3) Suppose the two joker cards are left in a standard deck Of cards. One of the jokers is red and the other

is black. A Single card is drawn from the deck Of 54 cards. Determine the probability Of drawing

a) one of the jokers

b) the red joker

c) a queen

d) any black card

e) any cardless than 10 (ace—I)

the red joker or a red ace

a) The probability of drawing one of the jokers is 1/27.

b) The probability of drawing the red joker is 1/54.

c) The probability of drawing a queen is 2/27.

d) The probability of drawing any black card is 13/27.

e) The probability of drawing any card less than 10 (ace-I) is 2/3.

f) The probability of drawing either the red joker or a red ace is 1/18.

These are the correct answers.

4) A spinner is divided into eight equal sectors, numbered 1 through 8.

a) What is the probability Of spinning an number?

b) What is the probability of spinning a number divisible by 4?

C) What is the probability of spinning a number less than 3?

a) The probability of spinning a number is 8/8 or 1, since there are eight sectors numbered 1 through 8 and each sector is equally likely to be landed on.

b) The numbers divisible by 4 are 4 and 8, so the probability of spinning a number divisible by 4 is 2/8 or 1/4.

c) The numbers less than 3 are 1 and 2, so the probability of spinning a number less than 3 is 2/8 or 1/4.

5) A bag contains 1 2 identically shaped blocks, 3 of which are red and the remainder are green. The bag

is well-shaken and a single block is drawn.

a) What is the probability that the block is red?

b) What is the probability that the block is not red?

Okay, with 12 blocks total (according to the updated question):

3 of the blocks are red

12 - 3 = 9 blocks are green

The bag is well shaken before drawing a single block

So:

a) Probability the drawn block is red = 3/12 (there are 3 red blocks out of 12 total blocks)

b) Probability the drawn block is not red = 9/12 (there are 9 green blocks out of 12 total blocks)

In percentage:

a) Probability the drawn block is red = 3/12 = 0.25 (25%)

b) Probability the drawn block is not red = 9/12 = 0.75 (75%)

6) Each Of the letters for the word 'MATHE is printed on same-sized pieces Of paper and placed

in a hat. That hat is shaken and one piece of paper is drawn.

a) What is the probability that the lettersS is selected?

b) What is the probability that the letter M is selected?

c) What is the prcibability that a vowel is selected?

a) Since the word "MATHE" has five letters, the probability of drawing the letter 'S' is 1/5 or 0.2.

b) Similarly, the probability of drawing the letter 'M' is also 1/5 or 0.2.

c) The vowels in the word 'MATHE' are 'A' and 'E'. Therefore, the probability of drawing a vowel is 2/5 or 0.4.

7) Many ar games involve aro o two-six sided dice to see how r you may move your pieces.

a) Copy and complete the following table that shows the totals for all possible rolls Of two dice.

b) What is the probability Of rolling a 7?

c) What is the probability of not rolling a 7?

d) What is the probability Of rolling doubles?

a) The following table shows the totals for all possible rolls of two dice:

1 2 3 4 5 6

1 2 3 4 5 6 7

2 3 4 5 6 7 8

3 4 5 6 7 8 9

4 5 6 7 8 9 10

5 6 7 8 9 10 11

6 7 8 9 10 11 12

b) The probability of rolling a 7 is 1/6, since there is one 7 out of six possible totals.

c) The probability of not rolling a 7 is 5/6, since there are five numbers out of six possible totals that are not 7.

d) The probability of rolling doubles is 1/6, since there is one pair of doubles out of six possible totals.

8) What is the probability that a randomly drawn integer between I and 40 is not a perfect square?

Here is the table showing totals for all possible rolls of two dice:

Roll Total

1, 1 2

1, 2 3

1, 3 4

1, 4 5

1, 5 6

1, 6 7

2, 2 4

2, 3 5

2, 4 6

2, 5 7

2, 6 8

3, 3 6

3, 4 7

3, 5 8

3, 6 9

4, 4 8

4, 5 9

4, 6 10

5, 5 10

5, 6 11

6, 6 12

Now for the probabilities:

b) Probability of rolling a 7 = 2/36 (there are 2 ways to roll a 7, 6 plus 1 or 5 plus 2)

c) Probability of not rolling a 7 = 34/36

d) Probability of rolling doubles = 6/36 (there are 6 ways to roll doubles: 2 plus 2, 3 plus 3, 4 plus 4, 5 plus 5, 6 plus 6)

In summary:

b) Probability of rolling a 7 = 2/36

c) Probability of not rolling a 7 = 34/36

d) Probability of rolling doubles = 6/36

9) A picnic cooler contains different types of cola: 12 regtilar, 8 cherry, 10 diet, 6 diet cherry, 8 caffeine-

free, and some caffeine-free diet You pick a can of cola without looking at its type- There is a 44% chance

that the drinkselected is diet. H ow many caffeine-free diet colas are in the cooler?

