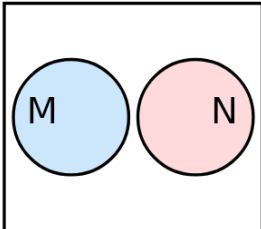




Probability - Set Operations - Practice

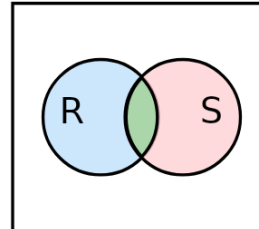
- 1 Based on this Venn diagram, are events M and N independent?



A Yes

B No

- 2 Based on this Venn diagram, which statement best describes events R and S?



A Neither mutually exclusive nor independent

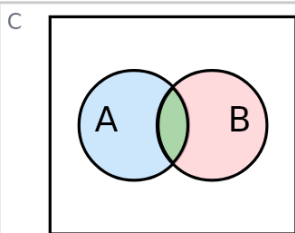
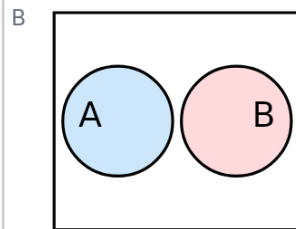
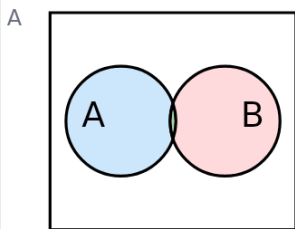
B Independent, but not mutually exclusive

C Mutually exclusive, but not independent

D Both mutually exclusive and independent

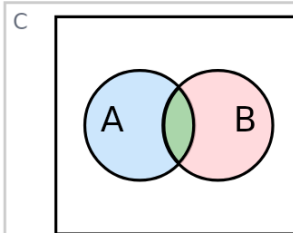
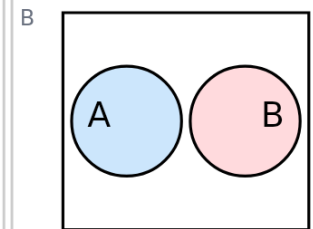
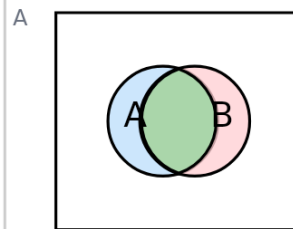
- 3 Which Venn diagram represents this situation?

Events A and B are independent.



- 4 Which Venn diagram represents this situation?

Events A and B are neither mutually exclusive nor independent.



- 5 Select the formula to calculate this probability operation if the events are independent

(A) intersect (B)

A $P(A) + P(B) - P(A \cap B)$

B $1 - P(A)$

C $P(A) \cdot P(B)$

- 6 Select the set operation that this probability formula calculates

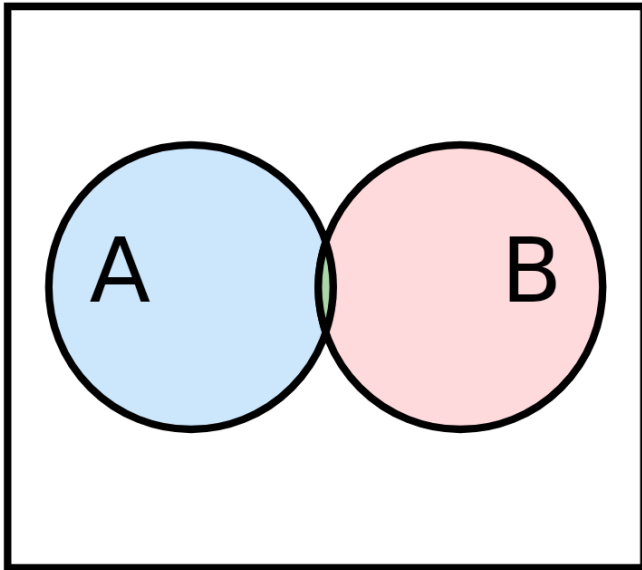
$$1 - P(A)$$

A $P(A \cap B)$

B $P(A')$

**Probability - Set Operations - Practice**

- 7 Events A and B are not mutually exclusive and not independent. Which equation gives the probability that both A and B occur?

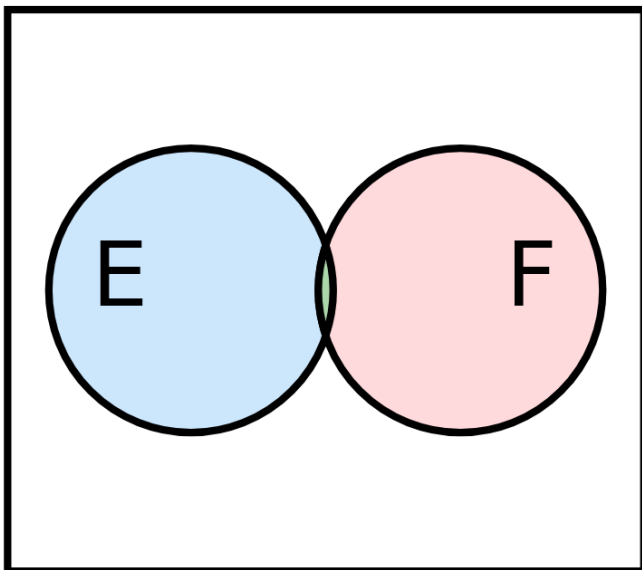


A Cannot be determined without more information

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

C $P(A \cap B) = 0$

- 8 Events E and F are not mutually exclusive and not independent. Which equation gives the probability that E or F occurs?



A $P(E \cup F) = P(E) + P(F) - P(E) \cdot P(F)$

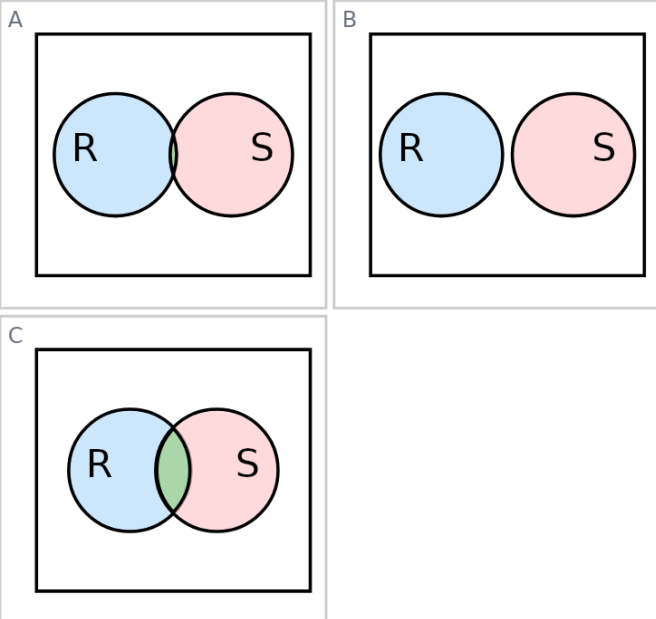
B $P(E \cup F) = P(E) + P(F)$

C $P(E \cup F) = P(E) + P(F) - P(E \cap F)$

**Probability - Set Operations - Practice**

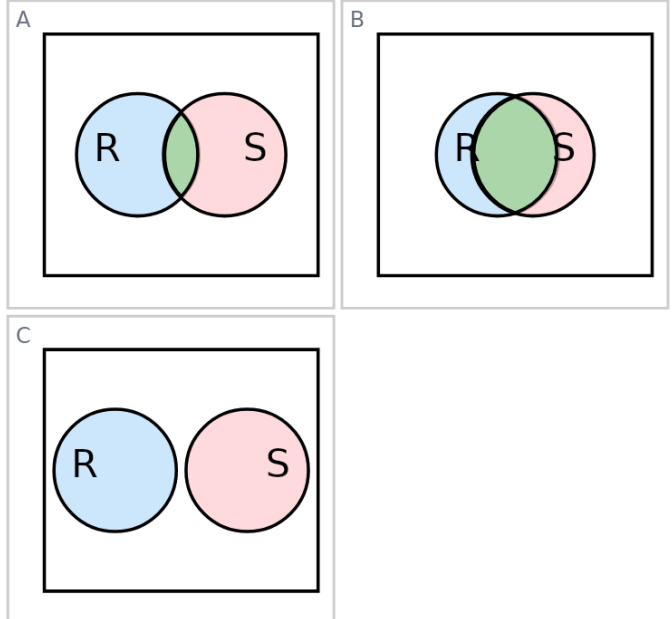
- 9** Which Venn diagram matches this information?

