

AP STATISTICS SUMMER MATH PACKET

This packet is a review of Algebra I, Algebra II, and basic probability/counting. The problems are designed to help you review topics that are important to your success in the class.

Review of Algebra I and Algebra II

1. Solve for the variable in each equation.

a. $4(x-2) = 3^2 - x$ b. $\frac{1}{3}n + 3 = n - 2$ c. $9(2p+1) - 3p > 4p - 6$

d. $\frac{2}{3}y = \frac{8}{27}$ e. $(q-12)3 \leq 5q + 2$ f. $\frac{m}{12} + \frac{5}{6} = \frac{5}{24}$

2. Write equations of the horizontal and vertical lines that pass through the point (3, 4). Label which equation is horizontal and which is vertical.

3. Find the slope and y-intercept of each line.

a. $y = \frac{2}{3}(2x-4)$ b. $3x + 2y = 14$ c. $\frac{1}{3}y - 6x = 4$

4. Find the slope and write the equation of the line containing the points

a. (6, -2) and (0, 5) b. (8, -5) and (3, 4)

5. Sketch the graph of the following functions. Be able to do without a calculator.

a. $y = |x-3| + 4$ b. $y = |x+2| - 6$ c. $y = 3|x-2| + 1$

6. Solve and graph each inequality.

a. $|x-2| < 4$ b. $|4x-6| \leq 4$ c. $\left|x + \frac{3}{2}\right| \geq \frac{3}{2}$

d. $-2x + 3y \geq x + 9$ e. $\frac{1}{2}x + 2y > 4$ f. $-y \geq 3x - 1$

7. Solve each equation.

a. $\frac{1}{2}x^2 - 8 = 0$ b. $-3x^2 + 363 = 0$ c. $x^2 - 8x + 7 = 0$

8. Blank.

9. Blank.

10. For each of the problems below, find $f[g(x)]$ and $g[f(x)]$. Then find $g[f(-2)]$ and $f[g(3)]$ for each.

a. $f(x) = 3x$; $g(x) = 2x + 3$ b. $f(x) = -x$; $g(x) = x^2 + 5$

11. Solve and check.

a. $2\sqrt{x} + 9 = 21$ b. $\sqrt{2x+10} = x+1$

12. Sketch each graph. Be able to do without a calculator.

a. $y = \left(\frac{1}{2}\right)^x - 2$ b. $y = 4^{x-1}$ c. $y = \sqrt{x-9}$
d. $y = -x^2 + 2$ e. $y = |x| + 3$

Logarithmic review:

Definition of logarithm to base a:

Let a and x be positive numbers, $a \neq 1$. The logarithm of x with base a is denoted by $\log_a x = y$ and is defined as follows:

$$\log_a x = y \text{ if and only if } a^y = x$$

Properties of Logarithms:

Let a, u, and v be positive numbers such that $a \neq 1$, and let n be any real number.

1. $\log_a(uv) = \log_a u + \log_a v$ 2. $\log_a\left(\frac{u}{v}\right) = \log_a u - \log_a v$
3. $\log_a u^n = n \log_a u$

Inverse Properties of Exponents and Logarithms:

Let a be a positive real number, $a \neq 1$.

Base a	Base e
1. $\log_a a^x = x$	$\ln e^x = x$
2. $a^{\log_a x} = x$	$e^{\ln x} = x$

Properties of Exponential and Logarithmic Equations:

Let a be a positive real number, $a \neq 1$

1. $a^x = a^y$ if and only if $x = y$ 2. $\log_a x = \log_a y$ if and only if $x = y$

13. Evaluate each expression without using a calculator.

a. $\log_5 25$ b. $\log_9 81$ c. $\log_{\frac{1}{2}}\left(\frac{1}{2}\right)$ d. $\log_2\left(\frac{1}{8}\right)$ e. $\log_9\left(\frac{1}{3}\right)$

14. Solve each equation for x:

a. $\log_3 81 = x$ b. $\log_3 x = 5$ c. $\log_x 256 = 8$
d. $\log_2(x+1) = 1$ e. $\log_5(x-4) = 0$

