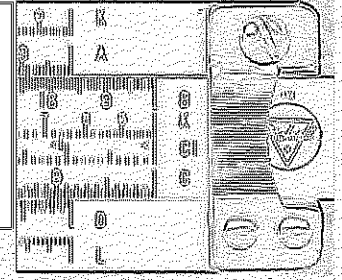
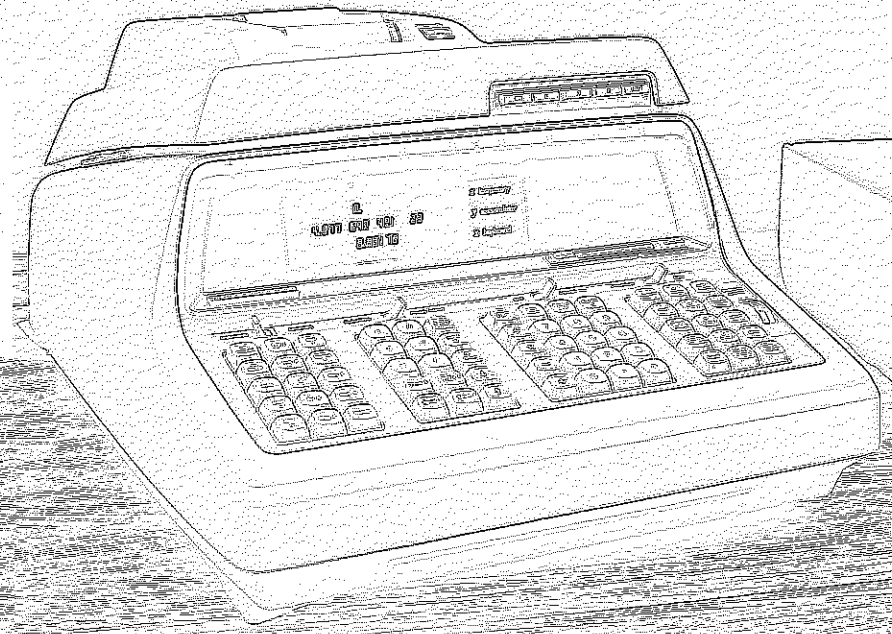
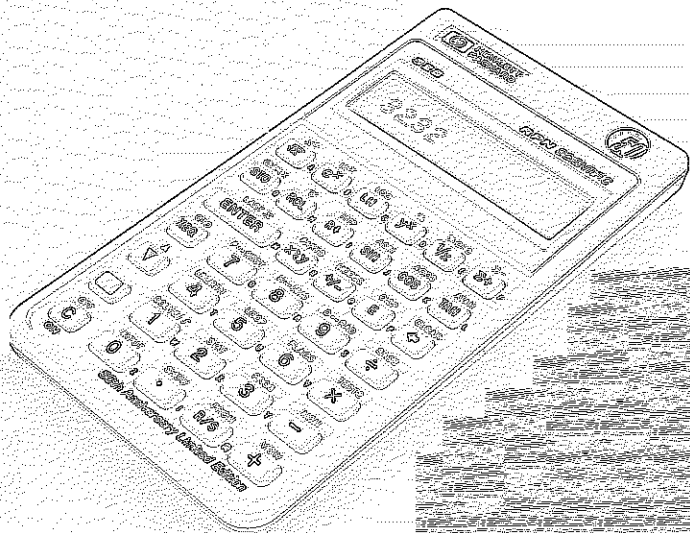
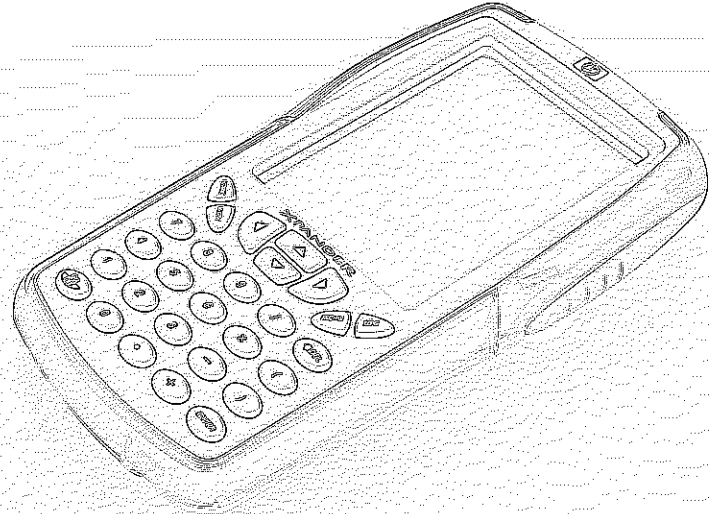
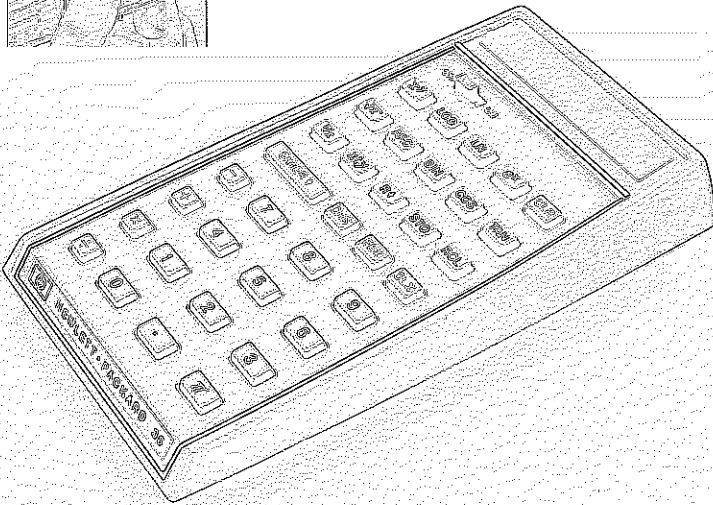
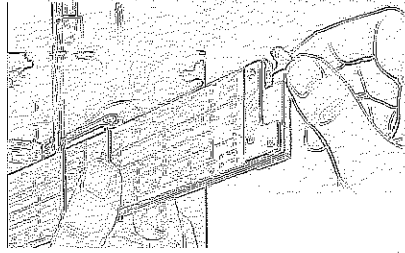
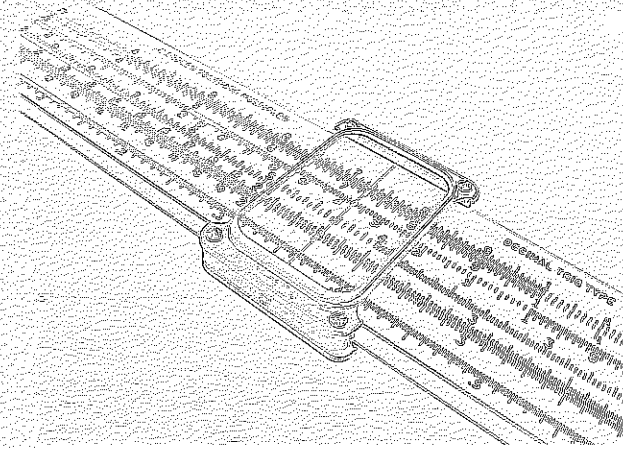
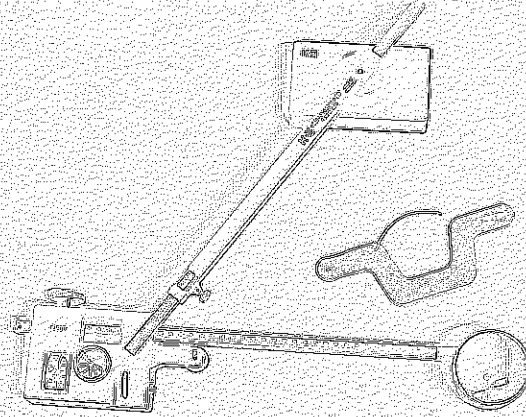
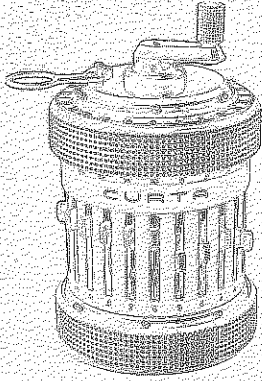


**Texas Competitive Mathematics**  
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E-Mail - [webmaster@texasmath.org](mailto:webmaster@texasmath.org)



**1979-80 UIL Number Sense  
(16 pages)**



# The University of Texas Interscholastic League

## Number Sense Test, Series MM-A

Contestant's Number \_\_\_\_\_

Contestant's Score \_\_\_\_\_

**Read Directions Carefully  
Before Beginning Test**

**Do not Unfold This Sheet  
Until Told to Begin**

*Directions:* Do not turn this page until person conducting this test gives the signal to begin. This is a ten-minute test. There are 70 problems. Solve accurately and quickly as many as you can in the order in which they appear. ALL PROBLEMS ARE TO BE SOLVED MENTALLY. Make no calculations with paper and pencil. Write only the answer in the space provided at the end of each problem. Problems marked with a star (\*) require only approximate answers; any answer to a starred problem that is within five per cent of the exact answer will be scored correct; all other problems require exact answers.

Person conducting contest should explain these directions carefully to the contestants.