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



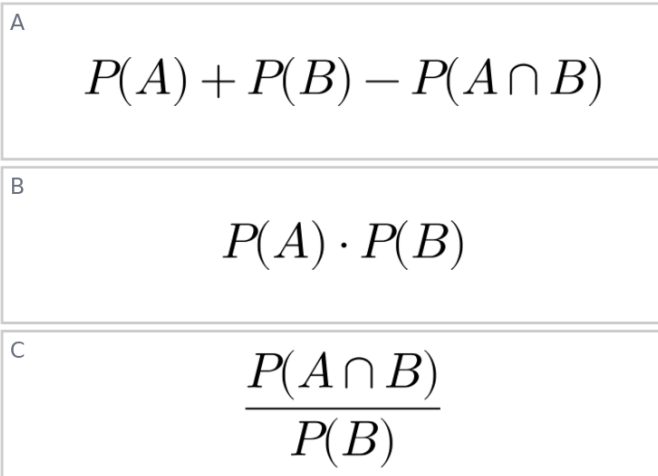
- 10** Which Venn diagram matches this information?

$$P(R \cup S) \neq P(R) + P(S) - P(R) \cdot P(S)$$



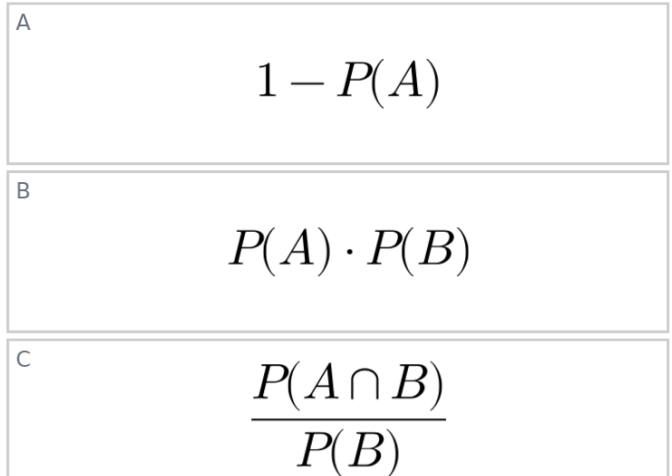
- 11** Select the formula to calculate this probability operation

(A) conditional on (B)



- 12** Select the formula to calculate the probability operation being described

Event A not happening



**Probability - Set Operations - Practice**

- 13** Select the formula to calculate the probability operation being described if the events are independent

Both A and B happening

A
$$\frac{P(A \cap B)}{P(B)}$$

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

C
$$P(A) + P(B) - P(A \cap B)$$

- 14** Select the formula for this probability operation if the events are independent

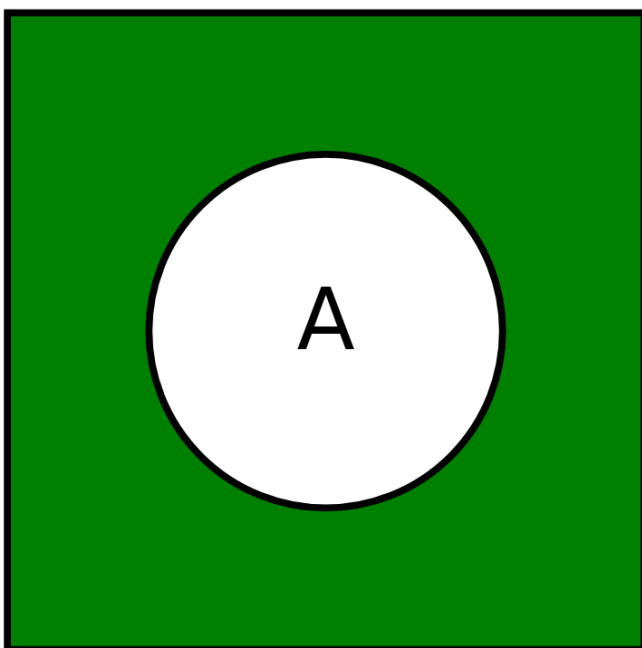
$$P(A \cap B)$$

A
$$\frac{P(A \cap B)}{P(B)}$$

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

C
$$P(A) + P(B) - P(A \cap B)$$

- 15** What formula would calculate the green area in this Venn diagram



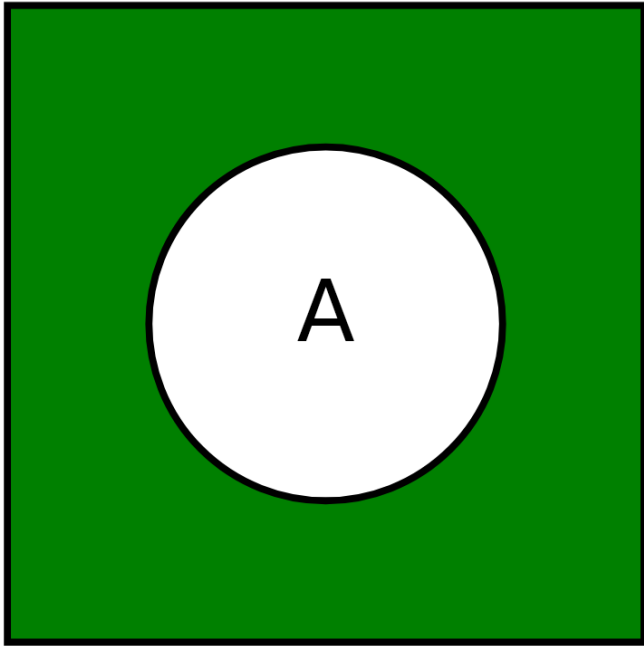
A
$$P(A) + P(B) - P(A \cap B)$$

B
$$1 - P(A)$$

C
$$\frac{P(A \cap B)}{P(B)}$$

**Probability - Set Operations - Practice**

16 What formula would calculate the green area in this Venn diagram



A

$$\frac{P(A \cap B)}{P(B)}$$

B

$$1 - P(A)$$

C

$$P(A) + P(B) - P(A \cap B)$$

17 Select the formula for this probability operation if the events are independent

$$P(A \cap B)$$

A

$$\frac{P(A \cap B)}{P(B)}$$

B

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

C

$$P(A) + P(B) - P(A \cap B)$$

18 Select the set operation that this probability formula calculates

$$1 - P(A)$$

A

$$P(A|B)$$

B

$$P(A')$$

C

$$P(A \cup B)$$

19 Select what this probability formula calculates

$$P(A) + P(B) - P(A \cap B)$$

A

Complement of (A)

B

(A) union (B)

C

(A) intersect (B)

D

(A) conditional on (B)



Probability - Set Operations - Practice

20 Select what this probability formula calculates

$$\frac{P(A \cap B)}{P(B)}$$

- | | |
|---|------------------------|
| A | (B) conditional on (A) |
| B | Complement of (A) |
| C | (A) intersect (B) |
| D | (A) conditional on (B) |

21 This formula calculates the probability of what?

$$1 - P(A)$$

- | | |
|---|--|
| A | Event A happening, given that B has happened |
| B | Event A not happening |
| C | Both A and B happening |
| D | Either A or B happening |

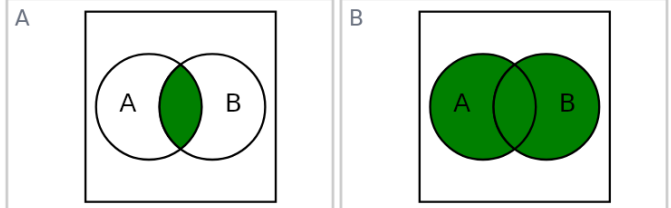
22 This formula calculates the probability of what for independent events?

