State if each scenario involves a permutation or a combination. Then find the number of possibilities.

1) There are 15 applicants for three jobs: computer programmer, software tester, and manager.

2) 4 out of 20 students will ride in a car instead of a van.

3) A group of 35 people are going to run a race. The top 10 finishers advance to the finals.

4) Julio and Shanice are planning trips to ten countries this year. There are 13 countries they would like to visit. They are deciding which countries to skip.

5) A team of 6 basketball players needs to choose three players to refill the water cooler.

6) Nicole and Eduardo are planning trips to eleven countries this year. There are 13 countries they would like to visit. They are deciding which countries to skip.

Represent the sample space using set notation.

7) You roll a six-sided die.

8) A spinner can land on either red, blue, green, or yellow. You spin once.

9) When a button is pressed, a computer program outputs a random even number greater than 0 and less than 12. You press the button once.

10) A spinner can land on either red or blue. You spin once.
Determine whether the scenario involves independent or dependent events.

11) You select two cards from a standard shuffled deck of 52 cards. Both selected cards are diamonds. (Note that 13 of the 52 cards are diamonds.)

12) A cooler contains nine bottles of sports drink: five lemon-lime flavored and four orange flavored. You randomly grab a bottle and give it to your friend. Then, you randomly grab a bottle for yourself. You and your friend both get lemon-lime.

13) A bag contains seven red marbles and four blue marbles. Another bag contains seven green marbles and six yellow marbles. You randomly pick one marble from each bag. One marble is blue and one marble is yellow.

14) You flip a coin and then roll a fair six-sided die. The coin lands tails-up and the die shows an odd number.

Find the probability.

15) You flip a coin twice. The first flip lands heads-up and the second flip lands tails-up.

16) A basket contains six apples and six peaches. You randomly select a piece of fruit and then return it to the basket. Then you randomly select another piece of fruit. The first piece of fruit is an apple and the second piece is a peach.

17) A box of chocolates contains four milk chocolates and six dark chocolates. You randomly pick a chocolate and eat it. Then you randomly pick another piece. Both pieces are milk chocolate.

18) You flip a coin and then roll a fair six-sided die. The coin lands heads-up and the die shows a three.

19) A basket contains eight apples and eight peaches. You randomly select one piece of fruit and eat it. Then you randomly select another piece of fruit. Both pieces of fruit are apples.

20) There are seven nickels and five dimes in your pocket. You randomly pick a coin out of your pocket and place it on a counter. Then you randomly pick another coin. Both coins are nickels.
State if each scenario involves a permutation or a combination. Then find the number of possibilities.

1) There are 15 applicants for three jobs: computer programmer, software tester, and manager.
   Permutation; 2,730

2) 4 out of 20 students will ride in a car instead of a van
   Combination; 4,845

3) A group of 35 people are going to run a race. The top 10 finishers advance to the finals.
   Combination; 183,579,396

4) Julio and Shanice are planning trips to ten countries this year. There are 13 countries they would like to visit. They are deciding which countries to skip.
   Combination; 286

5) A team of 6 basketball players needs to choose three players to refill the water cooler.
   Combination; 20

6) Nicole and Eduardo are planning trips to eleven countries this year. There are 13 countries they would like to visit. They are deciding which countries to skip.
   Combination; 78

Represent the sample space using set notation.

7) You roll a six-sided die.
   \{1, 2, 3, 4, 5, 6\}

8) A spinner can land on either red, blue, green, or yellow. You spin once.
   \{red, blue, green, yellow\}

9) When a button is pressed, a computer program outputs a random even number greater than 0 and less than 12. You press the button once.
   \{2, 4, 6, 8, 10\}

10) A spinner can land on either red or blue. You spin once.
    \{red, blue\}
Determine whether the scenario involves independent or dependent events.

11) You select two cards from a standard shuffled deck of 52 cards. Both selected cards are diamonds. (Note that 13 of the 52 cards are diamonds.)
   Dependent

12) A cooler contains nine bottles of sports drink: five lemon-lime flavored and four orange flavored. You randomly grab a bottle and give it to your friend. Then, you randomly grab a bottle for yourself. You and your friend both get lemon-lime.
   Dependent

13) A bag contains seven red marbles and four blue marbles. Another bag contains seven green marbles and six yellow marbles. You randomly pick one marble from each bag. One marble is blue and one marble is yellow.
   Independent

14) You flip a coin and then roll a fair six-sided die. The coin lands tails-up and the die shows an odd number.
   Independent

Find the probability.

15) You flip a coin twice. The first flip lands heads-up and the second flip lands tails-up.
   \[
   \frac{1}{4} = 0.25
   \]

16) A basket contains six apples and six peaches. You randomly select a piece of fruit and then return it to the basket. Then you randomly select another piece of fruit. The first piece of fruit is an apple and the second piece is a peach.
   \[
   \frac{1}{4} = 0.25
   \]

17) A box of chocolates contains four milk chocolates and six dark chocolates. You randomly pick a chocolate and eat it. Then you randomly pick another piece. Both pieces are milk chocolate.
   \[
   \frac{2}{15} \approx 0.133
   \]

18) You flip a coin and then roll a fair six-sided die. The coin lands heads-up and the die shows a three.
   \[
   \frac{1}{12} \approx 0.083
   \]

19) A basket contains eight apples and eight peaches. You randomly select one piece of fruit and eat it. Then you randomly select another piece of fruit. Both pieces of fruit are apples.
   \[
   \frac{7}{30} \approx 0.233
   \]

20) There are seven nickels and five dimes in your pocket. You randomly pick a coin out of your pocket and place it on a counter. Then you randomly pick another coin. Both coins are nickels.
   \[
   \frac{7}{22} \approx 0.318
   \]