### Stop—Wait for Signal

1.  $157 + 234 =$  \_\_\_\_\_.
2.  $513 - 385 =$  \_\_\_\_\_.
3.  $79 \times 8 =$  \_\_\_\_\_.
4.  $66 \frac{2}{3}\%$  of 84 = \_\_\_\_\_.
5.  $19 \times 8 + 22 \times 4 =$  \_\_\_\_\_.
6.  $(42)^2 =$  \_\_\_\_\_.
7.  $19 \div 2 \frac{3}{8} =$  \_\_\_\_\_.
8.  $44 \times 37 =$  \_\_\_\_\_.
9.  $4 \frac{2}{3} - 1 \frac{5}{6} =$  \_\_\_\_\_.
- \*10.  $8274 + 91385 + 99100 + 76426 + 9315 =$  \_\_\_\_\_.
11.  $17 \frac{7}{9}\% =$  \_\_\_\_\_ (fraction).
12. If  $3x - 1/8 = 4$ ,  $x =$  \_\_\_\_\_.
13.  $376 \div 47 =$  \_\_\_\_\_.
14.  $615 \times 11 =$  \_\_\_\_\_.
15.  $27 + 18 + 39 + 14 =$  \_\_\_\_\_.
16.  $4.21 - .32 =$  \_\_\_\_\_.
17. 52 minutes = \_\_\_\_\_ seconds.
18. Find the principal plus the interest if \$2,400 is borrowed for 150 days at 9% interest. \$ \_\_\_\_\_.
19.  $\sqrt{784} =$  \_\_\_\_\_.
- \*20.  $3024 \times 355 =$  \_\_\_\_\_.
21.  $[4 - (-2 + 6) + 5] =$  \_\_\_\_\_.
22.  $2/5 + 1/3 - 1/2 =$  \_\_\_\_\_.
23.  $9^4 =$  \_\_\_\_\_.
24. How many positive prime divisors does 48 have?  
\_\_\_\_\_.
25. What is the sum of the positive integral divisors of 20?  
\_\_\_\_\_.
26.  $6 \frac{3}{8} - 2 \frac{3}{4} =$  \_\_\_\_\_.
27. What is the area of a triangle whose base is 13 and whose altitude is 18? \_\_\_\_\_.
28. What is the perimeter of a square whose area is 9?  
\_\_\_\_\_.
29. 396 sq. in. = \_\_\_\_\_ sq. ft.
- \*30.  $\sqrt{335241} + 221 =$  \_\_\_\_\_.
31. Change 123, base six, to base ten. \_\_\_\_\_.
32. The greatest common divisor of 176 and 396 is \_\_\_\_\_.
33. The least common multiple of 176 and 396 is \_\_\_\_\_.
34. The next term of 11, 10, 8, 5, 1, . . . is \_\_\_\_\_.
35. The smaller of  $11/31$  and  $6/17$  is \_\_\_\_\_.
36. Multiply 36, base eight, by 6, base eight, and give the answer in base eight. \_\_\_\_\_, base eight.
37. If 2.54 cm. equals one inch, 50 in. = \_\_\_\_\_ cm.
38. The number of proper subsets of the set  $\{3, -1, 2, 5, 0\}$  is \_\_\_\_\_.
39. The product of the primes between 20 and 30 is \_\_\_\_\_.
- \*40.  $97 \times 56 + 258 \times 6 =$  \_\_\_\_\_.
41. Find the perimeter of an equilateral triangle whose altitude is  $4\sqrt{3}$ . \_\_\_\_\_.

42. The remainder when  $(13)^7$  is divided by 9 is \_\_\_\_\_.
43. The distance between the points  $(-1/4, 3)$  and  $(-2, 2/3)$  is \_\_\_\_\_.
44. If  $f(x) = \frac{5x}{2} - \left|1 - \frac{3x^2}{4}\right|$ ,  $f(-2) =$  \_\_\_\_\_.
45. The remainder when 810642 is divided by eleven is \_\_\_\_\_.
46. If  $\left(\frac{2}{3}\right)^x = \frac{9}{4}$ ,  $x =$  \_\_\_\_\_.
47. Find the slope of the line  $\frac{4x}{7} - \frac{3y}{2} = \frac{1}{3}$  \_\_\_\_\_.
48.  $63_{\text{thirteen}} \times 9_{\text{thirteen}} =$  \_\_\_\_\_ thirteen.
49. Write the value of  $.85\overline{4}$  as a common fraction. \_\_\_\_\_.
- \*50. The average of 270, 3458, 9232, and 640 is \_\_\_\_\_.
51. If  $x \neq 0$ ,  $\log_3 x - \log_3(3x) =$  \_\_\_\_\_.
52. The sum of the roots of  $5x^2 - 6x + 3 = 0$  is \_\_\_\_\_.
53.  $\frac{6\frac{1}{4} - 3\frac{3}{8}}{5\frac{1}{2} - 2} =$  \_\_\_\_\_.
54. The smallest value in the solution set of  $4x^2 - x = 3$  is \_\_\_\_\_.
55. The number of different six-letter words, real or imaginary, that can be constructed using the letters "A, R, A, B, I, C" is \_\_\_\_\_.
56. If one card is drawn from a deck of 52 cards, what is the probability of drawing a red ace? \_\_\_\_\_.
57. If the sum of three consecutive even numbers is 36, the largest is \_\_\_\_\_.
58. If  $3y - x = 4$  and  $y = 5x - 1$ , then  $x =$  \_\_\_\_\_.
59. If  $\log_{16} 4^x = 3$ , then  $x =$  \_\_\_\_\_.
- \*60.  $(47)^4 - 1 =$  \_\_\_\_\_.
61. If two dice are tossed, what are the odds that the difference of the faces will be three? \_\_\_\_\_.
62.  $(3i - 2)^3 = a + bi$  and  $a =$  \_\_\_\_\_.
63. The smallest possible value of  $f(x) = 2x^2 - 3x + \frac{1}{8}$  is \_\_\_\_\_.
64. In how many different ways can six salesmen be assigned to six sales routes? \_\_\_\_\_.
65. If  $\left|\frac{5x}{2} - 3\right| \leq 4$ , the smallest value for  $x$  is \_\_\_\_\_.
66. The second derivative of  $f(x) = 3x^4 - 5x^3 + 6x$  at  $x = 1$  is \_\_\_\_\_.
67. How many symbols are used in a base eighteen system of numeration? \_\_\_\_\_.
68. Change  $203^\circ$  Fahrenheit to Celsius. \_\_\_\_\_ degrees.
69.  $21750 \div 125 =$  \_\_\_\_\_.
- \*70. If  $f(x) = (3x - 5)^2(2x + 4)$ ,  $f(10) =$  \_\_\_\_\_.

# The University of Texas Interscholastic League

## Number Sense Test, Series MM-B

Contestant's Number .....

Contestant's Score .....

**Read Directions Carefully  
Before Beginning Test**

**Do not Unfold This Sheet  
Until Told to Begin**

*Directions:* Do not turn this page until person conducting this test gives the signal to begin. This is a ten-minute test. There are 70 problems. Solve accurately and quickly as many as you can in the order in which they appear. **ALL PROBLEMS ARE TO BE SOLVED MENTALLY.** Make no calculations with paper and pencil. Write only the answer in the space provided at the end of each problem. Problems marked with a star (\*) require only approximate answers; any answer to a starred problem that is within five per cent of the exact answer will be scored correct; all other problems require exact answers.

Person conducting contest should explain these directions carefully to the contestants.