15. Simplify each expression:

a. $\frac{4e^x}{e^{4x}}$

b. $(2e^{5x})^2$

c. $\sqrt[3]{64e^6x}$

16. Blank.

17. Expand each expression:

a. $\log_2(3x)$

b. $\log_{10}(7x^3yz)$

c. $\log_2(x^{\frac{1}{2}}y^3)$

d. $\ln(3xy^2)$

e. $\ln \frac{2xy}{x^2}$

18. Condense each expression:

a. $\log_{10} 8 + \log_{10} x + 2\log_{10} y$

b. $2\log_{10} 9 + 5\log_{10} x + \log_{10} \left(\frac{1}{3}\right)$

c. $\ln 20 + 2\ln \frac{1}{2} + \ln x$

d. $2(\ln 2 - \ln x) + (\ln x - \ln 4)$

19. Use properties of logarithms to solve for x:

a. $\log_4 2 - \log_4 x = \log_4 \left(\frac{2}{3}\right)$

b. $\log_3 8 = x \log_3 2$

20. Solve the exponential equation:

a. $5(2)^{3x} - 4 = 13$

b. $10^{-12x} + 6 = 100$

21. Solve the logarithmic equation:

a. $\ln x = 4$

b. $4\log_3 x = 28$

22. Sketch the graph of each function. Be able to do without a calculator.

a. $y = \log_2(x - 1)$

b. $y = \ln(x + 2) - 1$

Review of Basic Probability and Counting

1. A traffic survey indicates that of 3756 cars approaching a shopping plaza, 857 turned into the parking lot. Find the empirical probability of a car *not* entering the parking lot.
2. Find the probability of selecting a date in May if one date is randomly drawn from the 366 possible dates in a leap year.
3. Among eight helicopters sent to rescue American hostages in Iran, three helicopters failed to operate properly. Given the same conditions, what is the empirical probability of failure for a helicopter?
4. A jury of four men and eight women has been selected for a sex-discrimination case. If the foreman of this jury is selected at random, find the probability that the foreman will be a woman.
5. A computer is used to generate random telephone numbers. Of the numbers generated and in service, 56 are unlisted, and 144 are listed in the telephone directory. If one of these telephone numbers is randomly selected, what is the probability that it is unlisted?
6. Blood types are determined for a sample of people, and the results are as follows: 18 have Blood type O, 9 have Blood type A, and 8 have Blood type B. If one person from this sample group is randomly selected, find the probability that the person has type O blood.
7. In a study of the effects of cigarette smoking on children, the data in the table below were compiled. If one of these mothers is randomly selected, find the probability that she is in the category of those who smoke two or more packs a day and has a hyperactive child.

	Child is hyperactive	Child is not hyperactive
Mother smokes ≥ 2 packs/day	64	437
Mother smokes < 2 packs/day	32	475

8. A couple plans to have two children.
 - a. List the different possible outcomes according to the sex of each child. Assume that these outcomes are equally likely.
 - b. Find the probability of getting two boys.
 - c. Find the probability of getting exactly one child of each sex.
9. Both parents have the brown-blue pair of eye-color genes, and each parent contributes one gene to a child. Assume that if the child has at least one brown gene, that color will dominate and the eyes will be brown. (Actually, the determination of eye color is somewhat more complex.)
 - a. List the different possible outcomes. Assume that these outcomes are equally likely.

- b. What is the probability that a child of these parents will have the blue-blue pair of genes?
 - c. What is the probability that a child will have brown eyes?
10. A burger house offers two types of buns, two types of cheese, four vegetable toppings, and three dressings. How many different ways could you select a bun, a cheese, a vegetable topping, and a dressing?
11. A summer reading list contains 8 biographies and 6 science books.
- a. In how many ways could you select a biography and a science book?
 - b. In how many ways could you select a biography or a science book?
 - c. In how many ways could you select a science book and then another science book?
12. An algebra class has 13 girls and 8 boys.
- a. In how many ways could you select a boy or a girl to work the homework problems?
 - b. In how many ways could you select a boy and then another boy to work the assignment?
 - c. In how many ways could you select a girl and a boy to do the assignment?
13. Using the letters in the word COMPUTER
- a. In how many ways could you pick a vowel and then a consonant?
 - b. In how many ways could you pick a consonant or a vowel?
 - c. In how many ways could you select a vowel and then another vowel?

For problems 14 and 15, use a Venn Diagram to help you answer the questions.

14. An advertising agency finds that of its 170 clients, 115 use television (T), 100 use radio (R), 130 use magazines (M), 75 use television and radio, 95 use radio and magazines, 85 use television and magazines, and 70 use all three.
- a. How many clients do not use television, radio, or magazines?
 - b. How many clients use radio only?
 - c. How many clients use television only?
15. A campus radio station surveyed 190 students to determine the types of music they liked. The survey revealed that 114 liked rock, 50 liked country, and 41 liked classical music. Moreover, 14 liked rock and country, 15 liked rock and classical, 11 liked classical and country, and 5 liked all three types of music.
- a. How many students like rock only?
 - b. How many students like country but not rock?
 - c. How many students like classical and country, but not rock?
 - d. How many students like classical or country, but not rock?
 - e. How many students like exactly one of the three types of music?
 - f. How many students do not like any of the three types of music?
 - g. How many students like at least two of the three types of music?