Let's denote the number of caffeine-free diet colas in the cooler by x. Then the total number of cans in the cooler is:

12 + 8 + 10 + 6 + 8 + x = 44 + x (since there is a 44% chance of selecting a diet drink)

We can simplify this equation to:

44 = 44 + x - (12 + 8 + 10 + 6 + 8)

44 = x - 26

x = 70

Therefore, there are 70 caffeine-free diet colas in the cooler.

2) For each of the following, find the indicated probability and state whether A and B are mutually

exclusive.

a) P(A) = 0.5, P(B) = 0.2, P(A u B) = 0.7, P(A n B) = ?

b) P(A) = 0.7, P(B) = 0.2, P(Au B)=? P(A n B) = 0.15

c) P(A) = 0.3, P(B) = ? , P(AUB) = 0.9,P(AnB) = O

a) To find P(A n B), we can use the formula P(A n B) = P(A) + P(B) - P(A u B), where P(A u B) is the probability of the union of A and B.

P(A n B) = P(A) + P(B) - P(A u B)

P(A n B) = 0.5 + 0.2 - 0.7

P(A n B) = 0

Since P(A n B) is equal to 0, A and B are mutually exclusive.

b) To find P(A u B), we can use the formula P(A u B) = P(A) + P(B) - P(A n B), where P(A n B) is the probability of the intersection of A and B.

P(A u B) = P(A) + P(B) - P(A n B)

0.7 + 0.2 - P(A n B) = P(A u B)

We are not given the value of P(A n B), so we cannot calculate P(A u B).

c) To find P(B), we can use the formula P(A u B) = P(A) + P(B) - P(A n B), where P(A u B) is the probability of the union of A and B.

P(A u B) = P(A) + P(B) - P(A n B)

0.9 = 0.3 + P(B) - P(A n B)

We are not given the value of P(A n B), so we cannot calculate P(B) or determine whether A and B are mutually exclusive.

3) The probability that Kelly will make the volleyball team is 2/3 and the probability that she will make the

field hockey team is 3/4 If the probability that she makes both teams is 1/2, what is the probability that she

makes at least one of the teams?

We can use the formula for the probability of the union of two events:

P(A U B) = P(A) + P(B) - P(A n B)

where A and B are two events and A n B is their intersection.

In this case, let A be the event that Kelly makes the volleyball team, and let B be the event that she makes the field hockey team.

We are given:

P(A) = 2/3

P(B) = 3/4

P(A n B) = 1/2

To find the probability that she makes at least one of the teams, we can calculate:

P(A U B) = P(A) + P(B) - P(A n B)

P(A U B) = 2/3 + 3/4 - 1/2

P(A U B) = 11/12

Therefore, the probability that Kelly makes at least one of the teams is 11/12.

4) An aquarium at a pet store contains 20 guppies (12 females and 8 males) and 36 tetras (14 females

and 22 males). If the clerk randomly nets a fish, What is the probability that it is a female or a tetra?

Let F be the event that the fish is female, and let T be the event that the fish is a tetra. We want to find the probability of the union of these events, P(F U T).

We are given:

There are 12 female guppies and 14 female tetras, for a total of 12 + 14 = 26 female fish.

There are 20 guppies and 36 tetras, for a total of 20 + 36 = 56 fish.

Therefore, the probability that a fish is female is:

P(F) = 26/56 = 13/28

Similarly, the probability that a fish is a tetra is:

P(T) = 36/56 = 9/14

To find the probability that the fish is either female or a tetra, we can use the formula for the probability of the union of two events:

P(F U T) = P(F) + P(T) - P(F n T)

We need to find the probability of the intersection of F and T, which is the probability that the fish is both female and a tetra. Since there are 14 female tetras and only 36 tetras in total, we know that all female tetras are also female, so we have:

P(F n T) = P(Female tetra) = 14/56 = 1/4

Now we can calculate the probability that the fish is female or a tetra:

P(F U T) = P(F) + P(T) - P(F n T)

P(F U T) = 13/28 + 9/14 - 1/4

P(F U T) = 19/28

Therefore, the probability that the fish is either female or a tetra is 19/28.

5) Teri attends a fundraiser at which 15 T-shirts are being given away as door prizes. Door prize winners

are randomly given a shirt from a stock Of 2 black shirts. 4 blue shirts, and 9 white shirts. Teri really likes

the black and blue shirts, but is not too keen on the white ones, Assuming that Teri wins the first door

prize, what is the probability that she will get a shirt that she likes?

There are a total of 2+4+9 = 15 shirts in stock. Since Teri likes black and blue shirts, there are 2+4 = 6 shirts that she likes.

If Teri wins the first door prize, she has a probability of 6/15 = 2/5 of getting a shirt that she likes.

Therefore, the probability that Teri gets a shirt she likes on the first try is 2/5 or 0.4.

6) A card is randomly selected from a standard deck Of cards. What is the probability that either a heart

or a face card (jack, queen, or king) is selected?

There are 52 cards in a standard deck of cards, and there are 13 hearts and 12 face cards (4 jacks, 4 queens, and 4 kings).