### Stop—Wait for Signal

- |   |   |
|---|---|
| <p>(1) <math>21764 + 79847 =</math> .....</p> <p>(2) <math>32 \times 8 =</math> .....</p> <p>(3) <math>50126 - 7943 =</math> .....</p> <p>(4) <math>6.42 + 193\% =</math> .....</p> <p>(5) <math>3 \frac{7}{9} \div 5 \frac{2}{3} =</math> .....</p> <p>(6) <math>19 + 27 + 45 - 16 =</math> .....</p> <p>(7) <math>16\frac{5}{8} - 8\frac{3}{4} =</math> .....</p> <p>(8) <math>(27)^2 =</math> .....</p> <p>(9) <math>66\frac{2}{3}\%</math> of 78 = .....</p> <p>* (10) <math>668 + 3(792) + 4(4439) =</math> .....</p> <p>(11) <math>974 \times 11 =</math> .....</p> <p>(12) The average of 45, 72, and 39 is .....</p> <p>(13) If <math>2x - \frac{2}{3} = \frac{4}{5}</math>, <math>x =</math> .....</p> <p>(14) <math>798 \div 42 =</math> .....</p> <p>(15) The reciprocal of <math>6\frac{3}{4}</math> is .....</p> <p>(16) <math>27 \times 54 + 9 \times 18 =</math> .....</p> <p>(17) <math>\sqrt{324} =</math> .....</p> <p>(18) The median of 17, 29, 22, 36, 18, 47 is .....</p> <p>(19) Find the perimeter of a square whose diagonal is <math>\sqrt{32}</math> .....</p> <p>* (20) <math>(25)^3 - (25)^2 =</math> .....</p> <p>(21) <math>643 + 174 - 315 =</math> .....</p> <p>(22) <math>6\frac{1}{8} \times \frac{2}{7} =</math> .....</p> <p>(23) If <math>f(x) = 9x^2 - 3x + 2</math>, <math>f(-\frac{2}{3}) =</math> .....</p> <p>(24) <math>280 \times 17\frac{1}{2} =</math> .....</p> <p>(25) Change <math>41\frac{2}{3}\%</math> to a fraction. ....</p> <p>(26) <math>(12)^3 =</math> .....</p> <p>(27) 276 inches = ..... ft.</p> <p>(28) <math>21/8 = 14/x</math>, <math>x =</math> .....</p> <p>(29) <math>4433 \div 11 =</math> .....</p> | <p>* (30) <math>459 \times 76 - 4 =</math> .....</p> <p>(31) If 1 qt. = 0.95 liters, 1 gal. = ..... liters.</p> <p>(32) The greatest common divisor of 891 and 198 is .....</p> <p>(33) The least common multiple of 891 and 198 is .....</p> <p>(34) Change 162, base ten, to base seven. ....<br/>....., base seven.</p> <p>(35) <math>2.036 + 2.21 - 0.0072 =</math> .....</p> <p>(36) <math>1 + 3 + 5 + 7 + 9 + 11 + 13 + 15 =</math> .....</p> <p>(37) 453, base eight, added to 52.6, base eight = .....<br/>....., base eight.</p> <p>(38) At \$7.85 per skirt, how many skirts can be purchased for \$62.80? .....</p> <p>(39) If one mile is equal to 1.61 kilometers, 60 miles = ..... km.</p> <p>* (40) <math>(535580 \div 244) + 5 =</math> .....</p> <p>(41) If 84275 is divided by 9, the remainder is .....</p> <p>(42) Change 1.18 to a fraction .....</p> <p>(43) The distance between the points <math>(-3, 2)</math> and <math>(-\frac{1}{3}, 1)</math>, in simplified form, is a <math>\sqrt{b}</math>, and a = .....</p> <p>(44) What is the remainder when <math>(347)^7</math> is divided by 9? .....</p> <p>(45) If two dice are tossed, what is the probability that the sum of the faces will be six? .....</p> <p>(46) Find the slope of the line <math>\frac{4x}{7} - 2y + \frac{3}{4} = 0</math>. .....</p> <p>(47) The x-intercept of the above line is .....</p> |
|---|---|

- (48)  $\log_3(x - 2) = 4$ ,  $x =$  .....
- (49) If 1 yard = 0.914 meters, 15 feet = ..... m.
- \* (50)  $\sqrt{97969} + 7 =$  .....
- (51)  $(7 + 6i)(-5 - 3i) = a + bi$ , and  $a =$  .....
- (52) 2 square yards = ..... sq. in.
- (53)  $(79)^2 - (59)^2 =$  .....
- (54) Find the smallest value of  $x$  such that  $\left| \frac{6x}{5} - 2 \right| \leq 4$ . .....
- (55) The center of the circle  $4x^2 + 4y^2 - x + 2y = 60$  is ..... (.....,.....)
- (56) If Joe is 3 m. in height and casts a shadow of 1.8 m., how tall is a pole which casts a shadow of 4.2 m? ..... m.
- (57) Find the total surface area of a right rectangular prism with length 2, width 4, and height 5. ....
- (58) If three coins are tossed, what are the odds that at least two tails will turn up? .....
- (59)  $x + 3 \equiv 17 \pmod{4}$ ,  $x =$  ..... (for  $0 \leq x < 4$ ).
- \* (60) 260 cu. ft. = ..... cu. in.
- (61) If  $0 \leq x \leq \pi/2$  and  $\sin x = 3/4$ ,  $\cotan x =$  .....
- (62) If  $h(x) = 2x^3 + 3x^2$  and  $g(x) = \frac{3x}{2} - 5$ ,  $h(g(2/3)) =$  .....
- (63) Find the vertex of the parabola  $y = 3x^2 + 6x + 2$ . ..... (.....,.....)
- (64)  $\int_1^2 (5x^4 - 2x) dx =$  .....
- (65) The slope of the line tangent to  $f(x) = \frac{3x}{2} - x^3 + 1$  at  $x = -2$  is .....
- (66) How many different two-card hands can be dealt from a deck of 52 cards? .....
- (67) What is the coefficient of the second term in the binomial expansion of  $(5x - 2y)^4$ ? .....
- (68) The second derivative of  $f(x) = \frac{3x^2}{2} - 5x^3$  is .....
- (69) The volume of a right circular cone with radius  $5\frac{1}{2}$  and height  $48/\pi$  is .....
- \* (70)  $\sum_{x=7}^{10} 5x^3 =$  .....

# The University of Texas Interscholastic League

## Number Sense Test, Series MM-C

**Read Directions Carefully  
Before Beginning Test**

**Do not Unfold This Sheet  
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Person conducting contest should explain these directions carefully to the contestants.

### Stop—Wait for Signal

- |  |  |
|--|--|
| <p>(1) <math>4219 + 7836 =</math> .....</p> <p>(2) <math>384 - 197 =</math> .....</p> <p>(3) <math>8\frac{7}{8} - 9\frac{3}{4} =</math> .....</p> <p>(4) <math>52 \times 73 =</math> .....</p> <p>(5) <math>6887 \div 71 =</math> .....</p> <p>(6) If 1 liter = 1.1 qt., 43 liters = ..... qt.</p> <p>(7) <math>\sqrt{196} =</math> .....</p> <p>(8) <math>2^2 + 3^2 + 4^2 - 5^2 =</math> .....</p> <p>(9) The interest on \$730.00 at 9% for one year is \$ .....</p> <p>* (10) <math>10764 + 9824 + 76432 =</math> .....</p> <p>(11) The negative reciprocal of <math>-1.6</math> is .....</p> <p>(12) Find the area of a square whose diagonal is <math>\sqrt{50}</math>.<br/>.....</p> <p>(13) <math>9 \times 48 + 18 \times 6 =</math> .....</p> <p>(14) <math>2.71 + 0.68 + 3.11 =</math> .....</p> <p>(15) <math>1 + 3 + 5 + 7 + 9 + 11 + 13 =</math> .....</p> <p>(16) If <math>A = \{3, 0, -1, \frac{2}{3}\}</math> and <math>B = \{6, \frac{1}{2}, 2, 3, 7, -1\}</math>,<br/><math>A \times B</math> will have how many elements? .....</p> <p>(17) <math>67 \times 73 =</math> .....</p> <p>(18) At \$5.75 per ticket, how many tickets can be purchased for \$34.50? .....</p> <p>(19) <math>11 \frac{1}{9} \times 729 =</math> .....</p> <p>* (20) <math>7164 \times 84 + 4 =</math> .....</p> <p>(21) The positive square root of <math>5 \frac{1}{16}</math> is .....</p> <p>(22) Find the area of a triangle whose altitude is 21 and base is 16. ....</p> <p>(23) If 24 steaks weighing 6 oz. each sell for \$33.75, what is the equivalent price per pound? \$ .....</p> <p>(24) The median of <math>17\frac{1}{2}</math>, 25, <math>16\frac{3}{4}</math>, and 20 is .....</p> <p>(25) <math>3 [7 - 2(8 - 3) + 4] =</math> .....</p> | <p>(26) <math>487 + 296 + 849 =</math> .....</p> <p>(27) <math>25 \times 95 + 75 \times 35 =</math> .....</p> <p>(28) Change 257, base eight, to base ten. ....</p> <p>(29) If <math>7x - 8 = 4 + 3x</math>, <math>x =</math> .....</p> <p>* (30) <math>(192)^2 + (36)^3 =</math> .....</p> <p>(31) The remainder when <math>219 \times 478</math> is divided by 3 is .....</p> <p>(32) <math>(4 \frac{3}{8} \times 7) \div 3 \frac{1}{16} =</math> .....</p> <p>(33) Change <math>15\frac{1}{3}\%</math> to a fraction. ....</p> <p>(34) If <math>6^x = 1/216</math>, <math>x =</math> .....</p> <p>(35) If 2 apples cost 35¢, find the cost of 4 dozen apples.<br/>\$ .....</p> <p>(36) Find the largest integer whose square is less than 479. ....</p> <p>(37) The smaller of <math>17/23</math> and <math>37/50</math> is .....</p> <p>(38) How many primes are there between 140 and 150? .....</p> <p>(39) Find <math>k</math> so that the roots of <math>2x - 5x^2 + k = 0</math> are equal. ....</p> <p>* (40) <math>\sqrt{9216} + 4 =</math> .....</p> <p>(41) If the edges of a rectangular solid are 3, 4, and 16, find the area of the surface. ....</p> <p>(42) The sum of three consecutive odd integers is 273. The smallest is .....</p> <p>(43) Sue weighs 62 kg. A bag of groceries has a mass of 5100 g. What is their combined mass? ..... kg.</p> <p>(44) If 1 kg. = 2.2 lbs. and a man weighs 231 pounds, what is his weight in kilograms? ..... kg.</p> <p>(45) Find the volume of the right rectangular prism that measures <math>3\frac{1}{2}</math> by 6 by 8. ....</p> |
|--|--|

