

S.CP.B.9: Binomial Probability 3b

- In a game of chance, the probability of winning is $\frac{1}{4}$ and the probability of losing is $\frac{3}{4}$. If four games are played, the probability of winning *exactly* three games is
- The probability that Laura wins a tennis match against Jennifer is $\frac{2}{3}$. What is the probability that Laura wins *exactly* three of the next four matches she plays against Jennifer?
- The probability of rolling exactly three 4's in five rolls of a fair dice is
- The probability of hitting a target is $\frac{3}{4}$. What is the probability of hitting the target *exactly* once in four tries?
- The probability of winning a game is $\frac{3}{5}$, then the probability of winning exactly 3 games out of 4 played is
- If the probability that Mike will successfully complete a foul shot is $\frac{4}{5}$, what is the probability that he will successfully complete exactly three of his next four foul shots?
- In basketball, Nicole makes 4 baskets for every 10 shots. If she takes 3 shots, what is the probability that *exactly* 2 of them will be baskets?
- If the probability that it will rain on any given day this week is 60%, find the probability it will rain *exactly* 3 out of 7 days this week.
- Jim can drive a golf ball over 220 yards 40% of the time. He regularly plays on a golf course where drives of that distance are needed on 12 holes. Determine the probability that exactly 7 of his drives will be over 220 yards.
- Mr. and Mrs. Doran have a genetic history such that the probability that a child being born to them with a certain trait is $\frac{1}{8}$. If they have four children, what is the probability that *exactly* three of their four children will have that trait?
- The probability of Ashley being the catcher in a softball game is $\frac{2}{5}$. Calculate the exact probability that she will be the catcher in *exactly* five of the next six games.
- The probability of winning a game is $\frac{2}{3}$. Determine the probability, expressed as a fraction, of winning *exactly* four games if seven games are played.
- The probability of winning a game is $\frac{3}{5}$ and the probability of losing a game is $\frac{2}{5}$. If the game is played three times, what is the probability of winning *exactly* two games?
- The probability that Caitlin gets an A on a mathematics test is $\frac{3}{4}$. Find the probability that she earns an A on *exactly* two of three mathematics tests.
- The probability of Rick getting an A on any test is $\frac{2}{3}$. Find the probability that he earns an A on *exactly* 3 of 4 tests.

- 16 If the probability of a team winning any game is $\frac{2}{3}$, find the probability that the team would win *exactly* four games in a five-game series.
- 17 When a biased coin is tossed, the probability of getting a head is $\frac{2}{3}$. If the coin is tossed three times, what is the probability of getting no heads?
- 18 The probability that Team A will beat Team B in a sporting event is $\frac{2}{3}$. What is the probability that team B will win all three games of a three-game series?
- 19 When Nick plays cards with Lisa, the probability that Nick will win is $\frac{6}{10}$. If they play three games of cards and there are no ties, what is the probability that Lisa will win all three games?
- 20 In tossing a fair die three times, what is the probability of getting exactly 2 sixes?
- 21 After studying a couple's family history, a doctor determines that the probability of any child born to this couple having a gene for disease X is 1 out of 4. If the couple has three children, what is the probability that *exactly* two of the children have the gene for disease X?
- 22 During a recent survey, students at Franconia College were asked if they drink coffee in the morning. The results showed that two-thirds of the students drink coffee in the morning and the remainder do not. What is the probability that of six students selected at random, *exactly* two of them drink coffee in the morning? Express your answer as a fraction or as a decimal rounded to *four decimal places*.
- 23 At a certain intersection, the light for eastbound traffic is red for 15 seconds, yellow for 5 seconds, and green for 30 seconds. Find, to the *nearest tenth*, the probability that out of the next eight eastbound cars that arrive randomly at the light, exactly three will be stopped by a red light.
- 24 The Coolidge family's favorite television channels are 3, 6, 7, 10, 11, and 13. If the Coolidge family selects a favorite channel at random to view each night, what is the probability that they choose exactly three even-numbered channels in five nights? Express your answer as a fraction or as a decimal rounded to four decimal places.
- 25 On a multiple-choice test, Abby randomly guesses on all seven questions. Each question has four choices. Find the probability, to the *nearest thousandth*, that Abby gets *exactly* three questions correct.
- 26 Ginger and Mary Anne are planning a vacation trip to the island of Capri, where the probability of rain on any day is 0.3. What is the probability that during their five days on the island, they have *no* rain on *exactly* three of the five days?
- 27 The probability that Kay and Joseph Dowling will have a redheaded child is 1 out of 4. If the Dowlings plan to have three children, what is the *exact* probability that only one child will have red hair?