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

- | | |
|---|--|
| A | Event A happening, given that B has happened |
| B | Either A or B happening |
| C | Both A and B happening |
| D | Event A not happening |

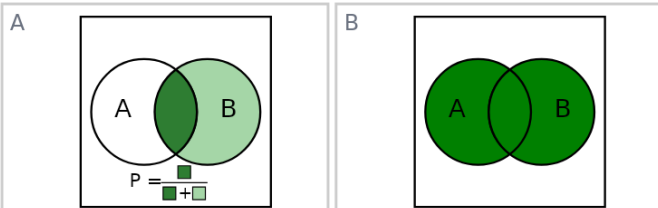
23 Which Venn diagram represents this probability formula for independent events

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

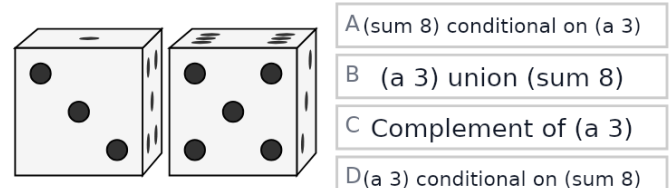


24 Which Venn diagram represents this probability formula

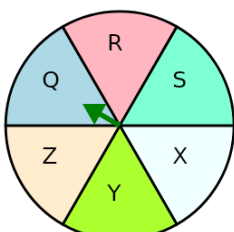
$$P(A) + P(B) - P(A \cap B)$$



25 What set operation would give you the probability of one die showing a 3, given that the sum is 8?



26 What set operation would give you the probability of not spinning 'Q'?



- | | |
|---|------------------------|
| A | (Q) conditional on (Q) |
| B | Complement of (Q) |
| C | (Q) intersect (Q) |
| D | (Q) union (Q) |

27 Select the name for this probability operation

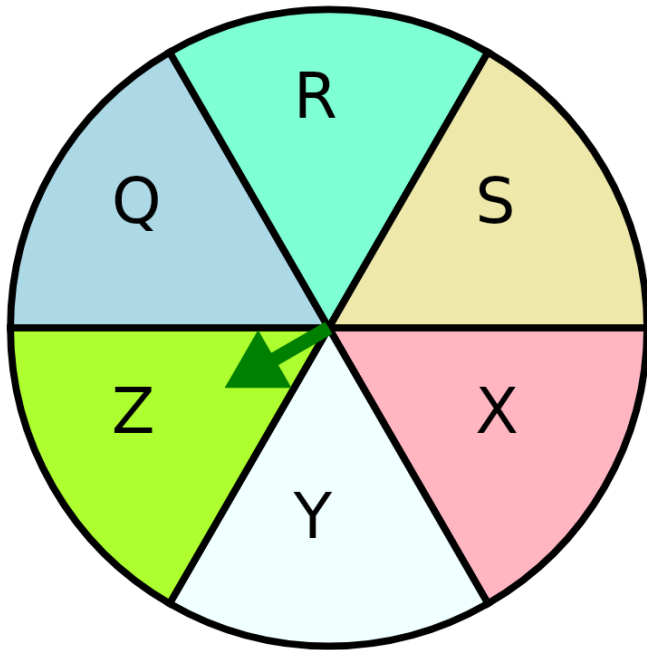
$$P(A \cup B)$$

- | | |
|---|------------------------|
| A | Complement of (A) |
| B | (A) conditional on (B) |
| C | (A) union (B) |
| D | (A) intersect (B) |



Probability - Set Operations - Practice

28 What set operation would give you the probability of spinning 'Z' at least once given two tries?



A

$Z_1 \text{ intersect } Z_2$

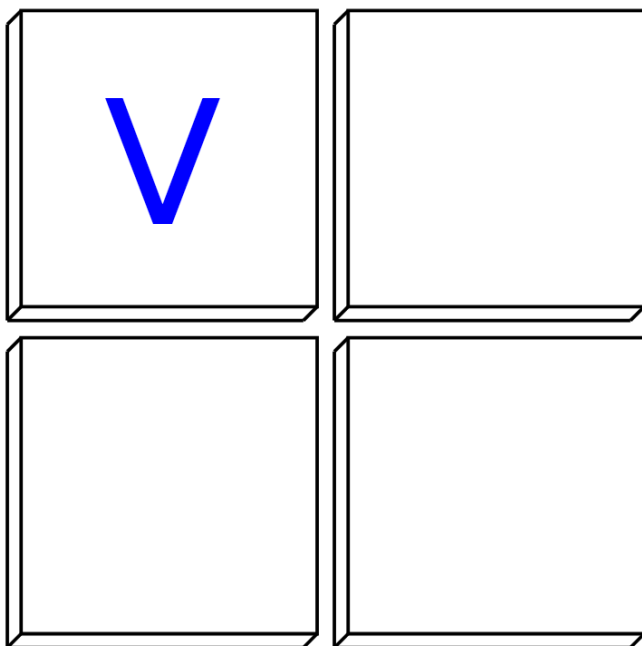
B

$Z_1 \text{ union } Z_2$

C

Complement of Z_1

29 What set operation would give you the probability of drawing an 'V' at least once given two tries?



A

$P(V_1')$

B

$P(V_1 \cup V_2)$

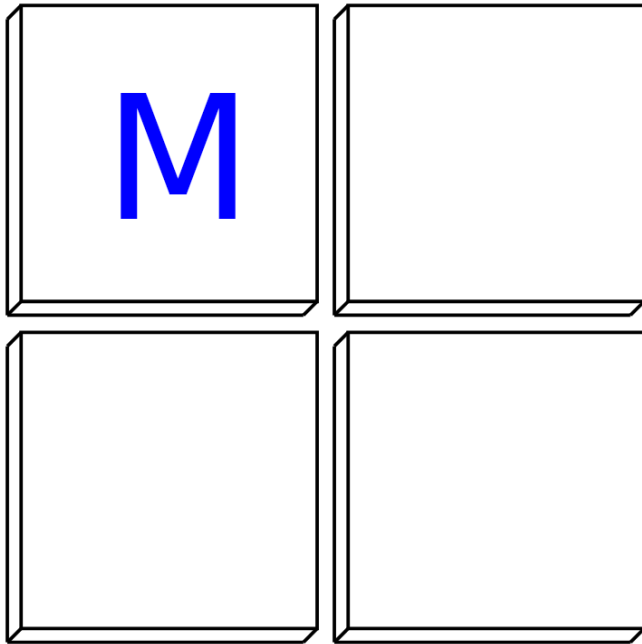
C

$P(V_1|V_2)$



Probability - Set Operations - Practice

30 What set operation would give you the probability of drawing an 'M' twice in a row?



A

$$P(M_1 \cap M_2)$$

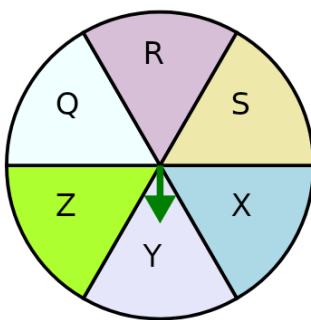
B

$$P(M_1 \cup M_2)$$

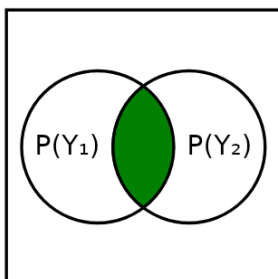
C

$$P(M_1')$$

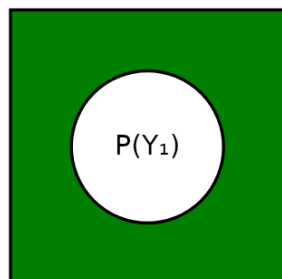
31 Which Venn diagram represents the probability of spinning 'Y' twice in a row?



