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# MATHCOUNTS

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## ■ Speed and Accuracy Practice Test 7 ■

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Name

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Date

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**DO NOT BEGIN UNTIL YOU ARE INSTRUCTED TO DO SO.**

The test consists of two parts, with each part 40 problems. You will have 15 minutes to complete the part 1 and 25 minutes to complete the part 2. You are not allowed to use calculators, books, or any other aids during this round. Calculations may be done on scratch paper. All answers must be complete, legible, and simplified to lowest terms. Record only final answers. Do each problem as quick as you can. If you finish one problem, go to the next. Do not spend any time to check your answers.

Total Correct		Scorer's Initials
Part I		
Part II		

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**Part I Problems 1–40**

1. What is  $1024^{0.1}$ ?
2. Express 96% as a fraction in the simplest form.
3.  $31 \times 65 =$
4.  $187 \div 17 =$
5.  $(8 \times 1000) + (8 \times 100) + (8 \times 10) + 8 \times 1 =$
6.  $838 - 383 =$
7. Find the remainder when 5,937 is divided by 4.
8.  $\frac{7}{9} - \frac{1}{3} = \left(\frac{x}{y}\right)^2$ . Find smallest possible value of  $x + y$ .
9. Is it true that  $\frac{6}{13} > \frac{4}{9}$ ?
10.  $4.5 \times 28 =$
11. 36 inches = \_\_\_\_\_ feet
12.  $(-22) + (-8) \times (-4) =$
13.  $11 \div 0.25 =$
14.  $55 \times 55 =$
15. If  $7a - 4 = 3a + 32$ , then  $a =$
16. The GCF of 58 and 174 is
17.  $12.5 \times 8 =$
18.  $24 \times 16 - 24 - 16 =$
19.  $7\frac{4}{13} \times 7\frac{7}{13} =$  \_\_\_\_\_ mixed number
20. MMXV = \_\_\_\_\_ Arabic number
21. The number of positive, proper fractions in lowest terms with denominator 13 is \_\_\_\_\_
22.  $13 \times 9\frac{7}{13} =$
23. 7 is 35% of what number?
24.  $\sqrt{1521} =$
25.  $\frac{1}{12}$  miles = \_\_\_\_\_ in
26. If  $f(x) = x^2 - 50$ , then  $f(10) =$

27. Find the number of odd subsets of the set  $(\omega, \beta, \pi, \Delta)$ .

28. Subtracting 31% of a number from the number is the same as multiplying the number by — %.

29. The geometric mean between 25 and 16 is —

30. The slope of the line passing through  $(0, 0)$  and  $(1, -3)$  is

31. 60 miles/hour = — feet/sec

32.  $7! \div 4! =$

33. The product of the GCF and the LCM of 11 and 45 is

34. If the hypotenuse of a 45-45-90 triangle measures  $13\sqrt{2}$ , then a leg measures —

35. The surface area of a cube with edge  $\sqrt{15}$  is

36. 100 feet = — cm

37.  $\frac{13}{16} \times \frac{32}{26} =$  —

38. 42 is — % less than 60

39.

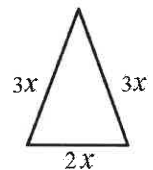
$$\binom{10}{0} + \binom{10}{1} + \binom{10}{2} + \binom{10}{3} + \binom{10}{4} + \binom{10}{5} \\ + \binom{10}{6} + \binom{10}{7} + \binom{10}{8} + \binom{10}{9} + \binom{10}{10} =$$

40. What is the value of  $9 \times 9 - 9 + 9 \div 9$ ?

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**Part II Problems 41–80**

41. Four couples went to the movies together. They all sit in eight adjacent seats in the same row. How many different ways can they be seated if each couple sits together?
42. Express  $0.5_{10}$  in base 2.
43. What is the product of the least common multiple and the greatest common factor of 24 and 48?
44. Alex has twice as many cookies as Bob and half as many cookies as Cathy. If Bob and Cathy have 40 cookies together, how many cookies does Alex have?
45. Express  $0.5^{0.5}$  in the simplest radical form.
46. What is the least of three prime numbers whose product is 2431?
47. The cost of daily school lunch increased from \$2.25 to \$1.80. What was the percent decrease?
48. When expressed as an integer, what are the last three digits of  $2015!$ ?
49. For what value of  $n$  is the sum of the first  $n$  positive integers equal to 210?
- ...
50. An isosceles triangle with sides of integer length has a perimeter of 40 inches. If the ratio of two of its sides is 2:3, what is the greatest possible value in inches in the length of one of the legs?



