NAME _____ DATE _____ SCORE _____

TEST 22 ROOTS AND RADICALS *(SECTIONS 6-1 THROUGH 6-5)*

Directions: Write answers in the spaces provided.

Section 6-1

1. Classify each of the following as true or false.

   a. $-\sqrt{4} = -2$ b. $\sqrt{(-4)^2} = -4$ c. $\sqrt[3]{-27} = -3$

Questions 2-4. Find the real roots of each equation. If there are none, so state.

2. $9x^2 - 16 = 0$ 3. $2x^2 + 8 = 0$ 4. $x^3 + 27 = 0$

Questions 5-7. State for what values of the variable each statement is true.

5. $\sqrt{(x+2)^2} = x + 2$ 6. $\sqrt{(x-3)^2} = 3 - x$

Section 6-2

8. Classify each of the following as true or false.

   a. $\sqrt[6]{64} = \sqrt{\sqrt[3]{64}} = \sqrt{4} = 2$
   b. $\sqrt{-4} \cdot \sqrt{-25} = \sqrt{(-4)(-25)} = \sqrt{100} = 10$
   c. $\sqrt[3]{-8} \cdot \sqrt[3]{-27} = \sqrt[3]{(-8)(-27)} = 6$

Questions 9-12. Simplify. Assume that the given radicals denote positive real numbers.

9. $\sqrt{50x^3y^4}$ 10. $\sqrt[3]{16a^4b^3}$ 11. $\sqrt{\frac{y^3}{3x^3}}$ 12. $\sqrt{3x^2 - 6x + 3}$

Section 6-3

Questions 13-15. Simplify. Assume that all radicals denote positive real numbers.

13. $\sqrt{18} + 3\sqrt{8} - \sqrt{50}$ 14. $\frac{\sqrt{12} + 2\sqrt{27}}{2\sqrt{3}}$

Section 6-4

Questions 16-18. Simplify. Assume that all radicals denote positive real numbers.

16. $(2 - \sqrt{5})^2$ 17. $(1 + \sqrt{3})(2 - \sqrt{3})$ 18. $\frac{1}{\sqrt{n} + \sqrt{3}}$

Section 6-5

19. Classify each of the following as true or false.

   a. $\sqrt{x} = 3$ and $x = 9$ have the same solution.
   b. $\sqrt{x} = 3 - x$ and $x = 9 - 6x + x^2$ have the same solution.
   c. The solution of $\sqrt{x} + 3 = 2$ is $x = 1$.

Questions 20-22. Solve. If there is no solution, so state.

20. $x - \sqrt{x + 10} = 2$ 21. $\sqrt[3]{x^2 + 2} - 3 = 0$

22. $\sqrt{x - 8} + \sqrt{x} = 4$

ANSWERS

1. a. TRUE (2)
   b. FALSE (2)
   c. TRUE (2)
2. $\pm\frac{4}{3}$ (4)
3. NONE (4)
4. -3 (4)
5. $\{x : x \geq -2\}$ (2)
6. $\{x : x \leq 3\}$ (2)

8. a. TRUE (2)
   b. FALSE (2)
   c. TRUE (2)
9. $5|x|y^2\sqrt{2x}$ (5)
10. $2AB\sqrt[3]{2A}$ (5)
11. $y\sqrt{3x5}/3x^2$ (5)
12. $(x-1)\sqrt{3}$ (5)
13. $4\sqrt{2}$ (5)
14. 4 (5)

16. $9 - 4\sqrt{5}$ (5)
17. $-1 + \sqrt{3}$ (5)
18. $\sqrt{N} - \sqrt{3}/N - 3$ (5)
19. a. TRUE (2)
    b. TRUE (2)
    c. FALSE (2)
20. $\{6\}$ (4)
21. $\{9\}$ (5)
22. $\{\pm 5\}$ (5)

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TEST 23 RATIONAL, IRRATIONAL, AND COMPLEX NUMBERS

(SECTIONS 6-6 THROUGH 6-8)

Directions: Write answers in the spaces provided. For each multiple-choice question, write the letter corresponding to the answer.