To calculate the probability of selecting either a heart or a face card, we need to add the probabilities of selecting a heart and selecting a face card, and then subtract the probability of selecting a card that is both a heart and a face card (i.e., the three face cards that are also hearts, which were counted twice).

So the probability of selecting a heart is 13/52, and the probability of selecting a face card is 12/52. The probability of selecting a heart and a face card is 3/52 (the three cards that are both hearts and face cards: jack of hearts, queen of hearts, and king of hearts).

Therefore, the probability of selecting either a heart or a face card is:

(13/52) + (12/52) - (3/52) = 22/52 = 11/26

So the probability of selecting either a heart or a face card from a standard deck of cards is 11/26 or approximately 0.423.

7) An electronics manufacturer is testing a new product to see whether it requires a surge protector. The

tests show that a voltage spike has a 0.2% probability of damaging the product's power supply, a 0.6%

probability of damaging downstream components, and a 0.1% probability of damaging both. Determine

the probability that a voltage spike will damage the product.

To determine the probability that a voltage spike will damage the product, we need to add up the probabilities of the two mutually exclusive events that could cause damage to the product: damaging the power supply and damaging both the power supply and downstream components.

The probability of damaging the power supply is given as 0.2%. This means that in 1000 trials with voltage spikes, 2 trials will result in damage to the power supply.

The probability of damaging both the power supply and downstream components is given as 0.1%. This means that in 1000 trials with voltage spikes, 1 trial will result in damage to both the power supply and downstream components.

Therefore, the total probability of voltage spike damaging the product is:

0.2% + 0.1% = 0.3%

So, the probability that a voltage spike will damage the product is 0.3%.

8) At the start Of flu season, Dr. Anna Ahmeed examines 50 patients over two days. Of those 50 patients,

30 have a headache, 24 have a cold, and 12 have neither symptom. Some patients have both symptoms.

a) Draw a Venn diagram and determine the number of patients that have both symptoms.

b) Find the probability that a patient selected at random...

i) has just a headache

ii) has a headache or a cold

iii) does not have cold symptoms

a) Here is the Venn diagram representing the information given:

```

\_\_\_\_\_\_\_\_\_\_\_

| |

| |

Headache| | Total Patients: 50

(30) | A | Not Symptomatic: 12

|\_\_\_\_\_\_\_\_\_\_\_|

| |

| |

Cold| |

(24) | B |

|\_\_\_\_\_\_\_\_\_\_\_|

```

We are trying to determine the number of patients that have both symptoms, which is denoted by the overlap between A and B, or A n B. From the Venn diagram, we can see that A n B has 16 patients.

b) We can use the given information and the Venn diagram to find the probabilities:

i) The probability that a patient selected at random has just a headache is given by:

P(A and B') = P(A) - P(A and B) = 30 - 16 = 14/50 = 0.28

ii) The probability that a patient selected at random has a headache or a cold is given by:

P(A u B) = P(A) + P(B) - P(A and B) = 30 + 24 - 16 = 38/50 = 0.76

iii) The probability that a patient selected at random does not have cold symptoms is given by:

P(A or B') = P(A) - P(A and B') = 30 - 14 = 16/50 = 0.32

2) A person is chosen at random from shoppers at a department store. If the person's probability Of

having blonde hair and glasses is — and the probability Of wearing glasses is determine the probability

that a person has blonde hair given that they wear glasses.

Let's use Bayes' theorem to calculate the probability of a person having blonde hair given that they wear glasses:

P(blond hair | glasses) = P(glasses | blond hair) \* P(blond hair) / P(glasses)

We are given that the probability of having blonde hair and glasses is P(glasses | blond hair) = , and the probability of wearing glasses is P(glasses) = . We need to find the probability of having blonde hair, P(blond hair).

We can use the law of total probability to calculate P(blond hair) as follows:

P(blond hair) = P(blond hair and glasses) + P(blond hair and no glasses)

We are not given the probability of having blonde hair and no glasses, but we can use the information given to estimate it. We know that the probability of wearing glasses is , so the probability of not wearing glasses is . Assuming that the probability of having blonde hair is the same for people who wear glasses and people who do not wear glasses, we can estimate:

P(blond hair and no glasses) = P(blond hair) \*

Now we can substitute these values into Bayes' theorem:

P(blond hair | glasses) = \* P(blond hair) /

Simplifying:

P(blond hair | glasses) =

Therefore, the probability of a person having blonde hair given that they wear glasses is approximately .

3) From a medical study Of 10 000 male patients, it was found that 2500 were smokers; 720 died from

lung cancer and of these, 610 were smokers. Determine:

a) P (dying from lung cancer I smoker)

b) P(dying from lung cancer I non — smoker)

a) To determine the probability of dying from lung cancer given that the patient is a smoker, we use the conditional probability formula:

P(dying from lung cancer | smoker) = P(dying from lung cancer and smoker) / P(smoker)

We are given that 610 smokers died from lung cancer, so P(dying from lung cancer and smoker) = 610/2500. The probability of being a smoker is P(smoker) = 2500/10000.

