Longitudinal

Study of

American

Youth

TENTH GRADE MATHEMATICS

Public Opinion Laboratory
Northern Illinois University
DeKalb, Illinois
Fall 1987

INTRODUCTION

This booklet contains questions about mathematics for you to answer. You will be able to answer some of the questions quickly and others will require more thought. Please do not feel discouraged if you are not absolutely sure of an answer. Some questions will ask about things you have covered in class, but others will not. Please do your best to answer each question. If you are not sure of the answer, read the question again, and make your best guess.

MARKING YOUR ANSWERS

Each question is followed by a set of possible answers labeled A, B, C, etc. Read each question carefully, then choose the *one* answer you think is the best, and darken in the letter on your *Answer Sheet* next to the number for that question. Be sure to mark only *one* letter for each question. Do not skip any questions.

The following is an example of a question. Look at the top of your *Answer Sheet* to check your answer.

Example: The sum of $5 + 3 =$

(A)	10	**(C)**	2
(B)	7	**(D)**	8

The correct answer is (D). This answer has been blackened in on your *Answer Sheet*, just as you are to do for each question.

Do not make any stray marks on your *Answer Sheet*. Do all of your calculations on the Question Booklet, and use the *Answer Sheet* only to record your answers.

If you have any questions while taking this test, raise your hand, and the person giving the test will come to your seat to help you.

1. Here are the ages of five children:

    13, 8, 6, 4, 4

    What is the average age of these children?

    (A) 4
    (B) 6
    (C) 7

    (D) 8
    (E) 9
    (F) 13   N263501

2. Which of the following sets of numbers CANNOT be lengths of the sides of a triangle?

    (A) 3, 6, 8
    (B) 10, 8, 4
    (C) 7, 2, 6

    (D) 8, 4, 2
    (E) 3, 4, 5   N253201

3. Allen's batting average is 0.425. What is his batting average expressed as a percent?

    (A) 0.0425%
    (B) 4.25%

    (C) 42.5%
    (D) 425%   N202501

4. If an object is measured to the nearest centimeter there may be some error. How large could the error be?

    (A) 0.1 centimeter
    (B) 0.5 centimeter

    (C) 1 centimeter
    (D) 5 centimeters   N216301

5. If you add the page numbers for two facing pages in a book, the sum is 89. What is one of the page numbers?

    (A) 40
    (B) 44

    (C) 89
    (D) Any of the above   N203201

6. The length of a box was measured and found to be 7 centimeters *to the nearest centimeter*. Which of these could have been the length if the box was measured with greater precision?

    (A) 6.4 cm
    (B) 7.9 cm

    (C) 7.62 cm
    (D) 6.7 cm   N216401

7. When the students in Mrs. Bird's room are put in teams of 2 or 5 or 6, there is always 1 student left over. How many students are in Mrs. Bird's room if there are fewer than 50?

    (A) 11
    (B) 29

    (C) 30
    (D) 31   N203601

This is a picture of a block of wood.

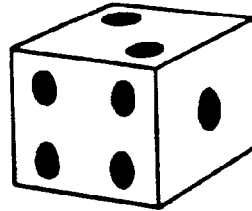8. If you looked straight down at the top of the block of wood shown above, what shape would you see?

(A)

(C)

(B)

(D)   N215001

9. One kilogram is how many grams?

   (A)   10

   (B)   100

   (C) 1000   N265903

▶ **Questions 10-12** refer to the following picture.

10. Scott is rolling a number cube with 1, 2, 3, 4, 5 and 6 dots on its faces. What is the probability of Scott getting a 4 on his next roll?

(A) 0	**(D)** $\frac{3}{6}$
(B) $\frac{1}{6}$	**(E)** $\frac{4}{6}$
(C) $\frac{2}{6}$	**(F)** $\frac{5}{6}$ N262801

11. Scott rolls the number cube again. What is the probability of Scott NOT getting a 4 on this roll?

(A) 0	**(D)** $\frac{3}{6}$
(B) $\frac{1}{6}$	**(E)** $\frac{4}{6}$
(C) $\frac{2}{6}$	**(F)** $\frac{5}{6}$ N262802

12. Scott rolls five 5's in a row. What is the probability of getting a 5 on his next roll?

(A) 0	**(D)** $\frac{3}{6}$
(B) $\frac{1}{6}$	**(E)** $\frac{4}{6}$
(C) $\frac{2}{6}$	**(F)** $\frac{5}{6}$ N262803

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13. Carlos' basketball team won 75% of its games last season. If they played 80 games, how many games did they win?