Section 6-6

1. Classify each real number as either rational or irrational.

   a. $\sqrt[5]{32}$ b. $\frac{\pi}{3}$ c. $1.2\overline{1}$ d. 1.212112111 . . .

2. Classify each of the following as true or false.
   a. A decimal representation of an irrational number is either finite or repeating.
   b. Between any two rational numbers there is an irrational number.
   c. All integers are rational numbers.

3. Write $\frac{3}{7}$ as a decimal.

4. Write $0.3\overline{25}$ as a common fraction.

5. Name a rational number between 0.034 and 0.035.

Section 6-7

6. Which *one* of the following equations is not true?

   A. $\sqrt{-9} = 3i$ B. $i^3 = -i$ C. $\sqrt{-9} \cdot \sqrt{-4} = 6$ D. $\frac{1}{i} = -i$

   E. $\sqrt{-2} + \sqrt{-8} = 3i\sqrt{2}$

Questions 7-8. Simplify each expression.

7. $\sqrt{-50} + 2\sqrt{-18}$ 8. $(2\sqrt{3})(-\sqrt{-27})$

9. Solve over the complex numbers: $4x^2 + 25 = 0$

Section 6-8

11. Classify each of the following as true or false.
    a. $2 + 4i$ is called a pure imaginary number.
    b. The reciprocal of $3 + i$ is $\frac{3}{10} - \frac{1}{10}i$.
    c. $(4 + 3i)(4 - 3i) = 7$
    d. In the complex number $a + bi$, b is called the imaginary part.

Questions 12-15. Simplify each expression.

12. $2(5i - 1) - 3(2i + 2)$ 13. $(-2 + 3i)(1 - 5i)$

15. $\frac{3 + i}{2 - i}$

ANSWERS

1. a. RATIONAL (2)
   b. IRRATIONAL (2)
   c. RATIONAL (2)
   d. IRRATIONAL (2)
2. a. FALSE (2)
   b. TRUE (2)
   c. TRUE (2)
3. 0.428571 (6)
4. 161/495 (6)
5. 0.0345 (6)
6. C (6)
7. $11i\sqrt{2}$ (6)
8. $-18i$ (6)
9. $\pm\frac{5}{2}i$ (6)

11. a. FALSE (2)
    b. TRUE (2)
    c. FALSE (2)
    d. FALSE (2)
12. $-8 + 4i$ (6)
13. $13 + 13i$ (6)
15. $1 + i$ (6)

(Continued)

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TEST 27 QUADRATIC EQUATIONS *(SECTIONS 7-1 THROUGH 7-4)*

Directions: *Write answers in the spaces provided. For each multiple-choice question, write the letter corresponding to the answer.*

Section 7-1

Questions 1-6. Give the value of each of the letters A through F in the following solution of $x^2 - 4x - 5 = 0$ by completing the square.

1. $x^2 - 4x + A = 5 + A$

2 and 3. $(x - B)^2 = C$

4. $x - B = \pm D$

5 and 6. $x = E$ or $x = F$

7. If $x^2 + 7x + k = \left(x + \frac{7}{2}\right)^2$, then $k =$ ___?___.

Section 7-2

Questions 8-9. State the values of a, b, and c that you would use in the quadratic formula for each equation.

8. $3x^2 + 5x - 2 = 0$

9. $x(x - 3) = 9$

Questions 10-12. Solve and give answers in simplest radical form.

10. $3x^2 + 5x - 2 = 0$

11. $\frac{x^2}{2} + 1 = \frac{x}{5}$

12. $z^2 + (2i)z - 1 = 0$

13. The length of a rectangle measures 4 cm less than 4 times the width. If the area is 31.0 cm², find the dimensions. Write your answers to three significant digits. (Use $\sqrt{2} \approx 1.414$.)