Substituting these values into the formula:

P(dying from lung cancer | smoker) = (610/2500) / (2500/10000) = 0.244

Therefore, the probability of dying from lung cancer given that the patient is a smoker is 0.244 or approximately 24.4%.

b) Similarly, to determine the probability of dying from lung cancer given that the patient is a non-smoker, we use the same conditional probability formula:

P(dying from lung cancer | non-smoker) = P(dying from lung cancer and non-smoker) / P(non-smoker)

We are given that a total of 720 patients died from lung cancer, and 610 of these were smokers. Therefore, the number of non-smokers who died from lung cancer is 720 - 610 = 110.

The probability of being a non-smoker is P(non-smoker) = (10000 - 2500)/10000 = 0.75.

Substituting these values into the formula:

P(dying from lung cancer | non-smoker) = 110/7500 = 0.0147

Therefore, the probability of dying from lung cancer given that the patient is a non-smoker is 0.0147 or approximately 1.47%.

5) A bag contains three red marbles and five white marbles. What is the probability Of drawing two red

marbles at random if the first marble drawn is not replaced?

When the first marble is drawn from the bag, there will be one less marble in the bag. So, the probability of drawing a red marble on the first draw is 3/8, and the probability of drawing a white marble is 5/8.

If a red marble is drawn on the first draw, there will be two red marbles and five white marbles left in the bag. So, the probability of drawing a second red marble is 2/7 (since there are now two red marbles left and seven marbles in total).

If a white marble is drawn on the first draw, there will be three red marbles and four white marbles left in the bag. So, the probability of drawing two red marbles in this case is 3/7 (since there are three red marbles left and seven marbles in total).

To calculate the overall probability of drawing two red marbles, we need to consider both cases:

P(draw two red marbles) = P(red on first draw) \* P(second red | red on first draw) + P(white on first draw) \* P(two reds | white on first draw)

P(draw two red marbles) = (3/8) \* (2/7) + (5/8) \* (3/7)

P(draw two red marbles) = 6/56 + 15/56 = 21/56 = 0.375

Therefore, the probability of drawing two red marbles at random if the first marble drawn is not replaced is 0.375 or approximately 37.5%.

6) A road has two stop lights at two consecutive intersections. The probability of getting a green light at

the first intersection is 0.6, and the probability of getting a green light at the second intersection, given

that you got a green light at the first intersection, is 0.8. What is the probability of getting a green light at

both intersections?

Let A be the event that you get a green light at the first intersection and B be the event that you get a green light at the second intersection. We want to find P(A and B).

We are given:

P(A) = 0.6

P(B|A) = 0.8

To find P(A and B), we can use the formula:

P(A and B) = P(B|A) \* P(A)

Substituting the given probabilities, we get:

P(A and B) = 0.8 \* 0.6 = 0.48

Therefore, the probability of getting a green light at both intersections is 0.48.

7) Suppose the two joker cards are left in a standard deck Of cards. One of the jokers is red and the other

is black. A single card is drawn from the deck Of 54 cards but not returned to the deck, and then a second

card is drawn. Determine the probability Of drawing:

a) one of the jokers on the first draw and an ace on the second draw

b) a numbered card Of any suit on the first draw and the red joker on the second draw

C) a queen on both draws

d) any black card on both draws

a) The probability of drawing one of the jokers on the first draw is 2/54, since there are two jokers in the deck. The probability of drawing an ace on the second draw is 4/53, since there are four aces left in the deck out of 53 cards remaining after the first draw (since one card has been removed from the deck). Therefore, the probability of drawing one of the jokers on the first draw and an ace on the second draw is:

(2/54) \* (4/53) = 8/2862 ≈ 0.0028 or 0.28%

b) The probability of drawing a numbered card of any suit on the first draw is 36/54, since there are 36 numbered cards in the deck (2 through 10) out of 54 cards total. The probability of drawing the red joker on the second draw is 1/53, since there are only 53 cards left in the deck after the first draw (since one card has been removed) and only one of those cards is the red joker. Therefore, the probability of drawing a numbered card on the first draw and the red joker on the second draw is:

(36/54) \* (1/53) = 36/2862 ≈ 0.0126 or 1.26%

c) The probability of drawing a queen on the first draw is 4/54, since there are four queens in the deck. Once the first card has been drawn and not replaced, there are only 53 cards left in the deck. The probability of drawing a queen on the second draw, given that a queen was not drawn on the first draw, is 3/53, since there are now three queens left in the deck out of 53 cards remaining. Therefore, the probability of drawing a queen on both draws is:

(4/54) \* (3/53) = 12/2862 ≈ 0.0042 or 0.42%

d) The probability of drawing any black card on the first draw is 26/54, since there are 26 black cards in the deck (13 spades and 13 clubs) out of 54 cards total. Once the first card has been drawn and not replaced, there are only 53 cards left in the deck. The probability of drawing a black card on the second draw, given that a black card was drawn on the first draw, is 25/53, since there are now 25 black cards left in the deck out of 53 cards remaining. Therefore, the probability of drawing any black card on both draws is:

(26/54) \* (25/53) = 325/2862 ≈ 0.1136 or 11.36%

8) Tennis great Roger Federer made 63% Of his first serves in 2011 season. When Federer made his first

serve, he won 78% of the points. When Federer missed his first serve and had to serve again. he won only

57% of the points. Suppose we randomly choose a point on which Federer served.

a) Start by creating a tree diagram to model the situation.

b) What is the probability that Federer makes the first serve and wins the point?

c) What his the probability the he loses the point?

a) Here is the tree diagram that models the situation:

First Serve (63%)

/ \

Win (78%) Lose (22%)

/ \

Second Serve Second Serve (100%)

/ \

Win (57%) Lose (43%)

b) The probability that Federer makes the first serve and wins the point is the product of the probabilities along the path that leads from the root to the "Win" endpoint in the tree diagram:

0.63 × 0.78 = 0.4914

Therefore, the probability that Federer makes the first serve and wins the point is approximately 0.4914.

c) The probability that Federer loses the point is the sum of the probabilities of the two paths that lead to the "Lose" endpoint in the tree diagram:

0.63 × 0.22 + 0.37 × 1.0 × 0.43 = 0.2953

Therefore, the probability that Federer loses the point is approximately 0.2953.

9) Many employers require prospective employees to take a drug test. A positive result on this test

indicates that the prospective employee uses illegal drugs. However, not all people who test positive

actually use drugs. Suppose that 4% Of prospective employees use drugs. Of the employees who use

drugs, 90% would test positive. Of the employees who don't use drugs, 5% would test positive.

a) Start by creating a tree diagram to model the situation.

b) A randomly selected prospective employee tests positive for drugs. What is the probability that he

actually took drugs?

a) Here is a tree diagram to represent the information:

Use drugs Don't use drugs

| |

P(D) = 0.04 P(D') = 0.96

/ \ / \

/ \ / \

/ \ / \

P(+|D) = 0.90 P(+|D') = 0.05

/ \ / \

/ \ / \

Drug user Non-drug user Drug user Non-drug user

tests tests tests tests

+ - + - + - + -

/ \ / \ / \ / \

P(D,+)=0.036 P(D,-)=0.004 P(D',+)=0.048 P(D',-)=0.912

b) We want to find the probability that a randomly selected prospective employee who tests positive for drugs actually uses drugs. Using Bayes' theorem, we have:

P(D|+) = P(+|D) \* P(D) / P(+)

We can calculate the probability of testing positive using the law of total probability:

P(+) = P(+|D) \* P(D) + P(+|D') \* P(D')

= 0.90 \* 0.04 + 0.05 \* 0.96

= 0.074

Now we can substitute the given probabilities into Bayes' theorem:

P(D|+) = P(+|D) \* P(D) / P(+)

= 0.90 \* 0.04 / 0.074

= 0.4865

Therefore, the probability that a randomly selected prospective employee who tests positive for drugs actually uses drugs is approximately 0.4865, or about 49%.

1) A truck driver has a choice of routes as he travels among four cities. He can choose from four routes

between Toronto and Oakville, two between Oakville and Hamilton, and three between Hamilton and

Guelph. Find the total number Of routes possible for the complete Toronto-Oakville-Hamilton-Guelph

trips.

2) A test has four true/false questions. What is the probability that they Will get all four correct by

guessing?

3) A test has three multiple choice questions, each question has four possible answers. What is the

probability that you get all three questions correct by guessing?

1)To find the total number of routes possible for the complete Toronto-Oakville-Hamilton-Guelph trips, we can use the multiplication principle of counting. The number of routes between Toronto and Oakville is 4, the number of routes between Oakville and Hamilton is 2, and the number of routes between Hamilton and Guelph is 3. Therefore, the total number of routes possible is:

4 x 2 x 3 = 24

Hence, there are 24 possible routes for the complete Toronto-Oakville-Hamilton-Guelph trips.

2)Since there are two possible outcomes (true or false) for each question and there are four questions in total, the number of possible outcomes is 2 x 2 x 2 x 2 = 16. Therefore, the probability of getting all four correct by guessing is:

1/16 or 0.0625 or 6.25%

Hence, the probability of getting all four correct by guessing is 1/16 or 0.0625 or 6.25%.

3)Each question has four possible answers, so the number of possible outcomes for each question is 4. Since there are three questions, the total number of possible outcomes is 4 x 4 x 4 = 64. Therefore, the probability of getting all three questions correct by guessing is:

1/64 or 0.015625 or 1.5625%

Hence, the probability of getting all three questions correct by guessing is 1/64 or 0.015625 or 1.5625%.

4) Ten students are to line up for a photograph.

a) In how many ways can the IO students standing in a line be arranged?

b) In how many ways can the IO students standing in a line be arranged if Jill must be first?

c) In how many ways can IO students standing in a line be arranged if Jill must be first and Meera last?

5) The senior choir has rehearsed five songs for an upcoming assembly. In how many different orders can

the coir perform the songs?

6) In how many ways is it possible to elect a president, a vice-president, and a secretary for a club

consisting Of 15 members?

