## Chapter 11 Test

1. Use the Fundamental Counting Principle with five groups of items. $10 \cdot 2 \cdot 2 \cdot 2 \cdot 3 = 240$

2. Use the Fundamental Counting Principle with four groups of items. $4 \cdot 3 \cdot 2 \cdot 1 = 24$

3. Use the Fundamental Counting Principle with seven groups of items. $1 \cdot 6 \cdot 5 \cdot 4 \cdot 3 \cdot 2 \cdot 1 = 720$

4. $_{11}P_3 = \frac{11!}{(11-3)!} = \frac{11!}{8!} = \frac{11 \cdot 10 \cdot 9 \cdot 8!}{8!} = 990$

5. $_{10}C_4 = \frac{10!}{(10-4)!4!} = \frac{10!}{6!4!} = \frac{10 \cdot 9 \cdot 8 \cdot 7 \cdot 6!}{6!4 \cdot 3 \cdot 2 \cdot 1} = 210$

6. $\frac{n!}{p!q!} = \frac{7!}{3!2!} = \frac{7 \cdot 6 \cdot 5 \cdot 4 \cdot \not{3}!}{\not{3}! \cdot 2 \cdot 1} = 420$

7. $P(\text{freshman}) = \frac{12}{50} = \frac{6}{25}$

8. $P(\text{not a sophomore}) = 1 - P(\text{sophomore}) = 1 - \frac{16}{50} = 1 - \frac{8}{25} = \frac{17}{25}$

9. $P(\text{junior or senior}) = P(\text{junior}) + P(\text{senior}) = \frac{20}{50} + \frac{2}{50} = \frac{22}{50} = \frac{11}{25}$

10. $P(\text{greater than 4 and less than 10}) = \frac{20}{52} = \frac{5}{13}$

11. $P(C \text{ first}, A \text{ next-to-last}, E \text{ last})$
$= P(C) \cdot P(A \text{ given } C \text{ was first}) \cdot P(E \text{ given } C \text{ was first and } A \text{ was next-to-last}) = \frac{1}{7} \cdot \frac{1}{6} \cdot \frac{1}{5} = \frac{1}{210}$

12. total number of possible combinations: $_{15}C_6 = \frac{15!}{(15-6)!6!} = \frac{15!}{9!6!} = \frac{15 \cdot 14 \cdot 13 \cdot 12 \cdot 11 \cdot 10 \cdot 9!}{9!6 \cdot 5 \cdot 4 \cdot 3 \cdot 2 \cdot 1} = 5005$

$P(\text{winning with 50 tickets}) = \frac{50}{5005} = \frac{10}{1001} \approx 0.00999$

13. $P(\text{red or blue}) = P(\text{red}) + P(\text{blue}) = \frac{2}{8} + \frac{2}{8} = \frac{4}{8} = \frac{1}{2}$

14. $P(\text{red then blue}) = P(\text{red}) \cdot P(\text{blue}) = \frac{2}{8} \cdot \frac{2}{8} = \frac{1}{4} \cdot \frac{1}{4} = \frac{1}{16}$

15. $P(\text{flooding for three consecutive years}) = P(\text{flood}) \cdot P(\text{flood}) \cdot P(\text{flood}) = \frac{1}{20} \cdot \frac{1}{20} \cdot \frac{1}{20} = \frac{1}{8000}$

16. $P(\text{black or picture card}) = P(\text{black}) + P(\text{picture card}) - P(\text{black picture card}) = \frac{26}{52} + \frac{12}{52} - \frac{6}{52} = \frac{32}{52} = \frac{8}{13}$

17. $P(\text{freshman or female}) = P(\text{freshman}) + P(\text{female}) - P(\text{female freshman}) = \frac{10+15}{50} + \frac{15+5}{50} - \frac{15}{50} = \frac{30}{50} = \frac{3}{5}$






18. $P(\text{both red}) = P(\text{red}) \cdot P(\text{red given first ball was red}) = \frac{5}{20} \cdot \frac{4}{19} = \frac{1}{4} \cdot \frac{4}{19} = \frac{1}{19}$

19. $P(\text{all correct}) = P(\text{correct}) \cdot P(\text{correct}) \cdot P(\text{correct}) \cdot P(\text{correct}) = \frac{1}{4} \cdot \frac{1}{4} \cdot \frac{1}{4} \cdot \frac{1}{4} = \left(\frac{1}{4}\right)^4 = \frac{1}{256}$

20. number of favorable outcomes = 20, number of unfavorable outcomes = 15
Odds against being a man are 15:20, or 3:4.

21. **a.** Odds in favor are 4:1. **b.** $P(\text{win}) = \frac{4}{1+4} = \frac{4}{5}$

22. $P(\text{not brown eyes}) = \frac{18+10+20+12}{22+18+10+18+20+12} = \frac{60}{100} = \frac{3}{5}$

23. $P(\text{brown eyes or blue eyes}) = \frac{22+18+18+20}{22+18+10+18+20+12} = \frac{78}{100} = \frac{39}{50}$

24. $P(\text{female or green eyes}) = P(\text{female}) + P(\text{green eyes}) - P(\text{female and green eyes})$
$= \frac{18+20+12}{100} + \frac{10+12}{100} - \frac{12}{100}$
$= \frac{50}{100} + \frac{22}{100} - \frac{12}{100}$
$= \frac{60}{100}$
$= \frac{3}{5}$

25. $P(\text{male} \mid \text{blue eyes}) = \frac{18}{18+20} = \frac{18}{38} = \frac{9}{19}$

26. $P(\text{two people with green eyes}) = P(\text{green eyes}) \cdot P(\text{green eyes} \mid \text{first person has green eyes}) = \frac{22}{100} \cdot \frac{21}{99} = \frac{7}{150}$

27. $E = \$65{,}000(0.2) + (-\$15{,}000)(0.8) = \$1000$. This means the expected gain is \$1000 for this bid.

28. $E = (-\$19) \cdot \frac{10}{20} + (-\$18) \cdot \frac{5}{20} + (-\$15) \cdot \frac{3}{20} + (-\$10) \cdot \frac{1}{20} + (\$80) \cdot \frac{1}{20}$
$= \frac{-\$190 - \$90 - \$45 - \$10 + \$80}{20} = \frac{-\$255}{20} = -\$12.75$
This expected value of $-\$12.75$ means that a player will lose an average of \$12.75 per play in the long run.