Section 7-4

18. Which *one* of the following is not in quadratic form?

A. $3x - 2\sqrt{x} + 5 = 0$ B. $y^4 - 6y^2 + 5 = 0$

C. $4c^5 - 3c^3 + 6 = 0$ D. $(y - 1)^2 - (y - 1) + 2 = 0$

E. $y^{-2} - 3y^{-1} + 2 = 0$

19. Solve over the real numbers: $2x - 9\sqrt{x} + 4 = 0$

20. Solve over the complex numbers: $x^4 - 5x^2 - 36 = 0$

ANSWERS

1. 4 (4)
2. 2 (4)
3. 9 (4)
4. 3 (4)
5. 5 or -1 (4)
6. -1 or 5 (4)
7. 49/4 (4)
8. A=3; B=5; C=-2 (4)
9. A=1; B=-3; C=-9 (4)
10. {-2, 1/3} (5)
11. {(1±7i)/5} (5)
12. {-i DR} (5)
13. 3,328 x 9,312 (6)
18. C (5)
19. {1/4, 16} (6)
20. {±3, ±2i} (6)

(Continued)

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TEST 28 QUADRATIC EQUATIONS, FUNCTIONS, AND GRAPHS

(SECTIONS 7-5 THROUGH 7-7)

Directions: *Write answers in the spaces provided. For each matching or multiple-choice question, write the letter corresponding to the answer.*

ANSWERS

1. C (6)
2. A (6)
3. E (6)
4. D (6)
5. B (6)
6. *See graph.* (7)

Section 7-5

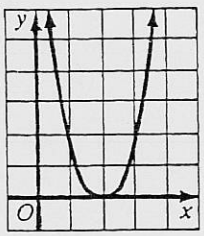
Questions 1-5. Match the quadratic function in Column I with its graph in Column II.

Column I

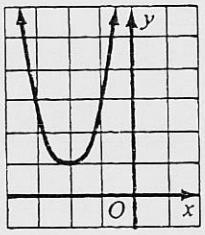
1. $y + 1 = 2(x + 2)^2$
2. $y = 2(x - 2)^2$
3. $y = 2(x + 2)^2$
4. $y - 1 = 2(x + 2)^2$
5. $y + 1 = 2(x - 2)^2$

Column II

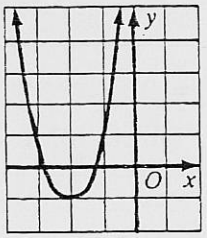
A.



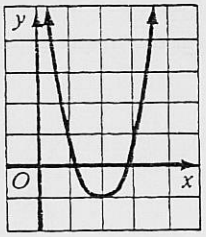
B.



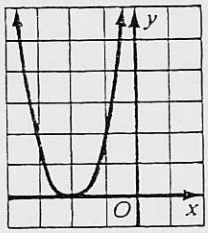
C.



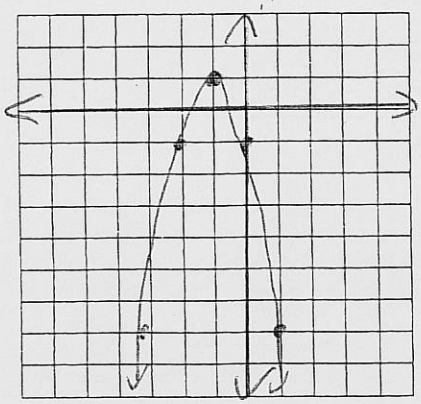
D.



E.



6. Sketch the graph of the equation $y - 1 = -2(x + 1)^2$ on the given grid. Label the vertex and axis of symmetry.



vertex = $(h, k) = (-1, 1)$

x	y
-1	1
-2	-1
0	-1
-3	-7
1	-7

(Continued)

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Test 28 (continued)

7. Write an equation in the form $y - k = a(x - h)^2$ for the parabola that has vertex $(1, -2)$ and y-intercept of 1.

Section 7-6

8. Which *one* of the following is an equivalent form of $y = 2x^2 + 8x + 3$?

   A. $y + 5 = 2(x - 2)^2$
   B. $y - 5 = 2(x + 2)^2$
   C. $y + 5 = 2(x + 2)^2$
   D. $y - 5 = 2(x - 2)^2$
   E. $y - 1 = 2(x - 4)^2$

9. What are the coordinates of the vertex of the parabola that represents the function $f(x) = x^2 + 6x + 4$?

Questions 10-11. Consider the function $f(x) = 2 + 4x - 2x^2$.