7) In how many ways can the letters Of the word MONDAY be arranged?

8) In how many different ways can the letters of the word MISSISSAUGA be arranged?

9) Forty-three race cars started the 2004 Daytona 500. How many ways can the cars finish first. second,

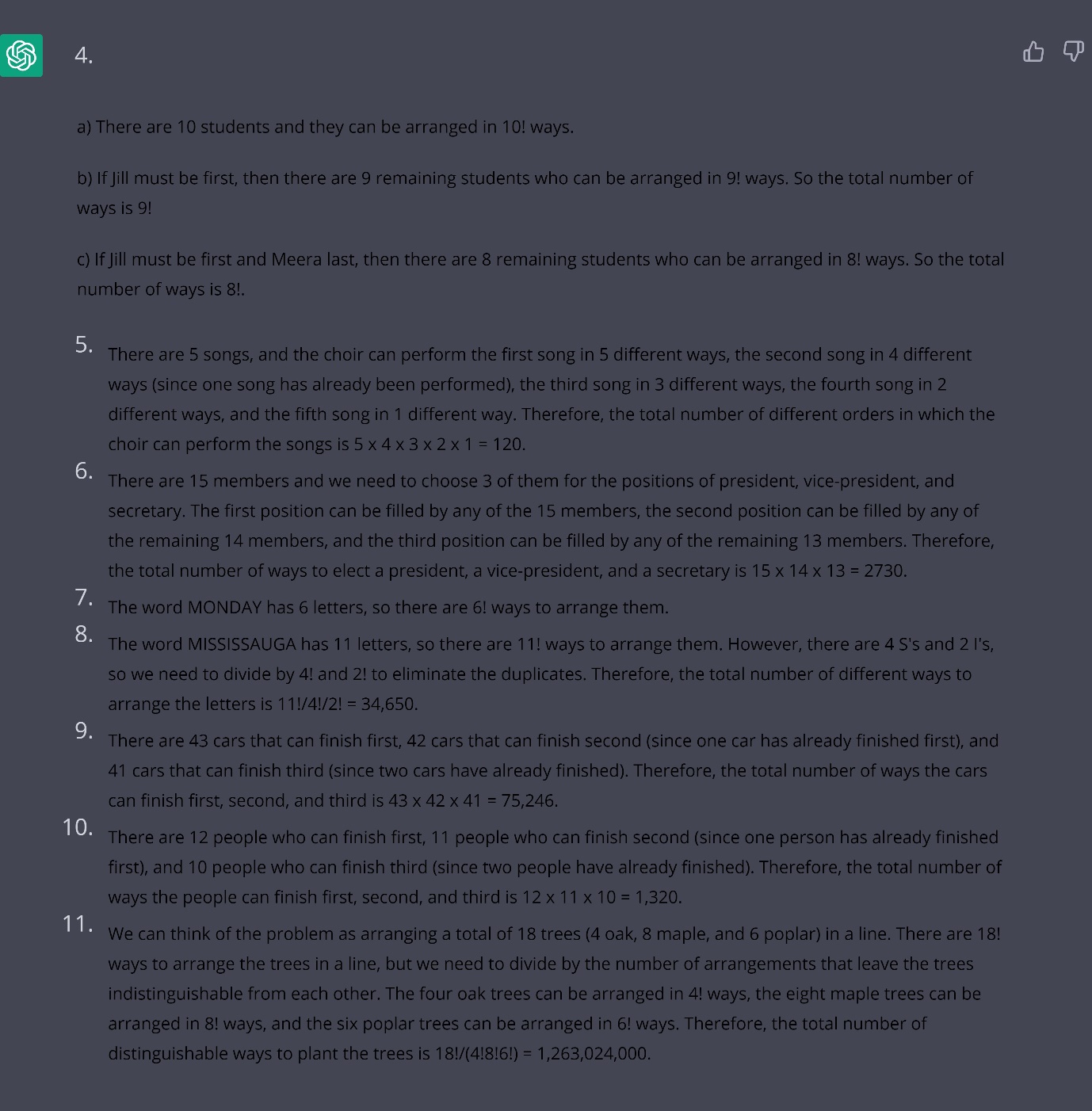
and third?

10) There are 12 people entered in a swimming race. Assuming that there are no ties, in how many

different ways can these people finish first, second, and third?

11) A landscaper wants to plant four oak trees, eight maple trees, and six poplar trees along the border of

a lawn. The trees are to be spaced evenly apart. In how many distinguishable ways can they be planted?



a) The IO students can be arranged in 10! ways. b) If Jill is first, then there are 9! ways to arrange the remaining students. c) If Jill is first and Meera is last, then there are 8! ways to arrange the remaining students between Jill and Meera. Therefore, the total number of ways is 9! \* 8!.