- (46) Find the greatest common divisor of 110, 132, and 165. ....
- (47) Find the least common multiple of 110, 132, and 165. ....
- (48) The distance between the points  $(-3, 2/5)$  and  $(0, 1/2)$  in simplified form is  $a\sqrt{b}$  and  $b =$  .....
- (49) The slope of a line parallel to  $\frac{5x}{2} - \frac{3y}{4} = 1$  is .....
- \* (50) 480 rods = ..... ft.
- (51) If  $f(x) = 5x + 2 \left| \frac{3x}{4} - 2 \right|$ ,  $f(-2) =$  .....
- (52) Solve for  $z$ :  $x + y = -1$   
 $y - z = 2$   
 $x - z = -1$ ,  $z =$  .....
- (53) Multiply 52, base seven, by 13, base seven. ....  
 ....., base seven.
- (54) If  $3^x(3^8)(3^{3x-3}) = 3$ ,  $x =$  .....
- (55) The larger root of the quadratic function  $f(x) = x - 3x^2 + 1$  is .....
- (56) The sum of the prime factors of 392 is .....
- (57) The number of permutations of 10 objects taken 4 at a time is .....
- (58) If  $x$  varies indirectly as the square of  $y$  and  $y = 3$  when  $x = 5$ , find  $x$  when  $y = 1/2$ . ....
- (59)  $927 \times 18 =$  .....
- \* (60) Change 852, base 14, to base 10. ....
- (61) The coefficient of the fourth term in the expansion of  $(2x - 3)^4$  is .....
- (62)  $\cot(\arccos -3/5) =$  .....
- (63) Solve the equation for  $0 \leq x \leq \pi/2$ ,  $\cos 2x = 1$ ,  $x =$  .....
- (64)  $(2 - i)^{-1} = a + bi$  and  $a =$  .....
- (65) If  $1/3 \equiv x \pmod{4}$ ,  $x =$  ..... ( $0 \leq x < 4$ ).
- (66) The largest value of  $f(x) = 2x - x^2 + 3$  is .....
- (67) The slope of the line tangent to  $f(x) = \frac{x^2}{2} - \frac{3x^4}{4} + 10x$  at  $x = 2$  is .....
- (68)  $\lim_{x \rightarrow 0} \frac{3x^2 - 4x^3 + 7x}{x} =$  .....
- (69)  $\int_{-1}^2 4x^3 dx =$  .....
- \* (70) The volume of a sphere with diameter 42 is .....  
 ..... (use  $\pi = 22/7$ ).

# The University of Texas Interscholastic League

## Number Sense Test, Series MM-1

Contestant's Number .....

Contestant's Score .....

**Read Directions Carefully  
Before Beginning Test**

**Do not Unfold This Sheet  
Until Told to Begin**

*Directions:* Do not turn this page until person conducting this test gives the signal to begin. This is a ten-minute test. There are 80 problems. Solve accurately and quickly as many as you can in the order in which they appear. **ALL PROBLEMS ARE TO BE SOLVED MENTALLY.** Make no calculations with paper and pencil. Write only the answer in the space provided at the end of each problem. Problems marked with a star (\*) require only approximate answers; any answer to a starred problem that is within five per cent of the exact answer will be scored correct; all other problems require exact answers.

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### Stop—Wait for Signal

- (1)  $693 + 178 =$  .....
- (2)  $235 - 86 =$  .....
- (3)  $7 \times 82 =$  .....
- (4)  $291 \div 97 =$  .....
- (5)  $5 \frac{2}{3} - 3 \frac{5}{6} =$  .....
- (6)  $(26)^2 =$  .....
- (7)  $46 \times 47 =$  .....
- (8)  $2/7 + 3/4 - 1/8 =$  .....
- (9)  $432 \div 16 =$  .....
- \* (10)  $8(75) + 6(32) + 2(44) =$  .....
- (11) 680 is what percent of 136? ..... %.
- (12)  $\sqrt{529} =$  .....
- (13)  $293 \times 11 =$  .....
- (14)  $3\frac{3}{4} \div 12\frac{1}{2}\% =$  .....
- (15) 36 hours = ..... min.
- (16)  $26 + 19 + 31 + 13 =$  .....
- (17)  $(6 + 5)(6 + 8) =$  .....
- (18)  $2.57 + .84 =$  .....
- (19)  $6 \frac{2}{5} \times 9 \frac{3}{8} =$  .....
- \* (20)  $(149)^2 - (21)^3 =$  .....
- (21)  $9^3 =$  .....
- (22) What is the interest on \$5,000.00 for 150 days at 9%? \$.....
- (23)  $31.2 - 4.63 =$  .....
- (24)  $[5 - 7(2 - 4) - 8] =$  .....
- (25) If  $\frac{5x}{3} - \frac{1}{6} = 9$ ,  $x =$  .....
- (26) Find the product of all primes less than twelve.  
.....
- (27) Change 413, base ten, to base nine. ....  
....., base nine.
- (28) The greatest common divisor of 214 and 321 is  
.....
- (29) The least common multiple of 214 and 321 is ....  
.....
- \* (30) 104960 oz. = ..... gal.
- (31) The next term of 4, 7, 6, 9, 8, 11, 10, . . . is  
.....
- (32)  $67 \times 53 =$  .....
- (33) Find the perimeter of a square whose diagonal is 25. ....
- (34) The second term of  $(2x - 3y)^3$  is .....
- (35) Change 56, base eight, to base ten. ....
- (36) If 2.54 cm equals one inch,  $1\frac{1}{2}$  inches = .....  
..... cm.
- (37) Of 360 students in a school, 188 take English, 190 take mathematics, and 22 take neither. How many take both? .....
- (38) 324, base six, multiplied by 4, base six, = .....  
....., base six.
- (39) The largest prime factor of 448 is .....



- \* (40) 15 miles = ..... in.
- (41) If  $3^{3x} = 27^{x-1}$ ,  $x =$  .....
- (42) The mean of  $22\frac{1}{2}$ ,  $33\frac{1}{4}$ ,  $25\frac{3}{4}$ , and  $30\frac{1}{2}$  is.....  
.....
- (43) Solve for  $y$ :  $2x - y = -1$   
 $y + z = 2$   
 $x + z = 0$ ,  $y =$  .....
- (44) What is the perimeter of an equilateral triangle with area of  $576\sqrt{3}$ ? .....
- (45)  $462 \times 17 =$  .....
- (46) What is the probability that in a two-child family, assuming boys and girls are born with equal frequency, the first child is a girl and the second is a boy? .....
- (47) What is the remainder when  $(294)^6$  is divided by 11? .....
- (48) If  $f(x) = \frac{3x}{4} - 2 \left| x^3 + \frac{1}{4} \right|$ ,  $f(-2) =$  .....
- .....
- (49) If the sum of the measures of the angles of a convex polygon is 1980, how many sides does the polygon have? .....
- \* (50) If  $f(x) = 3x^3 - 25x^2 + 8$ ,  $f(19) =$  .....
- (51) Change 132, base four, to base seven. ....  
....., base seven.
- (52) After successive discounts of  $37\frac{1}{2}\%$  and  $20\%$ , an \$8.80 article sold for \$.....
- (53)  $95^\circ$  Celsius = ..... $^\circ$  Fahrenheit.
- (54) Find the largest two-digit integer such that the sum of its digits is 8 and the product is 7. ....
- (55)  $(.7)^4 =$  .....
- (56) The sum of the roots of  $\frac{2x}{5} - \frac{4}{7}x^2 = 3$  is .....
- (57) The midpoint of the line segment with endpoints  $(2/3, -1)$  and  $(2, 3/5)$  is .....  
..... (.....,.....)
- (58) You score 20 on the first test in mathematics. How many consecutive 100 grades on tests would you have to make in order to bring your average to 90?  
.....
- (59) For what value of  $k$  does  $3x^2 - 5x + k = 0$  have equal roots? .....
- \* (60) The surface area of a cube with edge 76 is .....
- (61) The product of primes between 80 and 90 is .....
- (62) If  $\frac{1}{16} \times b = 2 \div 4^2$ , then  $b^3 =$  .....
- (63) The slope of the line containing the points  $(1\frac{1}{2}, -2)$  and  $(4, \frac{1}{2})$  is .....
- (64) If the area of a rhombus is 85 and the length of one of its diagonals is 10, what is the length of the other diagonal? .....
- (65) Write  $0.\overline{378}$  as a common fraction. ....
- (66) If 1 kg. equals 2.2 lbs., then 19 lbs. = ..... kg.
- (67) The sum of the infinite geometric series  $3/4 + 3/10 + 3/25 + 6/125 + \dots$  is .....
- (68) How many different 4-digit numbers can be formed from the digits 2, 5, 4, 7, 8, 9 if repetition in a number is not permitted? .....
- (69)  $\tan(\arcsin \frac{5}{13}) =$  .....
- \* (70) If 1 oz. = 28 g., 75 lbs. = ..... g.
- (71)  $(2 + i)^3 (2 - i)^3 =$  .....
- (72) The radius of the circle  $4x^2 - 2x + 4y^2 + y = \frac{19}{4}$  is .....
- (73) If 67 and 82 are in base 9, find the remainder when their product is divided by 8. ....
- (74) 314, base five, divided by 12, base five, = .....  
....., base five.
- (75) The first derivative of  $h(x) = \frac{5x^3}{6} - 2x^2 + 13$  at  $x = 4$  is .....
- (76) The vertical asymptote of  $y = \frac{2x - 1}{3x + 2}$  is  $x =$  .....
- (77) If  $A = \begin{bmatrix} -4 & 0 \\ 1 & 2/3 \end{bmatrix}$  and  $B = \begin{bmatrix} 2 \\ -3 \end{bmatrix}$ ,  
 $AB = \begin{bmatrix} \quad \quad \\ \quad \quad \end{bmatrix}$  .....
- (78) The second derivative of  $g(x) = 2x^{-3} + x^2$  is .....
- (79)  $\lim_{x \rightarrow \infty} \frac{3x^2 - 4x^5}{2x^5 - 5x} =$  .....
- \* (80)  $77 \times 152 + 63 \times 95 - (33)^2 =$  .....