10. Determine which the function has—a maximum or a minimum.

11. Find this value.

ANSWERS

7. $y+2=3(x-1)^2$ (6)
8. C (6)
9. $(-3,-5)$ (6)
10. MAXIMUM (6)
11. $y=4$ (6)

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Test 31 (continued)

Section 8-3

8. Perform the division $\frac{4x^2 + 5x - 6}{x}$ and state (a) the quotient and (b) the remainder.

9. Replace the letters A and B with monomials to complete the division process.

$$\begin{array}{r} 2x^2 + A + B \\ x + 3\overline{)2x^3 - x^2 - 15x + 18} \\ \underline{2x^3 + 6x^2} \\ -7x^2 - 15x \\ \underline{-7x^2 - 21x} \\ 6x + 18 \\ \underline{6x + 18} \\ 0 \end{array}$$

10. In Question 9, one factor of $2x^3 - x^2 - 15x + 18$ is $x + 3$. Which *one* of the following is another factor?

A. 0 B. $x - 3$ C. $x - 2$ D. $2x + 3$ E. $2x^2 - 7x - 6$

Section 8-4

11. Replace the letters A, B, and C with the correct numbers to complete the division process.

$$\begin{array}{r|rrrr} -1 & 2 & 5 & -1 & -6 \\ & & A & -3 & C \\ \hline & 2 & 3 & B & -2 \end{array}$$

12. In Question 11, state (a) the dividend, (b) the quotient, and (c) the remainder.

13. Find the value of k so that when $2x^3 - 7x^2 + 4x + k$ is divided by $x - 3$, the remainder will be zero.

Section 8-5

14. When $P(x) = 1 - 2x + 3x^2 - 4x^3$ is divided by $x + 2$, which *one* of the following is the remainder?

A. $P(2)$ B. $P(-2)$ C. 2 D. -2
E. Can't tell from the given information.

16. If 1 is a root of $x^3 - 6x^2 + 11x - 6 = 0$, find the other two roots.

17. Find a polynomial equation with integral coefficients that has $\frac{1}{2}$, 1, and -2 as roots.

ANSWERS

8. a. $4x + 5$ (3)
   b. $-6/x$ (3)
9. a. $-7x$ (3)
   b. 6 (3)
10. C (6)
11. a. -2 (2)
   b. -4 (2)
   c. 4 (2)
12. a. $2x^3 + 5x^2 - x - 6$ (2)
   b. $2x^2 + 3x - 4$ (2)
   c. $-2/x - 1$ (2)
13. $k = -3$ (6)
14. E (6)
16. $(x-2)(x-3)$ (6)
17. $2x^3 + x^2 - 5x + 2$ (6)

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TEST 40 EXPONENTIAL AND LOGARITHMIC FUNCTIONS

(SECTIONS 10-1 THROUGH 10-5)

Directions: *Write answers in the spaces provided. For each matching or multiple-choice question, write the letter corresponding to the answer.*

Section 10-1

Questions 1-8. Match each expression in Column I with the corresponding answer or simplification in Column II.

Column I	Column II
1. $(2^{\frac{1}{2}})^{\frac{2}{3}}$	A. 8
2. $\sqrt{\sqrt[3]{9}}$	B. $\frac{1}{4}$
3. $2^{\frac{1}{4}} \cdot 2^{\frac{1}{4}}$	C. $\sqrt[3]{2}$
4. $\sqrt{8} \cdot \sqrt[6]{8}$	D. no solution
5. $(-16)^{\frac{3}{4}}$	E. $\frac{1}{3}$
6. $16^{\frac{3}{4}}$	F. $\sqrt[3]{3}$
7. $8^{-\frac{2}{3}}$	G. $\sqrt{2}$
8. $3^{\frac{1}{2}} \div 3^{\frac{3}{2}}$	H. 4

9. Express in simplest radical form: $\sqrt[3]{4} \div \sqrt[6]{2}$

Section 10-2

Questions 11-13. Simplify each expression.