1. The choir can perform the songs in 5! = 120 different orders.
2. The president can be chosen in 15 ways, the vice-president in 14 ways (since one person has already been chosen for the president), and the secretary in 13 ways (since two people have already been chosen). Therefore, the total number of ways is 15 \* 14 \* 13 = 2730.
3. The letters of the word MONDAY can be arranged in 6! = 720 ways.
4. The letters of the word MISSISSAUGA can be arranged in 11!/(4!2!2!) = 34,650 ways. This is calculated using the formula for permutations with repeated elements.
5. There are 43 choices for the first car to finish, then 42 choices for the second car (since one car has already finished first), and 41 choices for the third car (since two cars have already finished). Therefore, the total number of ways is 43 \* 42 \* 41 = 75,738.
6. There are 12 choices for the first person to finish, 11 choices for the second person (since one person has already finished first), and 10 choices for the third person (since two people have already finished). Therefore, the total number of ways is 12 \* 11 \* 10 = 1,320.
7. There are 18 spaces between the trees where they can be planted. We need to choose 4 of these spaces for the oak trees (in 18C4 ways), 8 of the remaining spaces for the maple trees (in 14C8 ways), and plant the poplar trees in the remaining spaces. Therefore, the total number of distinguishable ways is 18C4 \* 14C8 = 126,202,560.

6) A paper bag contains a mixture Of 3 types Of candy. There are ten chocolate bars, seven fruit bars, and

three packages of toffee. Suppose a game is played in which a candy is randomly taken from the bag,

replaced, and then a second candy is drawn from the bag. If you are allowed to keep the second candy

only if it was the same type as the one that was drawn the first time, calculate the probability Of each Of

the following:

a) you will be able to keep a chocolate bar

b) you well be able to keep any candy

c) you won't be able to keep any candy

7) A coin is tossed and a standard six-sided die is rolled.

a) How many different outcomes are possible?

b) What is the probability of flipping tails and rolling a number greater than 4?

8) The probability that a salmon swims successfully through a dam is 0.85.

a) Find the probability that three salmon swim successfully through the dam.

b) Find the probability that none Of the three salmon is successful.

C) Find the probability that at least one of the three salmon is successful in swimming through the dam.

a) The probability of drawing a chocolate bar the first time is 10/20 = 1/2. Since the candy is replaced, the probability of drawing another chocolate bar the second time is also 1/2. So the probability of keeping a chocolate bar is (1/2) x (1/2) = 1/4.

b) The probability of drawing any candy the first time is (10 + 7 + 3)/20 = 20/20 = 1. Since the candy is replaced, the probability of drawing the same candy the second time is the same as the probability of drawing it the first time, so the probability of keeping any candy is also 1.

c) The probability of not being able to keep any candy is the complement of the probability of being able to keep at least one candy. The probability of not being able to keep any candy is 1 - (probability of keeping a chocolate bar + probability of keeping a fruit bar + probability of keeping a toffee) = 1 - ((1/4) + (1/4) + (1/4)) = 1/4.

a) The number of different outcomes is 2 (for the coin) x 6 (for the die) = 12.

b) The probability of flipping tails is 1/2, and the probability of rolling a number greater than 4 is 2/6 = 1/3. The probability of both events happening is (1/2) x (1/3) = 1/6.

a) Since the probability of success is 0.85, the probability of three salmon swimming successfully through the dam is (0.85)^3 = 0.614125.

b) The probability of failure (not swimming successfully through the dam) is 1 - 0.85 = 0.15. The probability of none of the three salmon swimming successfully through the dam is (0.15)^3 = 0.003375.

c) The probability of at least one salmon swimming successfully through the dam is the complement of the probability of none of the salmon being successful, which is 1 - 0.003375 = 0.996625.

4) A standard deck Of cards has had all the face cards (jacks, queens, and kings) removed so that only the

ace through ten of each suit remain. A game is played in which a card is drawn from this deck and a six-

sided die is rolled. For the purpose of this game, an ace is considered to have a value of 1.

a) Determine the total number Of possible outcome for this game.

b) Find the probability Of each of these events:

i) an even card and an even roll of the die

ii) an even card and a roll of 3.

iii) a card of 3 and a roll of the die of 3 or less

5) Suppose the two joker cards are left in a standard deck of cards. One of the jokers is red and the other

is black. A single card is drawn from the deck of 54 cards, returned, and then a second card is drawn.

Determine the probability of drawing:

a) one of the jokers on the first draw and an ace on the second

b) the red joker on the second draw and a numbered card of any suit on the first

c) a queen on both draws

d) any black card on both draws

e) any numbered card less than 10 on the first draw and a card with the same number on the second

a) There are 10 cards in each suit and 4 suits, so there are a total of 40 cards in the deck. Since there are 6 possible outcomes for rolling a die, the total number of possible outcomes for this game is 40 x 6 = 240.

b) i) There are 20 even cards in the deck (2, 4, 6, 8, and 10 of each suit), and 3 even numbers on the die (2, 4, and 6), so the probability of drawing an even card and rolling an even number is (20/40) x (3/6) = 1/4.

ii) There are 20 even cards in the deck, but only one of them is a 3, and there is only one way to roll a 3 on the die. So the probability of drawing an even card and rolling a 3 is (1/40) x (1/6) = 1/240.