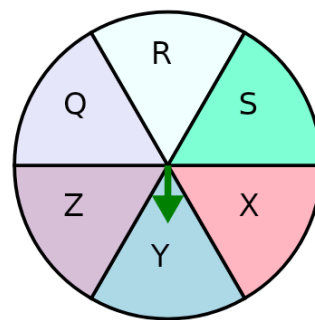
A



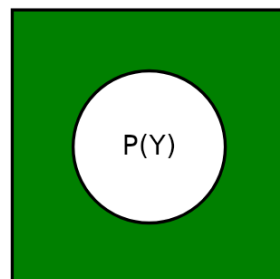
B



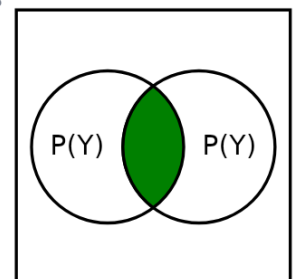
32 Which Venn diagram represents the probability of not spinning 'Y'?



A



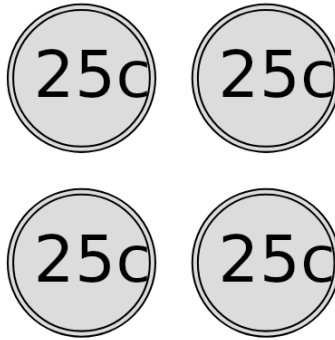
B



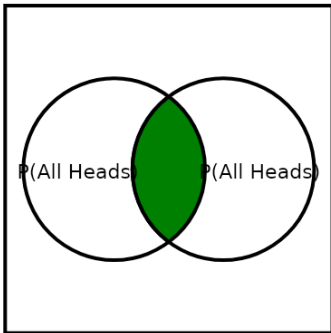


Probability - Set Operations - Practice

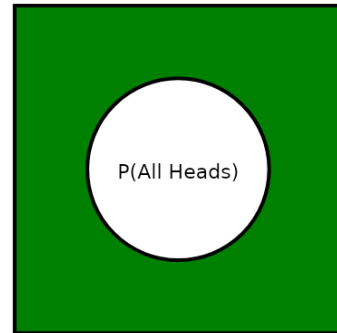
33 Which Venn diagram represents the probability of flipping at least one tails in 4 tries?



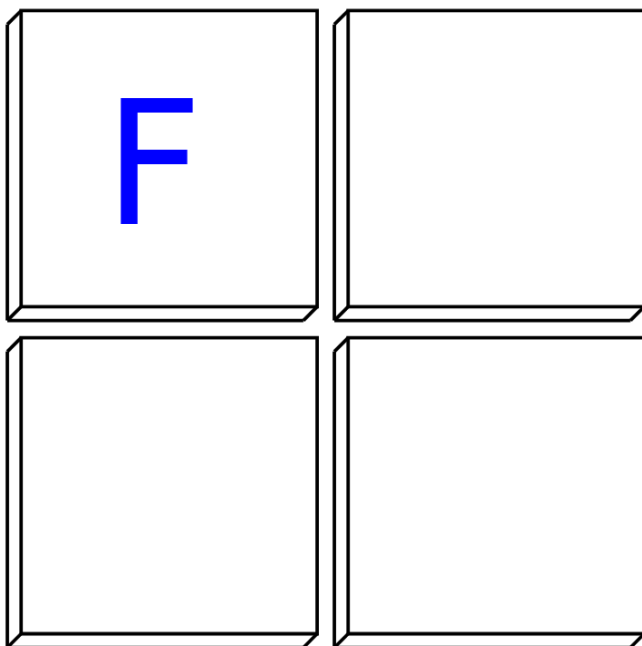
A



B



34 What formula would give you the chance of drawing an 'F' twice in a row?



A

$$P(F_1) \cdot P(F_2)$$

B

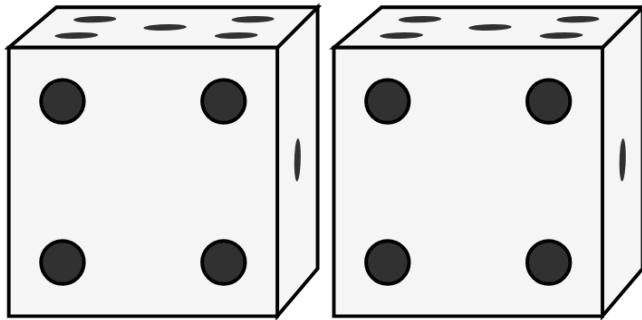
$$P(F_1) + P(F_2) - P(F_1 \cap F_2)$$

C

$$\frac{P(F_1 \cap F_2)}{P(F_2)}$$

**Probability - Set Operations - Practice**

35 What formula would give you the chance of rolling a 4 at least once given two tries?



A

$$P(4_1) \cdot P(4_2)$$

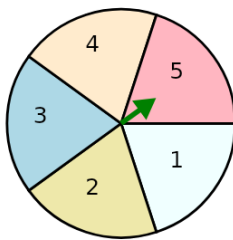
B

$$P(4_1) + P(4_2) - P(4_1 \cap 4_2)$$

C

$$\frac{P(4_1 \cap 4_2)}{P(4_2)}$$

36 What set operation would give you the probability of landing on an odd number, given that the spinner landed on a number greater than 1?



A

(odd) conditional on (>1)

B

(odd) intersect (>1)

C

(odd) union (>1)

D

 (>1) conditional on (odd)

37 Select the name for this probability operation

$$P(A \cup B)$$

A (A) conditional on (B)

B (A) union (B)

C (A) intersect (B)

D Complement of (A)

38 This set operation gives the probability of what?

$$P(A \cup B)$$

A Both A and B happening

B Event A not happening

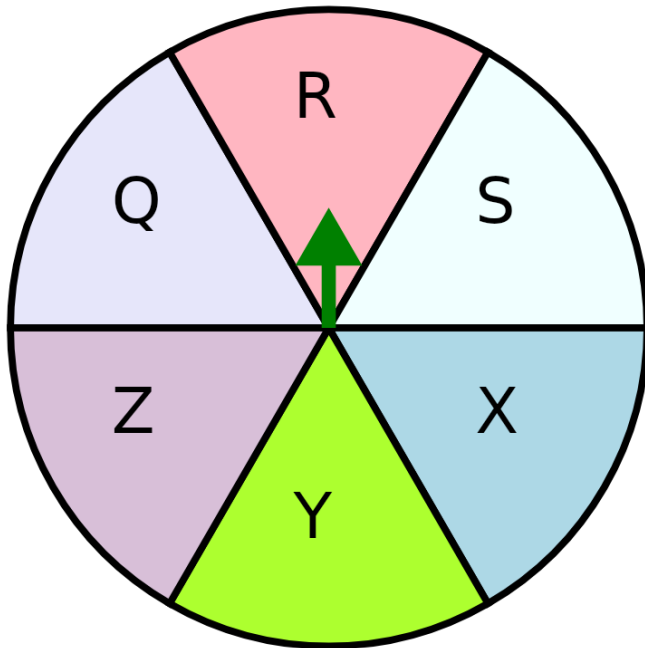
C Event A happening, given that B has happened

