

Determine whether each situation represents a binomial experiment. Solve the binomial experiments.

3. What is the probability of 2 heads and 2 tails if Jud tosses a coin 4 times? *binomial*  ${}^4C_2 \left(\frac{1}{2}\right)^2 \left(\frac{1}{2}\right)^2 = \frac{3}{8}$

4. What is the probability of Buddy drawing 4 kings from a deck of cards for each condition?

a) He replaces the card each time  ${}^4C_4 \left(\frac{1}{13}\right)^4 \left(\frac{12}{13}\right)^0 = \frac{1}{28,561}$       b) He does not replace the card *not binomial*

5. There are 8 pennies, 4 nickels, and 6 dimes in an antique coin collection. Two coins are selected with replacement after the first selection. Find each probability.

a) *P(both pennies)*  ${}^2C_2 \left(\frac{4}{9}\right)^2 \left(\frac{5}{9}\right)^0 = \frac{16}{81}$       b) *P(both nickels)*  ${}^2C_2 \left(\frac{2}{9}\right)^2 \left(\frac{7}{9}\right)^0 = \frac{4}{81}$       c) *P(both dimes)*  ${}^2C_2 \left(\frac{1}{3}\right)^2 \left(\frac{2}{3}\right)^0 = \frac{1}{9}$   
 d) *P(1 penny, 1 dime)*  $\frac{16}{81}$       e) *P(1 penny, 1 nickel)*  $\frac{4}{81}$       f) *P(1 nickel, 1 dime)*  $\frac{2}{9} \cdot \frac{1}{3} \cdot 2 = \frac{4}{27}$

Find each probability if a coin is tossed three times.

6. *P(all heads)*  ${}^3C_3 \left(\frac{1}{2}\right)^3 \left(\frac{1}{2}\right)^0 = \frac{1}{8}$       7. *P(exactly 2 tails)*  ${}^3C_2 \left(\frac{1}{2}\right)^2 \left(\frac{1}{2}\right)^1 = \frac{3}{8}$       8. *P(at least 2 heads)*  ${}^3C_2 \left(\frac{1}{2}\right)^2 \left(\frac{1}{2}\right)^1 + {}^3C_3 \left(\frac{1}{2}\right)^3 \left(\frac{1}{2}\right)^0 = \frac{1}{2}$

Find each probability if a die is tossed five times.

9. *P(only one 4)*  ${}^5C_1 \left(\frac{1}{6}\right)^1 \left(\frac{5}{6}\right)^4 = \frac{3125}{7776}$       10. *P(at least three 4s)*  $\frac{23}{648}$       11. *P(no more than two 4s)*  $1 - \frac{23}{648} = \frac{625}{648}$       12. *P(exactly five 4s)*  ${}^5C_5 \left(\frac{1}{6}\right)^5 \left(\frac{5}{6}\right)^0 = \frac{1}{7776}$

Reena carries tubes of lipstick in a bag in her purse. The probability of pulling out the color she wants is  $\frac{2}{3}$ . Suppose she uses her lipstick 4 times a day. Find each probability.

13. *P(never the correct color)*  $= \frac{1}{81}$       14. *P(correct at least 3 times)*  $= \frac{16}{27}$   
 15. *P(no more than 3 times correct)*  $= \frac{65}{81}$       16. *P(correct exactly 2 times)*  $= \frac{8}{27}$

Megan guesses at all 10 true/false questions on her psychology test. Find each probability.

17. *P(7 correct)*  $\frac{15}{128}$       18. *P(all incorrect)*  $\frac{1}{1024}$       19. *P(at least 6 correct)*  $\frac{193}{512}$       20. *P(at least half correct)*  $\frac{319}{512}$

Tori plays for the Worthington Wolves softball team. She is now batting .200. Find each probability for the next five times she goes to bat.

21. *P(exactly 1 hit)*  $\frac{256}{625}$       22. *P(exactly 3 hits)*  $\frac{32}{625}$       23. *P(at least 4 hits)*  $\frac{21}{3125}$

Find each probability if three coins are tossed.

24. *P(3 heads)*  $\frac{1}{8}$       25. *P(3 tails)*  $\frac{1}{8}$       26. *P(at least 2 heads)*  $\frac{1}{2}$       27. *P(exactly 2 tails)*  $\frac{3}{8}$

The probability of a tack landing point up is  $\frac{2}{5}$ . Find each probability if 10 tacks have been dropped.

28. *P(all point up)*  ${}^{10}C_{10} \left(\frac{2}{5}\right)^{10} \left(\frac{3}{5}\right)^0 = \frac{1024}{9765625}$       29. *P(exactly 3 point up)*  ${}^{10}C_3 \left(\frac{2}{5}\right)^3 \left(\frac{3}{5}\right)^7 = \frac{419904}{1953125}$       30. *P(exactly 5 point up)*  ${}^{10}C_5 \left(\frac{2}{5}\right)^5 \left(\frac{3}{5}\right)^5 = \frac{1959552}{9765625}$       31. *P(at least 6 point up)*  $\frac{1662}{15625}$  (count 6, 7, 8, 9, 10)