2017 Q10

10. A box contains five cards, numbered 1, 2, 3, 4, and 5. Three cards are selected randomly without replacement from the box. What is the probability that 4 is the largest value selected?

(A) $\frac{1}{10}$ **(B)** $\frac{1}{5}$ **(C)** $\frac{3}{10}$ **(D)** $\frac{2}{5}$ **(E)** $\frac{1}{2}$

10. **Answer (C):** There are 10 possible equally likely outcomes:

1, 2, 3	1, 2, 4	1, 2, 5	1, 3, 4	1, 3, 5
1, 4, 5	2, 3, 4	2, 3, 5	2, 4, 5	3, 4, 5

The three highlighted outcomes have 4 as the largest value selected. Hence the probability is $\frac{3}{10}$.

OR

There are 10 ways to select 3 cards without replacement from a box of 5 cards. If the largest value selected is 4, then the remaining two cards can be selected from the cards 1, 2, and 3 in 3 ways. So, the probability that 4 is the largest value selected is $\frac{3}{10}$.

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2015 Q11

11. In the small country of Mathland, all automobile license plates have four symbols. The first must be a vowel (A, E, I, O, or U), the second and third must be two different letters among the 21 non-vowels, and the fourth must be a digit (0 through 9). If the symbols are chosen at random subject to these conditions, what is the probability that the plate will read "AMC8"?

(A) $\frac{1}{22{,}050}$ **(B)** $\frac{1}{21{,}000}$ **(C)** $\frac{1}{10{,}500}$ **(D)** $\frac{1}{2{,}100}$ **(E)** $\frac{1}{1{,}050}$

11. **Answer (B):** The first symbol can be any of the 5 vowels, the second can be any of the 21 consonants, the third can be any of the 20 other consonants, and the fourth can be any of the 10 digits. The total number of possible license plates is $5 \cdot 21 \cdot 20 \cdot 10 = 21{,}000$. Only one plate will read "AMC8", so the probability is $\frac{1}{21{,}000}$.

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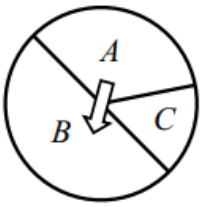
2002 Q12

12. A board game spinner is divided into three regions labeled A, B and C. The probability of the arrow stopping on region A is $\frac{1}{3}$ and on region B is $\frac{1}{2}$. The probability of the arrow stopping on region C is



(A) $\frac{1}{12}$ **(B)** $\frac{1}{6}$ **(C)** $\frac{1}{5}$ **(D)** $\frac{1}{3}$ **(E)** $\frac{2}{5}$

12. **(B)** Since the sum of the three probabilities is 1, the probability of stopping on region C is $1 - \frac{1}{3} - \frac{1}{2} = \frac{6}{6} - \frac{2}{6} - \frac{3}{6} = \frac{1}{6}$.

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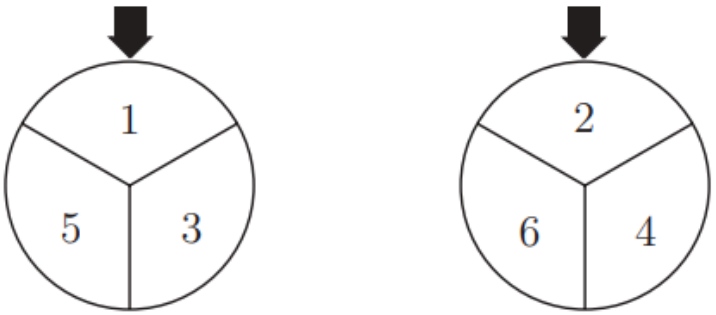
2009 Q12

12. The two spinners shown are spun once and each lands on one of the numbered sectors. What is the probability that the sum of the numbers in the two sectors is prime?



(A) $\frac{1}{2}$ **(B)** $\frac{2}{3}$ **(C)** $\frac{3}{4}$ **(D)** $\frac{7}{9}$ **(E)** $\frac{5}{6}$

12. **Answer (D):** Make a table.

	1	3	5
2	$1+2=3$	$3+2=5$	$5+2=7$
4	$1+4=5$	$3+4=7$	$5+4=9$
6	$1+6=7$	$3+6=9$	$5+6=11$

The table shows that seven of the nine equally likely events have prime numbers for their outcomes. So the probability of a prime outcome is $\frac{7}{9}$.

