Pear Assessment

Geometry 2017-2024 CP

Created By Sean

1 Josh has a bag containing pieces of candy. The bag contains 10 red circular pieces, 10 red square pieces, 10 blue triangular pieces, and 10 blue star-shaped pieces. He draws a red piece of candy from the bag.
What is the complement of this event?

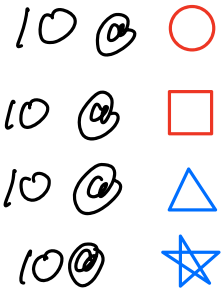
Complement = not Red

(A) He draws a blue piece.

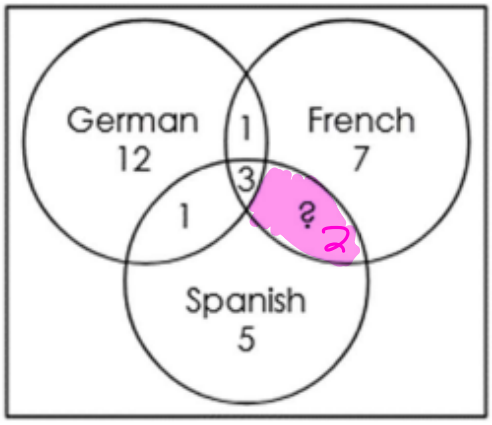
(B) He draws a square piece.

(C) He draws a circular piece.

(D) He draws a star-shaped piece.



2 Alicia surveys 31 people about how many world languages they speak. She finds that 11 people speak Spanish, 17 people speak German, and 13 people speak French. Part of the data she collects is shown in the Venn diagram.



Spanish = 1 + 3 + 5 + ?
11 = 9 + ?
2 = ?

How many people does Alicia survey that speak both French and Spanish but not German?

2

3 Events A and B are independent.

P(A) = P(A|B)

- $P(B) = 0.6$
- $P(A \text{ and } B) = 0.3$

$P(A \cap B) = P(A) \cdot P(B)$

$0.3 = P(A) \cdot 0.6$

$.5 = P(A)$

What is $P(A)$?

.5

4 The probability of event A is 0.6. The probability of event B is 0.7.

A and B are independent events.

What is the probability of A and B?

.42

$P(A \cap B) = P(A) \cdot P(B)$

$P(A \cap B) = (0.6)(0.7)$

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5 Events A and B are independent.

$P(A \text{ and } B) = 0.25$

Enter possible probabilities for events A and B.

$P(A) =$ 1

$P(B) =$ .25

$P(A \cap B) = P(A) \cdot P(B)$

$.25 = P(A) \cdot P(B)$

Many correct answers

Answers must be ≥ 0 and ≤ 1

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6 Probabilities for two events, event A and event B, are given.

$P(A \text{ and } B) = 0.14$

$P(B) = 0.4$

What is the probability of A given B?

.35

$P(A|B) = \frac{P(A \cap B)}{P(B)}$ or $P(A \cap B) = P(B) \cdot P(A|B)$

$= \frac{0.14}{.4}$

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7 A scientist conducts experiments on bacteria using three different conditions, A, B and C. The table shows the probabilities of the bacteria being affected by each condition.

Probabilities

Individual	Conditional
$p(A) = \frac{50}{100} = .50$	$P(A \mid B) = \frac{15}{65} \approx 0.23$
$P(B) = \frac{65}{100} = .65$	$P(A \mid C) = \frac{10}{20} = .50$
$P(C) = \frac{20}{100} = .20$	$P(B \mid C) = \frac{15}{20} = .75$

INDY

$P(A) = P(A|B)$

$P(B) = P(B|C)$

$P(C) = P(C|\text{anything})$

Complete the statements to explain which two conditions are independent.

Two conditions that are independent of each other are conditions [a]

The scientist can conclude this because [b] = [c]

a
- A and B
- A and C
- B and C

b
- P(A)
- P(B)
- P(C)
- P(A|B)
- P(A|C)
- P(B|C)

c
- P(A)
- P(B)
- P(C)
- P(A|B)
- P(A|C)
- P(B|C)

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8 Events Q and R are independent events, such that $\frac{P(Q \cap R)}{P(R)} = \frac{4}{5}$.

Which probability is equal to $\frac{4}{5}$?

$P(Q \cap R) = \frac{4}{5} \cdot P(R)$

- (A) $P(Q)$
- (B) $P(R)$
- (C) $P(Q \cup R)$
- (D) $P(Q \cap R)$

$P(Q \cap R) = P(Q) \cdot P(R)$

9 This item has **two** parts.

(a) A high school teacher surveyed 700 junior and senior students to see whether they preferred biology or chemistry.

- Out of all the juniors surveyed, 35% said they preferred chemistry. $.35(340) = 119$
- Out of all the students surveyed, 56% said they preferred biology. $.56(700) = 392$

Part A

Complete the two-way table that shows how many junior and senior students preferred each science course.

	Biology	+ Chemistry	= Total
Juniors	221	119	340
Seniors	171	189	360
Total	392	308	700

(b) **Part B**

What is the **exact** probability that a student is a senior given that the student preferred biology?

