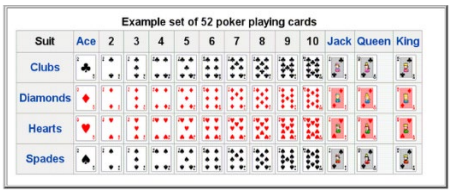
Test 2/ Practice **Section**_____ **Date**_____ **Name**_____

In a deck of **52 cards** there are **26 reds**, **26 blacks**, **12 faces**, **4 aces**, **4 queens**, **4 kings** and **4 jacks**.



1. If we draw a card from a deck of card what is the probability that it will be **Red *or King***? **1.** _____

2. If we draw a card from a deck of card what is the probability that it will be **Red *or* Face**? **2.** _____

3. If we draw a card from a deck of card what is the probability that it will be **Red *or not Face***? **3.** _____

4. If we draw a card from a deck of card what is the probability that it will be **Ace *or not* King**? **4.** _____

5. If we draw a card from a deck of card what is the probability that it will be **King *or* Queen**? **5.** _____

6. If we draw a card from a deck of card what is the probability that it will be **Not Red *or Not Black***? **6.** _____

Use the given information to complete the table.

	Yes	**No**	
Male	15	45	**60**
Female	10	30	**40**
	25	**75**	**100**

If **one** person is selected at random from the group, answers the following questions and draw the proper diagram with labeling the numbers

7. Find the probability that the person answered "no" **or** is male

8. Find the probability that the person answered yes **or** is female:

The table below shows a random sample of **500** students getting traffic tickets in terms of their **gender** and **living arrangements.**

	Home	**A**partment	**D**orm	
Male	100	70	60	**230**
Female	200	30	40	**270**
	300	**100**	**84**	**500**

If **one** student who got traffic ticket is randomly selected, then find the following probability and draw the proper diagram with labeling the numbers

9. The student is **Female** lives at **Dorm** **9.** _____

10. The student is **Male** lives at **Home** **10.** _____

11. A saleswoman packed 3 jackets and 5 skirts. With one jacket, she could wear all 5 skirts. With another jacket, she could wear 4 skirts. With the third jacket, she could wear only 3 skirts. How many different combinations did she have _____

12. A local department store sells carpets in 4 sizes. Each carpet comes in 3 different qualities. One of the sizes comes in 5 colors. The other sizes come in 2 colors. How many choices of carpet are there?

_____

13. How many different 4-letter radio-station call letters can be made if the first letter must be K or W, repeats are allowed, but the call letters cannot end in an O?

_____

14. How many **EVEN** 3-digit numbers can be formed using the digits 0, 1, 2, 3, 4, 5, 6, 7, 8, and 9 if the first digit cannot be 0? Repeated digits are allowed.

_____

15. How many different license plates can be made using 3 letters followed by 2 digits selected from the digits 0 through 9, if letters and digits may be repeated?

_____

16. How many 5-digit **codes** can be formed using the digits 0, 1, 2, 3, 4, 5, 6, if repetitions are not allowed? _____

17. Toss a coin 6 times. What is the number of sequences of heads or tails? _____

18. There are 10 teams in a football conference. Each team must play all the other teams one time. How many games will be played? _____

19. There are 13 members on a board of directors. If they must form a subcommittee of 4 members, _____
how many different subcommittees are possible?

20. How many ways can a president, vice-president, secretary, and treasurer be chosen from a club with 7 members? Assume that no member can hold more than one office. _____

21. Determine the number of 4 cards you can draw out of a deck of 52 cards _____

22. X = the number of **absent employees** at the office on any given day.

x =number of **absent employees**	$p(x)$	$x\,p(x)$
2	.10	
3	.30	
4	.40	
5	.20	+
	$\sum p(x) = ?$	$\sum x \bullet p(x)$ =

What will be the **expected number** of absent employees per day? _____

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23. A $1 slot machine in a casino has a winning prize of $5 for each play with winning probability $20/100$. What are the **expected** results for the player each time the game is played?