D Either A or B happening



Probability - Set Operations - Practice

39 What set operation would give you the probability of not spinning 'R'?



A

$$P(R \cup R)$$

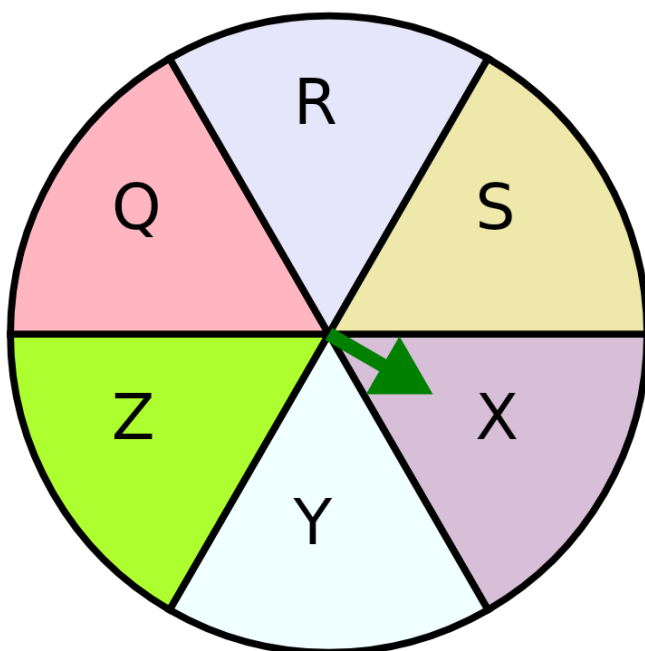
B

$$P(R|R)$$

C

$$P(R')$$

40 What set operation would give you the probability of spinning 'X' twice in a row?



A

$$P(X_1|X_2)$$

B

$$P(X_1 \cap X_2)$$

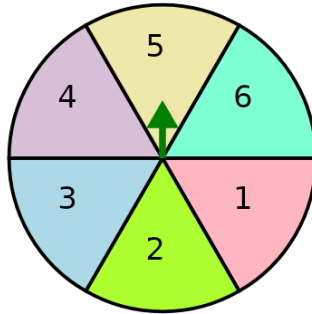
C

$$P(X_1 \cup X_2)$$

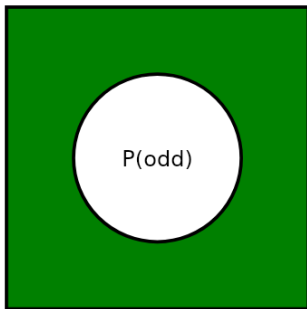


Probability - Set Operations - Practice

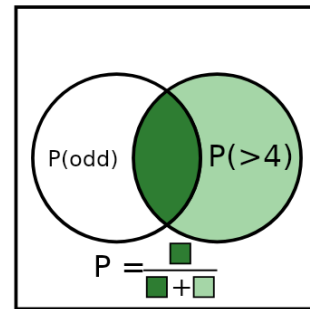
- 41** Which Venn diagram represents the probability of landing on an odd number, given that the spinner landed on a number greater than 4?



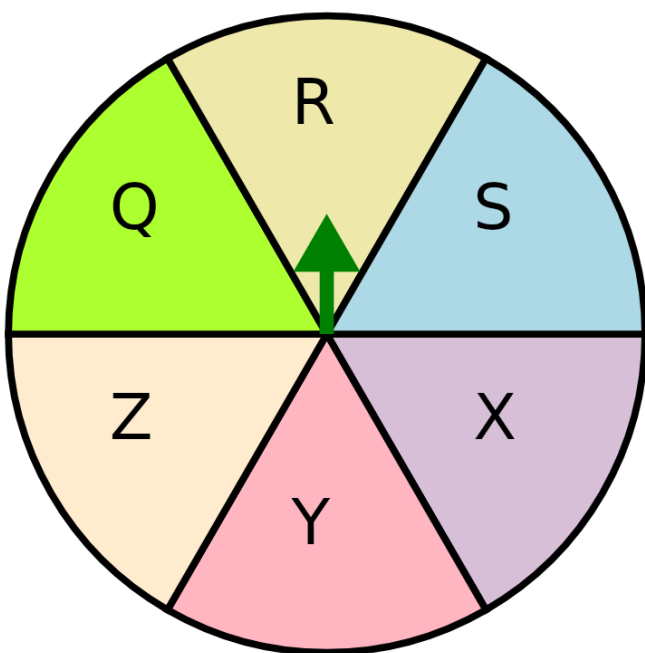
A



B



- 42** What formula would give you the chance of not spinning 'R'?



A

$$1 - P(R)$$

B

$$P(R) \cdot P(R)$$

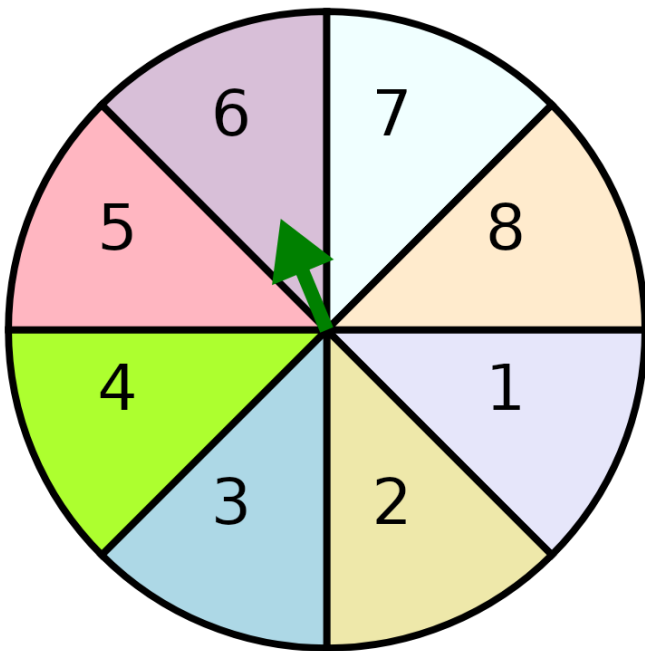
C

$$P(R) + P(R) - P(R \cap R)$$



Probability - Set Operations - Practice

- 43** What formula would give you the chance of landing on 6, given that the spinner landed on a number greater than 1?



A

$$1 - P(6)$$

B

$$P(6) \cdot P(> 1)$$

C

$$\frac{P(6 \cap > 1)}{P(> 1)}$$

- 44** This set operation gives the probability of what?

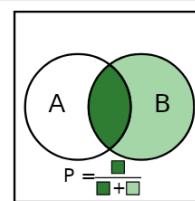
$$P(A \cup B)$$

- A Event A not happening
B Either A or B happening
C Both A and B happening
D Event A happening, given that B has happened

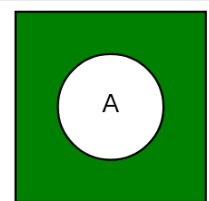
- 45** Which Venn diagram represents this probability set operation

$$P(A')$$

A



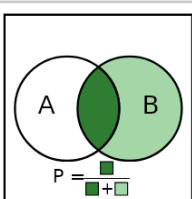
B



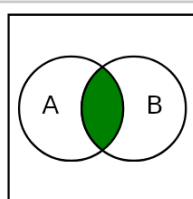
- 46** Which Venn diagram represents this probability set operation

$$P(A|B)$$

A



B



- 47** What set operation would give you the probability of flipping at least one heads in 2 tries?