$\frac{171}{392}$

$P(S|Bio) = \frac{\#\ S \cap B}{\#\ B} = \frac{171}{392}$

10 The table shows the voting results of a mayoral election in a small town between candidates Smith and Jones. The small town has two polling places, one in the North District and one in the South District.

	Smith	Jones	Total
North District	21	39	60
South District	135	45	180
Total	156	84	240

Which statement Is true?

$P(J) = \frac{84}{240} = .35$

$P(S|SD) = \frac{135}{180} = .75$

(A) Jones won the election with 65% of the total vote.

(B) Smith won 75% of all votes from the South District.

(C) Voters' choices are independent of the district in which they voted.

(D) Support for Jones was proportionally higher In the South District than in the North District.

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11 Rosa collects data on what students at her school like to eat at the movie theater. She asks a random sample of 120 students two questions:

- Do you like to eat popcorn at the movie theater?
- Do you like to eat candy at the movie theater?

Her data are partially shown in the table. Of the students she asks, 60% of those who like to eat popcorn also like to eat candy. $.60(70) = 42$

Complete the table to show the number of students in each category.

	Like popcorn	Don't Like popcorn	Total
Like Candy	42	16	58
Don't Like Candy	28	34	62
Total	70	50	120

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12 A survey was conducted to determine whether a group of 11th graders and 12th graders preferred to go to the amusement park or to the zoo for a class trip. The results are shown in the table.

	Amusement Park	Zoo
11th Graders	32	18
12th Graders	24	26

both 1
50

Based on the table, what is the probability that a student preferred a class trip to the zoo given they are in 11th grade?

18/50

$P(\text{zoo} \mid 11^{th}) = \frac{18}{50}$

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13 A company surveys people in a city to find the type of cell phone plans they have and which provider they use. The results are shown in the table.

	Unlimited Usage	Limited Usage	Total
Provider A	19	4	23
Provider B	14	6	20
Provider C	13	11	24
Other	7	1	8
Total	53	22	75

What is the probability that a randomly selected person who has a plan with Provider B has unlimited usage?

$\frac{14}{20}$

$P(\text{unlimited} \mid B) = \frac{\#\text{Un and B}}{B} = \frac{14}{20}$

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14 A student flips a fair coin twice and is surprised the result is heads both times.

INDY

Which sentence correctly describes the relationship between the two events?

(A) The two events are dependent because the result of the first flip changes the probability of the second flip being heads.

(B) The two events are dependent because the result of the first flip does not change the probability of the second flip being heads.

(C) The two events are independent because the result of the first flip changes the probability of the second flip being heads.

(D) The two events are independent because the result of the first flip does not change the probability of the second flip being heads.

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15 Greg buys a single coffee every weekday. He determines that the probability that he will buy a coffee on a random day in a 28-day period is $\frac{20}{28}$. Greg also looks at weather records for the 28 days and sees that the temperature was above $24^\circ C$ on 7 of the 28 days.

Greg determines that the probability that the temperature will be above $24^\circ C$ and that he will buy a coffee is $\frac{5}{28}$.

Select a phrase and a word to complete the sentence identifying the effect of the average daily temperature when it was above $24^\circ C$ and Greg purchasing a coffee on a random day in the 28-day period.

If the average daily temperature on a day is $24^\circ C$ or higher, it is **a** that Greg will buy a coffee because the two events are **b**

a

- ○ less likely
- ○ more likely
- ◉ equally likely

b

- ○ dependent.
- ◉ independent.

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16 Bryan records the number of hours he sleeps each night for several days and whether it is raining in the morning when he wakes up. Bryan concludes that these two events are independent:

- Bryan sleeps 8 or more hours.
- It is raining in the morning.

Based on Bryan's conclusion, which statement must be true?

(A) Bryan never sleeps 8 or more hours on days that it is not raining in the morning.

(B) The probability that Bryan sleeps 8 or more hours is the same whether or not it is raining in the morning.

(C) The probability that Bryan sleeps 8 or more hours is influenced by whether or not it is raining in the morning.

(D) The probability that Bryan sleeps 8 or more hours is the same as the probability that it is raining in the morning.

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17 During a 90 day semester, a student records whether he arrives at school on time and whether he goes to bed $10:00$ p.m. by the night before. The results are shown to the table.

Number of Occurrences

	Arrives at School on Time	Arrives at School Late	
Goes to Bed by 10:00 p.m.	72	8	80
Goes to Bed After 10:00 p.m.	9	1	10
	81	9	90

Does the student arriving at school on time depend on whether the student goes to bed by $10:00$ $p.m.$ Justify your reasoning. Type your answer in the space provided.

$P(\text{on time}) = \frac{\#\text{ on time}}{\#\text{ total}} = \frac{81}{90} = .90$

$P(\text{on time} \mid \text{Bed by } 10) = \frac{\#\text{ on time and by } 10}{\#\text{ by } 10} = \frac{72}{80} = .90$

$P(\text{on time}) = P(\text{on time} \mid \text{by } 10)$

$\therefore$ INDY

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18 Maurice has a bag containing 40 small wooden blocks.