11. $2^{\sqrt{3}} \cdot 2^{\sqrt{3}}$ 12. $(2^{\sqrt{3}})^{\sqrt{3}}$ 13. $\frac{2^{\sqrt{3}+2}}{4}$

Questions 14-15. Solve for x.

14. $4^x = \frac{1}{64}$ 15. $125^{2x-1} = 5$ 16. $36^{2x} = 6^{x+3}$

Section 10-4

25. Which *one* of the following is not true?

A. $\log_2 1 = 0$ B. $\log_2 2 = 1$ C. $\log_2 2^2 = 2$ D. $\log_2 (-8) = -3$ E. $2^{\log_2 3} = 3$

Questions 26-28. Solve for x.

26. $\log_x 25 = 2$ 27. $\log_3 x = 4$ 28. $\log_{\frac{1}{2}} 8 = x$

Section 10-5

Questions 29-31. Use $\log_{10} 2 = 0.3010$ and $\log_{10} 5 = 0.6990$ to evaluate each expression.

29. $\log_{10} 20$ 30. $\log_{10} 2.5$ 31. $\log_{10} 8$

32. Solve for x: $\log x = 2 \log 3 + 3 \log 2$

ANSWERS

1. C (3)
2. F (3)
3. G (3)
4. H (3)
5. D (3)
6. A (3)
7. B (3)
8. E (3)
9. $\sqrt{2}$ (3)

11. $2^{2\sqrt{3}}$ or $4^{\sqrt{3}}$ (3)
12. 2^3 or 8 (3)
13. $2^{\sqrt{3}}$ (3)
14. {-3} (3)
15. {5} (3)
16. {7} (3)

25. D (3)
26. {5} (3)
27. $\{3^4$ or 81$\}$ (3)
28. {-3} (3)
29. 1.3010 (3)
30. 0.3979 (3)
31. 0.9030 (3)
32. {72} (4)

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TEST 41 APPLICATIONS *(SECTIONS 10-6 THROUGH 10-8)*

Directions: *Write answers in the spaces provided.*

Section 10-6

Questions 1-5. Use a calculator or the following partial table of common logarithms of numbers.

N	0	1	2	3	4	5	6	7	8	9
20	3010	3032	3054	3075	3096	3118	3139	3160	3181	3201
21	3222	3243	3263	3284	3304	3324	3345	3365	3385	3404
22	3424	3444	3464	3483	3502	3522	3541	3560	3579	3598
23	3617	3636	3655	3674	3692	3711	3729	3747	3766	3784
24	3802	3820	3838	3856	3874	3892	3909	3927	3945	3962

1. Find log 2.48.

2. Find log 0.00222.

3. If $\log x = 0.3766$, find x.

Questions 4-5. Evaluate each expression to three significant digits.

4. $(2.08)^{7.5}$

5. $\sqrt[7]{245}$

6. Classify each of the following as true or false.

a. $\log_3 6 = \dfrac{\log 6}{\log 3}$ **b.** $\log_3 6 \cdot \log_6 3 = 1$ **c.** $\log_3 6 > \log_2 6$

Section 10-7

15. Problem: If \$5000 is invested at 12% compounded quarterly, how much is the money worth in 5 years?

Solution formula: $A = P(1 + \frac{r}{n})^{nt}$

16. In how many quarters will it take the \$5000 to double to \$10,000? (Write a calculation-ready solution.)

17. Do the calculation and answer the question. (Use of a calculator or the partial table at the beginning of the test may be necessary.)

Section 10-8

Questions 18-23. Evaluate each expression if possible.