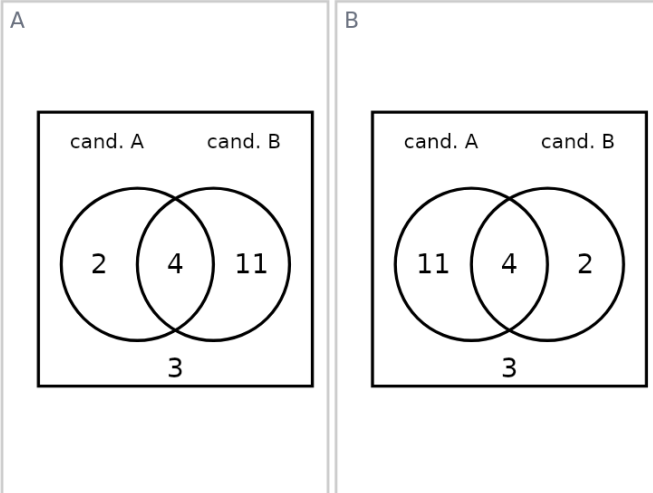
- A Complement of (All Tails)
B (All Tails) conditional on (All Tails)
C (All Tails) intersect (All Tails)
D (All Tails) union (All Tails)



Probability - Set Operations - Practice

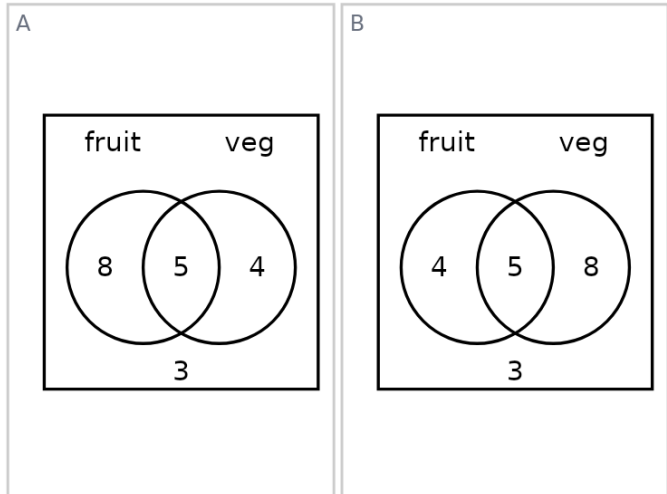
48 Which Venn diagram correctly shows the number of voters in each region?

In a group of voters, 4 support both, 2 are in the cand. A group but not the cand. B group, 11 are in the cand. B group but not the cand. A group, and 3 are in neither group.



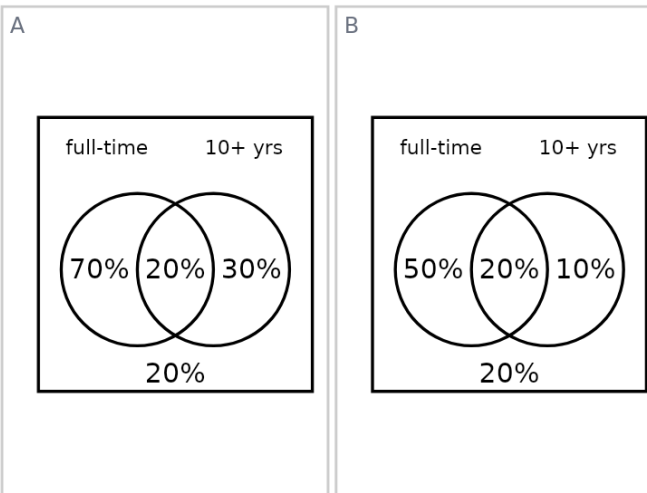
49 Which Venn diagram correctly shows the number of shoppers in each region?

In a group of 20 shoppers, 45% bought fruit, 13 bought vegetables, and 25% bought both.

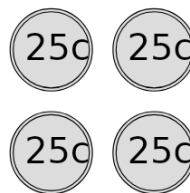


50 Which Venn diagram correctly shows the percentage of employees in each region?

In a survey of employees, 20% have both, 50% are in the full-time group but not the 10+ yrs group, and 10% are in the 10+ yrs group but not the full-time group.



51 What set operation would give you the probability of getting exactly 2 heads when flipping 4 coins, given that the first flip was heads?



- A (2 heads) intersect (first is heads)
- B (2 heads) conditional on (first is heads)
- C (2 heads) union (first is heads)
- D (first is heads) conditional on (2 heads)

52 How many households are in both groups?

In a group of 100 households, 38 are in the dog group but not the cat group, 10 are in the cat group but not the dog group, and 38 are in neither group.





Probability - Set Operations - Practice

53 Which set notation represents the customers who are in neither group?

In a group of 100 customers, 29 have memberships, 11 do both, and 64 are in the app group but not the member group.

- | | |
|---|-----------------------------------|
| A | $n(\text{Memb} \cup \text{App})$ |
| B | $n(\text{Memb}) + n(\text{App})$ |
| C | $n(\text{Memb} \cap \text{App})$ |
| D | $n(\text{Memb} \cup \text{App})'$ |

54 Which set notation represents the customers who are in at least one of the two groups?

In a group of 25 customers, 92% have memberships, 4 use the mobile app, and 1 are in neither group.

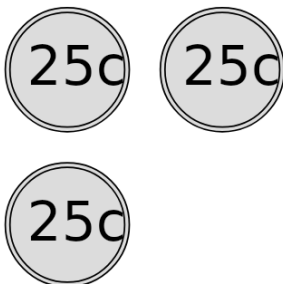
- | | |
|---|-----------------------------------|
| A | $n(\text{Memb}) + n(\text{App})$ |
| B | $n(\text{Memb} \cup \text{App})'$ |
| C | $n(\text{Memb} \cup \text{App})$ |
| D | $n(\text{Memb} \cap \text{App})$ |

55 Which set notation represents the employees who are in at least one of the two groups?

In a survey of employees, 16% work in sales, 48% work in marketing, and 8% work in both.

- | | |
|---|------------------------------------|
| A | $n(\text{Sale} \cup \text{Mark})$ |
| B | $n(\text{Sale}) + n(\text{Mark})$ |
| C | $n(\text{Sale} \cap \text{Mark})$ |
| D | $n(\text{Sale} \cup \text{Mark})'$ |

56 What set operation would give you the probability of flipping at least one heads in 3 tries?



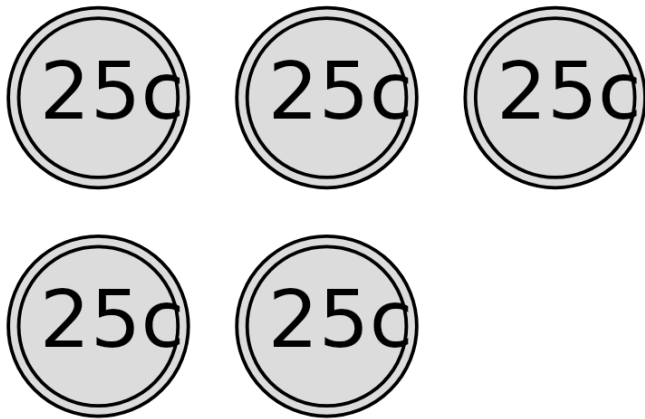
A $P(\text{All Tails})'$

B $P(\text{All Tails} \cap \text{All Tails})$



Probability - Set Operations - Practice

57 What set operation would give you the probability of flipping at least one heads in 5 tries?



A

$$P(\text{All Tails} \cup \text{All Tails})$$

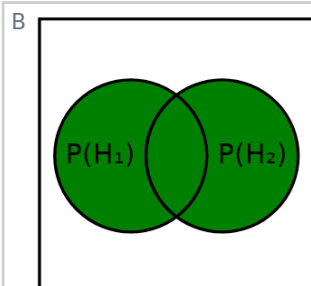
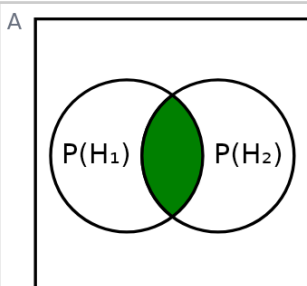
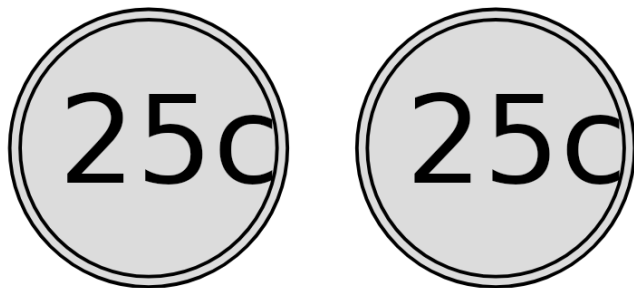
B