- There are 20 cubes, of which 5 are blue.
- There are 20 spheres, of which 6 are blue.

$P(B \mid \text{cube}) = \frac{\#\text{B and cube}}{\#\text{cube}}$

Maurice randomly selects a cube from the bag.

What is the probability that the cube he selects is blue?

$P(B \mid \text{cube}) = \frac{5}{20}$

$\frac{5}{20}$

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19 The two-way table shows the number of births, in thousands, in the United States for the years 2010 and 2011.

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
2010	324	303	340	327	325	338	346	359	350	342	337	326	4017
2011	322	299	330	315	328	335	348	362	346	331	328	322	3966

A baby born in 2011 is randomly selected.

What is the probability that the baby was born in February?

$P(F \mid 2011) = \frac{\#\text{ F and 2011}}{\#\text{ 2011}} = \frac{299}{3966}$

$\frac{299}{3966}$

20 A university determined the number of students pursuing different degrees, by gender. Some of the results are shown.

	Undergraduate Degree	Master's Degree	Doctoral Degree	Total
Male	8250	3750	500	12,500
Female	8000	2,500	2000	12,500
Total	16,250	6,250	2,500	25,000

What is the probability that a female student chosen at random is pursuing an undergraduate degree?

$P(U|F) = \frac{\#_{under \cap F}}{\#F} = \frac{8000}{12,500}$

(A) 18%

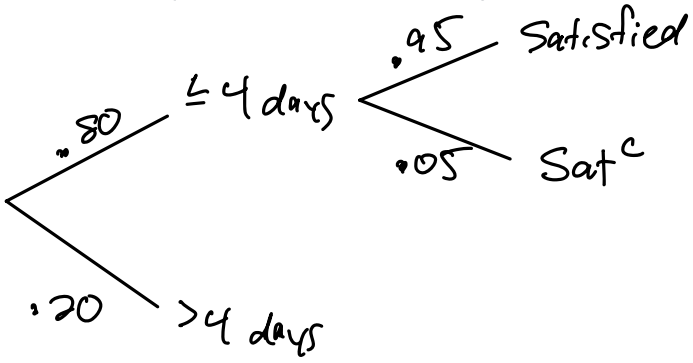
(B) 32%

(C) 36%

(D) 64%

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21 An online retailer conducts a random survey of its customers. The survey shows that 80% of the customers receive their purchases within four days, and 95% of those customers are satisfied with the quality of their purchases. What percent of all customers receive their purchases within four days and are not satisfied with the quality of their purchases?



$P(\leq 4 \text{ and Not } S) = (.80)(.05)$

(A) 4%

(B) 5%

(C) 19%

(D) 24%

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22 A total of 50 students play either soccer or lacrosse.

- 20 girls play lacrosse.
- 20 boys play either soccer or lacrosse.
- 20 students play soccer.

What is the probability that a student plays soccer or is a girl?

40/50

	Boy	Girl	
Soccer	10	10	20
Lacrosse	10	20	30
	20	30	50

$P(S \text{ or } G) = P(S) + P(G) - P(S \cap G)$

$= \frac{20}{50} + \frac{30}{50} - \frac{10}{50}$

23 A soccer coach determines that there is a 50% chance that a star player, Ralph, will play in a tournament.

- The probability that another star player, Dan, will play is 0.48.
- The probability that both Ralph and Dan will play in the tournament is 0.25.

$P(R \text{ or } D) = P(R) + P(D) - P(R \wedge D)$
$= .50 + .48 - .25$

Select phrases to complete the statement.

To find the probability that either Ralph or Dan will play in the tournament, first add **a** and then **b**

a

- (•) 0.50 and 0.48
- ( ) 0.50 and 0.25
- ( ) 0.48 and 0.25

b

- (•) subtract 0.25 from the sum.
- ( ) multiply the sum by 0.48.
- ( ) divide 0.50 by the sum.
- ( ) subtract 0.50 from the sum.
- ( ) multiply the sum by 0.25.
- ( ) divide 0.48 by the sum.

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24 The table shows when the tickets for a concert are sold and the types of tickets that are sold.

	Tickets Purchased on Day of Concert	Tickets Purchased in Advance	Total
Adult	48	100	148
Child	62	40	102
Total	110	140	250

What is the probability that a randomly selected person attending the concert is an adult or has purchased the ticket In advance?

$P(\text{Adult or Adv}) = P(\text{Adult}) + P(\text{Adv}) - P(\text{Adult} \wedge \text{Adv})$
$= \frac{148 + 140 - 100}{250}$
$= \frac{188}{250}$

$\frac{188}{250}$

25 Hernan randomly selects a book from his library. He calculates the probabilities given.

- P(hardcover or fiction) = 0.8
- P(hardcover and fiction) = 0.2
- P(hardcover) = 0.6

$P(H \text{ or } F) = P(H) + P(F) - P(H \cap F)$

$.8 = .6 + P(H) - .2$

$.4 = P(H)$

What is the probability that Hernan selects a fiction book?

.4