(A) 20	**(C)** 68
(B) 60	**(D)** 75 N259901

$$61 + 42 + 57 + 46 + \square = 250$$

14. Which of the following is closest to the number that goes in the box?

(A) 25	**(C)** 75
(B) 50	**(D)** 100 N261001

15. A coin is tossed and a die is rolled. What is the probability that the coin comes up heads and the die comes up 3?

(A) $\frac{1}{12}$

(C) $\frac{1}{5}$

(B) $\frac{1}{8}$

(D) $\frac{6}{12}$ N223001

$$3 \text{ o } 4 = 10 \qquad 8 \text{ o } 8 = 24$$
$$5 \text{ o } 4 = 14 \qquad 10 \text{ o } 9 = 29$$
$$6 \text{ o } 1 = 13 \qquad 16 \text{ o } 2 = 34$$

16. In each number sentence above, the o represents an operation on the two given numbers. According to the pattern, what is 11 o 10?

(A) 24

(C) 32

(B) 31

(D) 37   N219701

17. On the average, a baby's head is one-fourth the total length of the baby. If a baby's head is 10 centimeters long, about how long is the baby?

(A) 2.5 cm

(C) 24 cm

(B) 14 cm

(D) 40 cm   N207801

18. If a triangle has two equal sides, what can you say about the angles of the triangle?

(A) Two angles must be equal.

(C) Two angles must be 45 degree angles.

(B) One angle must be a right angle.

(D) All three angles must be equal.   N264601

19. Find the quotient: $\dfrac{^{+}10}{^{-}5} =$

(A) $^{+}2$

(D) $\dfrac{^{+}1}{2}$

(B) $^{-}2$

(E) $\dfrac{^{-}1}{2}$

(C) $^{+}5$ N286502
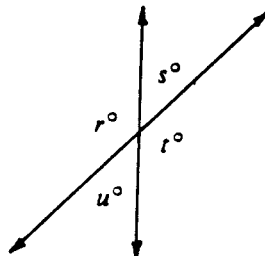
20. For the figure above, which of the following must be true?

I. $r = t$
II. $s = u$
III. $s + t = 180$

(A) I only

(C) I and II only

(B) III only

(D) I, II, and III   N213601

21. Find the quotient: $\dfrac{^-15}{^-5} =$

    (A) $^+3$ (D) $^+5$

    (B) $^-3$ (E) $^-20$

    (C) $^-5$ N286501

22. 7 is what percent of 175?

    (A) 4%   (C) 25%

    (B) 12.25%   (D) 40%   N278904
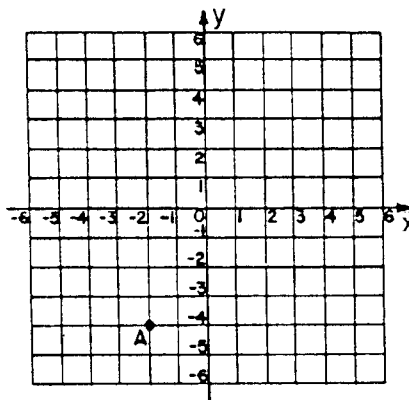
23. Which one of the following is the LARGEST unit of measurement?

    (A) centimeter   (C) meter

    (B) kilometer   (D) millimeter   N266101

24. Bill made the lowest score on the test. He only got 27 points. The teacher said the class mean was 63 and the range was 61. Jane made the highest score on the test. What score did Jane make?

    (A) 61   (C) 88

    (B) 63   (D) 90   N225601

25. What are the coordinates of point A?

    (A) (2,4)   (D) (2,-4)

    (B) (-4,-2)   (E) (-2,-4)

    (C) (-2,4)   N282701

26. If x is a real number, which one of the following is the graph of the solution set of $3x \geq 18$?

    (A)

    (B)

    (C)   N271401
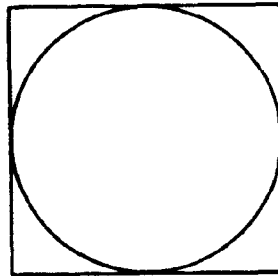
27. The length of a side of this square is 6. What is the radius of the circle?

