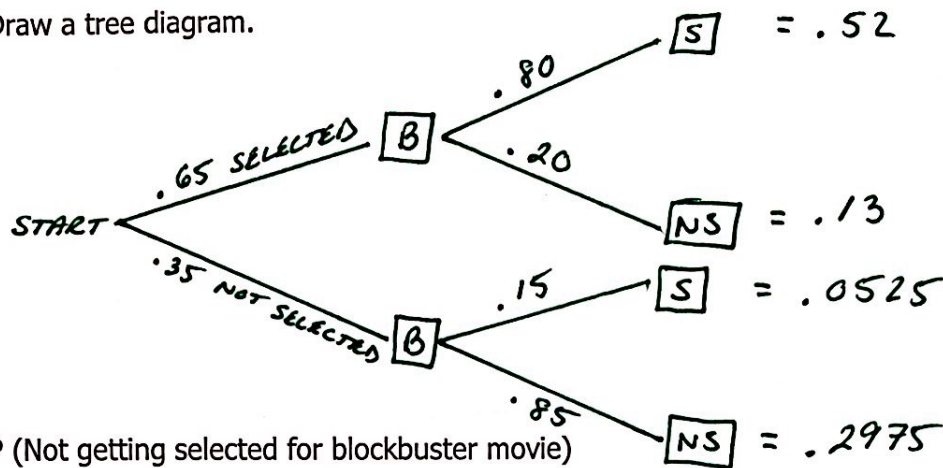
- B.) 3 girls and 4 guys

$$= \frac{8^C_3 \cdot 10^C_4}{18^C_7} = .369$$

$$= 36.9\%$$

- 16.) Galena Somez is an upcoming actress that has a 65% chance of being selected for the next blockbuster movie. If Galena gets selected for the upcoming blockbuster movie there is an 80% she would receive an offer to participate in the sequel. If she doesn't get selected for the upcoming blockbuster movie then she only has a 15% chance of being selected for the sequel.

A.) Draw a tree diagram.



B.) P (Not getting selected for blockbuster movie)

$$= .13 + .2975$$

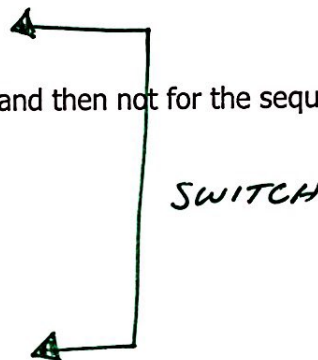
$$= .4275 = 42.75\%$$

C.) P (Being selected for the blockbuster movie and then not for the sequel.)

$$= .13 = 13\%$$

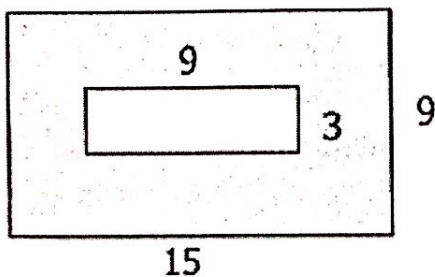
D.) P (Not being selected for the sequel)

$$= .35 = 35\%$$



- 17.) Find the area of each of the following regions. Then, find the probability that a randomly chosen point in the figure lies in the shaded region. Assume that all angles that appear to be right angles are right angles.

A.)



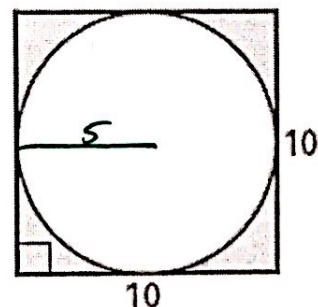
$$A_{\text{whole}} = (15)(9) = 135$$

$$A_{\text{unshaded}} = (9)(3) = 27$$

$$A_{\text{shaded}} = 135 - 27 = 108$$

$$\text{Probability} = \frac{108}{135} = .8 = 80\%$$

B.)



$$A_{\text{whole}} = 100$$

$$A_{\text{unshaded}} = \pi(5)^2 = 25\pi$$

$$A_{\text{shaded}} = 100 - 25\pi = 21.46$$

$$\text{Probability} = \frac{21.46}{100} = .2146$$

$$= 21.46\%$$