18. $\ln e^2$ **19.** $\ln e$ **20.** $\ln \frac{1}{e}$

21. $\ln 1$ **22.** $\ln 0$ **23.** $(e)^{\ln 2}$

Questions 24-25. Write each expression as a single logarithm. Express answers in terms of e if necessary.

24. $\ln 4 + \ln 3 - \ln 2$ **25.** $\frac{1}{2} \ln 9 - \frac{3}{2} \ln 4$ **26.** $\ln 3 + 2$

ANSWERS

1. 0.3945 (4)
2. -2.6536 (4)
3. 2.38 (4)
4. 243 (4)
5. 2.19 (4)
6. a. TRUE (4)
   b. TRUE (4)
   c. FALSE (4)
15. \$9,031 (4)
16. $109\,2/\log 1.03$ (4)
17. $23.45 \approx 24$ (4)
18. 2 (2)
19. 1 (2)
20. -1 (2)
21. 0 (2)
22. NO SOLN (2)
23. 2 (2)
24. $\ln 6$ (4)
25. $\ln \frac{3}{8}$ (4)
26. $\ln 3e^2$ (4)

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TEST 44 SEQUENCES *(SECTIONS 11-1 THROUGH 11-3)*

Directions: *Write answers in the spaces provided.*

Section 11-1

Questions 1-3. In each sequence, (**a**) tell whether the sequence is arithmetic, geometric, or neither, and (**b**) supply the missing terms.

1. $-19, -14, -9, \underline{?}, \underline{?}$

2. $1, 3, 4, 7, \underline{?}, \underline{?}$

3. $4, 2, \underline{?}, \underline{?}, \frac{1}{4}$

Questions 4-5. Given the nth term of a sequence, (**a**) find the first four terms, and (**b**) write the type of sequence: arithmetic, geometric, or neither.

4. $t_n = 2 \cdot 3^n$

5. $t_n = \frac{1}{n}$

Questions 6-7. Write the next two terms of each sequence.

6. $5, 8, 14, 23, 35, \underline{?}, \underline{?}$

7. $5, 7, 10, 15, 23, \underline{?}, \underline{?}$

Section 11-2

Questions 8-10. Use the arithmetic sequence $9, 4, -1, \ldots$ to answer each question.

8. What is the common difference?

9. What is the value of t_{17}?

10. Which term is -231?

11. Insert three arithmetic means between 12 and 36.

Section 11-3

12. Find t_{10} of the geometric sequence $1, -2, 4, -8, 16, \ldots$

13. Insert four geometric means between 3 and 96.

14. Find the formula for the nth term of the sequence $\frac{1}{3}, \frac{4}{5}, \frac{9}{7}, \frac{16}{9}, \ldots$

15. The value of a company car depreciates $\frac{1}{5}$ the first year and $\frac{1}{10}$ of its preceding value each year after that. If a car was purchased for \$10,000, what is its value 4 years later?

ANSWERS

1. a. Arithmetic (4)
   b. $-4, 1$ (4)
2. a. Neither (4)
   b. $11, 18$ (4)
3. a. Geometric (4)
   b. $1, \frac{1}{2}$ (4)
4. a. $6, 18, 54, 162$ (4)
   b. Geometric (4)
5. a. $1, \frac{1}{2}, \frac{1}{3}, \frac{1}{4}$ (4)
   b. Neither (4)
6. $50, 68$ (4)
7. $36, 51$ (4)
8. -5 (6)
9. -71 (6)
10. 49 (6)
11. $18, 24, 30$ (7)
12. $(-2)^9$ or -512 (6)
13. $6, 12, 24, 48$ (7)
14. $t_n = n^3/2n+1$ (7)
15. \$5,832 (7)

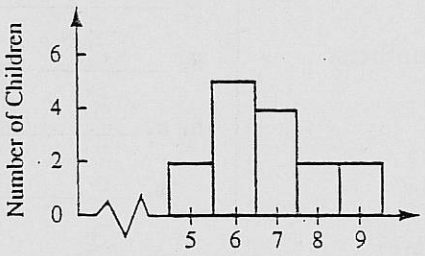
NAME _____ DATE _____ SCORE _____

TEST 63 STATISTICS *(SECTIONS 15-1 THROUGH 15-4)*

Directions: *Write answers in the spaces provided. For each multiple-choice question, write the letter corresponding to the answer.*