(A) 2   (D) 6

(B) 3   (E) 8

(C) 4   (F) 9   N251701

28. Dawn has 3 skirts and 5 blouses. How many different skirt-blouse outfits can she make with these?
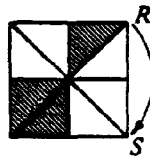
(A) 3   (C) 8

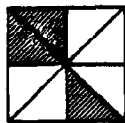(B) 5   (D) 15   N223301

29. A penny was tossed 20 times. Which of the following is most likely to be the number of times heads came up?
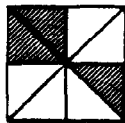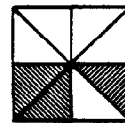
(A) 0   (D) 9

(B) 2   (E) 19

(C) 5   N285701

30. If you turn the square figure shown above about its center so that the corner labeled R ends up at S, which diagram shows what the figure will look like?
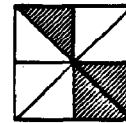
(A)   (B)   (C)   (D)   N226401

31. What is 8% of 25?

(A) 2   (C) 31.25

(B) 20   (D) 200   N278902

32. The perimeter of a square is 24 centimeters. What is the area of that square?

(A) 36 square cm   (C) 96 square cm

(B) 48 square cm   (D) 576 square cm   N268901

Side   Top
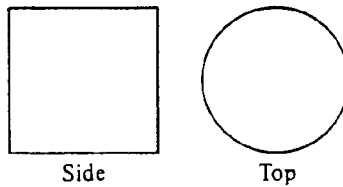
33. A geometry solid is viewed from the side and from the top. Those views are shown above. What could the solid be?

(A) Cone
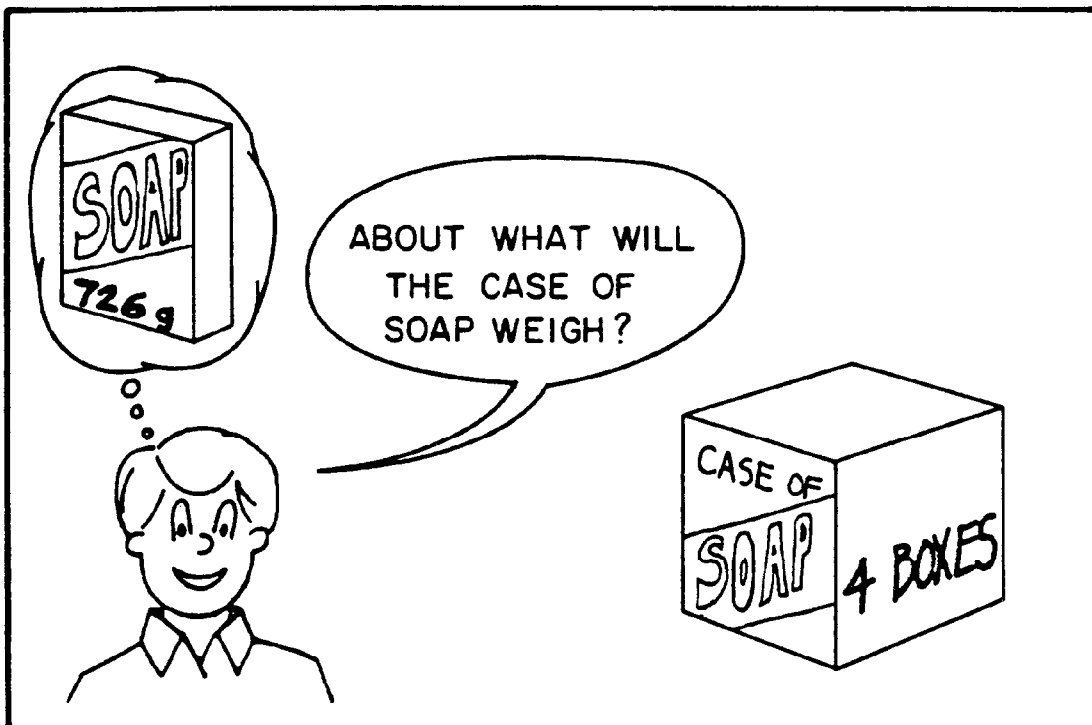
(B) Cylinder

(C) Sphere

(D) Cube   N212701

34. $3\frac{1}{5} =$

(A) $3 \div \frac{1}{5}$

(C) $3 \times \frac{1}{5}$

(B) $3 - \frac{1}{5}$

(D) $3 + \frac{1}{5}$ N230201

35. ESTIMATE.

(A) 2800 g

(B) 2900 g

(C) 3200 g

(D) 28,000 g   N261201

36. A taxi driver estimates that she drives about 250 miles a day. If she drives every day of the week, about how many miles does she drive in one week?