Outcome	x	$p(x)$	$x\,p(x)$
Win			
Lose			
		$\sum p(x) = ?$	$\sum xp(x) =$ **$**

What will be the expected gain or loss for the player and casino? _____ , _____

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24. In a game, you have a **8 probability of winning** $50 and a **12 probability of losing** $40. What is your **expected value**? **Hint**, you do not need to subtract?, from winning because you only pay if you lose!

Outcome	x	$p(x)$	$x\,p(x)$
Win			
Lose			

What will be the expected gain or loss for the player? _____

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25) Suppose you buy **1 ticket** for $1 out of a lottery of 2000 tickets where the prize for the one winning ticket is to be $500. What is your **expected** winning value?

Outcome	x	$p(x)$	$x\,p(x)$
Win			
Lose			

What will be the expected gain or loss for buying the ticket? _____

Section 6 Binomial

26. Which of the following is not a property of a Binomial Experiment?
a. All trials are identical.
b. Each trial has only two possible outcomes.
c. The probability of success may change from trial to trial.
d. The purpose of the experiment is to determine the number of successes that occurs during the n trials.

27. A student writes a five-question multiple-choice quiz. Each question has four possible responses. The student guesses at random for each question. Calculate the probability for each possible questions from 0 to 5 to be correct.

x	$p(x)$
0	
1	
2	
3	
4	
5	
Total	**This column must add up to 1**

What will be the expected number of correct answers? _____

What will be the standard deviation of number of correct answers? _____

28. There are 10 members on a committee. The probability of any member attending a randomly chosen meeting is 0.9.. What is the probability that 7 or more members will be present on a given date? ***98.72%***

29. For a member of a certain species of bird, the probability of surviving to adulthood is 45% In a nest of 6 eggs, what is the probability, to the *nearest hundredth*, that *at least* four eggs will survive to adulthood? ***25.53%***

30. Mrs. Gruber gave her history class a multiple-choice quiz containing five questions. A student must answer at least four questions correctly to pass. Greg decided to guess on every question. If each of the four possible answers to each question is equally likely to be chosen, what is the probability that Greg passed the quiz? ***1.56%***

31. A mathematics quiz has five multiple-choice questions. There are four possible responses for each question. Jennifer selects her responses at random on every question.
What is the probability she will select the correct response for *at most* one question? ***Answer*: *73.73%***
What is the probability she will select the correct response to *at least* three questions? ***Answer*: *5.79%***

32. If you guess all 50 true false questions, what will be the expected and standard deviation of correct answers.
Answer*: *25

33. If you guess all 50 five multiple-choice questions, what will be the expected and standard deviation of correct answers. ***Answer*: *10***

34. The chance of recovery after treatment against certain disease is 80%, if 200 patients have had the same treatment against the same disease, what will be the expected and standard deviation of recovered patients?
Answer*: *160

Section 7 Normal Probability Distribution

Find

35-a) $P(-1.34 < Z < 2.41) =$ ***Answer*: *90.19%***

35-b) $P(-1.34 < Z) =$ ***Answer*: *90.99%***

36-c) $P(Z < 2.41) =$ ***Answer*: *99.2%***

38) On a given test the average test scores was 68 with standard deviation of 8. If the scores are normally distributed, then find the probability as what percentage of students got scores:

a) Between 60 and 70? ***Answer*: *44.05%***

b) Between 70 and 80? ***Answer*: *33.45%***

c) Between 80 and 90? ***Answer*: *6.38%***

d) Less than 60? ***Answer*: *15.86%***

e) More than 90? ***Answer*: *0.29%***

f) Find the cut-off point for F if the bottom 1% will be getting "F". ***Answer*: *49.39***

g) Find the cut-off point for "A" if the top 2% will be getting "A" ***Answer*: *84.43***

h) Find the score for Q1 ***Answer*: *62.60***

i) Find the P_{30} ***Answer*:*63.80***

39) A company pays its employees an average wage of \$8.25 an hour with a standard deviation of 0.80 cents. If the wages are approximately normally distributed, determine

a. the proportion of the workers getting wages between \$6.75 and \$10.75 an hour; ***Answer*: 96%**
b. the minimum wage of the highest 5%. ***Answer*: \$9.57**
c. the minimum wage of the lowest 10%: ***Answer*: \$7.23**
d. What is the 90th percentile of the distribution ***Answer*: \$9.27**
e. What is the 30th percentile of the distribution ***Answer*: \$7.83**
f. What is the 75th percentile of the distribution ***Answer*: \$8.79**