Section 15-1

1. The histogram below indicates the ages of children at a birthday party. Complete the frequency distribution.



Age	Frequency
5	2
6	5
7	4
8	2
9	2

2. Given the stem-and-leaf plot shown at the right for the scores on a test, find:
   a. the mode
   b. the median
   c. the mean

6	7, 8
7	1, 3, 5, 8, 9
8	3, 5, 5, 5, 8
9	4, 9
10	0

3. The mean of nine numbers is 12. What is the sum of the numbers?

Section 15-2

4. In Question 2 find (a) the first quartile and (b) the third quartile.
5. Draw a box-and-whisker plot for the data from Question 2.

Questions 6-8. Refer to the frequency distribution of scores on a test.

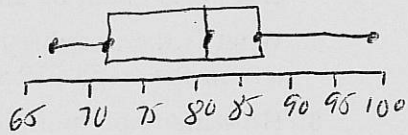
SCORE	72	75	81	85	92
NUMBER OF STUDENTS	1	2	3	1	1

6. What is the range of the scores on the test?
7. The variance of the scores?
8. the standard deviation of the scores?

16. Classify each of the following as true or false.
   a. Two variables have a positive correlation if one increases when the other increases.
   b. The correlation coefficient between hours spent studying for a test and the score on the test is likely to be negative.

ANSWERS

1. *See chart.* (5)
2. a. 85 (4)
   b. 83 (4)
   c. 82 (4)
3. 108 (4)
4. a. 73 (4)
   b. 88 (4)
5. *See diagram.* (5)
6. 20 (5)
7. 40, 79 (3)
8. 6.39 (3)
16. a. TRUE (2)
   b. False (2)



(Continued)

NAME_____ DATE_____ SCORE_____

TEST 64 PERMUTATIONS AND COMBINATIONS

(SECTIONS 15-5 THROUGH 15-7)

Directions: *Write answers in the spaces provided.*

Section 15-5

Questions 1-4. Use the following diagram to help you find the number of positive, odd, three-digit integers as you answer the questions.

H	T	U
z	y	x

1. Find x, the possible number of units' digits for odd numbers.
2. Find y, the possible number of tens' digits.
3. Find z, the possible number of hundreds' digits.
4. How many positive, odd, three-digit integers are there?
5. How many positive odd integers less than 1000 are there?

Section 15-6

Questions 6-7. Use the following diagram to help you to find the number of permutations that can be formed from the letters in the word FIRST, using all five letters.

a	b	3	c	1

6. **a.** Choice a can be any of ___?___ letters.
   b. Choice b can be any of ___?___ letters.
   c. Choice c can be any of ___?___ letters.
7. What is the possible number of permutations formed from the letters in the word FIRST, using all five letters?
8. How many permutations can be formed from the letters in the word FOURTH, using only 3 letters at a time?

Questions 9-10. Evaluate each expression.

9. $6!$

10. $\frac{8!}{5!}$

11. Classify each of the following as true or false for positive integers n and r, $r \leq n$.

    a. ${}_nP_r = \frac{n!}{(n-r)!}$ **b.** ${}_nP_n = 1$ **c.** $n! = n(n+1)!$

ANSWERS

1. 5 (6)
2. 10 (6)
3. 9 (6)
4. 450 (6)
5. 500 (6)
6. a. 5 (2)
   b. 4 (2)
   c. 2 (2)
7. 120 (6)
8. 120 (6)
9. 720 (3)
10. 336 (3)
11. a. TRUE (2)
    b. FALSE (2)
    c. FALSE (2)

(Continued)

NAME_____ DATE_____ SCORE_____

Test 64 (continued)

12. Find the number of ways in which 7 different books can be arranged on a shelf, side by side.

13. If you had 7 different books, but space on the shelf for only 3 of them, how many different side-by-side arrangements could you make?