(A) 1,000 miles

(B) 2,000 miles

(C) 3,000 miles

(D) 10,000 miles   N206501

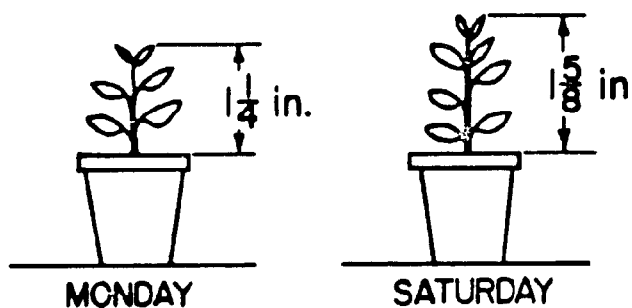**37.** Which of the patterns below can be folded along the dotted lines to form an open box in the shape of a cube with a bottom but no top?

I

II

III
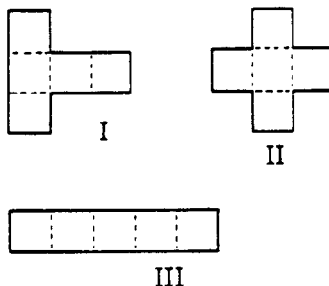
(A) II only

(B) I and II only

(C) I and III only

(D) I, II, and III

N232001

$1\frac{1}{4}$ in.

$1\frac{5}{8}$ in.

MONDAY

SATURDAY

38. Which one of the following expressions represents how many inches this plant grew from Monday to Saturday?

(A) $1\frac{1}{4} + 1\frac{5}{8}$

(B) $1\frac{5}{8}$

(C) $1\frac{5}{8} - 1\frac{1}{4}$

(D) $1\frac{1}{4} - 1\frac{5}{8}$

N258901

$$4 \times \square = \square \text{ and } \square \times 3 = \square$$

39. The same number must go in each box above. What number would make both sentences true?
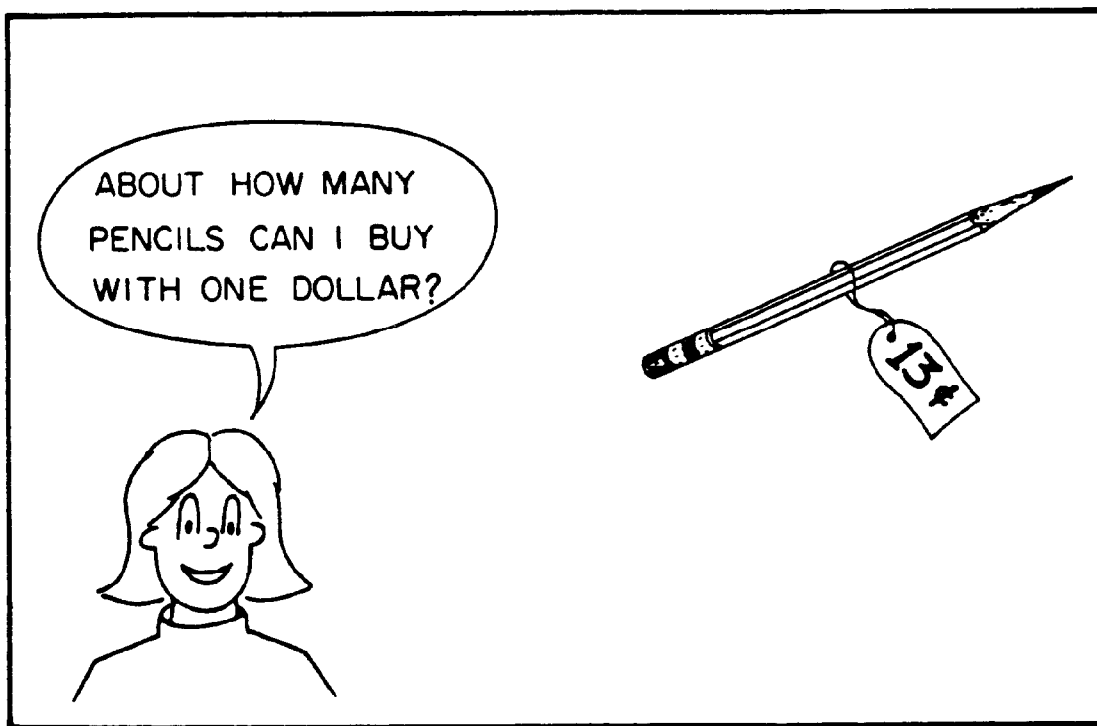
(A) 0