# The University of Texas Interscholastic League

## Number Sense Test, Series MM-2

Contestant's Number.....

Contestant's Score.....

**Read Directions Carefully  
Before Beginning Test**

**Do not Unfold This Sheet  
Until Told to Begin**

*Directions:* Do not turn this page until person conducting this test gives the signal to begin. This is a ten-minute test. There are 80 problems. Solve accurately and quickly as many as you can in the order in which they appear. **ALL PROBLEMS ARE TO BE SOLVED MENTALLY.** Make no calculations with paper and pencil. Write only the answer in the space provided at the end of each problem. Problems marked with a star (\*) require only approximate answers; any answer to a starred problem that is within five per cent of the exact answer will be scored correct; all other problems require exact answers.

Persons conducting contest should explain these directions carefully to the contestants.

### Stop—Wait for Signal

- |   |   |
|---|---|
| <p>(1) <math>54 \times 8 =</math> .....</p> <p>(2) <math>564 + 138 =</math> .....</p> <p>(3) <math>724 - 1386 =</math> .....</p> <p>(4) <math>60 \div 3\frac{1}{3} =</math> .....</p> <p>(5) <math>(32)^2 =</math> .....</p> <p>(6) <math>37 \times 24 =</math> .....</p> <p>(7) <math>6\frac{1}{8} - 4\frac{2}{3} =</math> .....</p> <p>(8) <math>(17 \times 12) + (36 \times 6) =</math> .....</p> <p>(9) <math>\sqrt{1681} =</math> .....</p> <p>* (10) <math>2(1864) + 5(296) - 4(22) =</math> .....</p> <p>(11) <math>\frac{1}{9} + \frac{2}{3} - \frac{1}{6} =</math> .....</p> <p>(12) 418 is what percent of 76? ..... %.</p> <p>(13) <math>(11)^3 =</math> .....</p> <p>(14) <math>17 + 36 + 24 + 9 =</math> .....</p> <p>(15) What is the interest on \$2,000.00 for 90 days at <math>9\frac{1}{2}\%</math>? \$.....</p> <p>(16) <math>26.1 - 7.34 =</math> .....</p> <p>(17) 16 days = ..... hours.</p> <p>(18) <math>18\frac{4}{7} \times 3\frac{10}{13} =</math> .....</p> <p>(19) <math>676 \div 52 =</math> .....</p> <p>* (20) <math>36 \times 725 =</math> .....</p> <p>(21) <math>[6 - 3(-4 + 1) - 9] =</math> .....</p> <p>(22) <math>17\frac{1}{7}\%</math> = ..... (fraction).</p> <p>(23) Find the sum of all primes less than 22. ....</p> <p>(24) The next term of 3, 5, 4, 6, 5, 7, 6, ... is .....</p> <p>(25) Find the area of a circle whose circumference is <math>24\sqrt{\pi}</math>. ....</p> <p>(26) <math>132 \times 128 =</math> .....</p> | <p>(27) If <math>5x - \frac{3x}{7} = 8</math>, <math>x =</math> .....</p> <p>(28) Change 210, base nine, to base ten. ....</p> <p>(29) Find the perimeter of a square whose diagonal is <math>\sqrt{18}</math>. ....</p> <p>* (30) <math>161480 \div 367 =</math> .....</p> <p>(31) The greatest common divisor of 126 and 198 is .....</p> <p>(32) The least common multiple of 126 and 198 is .....</p> <p>(33) The larger of <math>\frac{15}{17}</math> or <math>\frac{22}{25}</math> is .....</p> <p>(34) <math>84 \times 76 =</math> .....</p> <p>(35) The number of subsets of the set <math>\{\frac{3}{4}, -1, 2, 0\}</math> is .....</p> <p>(36) The last term in the expansion of <math>(4a - 3b)^5</math> is .....</p> <p>(37) Change 125, base ten, to base seven. .... base seven.</p> <p>(38) If 2.54 cm. equals one inch, 12.7 cm. = ..... in.</p> <p>(39) Of 388 students in a school, 188 take English, 190 take mathematics, and 30 take both. How many students take neither English nor mathematics? .....</p> <p>* (40) <math>(26)^3 - (13)^2 - 7 =</math> .....</p> <p>(41) The largest prime factor of 342 is .....</p> <p>(42) The sum of the roots of <math>\frac{2x}{7} - \frac{3x^2}{4} = 1</math> is .....</p> <p>(43) What is the area of an equilateral triangle with perimeter 132? .....</p> |
|---|---|

- (44)  $394 \times 15 =$  .....
- (45) Write  $\overline{.396}$  as a common fraction. ....
- (46) What is the remainder when  $(691)^5$  is divided by 7?  
.....
- (47) If  $\log_5 (3x - 1) = 3$ ,  $x =$  .....
- (48) If 1 pound equals 0.45 kg., 6 pounds = ..... g.
- (49) The maximum value of  $f(x) = -x^2 - x + 3$  is  
.....
- \* (50) If  $f(x) = 2(x)^5 - 35x^3 + \frac{x}{2}$ ;  $f(8) =$  .....
- (51) The sum of the measures of the angles of a polygon with 9 sides is .....
- (52) What is the probability that when three coins are tossed, at least two will be heads? .....
- (53) The midpoint of the line segment with endpoints  $(\frac{1}{2}, 2)$  and  $(1, -\frac{1}{3})$  is ..... (....., .....).....
- (54)  $176^\circ$  Fahrenheit = .....  $^\circ$  Celsius.
- (55) The product of the primes between 20 and 30 is  
.....
- (56) Change 57, base eight, to base six. ....  
....., base six.
- (57) After successive discounts of  $33\frac{1}{3}\%$  and  $25\%$ , a \$12.30 article sold for \$.....
- (58) Find the area of a rhombus with diagonals  $\sqrt{50}$  and  $\sqrt{18}$ . .....
- (59) In the metric system the square hectometer is called a hectare and symbolized by ha. If 1 ha equals 2.47 acres,  $123\frac{1}{2}$  acres = ..... ha.
- \* (60) 35 acres = ..... sq. ft.
- (61) You score 0 on the first test in history. How many consecutive 100 grades on tests would you have to make in order to bring your average to 80? .....
- (62) 945 months = ..... yrs.
- (63)  $\sec (\arcsin \frac{\sqrt{3}}{2}) =$  .....
- (64)  $(2 + i\sqrt{3}) \div (1 - i\sqrt{3}) = a + bi$  and  $a =$  .....  
.....
- (65) The remainder when  $f(x) = \frac{7x^3}{4} - 3x^2 + 7$  is divided by  $x - 2$  is .....
- (66) Find the x-intercept of a line containing the points  $(6, 2)$  and  $(0, -1)$ . .....
- (67)  $\sum_{x=1}^5 \frac{1}{2} (x - 2) =$  .....
- (68) If  $f(x) = \frac{2x}{5} - x^2$  and  $g(x) = \frac{1}{x^2}$ , then  $g(f(2)) =$   
.....
- (69) If 47 and 54 are in base 8, find the remainder in base 10 when their product is divided by 7. ....  
.....
- \* (70) At 231 cu. in. per gallon, how many gallons are in a rectangular box 120 in.  $\times$  78 in.  $\times$  462 in.? ..... gal.
- (71) Change 11001101, base two, to base eight. ....  
....., base eight.
- (72) How many six-digit numbers are there which are divisible by 5? .....
- (73) Find the largest value of  $x$  so that  $\sqrt{81 - 4x^2} = h(x)$  is real-valued. ....
- (74) The sum of the infinite geometric series  $\frac{4}{7} + \frac{12}{49} + \frac{36}{343} + \frac{108}{2401} + \dots$  is .....
- (75) The slope of the line tangent to  $h(x) = \frac{5x^2}{3} + 2x^3$  at  $x = -3$  is .....
- (76) If  $f(x) = 3x - 1$ , the inverse of  $f(x)$  is  $f^{-1}(x) =$   
.....
- (77) When two dice are tossed, what are the odds that the difference of the faces will be three? .....
- (78)  $\int_{-2}^1 (5x^4 + 1) dx =$  .....
- (79) How many different 5-member committees can be appointed from a club with 12 members? .....
- \* (80) If 1 yd. equals .914 m., 2285 meters = ..... ft.

# The University of Texas Interscholastic League

## Number Sense Test, Series MM-3

Contestant's Number.....

Contestant's Score.....

**Read Directions Carefully  
Before Beginning Test**

**Do not Unfold This Sheet  
Until Told to Begin**

*Directions:* Do not turn this page until person conducting this test gives the signal to begin. This is a ten-minute test. There are 80 problems. Solve accurately and quickly as many as you can in the order in which they appear. **ALL PROBLEMS ARE TO BE SOLVED MENTALLY.** Make no calculations with paper and pencil. Write only the answer in the space provided at the end of each problem. Problems marked with a star (\*) require only approximate answers; any answer to a starred problem that is within five per cent of the exact answer will be scored correct; all other problems require exact answers.