$$P(\text{All Tails} \cap \text{All Tails})$$

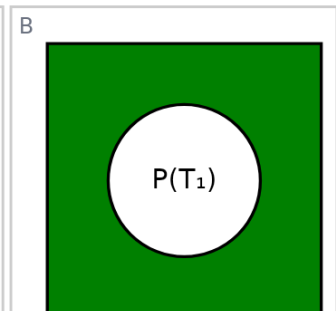
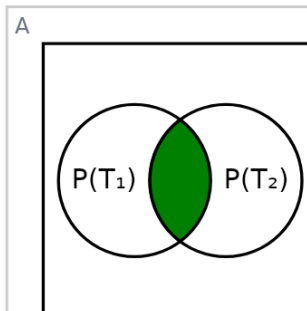
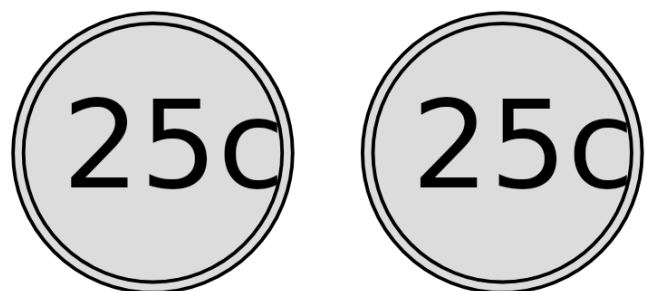
C

$$P(\text{All Tails}')$$

58 Which Venn diagram represents the probability of flipping heads at least once given two tries?

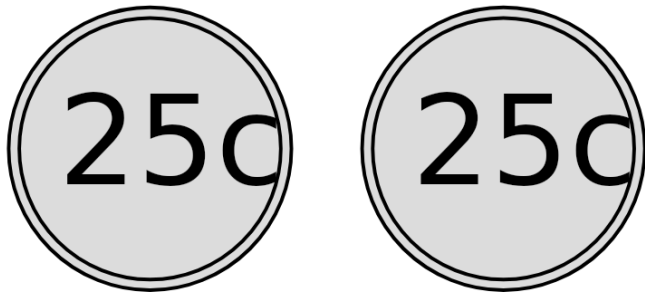


59 Which Venn diagram represents the probability of flipping tails twice in a row?



**Probability - Set Operations - Practice**

60 What formula would give you the chance of flipping at least one heads in 2 tries?



A

$$1 - P(\text{All Tails})$$

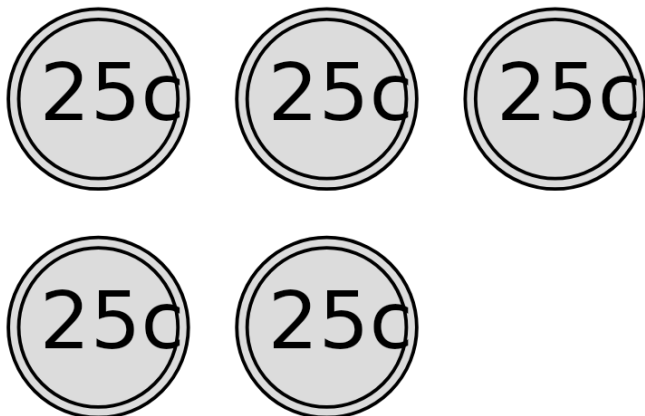
B

$$P(\text{All Tails}) \cdot P(\text{All Tails})$$

C

$$\frac{P(\text{All Tails} \cap \text{All Tails})}{P(\text{All Tails})}$$

61 What formula would give you the chance of getting exactly 4 tails when flipping 5 coins, given that the first flip was tails?



A

$$P(4 \text{ tails}) + P(\text{first is tails}) - P(4 \text{ tails} \cap \text{first is tails})$$

B

$$\frac{P(4 \text{ tails} \cap \text{first is tails})}{P(\text{first is tails})}$$



Probability - Set Operations - Practice

- 62** Let A be the full-time group and B be the 10+ yrs group. Which expression gives the number of employees who are in at least one of the two groups?

In a group of 25 employees, 18 are in the full-time group but not the 10+ yrs group, 2 are in the 10+ yrs group but not the full-time group, and 2 are in neither group.

- A $n(A) \cdot n(B)$
- B $n(A) + n(B)$
- C $n(A) + n(B) + n(A \cap B)$
- D $n(A) + n(B) - n(A \cap B)$

- 63** Let A be the art group and B be the comp sci group. Which expression gives the number of students who are in at least one of the two groups?

In a group of 50 students, 94% take art, 14% take both, and 2 are in the comp sci group but not the art group.

- A $n(A) + n(B) - n(A \cap B)$
- B $n(A) \cdot n(B)$
- C $n(A) + n(B) + n(A \cap B)$
- D $n(A) + n(B)$

- 64** Let A be the track group and B be the swimming group. Which expression gives the number of students who are in at least one of the two groups?

In a survey of students, 10% run track, 3% do both, and 30% are in neither group.

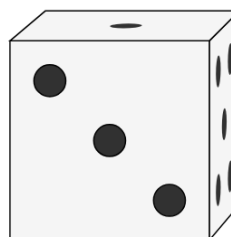
- A $n(A) \cdot n(B)$
- B $n(A) + n(B) + n(A \cap B)$
- C $n(A) + n(B)$
- D $n(A) + n(B) - n(A \cap B)$

- 65** How many customers are in neither group?

In a group of 25 customers, 16 made a purchase this month, 20% did both, and 28% are in the coupon group but not the bought group.

- | | |
|-----|-----|
| A 4 | B 7 |
| C 0 | D 2 |

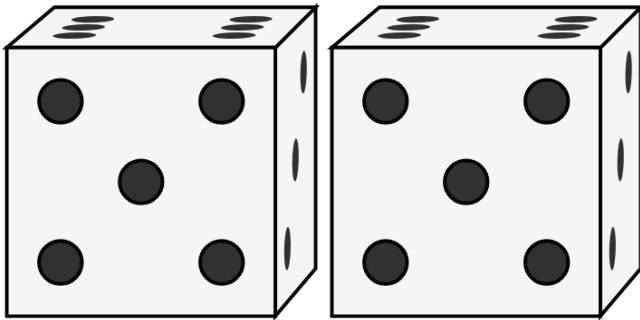
- 66** What set operation would give you the probability of not rolling a 3?



- A (3) union (3)
- B Complement of (3)
- C (3) conditional on (3)
- D (3) intersect (3)