(B) 1

(C) 3

(D) 4

N206801
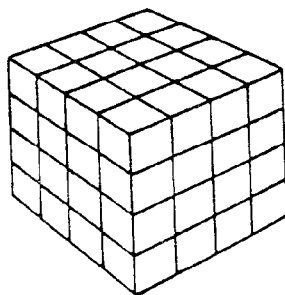
40. A pile of cubes 1 inch by 1 inch by 1 inch are glued together to make the block pictured above. How many of the original small cubes are completely hidden *inside* the big block?

(A) 8

(B) 9
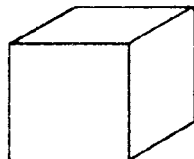
(C) 16

(D) 27

N215101

41. ESTIMATE.

(A) Less than 5

(B) Between 5 and 10

(C) Between 11 and 15

(D) Between 16 and 20

(E) More than 20

N261501

42. It took 3 games for a basketball player to score a total of 51 points. If the player keeps this scoring average, how many total points will the player have scored by the end of the seventh game?

(A) 17
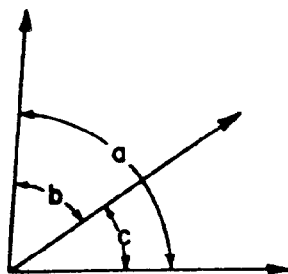
(B) 51

(C) 119

(D) 153

(E) 170

(F) 357

N263901

43. A blade slices completely through the wooden cube shown above. Which figure CANNOT be a surface resulting from the slice?

(A)

(B)

(C)
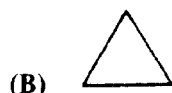
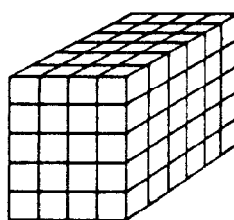(D) All the figures could be the sliced surfaces.

N229801

44. If angle a measures 85° and angle b measures 52°, what does angle c measure?

(A) 33°   (C) 137°

(B) 38°   (D) Not enough information given   N254301

45. This is a diagram of a rectangular solid model made of wooden cubes with 1-centimeter edges. What are the dimensions of the solid in centimeters?

(A) 30 by 20 by 24   (C) 6 by 4 by 5

(B) 7 by 5 by 6   (D) 5 by 3 by 5   N215601

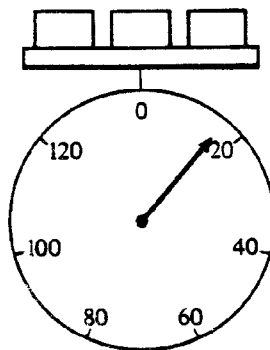**46.** Which of the following sets CANNOT be measures in degrees of the interior angles of a triangle?

(A) 60, 60, 60   (D) 100, 50, 40

(B) 90, 45, 45   (E) 150, 15, 15

(C) 90, 80, 10   N253202

47. Which of the following is closest to the height of the door to your classroom?

(A) 1 foot   (C) 12 feet

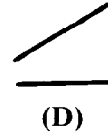(B) 7 feet   (D) 36 feet   N266801

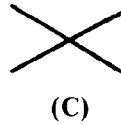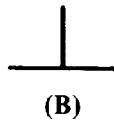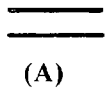**48.** Each of the three blocks in the figure above weighs the same. The weight of each block is closest to how many units?

(A) 3   (C) 9

(B) 6   (D) 20   N219001

49. Which of the drawings below shows PERPENDICULAR LINES.

| (A) | (B) | (C) | (D) | N254602 |

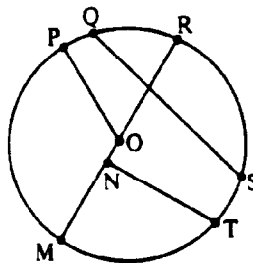**50.** ESTIMATE.

(A) $6

(B) $7

(C) $12

(D) $15

(E) $25

N261601

▶ **Questions 51-53** refer to the following figure.

