7-5 COMPOUND EVENTS

34. Each coupon offers only 1 discount.

35. $P(10\% \cup 15\%) = P(10\%) + P(15\%)$
$= \frac{1}{3} + \frac{1}{2} = \frac{5}{6}$

36. $P(\text{red} \cup 5) = P(\text{red}) + P(5) - P(\text{red} \cap 5)$
$= \frac{26}{52} + \frac{4}{52} - \frac{2}{52} = \frac{7}{13}$

37. $P(\text{club} \cup \text{heart}) = P(\text{club}) + P(\text{heart})$
$= \frac{13}{52} + \frac{13}{52} = \frac{1}{2}$

38. $P(\text{passed} \cup \text{male})$
$= P(\text{passed}) + P(\text{male}) - P(\text{passed} \cap \text{male})$
$= \frac{170}{300} - \frac{120}{300} - \frac{80}{300} = \frac{7}{10}$

CHAPTER TEST

1. $6 \cdot 4 \cdot 8 = 192$
The mannequin can be dressed in 192 ways.

2. ${}_8P_3 = \frac{8!}{(8-3)!}$
$= 8 \cdot 7 \cdot 6 = 336$
There are 336 ways to award first, second, and third places.

3. ${}_{30}C_3 = \frac{30!}{3!(30-3)!}$
$= \frac{30 \cdot 29 \cdot 28}{3 \cdot 2 \cdot 1} = 4060$

4. $P(\text{4 jacks, queens, or kings})$
$= 3 \cdot \frac{4!}{{}_{52}P_4}$
$= \frac{3}{270{,}725} \approx 0.000011$

5. $P(\text{T, T}) = \frac{6}{20} = \frac{3}{10}$

6. Replacing the first letter means that the occurrence of the first selection does not affect the probability of the second selection. The events are independent.
$P(D, \text{then } J) = \frac{1}{26} \cdot \frac{1}{26} = \frac{1}{676}$

7. Not replacing the vowel means that there will be fewer vowels to chose from, affecting the probability of the second and third selections. The events are dependent.
$P(\text{vowel, then vowel, then vowel})$
$= \frac{5}{26} \cdot \frac{4}{25} \cdot \frac{3}{24} = \frac{1}{260}$

8. $P(C \cup \text{even}) = \frac{1}{9} + \frac{2}{9} = \frac{1}{3}$

9. $P(\text{odd} \cup \text{multiple of 3})$
$= P(\text{odd}) + P(\text{multiple of 3}) - P(\text{odd} \cap \text{multiple of 3})$
$= \frac{3}{9} + \frac{3}{9} - \frac{2}{9} = \frac{4}{9}$

10. expected value
$= 0\left(\frac{7}{20}\right) + 1\left(\frac{5}{20}\right) + 2\left(\frac{4}{20}\right) + 3\left(\frac{3}{20}\right) + 4\left(\frac{1}{20}\right)$
$= \frac{13}{10} = 1.3$

11. The total number of students voting is 349. Calculate joint relative frequencies by dividing each entry by the total number. Then add each row and column to calculate the marginal relative frequencies.

		Plays a Sport		
		Yes	**No**	**Total**
Mascot	**Aardvark**	$\frac{9}{349} \approx 0.026$	$\frac{75}{349} \approx 0.215$	0.241
	Fruit bat	$\frac{35}{349} \approx 0.100$	$\frac{56}{349} \approx 0.160$	0.260
	Plankton	$\frac{51}{349} \approx 0.146$	$\frac{123}{349} \approx 0.352$	0.498
	Total	0.272	0.727	1

12. The marginal relative frequency for the row with the condition "Fruit bat" is about 0.260, or 26.0%. Out of these, about 0.100, or 10.0% also play on a sports team. The conditional relative frequency is $\frac{0.100}{0.260} \approx$ 0.385, or about 38.5%.

13. The marginal relative frequency for the column with the condition "Plays a Sport" is about 0.272, or 27.2%. Out of these, about 0.100, or 10.0%, also voted for fruit bat. The conditional relative frequency is $\frac{0.100}{0.272} \approx 0.368$, or about 36.8%.

14. The marginal relative frequency for the column with the condition "Plays a Sport" is about 0.272, or 27.2%. Out of these, those who did not vote for fruit bat are $0.026 + 0.146 = 0.172$. The conditional relative frequency is $\frac{0.172}{0.272} \approx 0.632$, or about 63.2%.