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Solution

In a deck of **52 cards** there are **26 reds**, **26 blacks**, **12 faces**, **4 aces**, **4 queens**, **4 kings** and **4 jacks**.

1. If we draw a card from a deck of card what is the probability that it will be **Red *or King***? **1.** _____

$$\frac{26}{52}+\frac{4}{52}-\frac{2}{52}=\frac{28}{52}=\frac{7}{13}=53.75\%=54\%$$

2. If we draw a card from a deck of card what is the probability that it will be **Red *or* Face**? **2.** _____

$$\frac{26}{52}+\frac{12}{52}-\frac{6}{52}=\frac{32}{52}=\frac{8}{13}=61.54\%=62\%$$

3. If we draw a card from a deck of card what is the probability that it will be **Red *or not Face***? **3.** _____

$$\frac{26}{52}+\frac{40}{52}-\frac{20}{52}=\frac{46}{52}=\frac{23}{26}=88.46\%=88\%$$

4. If we draw a card from a deck of card what is the probability that it will be **Ace *or not* King**? **4.** _____

$$\frac{4}{52}+\frac{48}{52}-\frac{4}{52}=\frac{48}{52}=\frac{12}{13}=92.31\%=92\%$$

5. If we draw a card from a deck of card what is the probability that it will be **King *or* Queen**? **5.** _____

$$\frac{4}{52}+\frac{4}{52}-\frac{0}{52}=\frac{8}{52}=\frac{2}{13}=15.38\%=15\%$$

6. If we draw a card from a deck of card what is the probability that it will be **Not Red *or Not Black***? **6.** _____

$$\frac{26}{52}+\frac{26}{52}-\frac{0}{52}=\frac{52}{52}=1=100\%$$

Use the given information to complete the table.

	Yes	**No**	
Male	15	45	**60**
Female	10	30	**40**
	25	**75**	**100**

If **one** person is selected at random from the group, answers the following questions and draw the proper diagram with labeling the numbers

7. Find the probability that the person answered "no" **or** is male $\frac{75}{100}+\frac{60}{100}-\frac{45}{100}=\frac{90}{100}=90\%$

8. Find the probability that the person answered yes **or** is female: $\frac{25}{100}+\frac{40}{100}-\frac{10}{100}=\frac{55}{100}=55\%$

The table below shows a random sample of **500** students getting traffic tickets in terms of their **gender** and **living arrangements.**

	Home	**A**partment	**D**orm	
Male	100	70	60	**230**
Female	200	30	40	**270**
	300	**100**	**84**	**500**

If **one** student who got traffic ticket is randomly selected, then find the following probability and draw the proper diagram with labeling the numbers

9. The student is **Female** lives at **Dorm** **9. _____**

$$\frac{270}{500}+\frac{84}{500}-\frac{40}{500}=\frac{314}{500}=62.8\%=63\%$$

10. The student is **Male** lives at **Home** **10. _____**

$$\frac{230}{500}+\frac{300}{500}-\frac{100}{500}=\frac{430}{500}=86\,\%$$

11. A saleswoman packed 3 jackets and 5 skirts. With one jacket, she could wear all 5 skirts. With another jacket, she could wear 4 skirts. With the third jacket, she could wear only 3 skirts. How many different combinations did she have

1st Jkt 2nd jkt 3rd jkt

1*5 + 1*4 + 1*3 =12

12. A local department store sells carpets in 4 sizes. Each carpet comes in 3 different qualities. One of the sizes comes in 5 colors. The other sizes come in 2 colors. How many choices of carpet are there?