51. Which of the following is a diameter of the circle?

(A) $\overline{OP}$

(B) $\overline{QS}$

(C) $\overline{RM}$

(D) $\overline{NM}$ N212901

52. Which of the following is a radius of the circle?

(A) $\overline{OP}$

(B) $\overline{QS}$

(C) $\overline{RM}$

(D) $\overline{NT}$ N212902

53. Which points are the end points of an arc?

(A) O, P

(B) Q, S

(C) N, T

(D) N, M   N212903

▶ **Questions 54-55.** The formula for the relationship between Fahrenheit and Celsius temperatures is $F = \frac{9}{5}C + 32$, where C is degrees Celsius and F is degree Fahrenheit.

54. For every increase of one degree Celsius, what is the corresponding increase in degrees Fahrenheit?

(A) 1

(B) 32

(C) $33\frac{4}{5}$

(D) $\frac{9}{5}$

(E) $\frac{5}{9}$

N255901
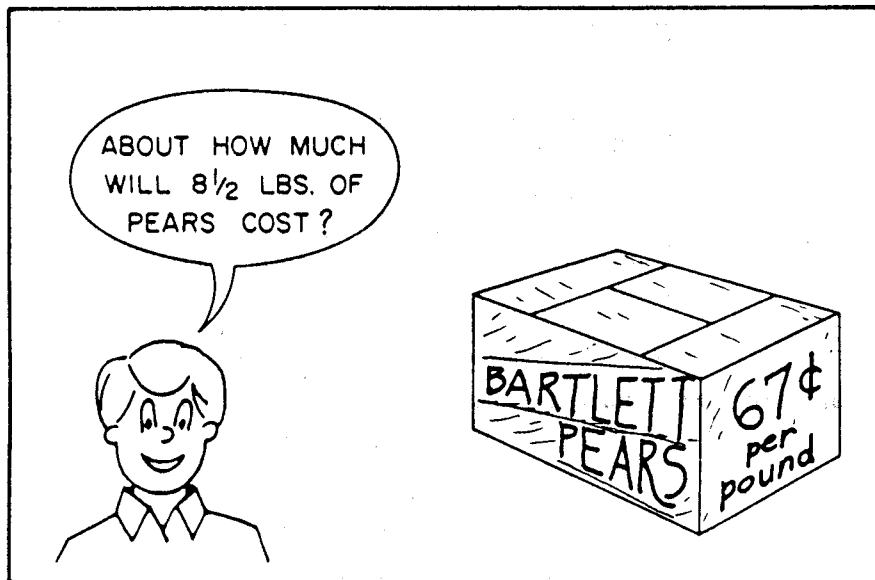
55. What is C when F = 122?

(A) 50

(B) $67\frac{7}{9}$

(C) $85\frac{5}{9}$

(D) 162

(E) $251\frac{3}{5}$

N255902

56. ESTIMATE.

(A) $6

(B) $9

(C) $50

(D) $60

(E) $90

N281401

57. A cooking instructor estimates that he uses 6 dozen eggs each month. At that rate about how many eggs does he use in one year?
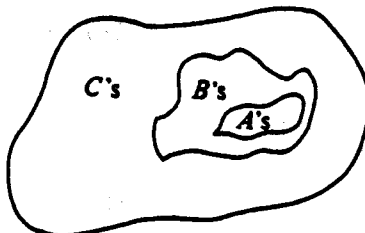
(A) 70

(B) 800

(C) 1,200

(D) 2,500

N206701

58. Karen used her hand calculator to divide 9 by 4. She got 2.25 for an answer. This number is between which of the following pairs of numbers?

(A) 1 and 2

(B) 2 and $2\frac{1}{2}$

(C) $2\frac{1}{2}$ and 3

(D) 3 and $3\frac{1}{2}$ N257901

59. Which two of the following may be concluded from this diagram?

   I. All B's are A's
  II. All A's are C's
 III. Some B's are A's
 IV. No B's are C's

(A) I and III only

(B) I and IV only

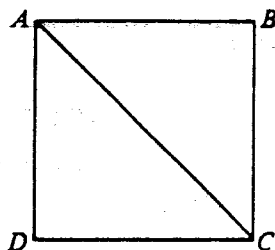(C) II and III only

(D) II and IV only   N220401

MUSICAL FAVORITES	
SINGERS	NUMBER OF VOTES
Michael Jackson	20
Diana Ross	10
Julio Iglesias	10
Willie Nelson	5
Culture Club	5

60. According to the chart above, what percent of all the votes went to Michael Jackson?

(A) 20%

(B) 40%

(C) 50%

(D) $66\frac{2}{3}\%$ N204401
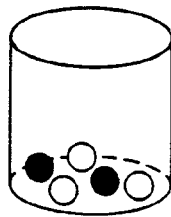
61. The area of square ABCD is 100 square centimeters. Which is true of the length of diagonal AC?

