Geometry Homework #13

1) Simplify: $\dfrac{10!4!}{3!5!9!} \div \dfrac{11!3!}{4!8!6!}$

2) What is the probability that the first four cards dealt from a randomly shuffled deck of cards are the four queens? What is the probability if they must be dealt in the exact order of queen of hearts, queen of diamonds, queen of spades, and queen of clubs?

3) Simplify: $\dfrac{9!4!}{12!3!} \div \dfrac{15!5!}{17!} \cdot \dfrac{6!2!}{8!}$

4) If you roll three normal dice, what is the probability that the sum of the roll is 11? What is the probability that you roll three fours? What is the probability that, if you threw the three dice twice, you would roll a sum of 11 the first time followed by a roll of three fours?

5) Suppose you are placed in charge of running a fundraising event for your church. You invent a game where people can receive a cash prize if they win, and you decide to charge $2 per person per chance to win. The game consists of rolling two normal dice, spinning a wheel that is broken up into 20 sections marked with the numbers 1 through 20, and flipping two coins. People can win if they roll a sum of 9 with the dice while spinning the wheel and landing on a number that is a multiple of 5 and also flipping the coins and having them both show up tails. If the church is hoping to make a $600 profit from the playing of your fundraising game and you expect that 1,600 people will play your game once, how much should a winning prize be worth?

6) A bag contains one green, one red, one blue, one yellow, one orange, one purple, and one grey marble. If you randomly select five marbles at a time, how many different combinations of marble colors are possible? If you were to line up those five marbles each time you selected them and look at the pattern of colors, how many different possible patterns would there be?

7) Construct Pascal's triangle to determine the numbers, in order, of the 6^{th} row of the triangle.

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8) A math honor society, consisting of 8 students, gets invited to participate in a national math competition. The rules state that you can only bring 3 members to the competition. If the team is chosen at random from all of the students in the honor society, how many different teams can possibly be created? If the first student chosen has to compete in the calculus competition, the second student chosen has to compete in the algebra competition, and the third student chosen has to compete in the basic math competition, how many unique teams are possible?

9) Construct Pascal's triangle to determine the numbers, in order, of the 9^{th} row of the triangle.

10) At a breakfast buffet, there are seven different types of fruit to choose from. If Joshua only has room for four pieces of fruit on his plate and he doesn't pick the same type of fruit more than once, how many different fruit combinations can he create?

11) Construct Pascal's triangle and use it to expand $(x+y)^5$

12) A bag contains one black, one brown, one green, one red, one blue, one yellow, one orange, one purple, and one grey marble. If you randomly select six marbles at a time, how many different combinations of marble colors are possible? If you were to line up those six marbles each time you selected them and look at the pattern of colors, how many different possible patterns would there be?

13) Construct Pascal's triangle and use it to expand $(x+y)^8$

14) Use the combination formula to determine the numbers, in order, in the 15^{th} row of Pascal's triangle without actually creating the triangle.

15) Construct Pascal's triangle and use it to expand $(x-3y)^3$

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16) Derek is allowed to carry 14 different clubs in his golf bag when he plays in a golf tournament. On the first hole, his ball ends up behind a tree, so he hits the tree with his golf club, breaking it in the process. On the next hole, he misses an easy putt, so he spitefully breaks his putter across his knee. For the third hole, he has to hit the ball over a large lake. When he tries to hit the ball over the lake, the ball ends up in the water, and each time it happens, he throws the club he is using for that shot into the lake in frustration. This happens six times in a row before his caddy steps in to try to stop the madness. His caddy tells him that there is virtually no way he can win now that he has lost or broken most of his clubs. Derek confidently replies that not only will he still win the tournament, but that he is going to win it by only using three of his remaining clubs to finish playing all of the rest of the holes. If Derek randomly selects three clubs from those left in his bag, how many different club combinations can Derek select? If the order in which he selects the clubs matters, how many different ways can he select the three clubs?

17) Find 11^7 without actually multiplying anything.

18) Construct Pascal's triangle and use it to expand $(3x-2y)^4$

19) Find 11^{11} without actually multiplying anything.

20) Use the combination formula to determine the numbers, in order, in the 14^{th} row of Pascal's triangle without actually creating the triangle.