14. Find the number of distinguishable ways in which 7 books can be arranged on a shelf, side by side, if 3 of the books are identical.

15. Find the number of distinguishable permutations of the letters of the word SASSAFRAS.

Section 15-7

16. How many combinations can be formed from the letters in the word FIRST, taking 3 at a time?

17. Classify each as true or false for positive integers n and r, $r \leq n$.

a. ${}_nC_r = \frac{{}_nP_r}{{}_rP_r}$ **b.** ${}_nC_r = \frac{n!}{(n-r)!}$ **c.** ${}_nC_r = {}_nC_{(n-r)}$

18. How many ways can a 5-person committee be selected from a group of 8 people?

ANSWERS

12. 7! or 5,040 (6)
13. 7!/4! or 210 (6)
14. 7!/3! or 840 (6)
15. 9!/(4!3!) or 2,520 (5)
16. 5!/(3!2!) or 10 (5)
17. a. TRUE (2)
    b. FALSE (2)
    c. TRUE (2)
18. 8!/(5!3!) or 56 (6)

TEST 65 PROBABILITY *(SECTIONS 15-8 THROUGH 15-10)*

Directions: Write answers in the spaces provided. For each multiple-choice question, write the letter corresponding to the answer.

Section 15-8

Questions 1-3. An experiment consists of rolling two dice, one blue and one gray. A simple event can be represented by the ordered pair (b, g), where b is the number up on the blue die and g is the number up on the gray die. For example, (6, 2) indicates a 6 up on the blue die and a 2 up on the gray die.

1. How many simple events make up the sample space?
2. Specify by a set of ordered pairs the event E: "The sum of the numbers up on the dice is at most 4."
3. Write a description of the event:

   {(1, 2), (2, 2), (3, 2), (4, 2), (5, 2), (6, 2)}

Section 15-9

4. What is $P(E)$, the probability of event E in Question 2?

Questions 5-6. A bag contains 2 white marbles, 4 green marbles, and 6 yellow marbles.

5. A marble is drawn at random from the bag. What is the probability that it is green?
6. Three marbles are drawn from the bag. What is the probability that:
   a. all three are green?
   b. none are green?
   c. two are green and one is white?
   d. there is one of each color?
   e. all three are white?

Section 15-10

10. Classify each of the following as true or false for any two events A and B in a sample space. The complement of A is denoted by A'.
    a. $P(A \cup B) = P(A) + P(B) - P(A \cap B)$
    b. $P(A \cap B) = P(A)P(B)$ if and only if A and B are independent.
    c. $P(A') = 1 + P(A)$
    d. $P(A \cup B) = P(A) + P(B)$ if $P(A \cap B) = 0$
    e. $P(A) + P(A') = 1$

Questions 11-12. Two fair dice are rolled and the numbers on the top faces are noted.

11. What is the probability that the sum of the numbers is 7 or 11?
12. What is the probability that both dice show:
    a. the same number?
    b. the same number or that the sum of the numbers is 8?
13. An experiment consists of tossing a coin and throwing a die. What is the probability that both a number less than 4 and a head result?
14. The probability of rain on July 4 in Chicago is 0.35. The probability of snow in Chicago on January 1 is 0.4. What is the probability that it will either rain on July 4 or snow on January 1 in Chicago?

ANSWERS

1. 36 (6)
   (1,1) (1,2) (1,3) (2,1)
2. (2,2) (3,1) (6)
3. The event That (6)
   The GRAY DIE EQUALS TWO.
4. 5/36 OR 14% (6)
5. 4/12 = 1/3 (3)
6. a. 1/55 (5)
   b. 14/55 (5)
   c. 3/55 (5)
   d. 12/55 (5)
   e. Null (5)
10. a. TRUE (2)
    b. TRUE (2)
    c. FALSE (2)
    d. TRUE (2)
    e. TRUE (2)
11. 2/9 (6)
12. a. 1/6 (3)
    b. 5/18 (3)
13. 1/4 (6)
14. 0.75 (5)