(A) It is equal to 10 centimeters.

(B) It is greater than 10 centimeters.

(C) It is less than 10 centimeters.

(D) It cannot be determined from the information given.   N226201

62. The jar shown above contains 2 black and 3 white marbles. Al picks one marble without looking. What is the probability that he picks a black marble?

(A) $\dfrac{1}{5}$ (C) $\dfrac{2}{3}$

(B) $\dfrac{2}{5}$ (D) 5   N221901

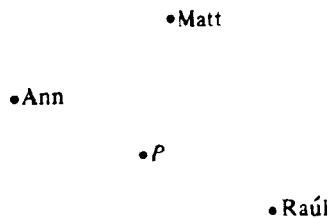63. One gram is how many milligrams?

   (A)   10

   (B)   100

   (C) 1000   N265902
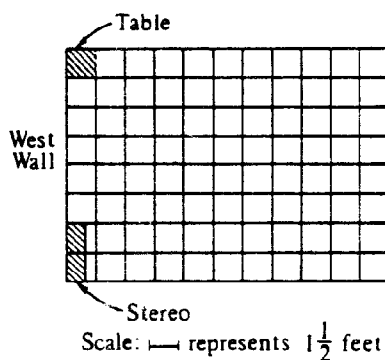
The teacher put a dot on the chalkboard and marked it P. Then she asked three children to measure 2 centimeters from P and put a dot. The picture shows where the children put their dots.

•Matt

•Ann

•P

•Raúl

64. If 20 children measured and each put a different dot, the picture would look most like a

   (A)   circle   (C)   square

   (B)   rectangle   (D)   triangle   N234901

Scale: ⊢—⊣ represents $1\frac{1}{2}$ feet
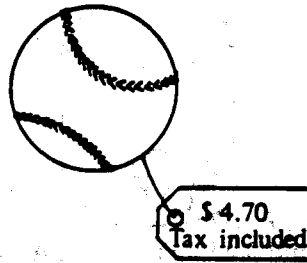
65. The scale drawing above shows the floor plan of a living room. A sofa is to be placed along the west wall between the table and the stereo. What is the maximum length the sofa can be?

   (A)   5 feet   (C) $7\frac{1}{2}$ feet

   (B) $6\frac{1}{2}$ feet   (D)   8 feet   N232901

66. Which is the smallest bill that is enough to pay for 4 baseballs?

    (A) Five-dollar bill   **(C)** Twenty-dollar bill

    (B) Ten-dollar bill   **(D)** Fifty-dollar bill   N206601

▶ **Questions 67-68** refer to the following.

John won $\frac{5}{8}$ of the games he played, Ted won $\frac{3}{4}$, Jim won $\frac{9}{16}$, and Rocky won $\frac{2}{3}$.

67. Which of the players had the best record?

    (A) John   **(C)** Jim

    (B) Ted   **(D)** Rocky   N201401

68. Which of the players had the worst record?

    (A) John   **(C)** Jim

    (B) Ted   **(D)** Rocky   N201402

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69. It is approximately 90,000,000 miles from the Earth to the Sun. Which is the correct scientific notation for this distance?

    (A) 9×10^7 **(C)** 90×10^5

    (B) 9×10^8 **(D)** 90 million $\times 10^7$ N201101

70. Which of the following is closest to the height of the door to your classroom?

    (A) 1 meter   **(C)** 4 meters

    (B) 2 meters   **(D)** 7 meters   N266701

71. Change .35 to a percent.

    (A) 0.35%

    (B) 3.5%

    (C) 35%

    (D) 350%   N274801

WHEN YOU HAVE FINISHED

Please check to make sure you have marked *one* answer for each question. When you have checked your answers place your *Answer Sheet* inside the front cover of the test booklet. All of the booklets will be collected at the same time after everyone is finished. Please sit quietly while others are completing their work.