Person conducting contest should explain these directions carefully to the contestants.

### Stop—Wait for Signal

- |   |  |
|---|--|
| <p>(1) <math>34 + 318 + 57 =</math> .....</p> <p>(2) <math>516 - 329 =</math> .....</p> <p>(3) <math>49 \times 8 =</math> .....</p> <p>(4) <math>25\frac{1}{2} \div 8\frac{1}{2} =</math> .....</p> <p>(5) <math>(38 \times 46) + (19 \times 28) =</math> .....</p> <p>(6) <math>4\frac{1}{3} + 2\frac{3}{4} - 3\frac{1}{2} =</math> .....</p> <p>(7) <math>(33)^2 =</math> .....</p> <p>(8) <math>423 + 277 + 18 =</math> .....</p> <p>(9) The interest on \$2800.00 for 6 months at <math>9\frac{3}{4}\%</math> is \$.....</p> <p>* (10) <math>5(187) + 17(194) - 3(11) =</math> .....</p> <p>(11) <math>\sqrt{1849} =</math> .....</p> <p>(12) <math>68 \times 72 =</math> .....</p> <p>(13) <math>21.8 - 3.72 =</math> .....</p> <p>(14) <math>7 - [-3(2 - 5) + 1] =</math> .....</p> <p>(15) If <math>\frac{3}{x} = \frac{5}{4}</math>, <math>x =</math> .....</p> <p>(16) <math>204 =</math> ..... dozen.</p> <p>(17) <math>453 \times 11 =</math> .....</p> <p>(18) <math>8\frac{1}{3}\% =</math> ..... (fraction).</p> <p>(19) <math>7\frac{1}{3} \times 4 - 9 =</math> .....</p> <p>* (20) <math>56 \times 84 \times 35 =</math> .....</p> <p>(21) The area of a triangle with altitude of <math>7\frac{1}{2}</math> and base 28 is .....</p> <p>(22) The average of 169 and 158 and 207 is .....</p> <p>(23) Find the largest prime divisor of 693. ....</p> <p>(24) <math>8\frac{1}{4} \div (-5\frac{1}{2}) =</math> .....</p> <p>(25) If gasoline sells for <math>89\frac{1}{2}\text{¢}</math> per gallon, 22 gallons costs \$.....</p> | <p>(26) <math>(13\frac{1}{3})^2 =</math> .....</p> <p>(27) <math>40\frac{1}{2}</math> is what percent of 162? ..... percent.</p> <p>(28) Change 271, base eight, to base ten. ....</p> <p>(29) The cube root of 1331 is .....</p> <p>* (30) If <math>1 \text{ m}^3</math> equals 35 cu. ft., 26,600 cu. ft. = ..... <math>\text{m}^3</math>.</p> <p>(31) The remainder when 107,423 is divided by 9 is .....</p> <p>(32) <math>1 + 2 + 3 + \dots + 16 =</math> .....</p> <p>(33) The greatest common divisor of 288 and 384 is .....</p> <p>(34) The least common multiple of 288 and 384 is .....</p> <p>(35) The smallest positive integer <math>m</math> such that <math>m/5</math> gives a remainder of 3 and <math>m/7</math> gives a remainder of 2 is .....</p> <p>(36) The area of a right triangle with hypotenuse of <math>\sqrt{208}</math> and one leg of 12 is .....</p> <p>(37) <math>(-15\frac{2}{3})x + 7\frac{1}{2} = 1\frac{5}{8}</math>, <math>x =</math> .....</p> <p>(38) A cubic foot of water contains <math>7\frac{1}{2}</math> gallons. How many gallons are there in 480 cu. ft.? ..... gal.</p> <p>(39) Find <math>x &gt; 0</math> such that <math>\log_5(2x^2 - 3) = 3</math>. <math>x =</math> .....</p> <p>* (40) <math>(54)^2 + (38)^2 =</math> .....</p> <p>(41) 8 <math>\frac{1}{3}</math> is to 11 as <math>x</math> is to <math>13\frac{1}{5}</math>. Find <math>x</math>. ....</p> <p>(42) <math>2.6(10^{-2}) - 0.014 + 1.6 =</math> .....</p> <p>(43) 3,400,000 cm. = ..... km.</p> <p>(44) The total surface area of a right circular cylinder with height 16 and radius 5 is <math>a\pi</math> and <math>a =</math> .....</p> |
|---|--|

- (45) Find the slope of the line perpendicular to  $\frac{7x}{3} - \frac{4y}{9} = \frac{1}{2}$ .
- (46) The product of the roots of  $\frac{5x}{2} - \frac{8x^2}{5} = \frac{3}{10}$  is
- (47) If two dice are tossed, what is the probability that the sum of the faces is 4 or that the sum of the faces is 7?
- (48) Which is larger  $\frac{9\frac{1}{2}}{15}$  or  $\frac{20}{31}$ ?
- (49) The area of a rhombus with diagonals 27 and 48 is
- \* (50)  $\sqrt{119716} - 6 =$
- (51) If  $f(x) = 2x^3 + 3^x + 2$ ,  $f(-2) =$
- (52) Find  $x$ ,  $0 \leq x < 6$ , such that  $4x \equiv 2 \pmod{6}$ .  
 $x =$
- (53) The difference of two positive numbers is 3 and the sum of their squares is 17. Find the larger of the numbers.
- (54) Find the largest value of  $x$  such that  $|3 - \frac{2x}{5}| \leq \frac{1}{3}$ .
- (55)  $(i - 2) \div (1 + i) = a + bi$  and  $a =$
- (56) The average of  $86\frac{1}{2}$ ,  $45\frac{3}{4}$ ,  $77\frac{1}{2}$  and  $60\frac{1}{4}$  is
- (57) Solve for  $z$ :  $2z - y = 1$   
 $x + 2y = 3$   
 $z - x = 0$ ;  $z =$
- (58) If  $3^{2x+y} = 27$  and  $3^{x-y} = 27$ ,  $y =$
- (59) If 1 qt. = .95 liters, 76 liters = pt.
- \* (60) 2600 gal. = liters.
- (61) Write  $2.1\overline{6}$  as a fraction.
- (62) The product of the prime divisors of 312 is
- (63)  $36^2 - 14^2 =$
- (64) A tin can has a diameter of 14 and a height of 25.  
The volume =  $a\pi$  and  $a =$
- (65) In the binomial expansion of  $(2x + 3y^2)^5$  find the coefficient of the  $x^3y^4$  term.
- (66) If three coins are tossed, what are the odds that exactly two will be heads?
- (67) The number of permutations of ten distinct objects taken four at a time is
- (68) Change .72, base ten, to base five. , base five.
- (69) The slope of the line tangent to the curve  $f(x) = 2x^5 - 3x^3 + 2$  at  $x = 3$  is
- \* (70)  $(82,956 \times 572) \div (186) + 2^3 =$
- (71)  $\lim_{x \rightarrow 2} \frac{2x^2 - x - 6}{x - 2} =$
- (72) The second derivative of  $2x + \frac{3x^3}{2} - \frac{x^4}{3}$  is
- (73) 64, base seven, multiplied by 13, base seven, = , base seven.
- (74)  $\int_{-2}^0 (7x^6 + 2) dx =$
- (75) The largest value of  $x$  so that  $f(x) = \frac{1}{4}\sqrt{16 - 81x^2}$  is real valued is
- (76) If  $\arccos \frac{1}{2} = y$ , then  $y = a\pi$  and  $a =$
- (77) The vertical asymptote farthest to the right for  $f(x) = \frac{2x - 1}{3x^2 + 5x - 2}$  is  $x =$
- (78) Express the polar coordinate  $(-1, \pi/2)$  as a pair of rectangular coordinates. ( , )
- (79) If  $A = \begin{bmatrix} -1 & 7 \\ 0 & 1 \\ 1/2 & \end{bmatrix}$  and  $B = [3, 1, -4]$ ,  $2BA =$
- \* (80) Evaluate the determinant:  $\begin{vmatrix} 30 & 2 & 1 \\ 0 & -1 & 4 \\ 50 & 1 & -1 \end{vmatrix} =$

# The University of Texas Interscholastic League

## Number Sense Test, Series MM-4

Contestant's Number .....

Contestant's Score .....

**Read Directions Carefully  
Before Beginning Test**

**Do not Unfold This Sheet  
Until Told to Begin**

*Directions:* Do not turn this page until person conducting this test gives the signal to begin. This is a ten-minute test. There are 80 problems. Solve accurately and quickly as many as you can in the order in which they appear. **ALL PROBLEMS ARE TO BE SOLVED MENTALLY.** Make no calculations with paper and pencil. Write only the answer in the space provided at the end of each problem. Problems marked with a star (\*) require only approximate answers; any answer to a starred problem that is within five per cent of the exact answer will be scored correct; all other problems require exact answers.

Person conducting contest should explain these directions carefully to the contestants.