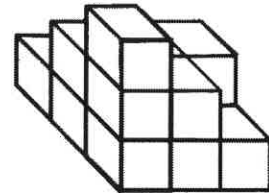
51. A conical pool takes 4 hours to be filled at a uniform rate to a depth of 12 ft. How many minutes does it take to fill it to a depth of 6 ft?
52. For how many integers  $x$  is  $(x + 4)(x - 5) < 0$ ?
53. How many diagonals can be drawn in a cube?
54. Eduardo is writing natural numbers. He writes one 1, two 2's, three 3's, and so on: 1, 2, 2, 3, 3, 3, 4, 4, 4, 4, 5,.... What number is the 100<sup>th</sup> term?
55. What is the 100<sup>th</sup> term of the sequence 1, 2, 5, 10, 17, ...?
56. Richard is thinking of two distinct, positive integers. He tells Barbara their sum is 20, and he tells Lori that their product is 91. What is the sum of the squares of Richard's two numbers?
57. Two sides of a triangle measure 12 units and 19 units. In units, what is the positive difference between the measures of the smallest and the largest possible integral lengths of the third side of the triangle?
58. What is the sum of all positive integers from 1 to 100, inclusive, that are neither multiples of 2 nor perfect squares?
59. Mike has eight U.S. coins with a total value of 62 cents. He does not have any half-dollars. What is the smallest number of dimes does Mike have?

60. The domain of a function  $f(x)$  is all real numbers and the range of  $f(x)$  is all real numbers from  $-11$  to  $11$ , inclusive. What is the maximum value of  $g(x)$  if  $g(x) = 11f(x - 11) + 11$ ?

61. In an arithmetic progression the first term is  $0$  and the fifth term is  $7$ . What is the third term? Express your answer as a common fraction.

62. The positive real numbers  $w$ ,  $x$  and  $y$  satisfy the equation  $\frac{x}{5} = 20yw^2$ . If  $y$  is tripled and  $w$  is halved, by what percent must  $x$  be decreased so that the new values of  $w$ ,  $x$  and  $y$  also satisfy the equation?

63. A solid consisting of 15 unit cubes placed on a table as shown in the figure is painted from five directions (the bottom is not painted) and is then separated into 15 unit cubes. One unit cube is randomly selected and rolled. What is the probability that the face showing is painted? Express your answer as a fraction.



64. How many ways are there to select 3 boys and 2 girls from 6 boys and 4 girls to do 5 different jobs?

65. How many sides does a regular polygon have if the measure of an interior angle is 160 degrees?

66. If  $g(x) = 2x - 4$  and  $f(x) = 3x^2 + 15x$ , what is  $f(g(3))$ ?

67. When all two-digit positive integers are written, what fraction of the digits written are 5's? Express your answer as a common fraction.



68. A bus can hold a maximum of 41 students. What is the minimum number of buses needed to transport 821 students?

69. The product of two consecutive odd whole numbers is 255. What is the smaller number?

70. Set  $A$  contains 25 elements, set  $B$  contains 22 elements, and the intersection of the sets contains 18 elements. How many elements are in the union of the sets?

71. Find the last four digits of  $5^{2014}$ .

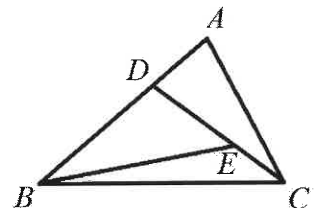
72. Find the remainder when  $66^{2015} + 12^{2015}$  is divided by 13.

73. What is the units digit of the base-6 representation of the base-10 number  $2015^{2015}$ ?

74. It takes Bryan one hour to dig a hole that is 2.4 meters wide, 3.5 meters long and 1.5 meters deep. At the same rate, how many hours will it take Bryan to dig a hole that is 4.8 meters wide, 10.5 meters long and 3.0 meters deep?

75. From a group of five boys and three girls, two children are selected at random. What is the probability that the second child selected is a girl? Express your answer as a common fraction.

76. The area of triangle  $ABC$  is 72 square meters. Point  $D$  is on  $AB$  such that  $BD = 2AD$ . Point  $E$  is on  $CD$  such that  $DE = 2EC$ . What is the number of square meters in the area of the triangle  $BCE$ ?



77. What is the value of  $13^3 - 9 \times 13^2 + 27 \times 13 - 27$ ?

78. The price of a iPod was discounted 30% on the first day of a sale. The sale price was then discounted an additional 30% on the second day. What percent is the combined discount?

79. What day of the week will it be 2015 days from Tuesday?

80. There are nine points on the circumference of a circle. All line segments are drawn by connecting two of these 9 points. How many triangles are there if no three line segments go through the same point? The vertices of any triangle must be inside the circle.