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Answer Section

1 ANS:

$$\frac{3}{64}$$

REF: 068434siii

2 ANS:

$$\frac{32}{81}$$

REF: 010421siii

3 ANS:

$$\frac{250}{7776}$$

REF: 019430siii

4 ANS:

$$\frac{12}{256}$$

REF: 089426siii

5 ANS:

$$\frac{216}{625}$$

REF: 019533siii

6 ANS:

$$\frac{256}{625}$$

REF: 080024siii

7 ANS:

0.288

REF: 089629siii

8 ANS:

$$19.35\%. \quad {}_7C_3 \left(\frac{3}{5}\right)^3 \left(\frac{2}{5}\right)^4 = \frac{15120}{78125}$$

REF: 010524b

9 ANS:

$$0.101. \quad {}_{12}C_7 (4)^7 (6)^5 \approx .101$$

REF: fall9922b

10 ANS:

$$\frac{28}{4096} \cdot {}_4C_3 \left(\frac{1}{8}\right)^3 \left(\frac{7}{8}\right)^1 = \frac{28}{4096}$$

REF: 080723b

11 ANS:

$${}_6C_5 \left(\frac{2}{5}\right)^5 \left(\frac{3}{5}\right) = 6 \left(\frac{32}{3125}\right) \left(\frac{3}{5}\right) = \frac{576}{15,625}$$

REF: 011532a2

12 ANS:

$${}_7C_4 \left(\frac{2}{3}\right)^4 \left(\frac{1}{3}\right)^3 = 35 \left(\frac{16}{81}\right) \left(\frac{1}{27}\right) = \frac{560}{2187}$$

REF: 081531a2

13 ANS:

$$\frac{54}{125}$$

REF: 080110siii

14 ANS:

$$\frac{27}{64}$$

REF: 080311siii

15 ANS:

$$\frac{32}{81}$$

REF: 060113siii

16 ANS:

$$\frac{80}{243}$$

REF: 010110siii

17 ANS:

$$\frac{1}{27}$$

REF: 088913siii

18 ANS:

$$\frac{1}{27}$$

REF: 018913siii

19 ANS:

$$\frac{64}{1000}$$

REF: 069513siii

20 ANS:

$$\frac{5}{72}$$

REF: 018612siii

21 ANS:

$$\frac{9}{64} \cdot {}_3C_2 \left(\frac{1}{4}\right)^2 \left(\frac{3}{4}\right)^1 = \frac{9}{64}$$

REF: 060223b

22 ANS:

$$0.0823 \cdot {}_6C_2 \left(\frac{2}{3}\right)^2 \left(\frac{1}{3}\right)^4 = \frac{20}{243}$$

REF: 010625b

23 ANS:

$$0.3. \text{ Probability of red is } \frac{15}{15 + 5 + 30} = \frac{3}{10}. \text{ P(3 stopped)} = {}_8C_3 \left(\frac{3}{10}\right)^3 \left(\frac{7}{10}\right)^5 = \frac{25412184}{100000000} \approx .3$$

REF: 060122b

24 ANS:

0.1646. Since there are two even-numbered channels, the probability of selecting an even number is $\frac{2}{6} = \frac{1}{3}$. P(3

$$\text{evens}) = {}_5C_3 \left(\frac{1}{3}\right)^3 \left(\frac{2}{3}\right)^2 = \frac{40}{243}$$

REF: 080522b

25 ANS:

$${}_7C_3 \left(\frac{1}{4}\right)^3 \left(\frac{3}{4}\right)^4 = 35 \left(\frac{1}{64}\right) \left(\frac{81}{256}\right) = \frac{2835}{16384} \approx 0.173$$

REF: 061335a2

26 ANS:

$$0.3087. \text{ Note the problem gives you the value of } q, \text{ instead of } p. {}_5C_3 \left(\frac{7}{10}\right)^3 \left(\frac{3}{10}\right)^2 = \frac{3087}{10000}$$

REF: 060625b

27 ANS:

$${}_3C_1 \left(\frac{1}{4}\right)^1 \left(\frac{3}{4}\right)^2 = 3 \cdot \frac{1}{4} \cdot \frac{9}{16} = \frac{27}{64}$$

REF: 061530a2