### Stop—Wait for Signal

- |   |   |
|---|---|
| <p>(1) <math>73 + 81 + 94 =</math> .....</p> <p>(2) <math>283 \times 19 =</math> .....</p> <p>(3) <math>6413 - 1285 =</math> .....</p> <p>(4) <math>3\frac{5}{9} \times 3\frac{3}{8} =</math> .....</p> <p>(5) 84 hours = ..... days.</p> <p>(6) <math>(71)^2 =</math> .....</p> <p>(7) The principal plus the interest on \$160.00 for 4 months at <math>9\frac{3}{4}\%</math> is \$.....</p> <p>(8) <math>7\frac{1}{7}\% =</math> ..... (fraction).</p> <p>(9) <math>(17 \times 27) + (51 \times 31) =</math> .....</p> <p>* (10) <math>73\frac{1}{8} \times 864 =</math> .....</p> <p>(11) What percent of 18 is 63? ..... %.</p> <p>(12) <math>8.523 + 3.45(10^{-2}) + .67 =</math> .....</p> <p>(13) 570 cl. = ..... ml.</p> <p>(14) 43, base six, added to 15, base six, = ..... , base six.</p> <p>(15) <math>3^6 =</math> .....</p> <p>(16) <math>20 + 21 + 22 + 23 + 24 + \dots + 50 =</math> .....</p> <p>(17) <math>23584 \div 352 =</math> .....</p> <p>(18) <math>75 \times 95 =</math> .....</p> <p>(19) <math>9\frac{3}{5} \times 16\frac{3}{5} =</math> .....</p> <p>* (20) <math>(642915 \div 1365) + 3^2 =</math> .....</p> <p>(21) Find the lateral area of a right triangular prism if its height is 4 and its base is an equilateral triangle with sides 6. ....</p> <p>(22) Change 127, base ten, to base nine. .... , base nine.</p> <p>(23) What is the largest prime divisor of 414? .....</p> | <p>(24) Solve for x: <math>4(x - 2) = \frac{3x}{2} + \frac{1}{3} \cdot x =</math> .....</p> <p>(25) What is the remainder when 831542 is divided by eleven? .....</p> <p>(26) If apples sell 8 for \$.96, three dozen will cost \$.....</p> <p>(27) <math>793 \times 111 =</math> .....</p> <p>(28) <math>(\frac{2}{3} - \frac{1}{5}) \div \frac{-7}{10} =</math> .....</p> <p>(29) A car travels 231 miles in 3 hours and 30 minutes. How fast does it travel? ..... mph.</p> <p>* (30) 85 sq. yd. = ..... sq. in.</p> <p>(31) Joe has 6 meters of wire that he wishes to cut into pieces of length 30 cm. How many pieces will he have? .....</p> <p>(32) The greatest common divisor of 392 and 448 is .....</p> <p>(33) The least common multiple of 392 and 448 is .....</p> <p>(34) Jane buys a \$20.00 sweater. Her mother gives her \$2.55, and her father gives her \$4.85. What percent of the cost remains for her to pay? ..... %.</p> <p>(35) <math>63\frac{3}{4} \div 5\frac{5}{8} =</math> .....</p> <p>(36) <math>\log_8 4 + \log_8 128 =</math> .....</p> <p>(37) Find k so that the product of the roots of <math>\frac{3x^2}{5} - \frac{2x}{3} + k = 0</math> is 10. ....</p> <p>(38) If the area of a right triangle is 30 and one leg is 5, find the perimeter of the triangle. ....</p> |
|---|---|

- (39)  $54 \div 66\frac{2}{3}\% \div 450\% = \dots$
- \*(40)  $(290)^2 - (175)^2 + 5^2 = \dots$
- (41) The product of the prime divisors of 198 is  $\dots$
- (42)  $(48)^2 - (52)^2 = \dots$
- (43) Express  $\overline{2.48}$  as a fraction.  $\dots$
- (44) If  $2x + 1 \equiv 5 \pmod{8}$ ,  $x = \dots$  (for  $0 \leq x < 8$ ).
- (45) The larger of  $\frac{27}{35}$  and  $\frac{19}{25}$  is  $\dots$
- (46) If two dice are tossed, what is the probability that the sum of the faces will be 2 or that the difference of the faces will be 2?  $\dots$
- (47) What is the remainder when  $47 \times 826$  is divided by 6?  $\dots$
- (48) 421, base eight, minus 257, base eight, =  $\dots$ , base eight.
- (49) The distance between the points  $(4, -6)$  and  $(2, \frac{1}{2})$  is in simplified form  $a\sqrt{b}$  and  $b = \dots$
- \*(50)  $\sqrt{611524} - 2 = \dots$
- (51) If  $f(x) = 3^x - 4 |5 - x^2| - 2x$ ,  $f(3) = \dots$
- (52) The area of the surface of a sphere with radius  $\frac{7}{8}$  is  $\dots$  (use  $\pi = 22/7$ )
- (53) If  $y$  varies indirectly with  $x^2$  and  $x = -1$  when  $y = 3$ , find  $y$  when  $x = \frac{1}{4}$ .  $\dots$
- (54) Find the slope of the line containing the points  $(2/5, -4)$  and  $(2, 8)$ .  $\dots$
- (55) The  $y$ -intercept of the above line is  $\dots$
- (56) If the area of a rhombus is 864 and one of the diagonals is 64, find the other diagonal.  $\dots$
- (57) The discriminant of  $\frac{x^2}{2} - \frac{5x}{2} + 4 = 0$  is  $\dots$
- (58) If  $6^x = 1296$ ,  $x = \dots$
- (59) If 80 kph is the same speed as 50 mph, 95 mph =  $\dots$  kph.
- \*(60) 59 miles =  $\dots$  ft.
- (61) Find the slope of a line which is perpendicular to the line tangent to the circle  $x^2 + y^2 = 24$  at  $(2, 2\sqrt{5})$ .  $\dots$
- (62) Find the vertex of the parabola  $f(x) = x - 3x^2 - 1$ .  $\dots$
- (63)  $i \div (3 + i) = a + bi$  and  $a = \dots$
- (64) If  $\log(5x + 3) = (\log x) + 1$ ,  $x = \dots$
- (65) Find the vertical asymptote farthest to the left for  $f(x) = \frac{x^2 - x - 3}{x^4 - x}$ .  $x = \dots$
- (66) Find the smallest value of  $x$  such that  $\frac{2x - 1}{x} \geq 3$ .  $\dots$
- (67) If 1 oz. = 28 g., a baby which weighs 7 lbs. 13 oz. will weigh how many kg.?  $\dots$  kg.
- (68) If  $f(x) = 3x^2 - 4x + 1$  and  $g(x) = x + \frac{2}{3}$ ,  $f(g(-1)) = \dots$
- (69) How many different three-element subsets can be constructed from a set containing 20 elements?  $\dots$
- \*(70) If the area of the base of a pyramid is 750 and its height is 40, its volume is  $\dots$
- (71) If  $6.1 - 5x = 4.6x + 3.22$ ,  $x = \dots$
- (72) Two similar right cylinders have radii of 2 and 3. The total area of the smaller is  $8\pi$ . The total area of the larger cylinder is  $a\pi$  and  $a = \dots$
- (73) The remainder when  $f(x) = \frac{2x^3}{3} - 4x^2 - 2$  is divided by  $(x - 3)$  is  $\dots$
- (74)  $\int_{-3}^1 (4x^3 - 1) dx = \dots$
- (75) Change .14, base five, to base ten.  $\dots$
- (76)  $\sum_{x=2}^5 (2x^2 - 5) = \dots$
- (77) The second derivative of  $f(x) = 2x^{-1} + 3x^2$  is  $\dots$
- (78) Express the equation  $6r = r^2 \cos \theta$  in rectangular coordinates.  $\dots$
- (79) Convert  $180^\circ$  Celsius to Fahrenheit.  $\dots$   $^\circ\text{F}$ .
- \*(80) If  $A = [3, -4, 5, 10]$  and  $B = \begin{bmatrix} -5 \\ 17 \\ 20 \\ 4 \end{bmatrix}$ ,  $20AB = \dots$

# The University of Texas Interscholastic League

Note: If error is found in this key, answer. The state office will appreciate your report.