2011 Q12

12. Angie, Bridget, Carlos, and Diego are seated at random around a square table, one person to a side. What is the probability that Angie and Carlos are seated opposite each other?

(A) $\frac{1}{4}$ **(B)** $\frac{1}{3}$ **(C)** $\frac{1}{2}$ **(D)** $\frac{2}{3}$ **(E)** $\frac{3}{4}$

12. **Answer (B):** Proceeding clockwise from Angie, the seating could be: BCD, BDC, CBD, CDB, DBC, or DCB. In 2 of these 6 possibilities Carlos is opposite Angie, so the probability is $\frac{2}{6} = \frac{1}{3}$.

OR

If Angie sits down first, there are three equally likely places for Carlos to sit. Only one of these is opposite Angie. Thus the probability is $\frac{1}{3}$.

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2014 Q12

12. A magazine printed photos of three celebrities along with three photos of the celebrities as babies. The baby pictures did not identify the celebrities. Readers were asked to match each celebrity with the correct baby picture. What is the probability that a reader guessing at random will match all three correctly?

(A) $\frac{1}{9}$ **(B)** $\frac{1}{6}$ **(C)** $\frac{1}{4}$ **(D)** $\frac{1}{3}$ **(E)** $\frac{1}{2}$

12. **Answer (B):** Call the celebrities L, M, and N. There are six possible orderings: LMN, LNM, MLN, MNL, NLM, and NML. Only one of these identifies all three correctly. Therefore the probability is $\frac{1}{6}$.

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2009 Q13

13. A three-digit integer contains one of each of the digits 1, 3 and 5. What is the probability that the integer is divisible by 5?

(A) $\frac{1}{6}$ (B) $\frac{1}{3}$ (C) $\frac{1}{2}$ (D) $\frac{2}{3}$ (E) $\frac{5}{6}$

13. **Answer (B):** There are 6 three-digit numbers possible using the digits 1, 3 and 5 once each: 135, 153, 315, 351, 513 and 531. Because the numbers divisible by 5 end in 0 or 5, only 135 and 315 are divisible by 5. The probability that the three-digit number is divisible by 5 is $\frac{2}{6} = \frac{1}{3}$.

OR

The number is equally likely to end in 1, 3 or 5. The number is divisible by 5 only if it ends in 5, so the probability is $\frac{1}{3}$.

2016 Q13

13. Two different numbers are randomly selected from the set $\{-2,-1,0,3,4,5\}$ and multiplied together. What is the probability that the product is 0?

(A) $\frac{1}{6}$ **(B)** $\frac{1}{5}$ **(C)** $\frac{1}{4}$ **(D)** $\frac{1}{3}$ **(E)** $\frac{1}{2}$

13. Answer (D):

There are $6 \cdot 5 = 30$ possible pairs of numbers. For a product to be 0, either the first factor or the second factor must be 0, so there are $1 \cdot 5 + 5 \cdot 1 = 10$ such products. The desired probability is $10/30 = 1/3$.

1990 Q14

14. A bag contains only blue balls and green balls. There are 6 blue balls. If the probability of drawing a blue ball at random from this bag is $\frac{1}{4}$, then the number of green balls in the bag is

A) 12 B) 18 C) 24 D) 30 E) 36

14. B Since one quarter of the balls are blue and there are 6 blue balls, there must be 24 balls in the bag. Thus there are $24 - 6 = 18$ green balls.

OR

Since one quarter of the balls are blue, three quarters of them must be green. Thus there are three times as many green balls as blue balls, so there are $3 \times 6 = 18$ green balls.

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2013 Q14

14. Abe holds 1 green and 1 red jelly bean in his hand. Bea holds 1 green, 1 yellow, and 2 red jelly beans in her hand. Each randomly picks a jelly bean to show the other. What is the probability that the colors match?

(A) $\frac{1}{4}$ **(B)** $\frac{1}{3}$ **(C)** $\frac{3}{8}$ **(D)** $\frac{1}{2}$ **(E)** $\frac{2}{3}$

14. **Answer (C):** Denote Abe's jelly beans by g and r. Denote Bea's jelly beans by G, Y, R_1, and R_2. There are 8 equally likely pairings: (g, G), (g, Y), (g, R_1), (g, R_2), (r, G), (r, Y), (r, R_1), and (r, R_2). Only (g, G), (r, R_1), and (r, R_2) match, so the probability that the colors match is $\frac{3}{8}$.