S Q C S Q C

1 * 3 * 5 + 3 * 3 * 2 =

13. How many different 4-letter radio-station call letters can be made if the first letter must be K or W, repeats are allowed, but the call letters cannot end in an O?

2 * 26 * 26 * 25 =33,800

14. How many **EVEN** 3-digit numbers can be formed using the digits 0, 1, 2, 3, 4, 5, 6, 7, 8, and 9 if the first digit cannot be 0? Repeated digits are allowed. **9 * 10 * 5 = 450**

14. How many different license plates can be made using 3 letters followed by 2 digits selected from the digits 0 through 9, if letters and digits may be repeated? **26 * 26 * 26 * 10 * 10 = 1,757,600**

16. How many 5-digit **codes** can be formed using the digits 0, 1, 2, 3, 4, 5, 6, if repetitions are not allowed? _____

7 * 6 * 5 * 4 * 3 = 2,520

17. Toss a coin 6 times. What is the number of sequences of heads or tails? 2 * 2 * 2 * 2 * 2 * 2 = 64

18. There are 10 teams in a football conference. Each team must play all the other teams one time. How many games will be played? It is a **combination** problem therefore, **10 C 2**

$$\textbf{Combinations, } {}_nC_r = \frac{10!}{2! \times (10-2)!} = \mathbf{45}$$

19. There are 13 members on a board of directors. If they must form a subcommittee of 4 members, _____ how many different subcommittees are possible? It is a **combination** problem therefore, **13 C 4**

$$\textbf{Combinations, } {}_nC_r = \frac{13!}{4! \times (13-4)!} = \mathbf{715}$$

20. How many ways can a president, vice-president, secretary, and treasurer be chosen from a club with 7 members? Assume that no member can hold more than one office.

It is a **permutation** problem therefore, **7 P 4**

$$\textbf{Permutations, } {}_nP_r = \frac{7!}{(7-4)!} = \mathbf{840}$$

21. Determine the number of 4 cards you can draw out of a deck of 52 cards _____

It is a **combination** problem therefore, **52 C 4**

$$\textbf{Combinations, } {}_nC_r = \frac{52!}{4! \times (52-4)!} = \mathbf{270{,}725}$$

22. X = the number of **absent employees** at the office on any given day.

x =number of **absent employees**	$p(x)$	$x\,p(x)$
2	.10	0.2
3	.30	0.9
4	.40	1.6
5	.20	1 +
	$\sum p(x) = ?$	$\sum x \bullet p(x)$ = ***3.7***

What will be the **expected number** of absent employees per day? **3.7** _____

23. A $1 slot machine in a casino has a winning prize of $5 for each play with winning probability $20/100$. What are the **expected** results for the player each time the game is played?

Outcome	x	$p(x)$	$x\,p(x)$
Win	5 -1 = 4	0.2	0.8
Lose	-1	0.8	0.8
		$\sum p(x) = ?$	$\sum xp(x) =$ **$ 0**

What will be the expected gain or loss for the player and casino? Zero

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24. In a game, you have a **8 probability of winning** $50 and a **12 probability of losing** $40. What is your **expected value**? **Hint**, you do not need to subtract from winning because you only pay if you lose!

Outcome	x	$p(x)$	$x\,p(x)$
Win	50	8 /20	20
Lose	- 40	12 /20	- 24

$ - 4

What will be the expected gain or loss for the player? **$ - 4** _____

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25) Suppose you buy **1 ticket** for $1 out of a lottery of 2000 tickets where the prize for the one winning ticket is to be $500. What is your **expected** winning value?

Outcome	x	$p(x)$	$x\,p(x)$
Win	500 – 1 = 499	1/2000	0.2495
Lose	- 1	1999/2000	- 0.9995

$ -0.75

What will be the expected gain or loss for buying one ticket is **$ -0.75**