<b>Answer Key—Number</b>	64. 720	55. (1/8, -1/4)	44. 105 kg.	32. 3551	9. 41	71. 315, base eight	47. 1
<b>Sense Test MM-A</b>	65. -2/5 or -4	56. 7 m.	45. 168	$\frac{100}{\sqrt{2}}$	*10. 4864 - 5376	72. 180000	48. 2
1. 391	66. 6	57. 76	46. 11	33. $50\sqrt{2}$ or $\sqrt{2}$	11. 11/18	73. $9/2$ or $4 \frac{1}{2}$	49. 6
2. 128	67. 18	58. 1	47. 660	34. $-36x^2y$	12. 550%	or 4.5	*50. 3
3. 632	68. 95 degrees	59. 2	48. 901	35. 46	13. 1331	74. 1	51. -
4. 56	69. 174	*60. 426816 - 471744	49. $10/3$ or $3 \frac{1}{3}$	36. 3.81 cm.	14. 86	75. 44	52. 2
5. 240	*70. 14250 - 15750	cu. in.	*50. 7524 - 8316 ft.	37. 40	15. \$47.50	x + 1	53. 4
6. 1764	<b>Answer Key—Number</b>	61. $1/3\sqrt{7}$	51. -3	38. 2144, base six	16. 18.76	76. $\frac{\quad}{\quad}$ or	54. 2
7. 8	<b>Sense Test MM-B</b>	62. -80	52. -1	39. 7	17. 384 hrs.	3	55. -
8. 1628	1. 101611	63. (-1, -1)	53. 1036, base seven	*40. 902880 - 997920 in.	18. 70	1 1	56. 6
9. 17/6 or 2 5/6	2. 256	64. 28	54. -1	41. $-3/2$ or $-1 \frac{1}{2}$	19. 13	-x + -	57. 1
*10. 270275 - 298725	3. 42183	65. $-21/2$ or $-10 \frac{1}{2}$	55. $1 + \sqrt{13}$	or -1.5	*20. 24795 - 27405	3 3	57. 1
11. 8/45	4. 8.35	or -10.5	$\frac{6}{\quad}$	42. 28	21. 6	77. $1/5$ or $.2$	58. -
12. $11/8$ or $1 \frac{3}{8}$	5. 2/3	66. 1326	or $\frac{-1-\sqrt{13}}{-6}$	43. 3	22. 6/35	78. -36	59. 1
13. 8	6. 75	67. -1000	56. 9	44. 144	23. 77	79. 792	*60. 9
14. 6765	7. $7 \frac{23}{24}$ or $191/24$	68. $3 - 30x$	57. 5040	45. 7854	24. 8	*80. 7125 - 7875	61. 1
15. 98	8. 729	69. 484	58. 180	46. $1/4$ or $.25$	25. 144		62. 7
16. 3.89	9. 52	*70. 12274 - 13566	59. 16686	47. 3	26. 16896	<b>Answer Key—Number</b>	63. 1
17. 3120 sec.	*10. 19760 - 21840	<b>Answer Key—Number</b>	*60. 1558 - 1722	48. -17	27. $7/4$ or $1 \frac{3}{4}$	<b>Sense Test MM-B</b>	64. 1
18. \$2,490.00	11. 10714	<b>Sense Test MM-C</b>	61. -216	49. 13	or 1.75	1. 409	65. 7
19. 28	12. 52	1. 12055	62. $-3/4$ or $-.75$	*50. 10982 - 12138	28. 171	2. 187	66. 3
*20. 1019844 - 1127196	13. 11/15	2. 187	63. 0	51. 42, base seven	29. 12	3. 392	67. 5
21. 5	14. 19	3. -7/8	64. $2/5$ or $.4$	52. \$4.40	*30. 418 - 462	4. 3	68. 5
22. 7/30	15. 4/27	4. 3796	65. 3	53. 203°F	31. 18	5. 2280	69. 7
23. 6561	16. 1620	5. 97	66. 4	54. 71	32. 1386	6. $3 \frac{7}{12}$ or $43/12$	*70. 2
24. 2	17. 18	6. 47.3 qt.	67. -12	55. .2401	33. 15/17	7. 1089	71. 7
25. 42	18. $25.5$ or $25 \frac{1}{2}$	7. 14	68. 7	56. .7 or $7/10$	34. 6384	8. 718	72. 9
26. $3 \frac{5}{8}$ or $29/8$	or 51/2	8. 4	69. 15	57. $(4/3, -1/5)$ or	35. 16	9. \$136.50	73. 1
27. 117	19. 16	9. \$65.70	*70. 36867.6 - 40748.4	(1 1/3, -2)	36. -243b <sup>5</sup>	*10. 3990 - 4410	74. 1
28. 12	*20. 14250 - 15750	10. 92169 - 101871	<b>Answer Key—Number</b>	58. 7	37. 236, base seven	11. 43	75. 4
29. 2.75 or 2 3/4	21. 502	11. 5/8	<b>Sense Test MM-1</b>	59. $25/12$ or $2 \frac{1}{12}$	38. 5	12. 4896	76. 1
or 11/4 sq. ft.	22. $7/4$ or $1 \frac{3}{4}$	12. 25	1. 871	*60. 32923.2 - 36388.8	39. 40	13. 18.08	77. 1
*30. 760 - 840	or 1.75	13. 540	2. 149	61. 7387	*40. 16530 - 18270	14. -3	78. (
31. 51	23. 8	14. $6.5$ or $13/2$	3. 574	62. 8	41. 19	15. $12/5$ or $2.4$	79. -
32. 44	24. 4900	or 6 1/2	4. 3	63. + 1	42. 8/21	16. 17 dozen	*80. 3
33. 1584	25. 5/12	15. 49	5. 11/6 or $1 \frac{5}{6}$	64. 17	43. $484\sqrt{3}$	17. 4983	<b>Answer Key—Number</b>
34. -4	26. 1728	16. 24	6. 676	65. 14/37	44. 5910	18. 1/12	<b>Sense Test MM-C</b>
35. 6/17	27. 23 ft.	17. 4891	7. 2162	66. $95/11$ or	45. 44/111	19. $20 \frac{1}{3}$ or $61/3$	19. 2
36. 264, base eight	28. $5 \frac{1}{3}$ or $16/3$	18. 6	8. 51/56	8 7/11 kg.	46. 3	*20. 156408 - 172872	2. 2
37. 127 cm.	29. 403	19. 8100	9. 27	67. $5/4$ or $1 \frac{1}{4}$	47. 42	21. 105	2. 5
38. 31	*30. 33136 - 36624	*20. 571691 - 631869	10. 836 - 924	or 1.25	48. 2700 g.	22. 178	3. 5
39. 667	31. 3.8 liter	21. $9/4$ or $2 \frac{1}{4}$	11. 500%	68. 360	49. $13/4$ or $3 \frac{1}{4}$	23. 11	4. 1
*40. 6631 - 7329	32. 99	or 2.25	12. 23	69. 5/12	or 3.25	24. $-1 \frac{1}{2}$ or	5. 3
41. 24	33. 1782	22. 168	13. 3223	*70. 31920 - 35280 g.	*50. 45239 - 50001	-1.5 or -3/2	7
42. 4	34. 321, base seven	23. \$3.75	14. 30	71. 125	51. 1260	25. \$19.69	6. 5
43. $35/12$ or $2 \frac{11}{12}$	35. 4.2388	24. $18.75$ or $18 \frac{3}{4}$	15. 2160 min.	72. $9/8$ or $1 \frac{1}{8}$	52. $1/2$ or $.5$	26. $1600/9$ or $177 \frac{7}{9}$	7. \$
44. -7	36. 64	25. 3	16. 89	73. 2	53. $(3/4, 5/6)$	27. 25%	8. 1
45. 8	37. 1201, base eight	26. 1632	17. 154	74. 22, base five	54. 80°C	28. 185	9. 2
46. -2	38. 8	27. 5000	18. 3.41	75. 24	55. 667	29. 11	*10. 6
47. 8/21	39. 96.6 km.	28. 175	19. 60	76. -2/3	56. 115, base six	*30. 722 - 798 m <sup>3</sup>	11. 3
48. 441 thirteen	*40. 2090 - 2310	29. 3	20. 12293 - 13587	77. $\begin{bmatrix} -8 \\ 0 \end{bmatrix}$	57. \$6.15	31. 8	12. 9
49. 47/55	41. 8	*30. 79344 - 87696	21. 729	78. $24x^5 + 2$	58. 15	32. 136	13. 5
*50. 3230 - 3570	42. 13/11	31. 0	22. \$187.50	79. -2	59. 50 ha	33. 96	14. 1
51. -1	43. 1/3	32. 10	23. 26.57	*80. 15770 - 17430	*60. 1448370 - 1600830	34. 1152	15. 7
52. $6/5$ or $1 \frac{1}{5}$ or $1.2$	44. 5	33. $23/150$	24. 11	61. 4	sq. ft.	35. 23	16. 1
53. 31/42	45. 5/36	34. -3	25. $5.5$ or $5 \frac{1}{2}$	62. $78 \frac{3}{4}$ or $315/4$	or 78.75 yrs.	36. 48	17. 6
54. $-3/4$ or $-.75$	46. 2/7	35. \$8.40	or 11/2	or 78.75 yrs.	63. 2	37. 3/8	18. 7
55. 360	47. $-21/16$ or	36. 21	26. 2310	64. $-1/4$ or $-.25$	64. $-1/4$ or $-.25$	38. 3600 gal.	19. 1
56. 1/26	1 5/16	37. 17/23	27. 508, base nine	65. 9	65. 9	39. 8	20. 4
57. 14	48. 83	38. 1	28. 107	66. 2	66. 2	40. 4142 - 4578	21. 7
58. $1/2$ or $.5$	49. 4.57 m.	39. $-1/5$ or $-.2$	29. 642	67. $5/2$ or $2 \frac{1}{2}$	67. $5/2$ or $2 \frac{1}{2}$	41. 10	22. 1
59. 6	*50. 304 - 336	*40. 95 - 105	30. 779 - 861 gal.	or 2.5	or 2.5	42. 1.612	*20. 4
*60. 4635696 - 5123664	51. -17	41. 248	31. 13	68. 25/256	68. 25/256	43. 34	21. 7
61. $1/5$ or $.2$	52. 2592 sq. in.	42. 89		69. 1	69. 1	44. 210	22. 1
62. 46	53. 2760	43. 67.1 kg. or		*70. 17784 - 19656 gal.		45. -4/21	23. 2
63. -1	54. $-5/3$ or $-1 \frac{2}{3}$	67 1/10 kg.				46. 3/16	24. 1