# S.CP.B.9: Binomial Probability 5

1 The junior class is planning a two-day fair in April. The weather forecast indicates a 60% chance of rain for each of the two days.
(1) Find the probability that it will rain on at least one of the two days.
(2) Find the probability that it will rain on both days.

2 When Joe bowls, he can get a strike (knock down all the pins) 60% of the time. How many times more likely is it for Joe to bowl *at least* three strikes out of four tries as it is for him to bowl zero strikes out of four tries? Round your answer to the *nearest whole number*.

3 Dr. Glendon, the school physician in charge of giving sports physicals, has compiled his information and has determined that the probability a student will be on a team is 0.39. Yesterday, Dr. Glendon examined five students chosen at random. Find, to the *nearest hundredth*, the probability that *at least* four of the five students will be on a team. Find, to the *nearest hundredth*, the probability that *exactly* one of the five students will not be on a team.

4 In each basketball game played, the Raiders have a probability of winning of $\frac{2}{3}$ and a probability of losing of $\frac{1}{3}$. Find the probability of the Raiders winning:
(1) exactly 4 out of five games
(2) at most 4 out of five games
(3) exactly 4 out of five games if they have already won the first two games

5 The probability of Chris getting a hit is $\frac{1}{3}$. If Chris comes to bat four times, what is the probability that he gets
(1) *exactly* 2 hits
(2) *at least* 3 hits
(3) *at most* 1 hit
If, in his first two times at bat, Chris does not get a hit, what is the probability that he gets 2 hits in his next two times at bat?

6 In a contest, the probability of the Alphas beating the Betas is $\frac{3}{5}$. The teams compete four times a season and each contest has a winner. Find the probability that
(1) the Betas win all four contests
(2) each team wins two contests during the season
(3) the Alphas win *at least* two contests during the season
(4) the Betas win *at most* one contest during the season

7 Only red and black cards are in a box. The probability of drawing a black card is $\frac{3}{5}$. A card is randomly drawn and replaced in the box after each draw. Five such draws are made. Find the probability that
(1) *exactly* two black cards will be drawn
(2) *at least* four black cards will be drawn

8 Five marbles are in a jar. Two are red and three are white. Four marbles are selected at random with replacement. Find the probability that *at most* two red marbles are selected. Find the probability that *at least* three red marbles are selected.

9 Assume that in the United States $\frac{1}{5}$ of all cars are red. Suppose you are driving down the highway and you pass 6 cars. What is the probability that *at most* one of the cars you pass is red? What is the probability that *at least* four of the cars you pass are red?

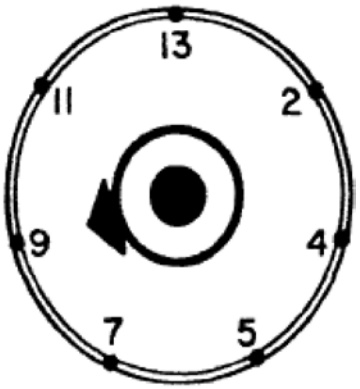
10 In the month of February at a ski resort, the probability of snow on any day is $\frac{3}{4}$. What is the probability that snow will fall on every day of a 5-day trip to that resort in February? What is the probability that snow will fall on *at least* 3 days of that 5-day trip in February?

11 A varsity basketball player makes $\frac{3}{4}$ of the foul shots she attempts. Find the probability that in four attempts she will make:
(1) *exactly* three foul shots
(2) *at least* three foul shots

12 The probability that bus *A* will arrive on time is $\frac{5}{6}$. Yolanda takes this bus on 4 consecutive days. Find the probability that this bus will arrive on time:
(1) all 4 days
(2) *at least* 3 days

13 A factory that produces light bulbs determined that $\frac{1}{10}$ of all light bulbs it produces are defective. If four light bulbs are selected at random, what is the probability that
(1) no bulb selected is defective
(2) *at least* three bulbs selected are defective

14 The receivable channels on a TV are indicated on the channel selector shown. The probability of selecting each channel is the same.




a Find: (1) $P(2)$
(2) $P$(even channel)
(3) $P$(odd channel)
b Find the probability of:
(1) choosing *exactly* two even channels on three random selections
(2) choosing *at least* two odd channels on three random selections

15 Five cards are in a box. Two are red and three are black. Four cards are selected at random and replaced in the box after each selection.
(1) Find the probability that *exactly* three of the cards selected are black.
(2) Find the probability of selecting *at most* one red card.

16 If a letter is selected at random from the name MARILYN in five separate trials, what is the probability that the M is chosen *exactly* three times? If a letter is selected at random from the name DAPHNE in seven separate trials, what is the probability that a vowel is chosen *at least* six times? If a letter is selected at random from the name NORMA in six separate trials, what is the probability that a consonant is chosen *at most* once?

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## Answer Section

1 ANS:
84%, 36%

REF: 088441siii

2 ANS:
19. P(3 strikes) = $_4C_3(\frac{6}{10})^3(\frac{4}{10})^1 = \frac{3456}{10000}$ + P(4 strikes) = $_4C_4(\frac{6}{10})^4(\frac{4}{10})^0 = \frac{1296}{10000} = \frac{4752}{10000}$.
P(0 strikes) = $_4C_0(\frac{6}{10})^0(\frac{4}{10})^4 = \frac{256}{10000}$. $\frac{\frac{4752}{10000}}{\frac{256}{10000}} = 18.5625 \approx 19$

REF: 080334b

3 ANS:
0.08, 0.07. P(4 students) = $_5C_4(.39)^4(.61)^1 \approx .071$ + P(5 students) = $_5C_5(.39)^5(.61)^0 \approx .009$
P(1 student) = $_5C_1(.61)^1(.39)^4 \approx .07$

REF: 010731b

4 ANS:
$\frac{80}{243}, \frac{211}{243}, \frac{4}{9}$

REF: 088739siii

5 ANS:
$\frac{24}{81}, \frac{9}{81}, \frac{48}{81}, \frac{1}{9}$

REF: 068940siii

6 ANS:
$\frac{16}{625}, \frac{216}{625}, \frac{513}{625}, \frac{297}{625}$

REF: 069639siii

7 ANS:
$\frac{720}{3125}, \frac{1053}{3125}$

REF: 069839siii

8 ANS:
$\frac{513}{625}, \frac{112}{625}$

REF: 080039siii

9 ANS:
$\frac{10240}{15625}, \frac{265}{15625}$

REF: 060038siii

10 ANS:
$\frac{243}{1024}, \frac{918}{1024}$

REF: 010037siii

11 ANS:
$\frac{108}{256}, \frac{189}{256}$

REF: 010341siii

12 ANS:
$\frac{625}{1,296}, \frac{1,125}{1,296}$

REF: 010241siii

13 ANS:
$\frac{6,561}{10,000}, \frac{37}{10,000}$

REF: 080240siii

14 ANS:
$\frac{1}{7}, \frac{2}{7}, \frac{5}{7}, \frac{60}{343}, \frac{275}{343}$

REF: 068143siii

15 ANS:
$\frac{216}{625}, \frac{297}{625}$

REF: 060340siii

16 ANS:
$\frac{360}{16807}, \frac{15}{2187}, \frac{640}{15625}$

REF: 089741siii