**Probability - Set Operations - Practice**

67 What set operation would give you the probability of rolling a 5 at least once given two tries?



A

Complement of 5_1

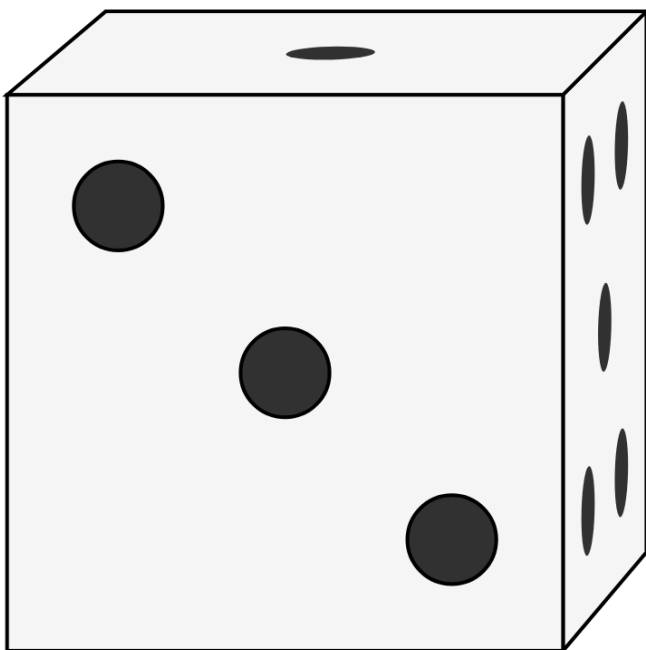
B

 5_1 intersect 5_2

C

 5_1 union 5_2

68 What set operation would give you the probability of not rolling a 3?



A

 $P(3')$

B

 $P(3 \cup 3)$

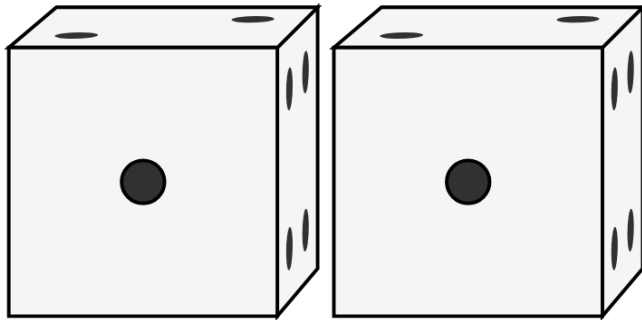
C

 $P(3|3)$



Probability - Set Operations - Practice

69 What set operation would give you the probability of rolling a 1 twice in a row?



A

$$P(1_1')$$

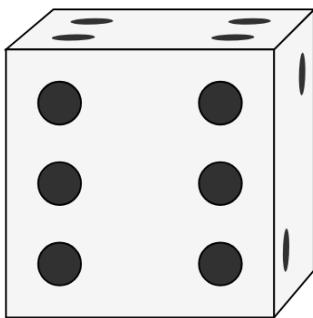
B

$$P(1_1 \cap 1_2)$$

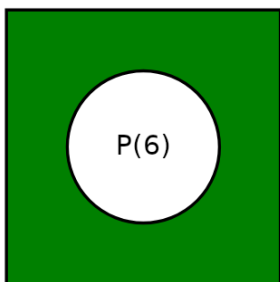
C

$$P(1_1 \cup 1_2)$$

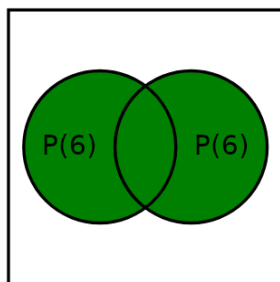
70 Which Venn diagram represents the probability of not rolling a 6?



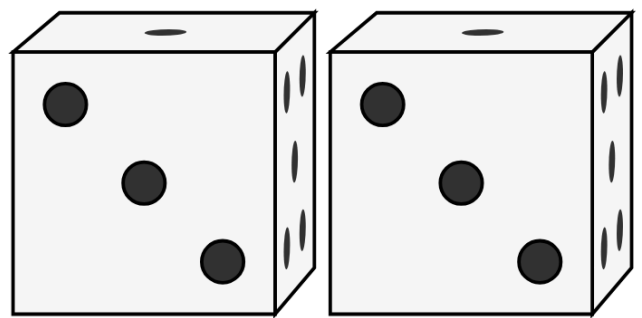
A



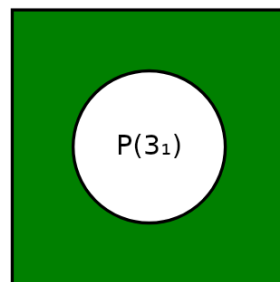
B



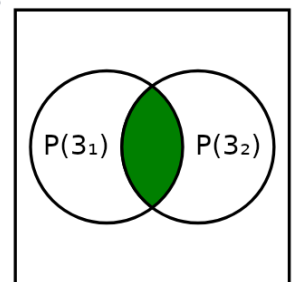
71 Which Venn diagram represents the probability of rolling a 3 twice in a row?



A

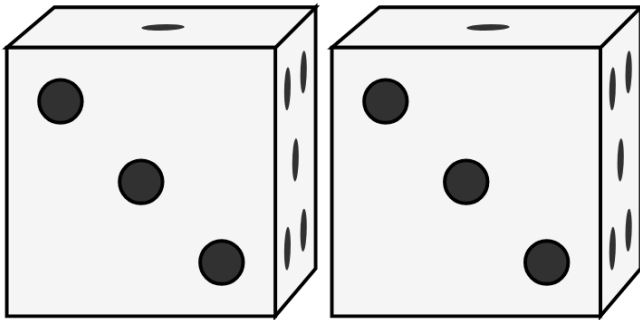


B



**Probability - Set Operations - Practice**

72 What formula would give you the chance of rolling a 3 twice in a row?



A

$$P(3_1) + P(3_2) - P(3_1 \cap 3_2)$$

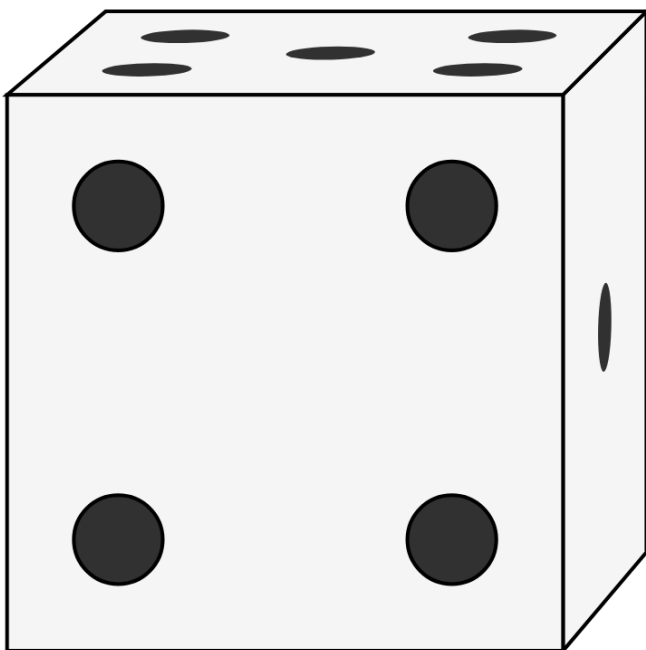
B

$$1 - P(3_1)$$

C

$$P(3_1) \cdot P(3_2)$$

73 What formula would give you the chance of not rolling a 4?



A

$$1 - P(4)$$

B

$$P(4) \cdot P(4)$$

C

$$\frac{P(4 \cap 4)}{P(4)}$$



Probability - Set Operations - Practice

74 What percent of the vehicles are in the electric group?

In a group of 50 vehicles, 6 are both, 6 are in the electric group but not the under 5 yrs group, and 10 are in the under 5 yrs group but not the electric group.

A	36%	B	24%
C	12%	D	21%

75 What percent of the students are in at least one of the two groups?

In a group of 20 students, 17 ride a bicycle, 20% ride both, and 1 are in neither group.

A	80%	B	115%	C	100%
D	135%	E	95%		

76 What percent of the employees are in the sales group but not the marketing group?

In a survey of employees, 65% work in sales, 40% work in marketing, and 20% work in both.

A	65%	B	20%	C	45%
D	44%	E	85%		

77 If one of the employees is chosen at random, what is the probability they are in at least one of the two groups?

In a group of employees, 12 work remotely, 4 are managers, 2 are both, and 6 are in neither group.

A	$\frac{7}{10}$	B	$\frac{4}{5}$
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78 Among the students in the soccer group, what is the probability that a randomly chosen one is also in the basketball group?

In a group of 20 students, 11 play basketball, 50% play soccer, and 15% are in neither group.

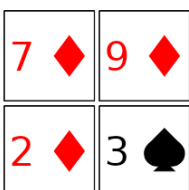
A	$\frac{3}{10}$	B	$\frac{2}{5}$
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79 If one of the students is chosen at random, what is the probability they are in neither group?

In a survey of students, 59% ride a bicycle, 55% ride a skateboard, and 21% ride both.

A	$\frac{21}{100}$	B	$\frac{3}{50}$
C	$\frac{7}{100}$		

80 What set operation would give you the probability of drawing a card that is a diamond or under 6?



A(diamonds) conditional on (under 6)

B(diamonds) union (under 6)

C complement of (diamonds)

D(diamonds) intersect (under 6)