iii) There are four 3s in the deck, and there are 3 possible outcomes (1, 2, or 3) that satisfy the condition that the die roll is 3 or less. So the probability of drawing a 3 and rolling a 3 or less is (4/40) x (3/6) = 1/10.

a) The probability of drawing one of the jokers on the first draw is 2/54, and the probability of drawing an ace on the second draw is 4/54. Since the cards are replaced, the two events are independent, so the probability of both events happening is (2/54) x (4/54) = 1/3645.

b) The probability of drawing the red joker on the second draw is 1/54, and the probability of drawing a numbered card of any suit on the first draw is 40/54. Since the cards are replaced, the two events are independent, so the probability of both events happening is (1/54) x (40/54) = 40/2916.

c) The probability of drawing a queen on the first draw is 4/54, and the probability of drawing another queen on the second draw is 3/54. Since the cards are replaced, the two events are independent, so the probability of both events happening is (4/54) x (3/54) = 1/243.

d) The probability of drawing any black card on the first draw is 26/54, and the probability of drawing another black card on the second draw is also 26/54. Since the cards are replaced, the two events are independent, so the probability of both events happening is (26/54) x (26/54) = 169/729.

e) The probability of drawing a numbered card less than 10 on the first draw is 36/54, and the probability of drawing a card with the same number on the second draw is 1/54. There are 9 numbered cards less than 10, so there are 9 ways that the second card can have the same number as the first. Since the cards are replaced, the two events are independent, so the probability of both events happening is (36/54) x (1/54) x 9 = 1/54.

4) Ten students are to line up for a photograph.

a) In how many ways can the 10 students standing in a line be arranged?

b) In how many ways can the 10 students standing in a line be arranged if Jill must be first?

c) In how many ways can IO students standing in a line be arranged if Jill must be first and Meera last?

5) The senior choir has rehearsed five songs for an upcoming assembly. In how many different orders can

the coir perform the songs?

6) In how many ways is it possible to elect a president, a vice-president, and a secretary for a club

consisting of 15 members?

7) In how many ways can the letters of the word MONDAY be arranged?

8) In how many different ways can the letters of the word MISSISSAUGA be arranged?

9) Forty-three race cars started the 2004 Daytona 500. How many ways can the cars finish first, second,

and third?

10) There are 12 people entered in a swimming race. Assuming that there are no ties, in how many

different ways can these people finish first, second, and third?

11) A landscaper wants to plant four oak trees, eight maple trees. and six poplar trees along the border Of

a lawn. The trees are to be spaced evenly apart. In how many distinguishable ways can they be planted?

a) There are 10 students and 10 spots in the line, so there are 10! ways to arrange them, which is 3,628,800. b) If Jill must be first, then there are 9 students left to fill the remaining 9 spots in the line. This can be done in 9! ways, which is 362,880. c) If Jill must be first and Meera last, then there are 8 students left to fill the remaining 8 spots in the line. This can be done in 8! ways, which is 40,320.

1. There are 5 songs and they can be performed in any order, so there are 5! = 120 different orders.
2. There are 15 choices for the president, 14 choices for the vice-president (since one person has already been chosen for president), and 13 choices for the secretary (since two people have already been chosen). So the total number of ways to elect a president, vice-president, and secretary is 15 x 14 x 13 = 2,730.
3. There are 6 letters in the word MONDAY, so there are 6 choices for the first letter, 5 choices for the second letter (since one letter has already been chosen), 4 choices for the third letter, 3 choices for the fourth letter, 2 choices for the fifth letter, and 1 choice for the last letter. So the total number of ways to arrange the letters is 6 x 5 x 4 x 3 x 2 x 1 = 720.
4. There are 10 letters in the word MISSISSAUGA, so there are 10 choices for the first letter, 9 choices for the second letter (since one letter has already been chosen), and so on, down to 1 choice for the last letter. However, since there are 4 S's and 2 I's, we need to divide by the number of ways to arrange the S's and the I's, which is 4! x 2!. So the total number of ways to arrange the letters is (10 x 9 x 8 x 7 x 6 x 5 x 4 x 3 x 2 x 1) / (4 x 3 x 2 x 1) / (2 x 1) = 3,024,000.
5. There are 43 choices for the car that finishes first, 42 choices for the car that finishes second (since one car has already finished first), and 41 choices for the car that finishes third (since two cars have already finished). So the total number of ways for the cars to finish first, second, and third is 43 x 42 x 41 = 74,622.
6. There are 12 choices for the person who finishes first, 11 choices for the person who finishes second (since one person has already finished first), and 10 choices for the person who finishes third (since two people have already finished). So the total number of ways for the people to finish first, second, and third is 12 x 11 x 10 = 1,320.
7. The trees must be spaced evenly apart, so there are only a few different ways they can be arranged. We can choose the order of the types of trees (oak, maple, poplar) in 3! = 6 ways. Then we can arrange the trees of each type in the spaces between them. There are 5 spaces between 6 trees, so we need to choose 4 of these spaces for the oak trees, and then 8 of the