1973-74 UIL Number Sense
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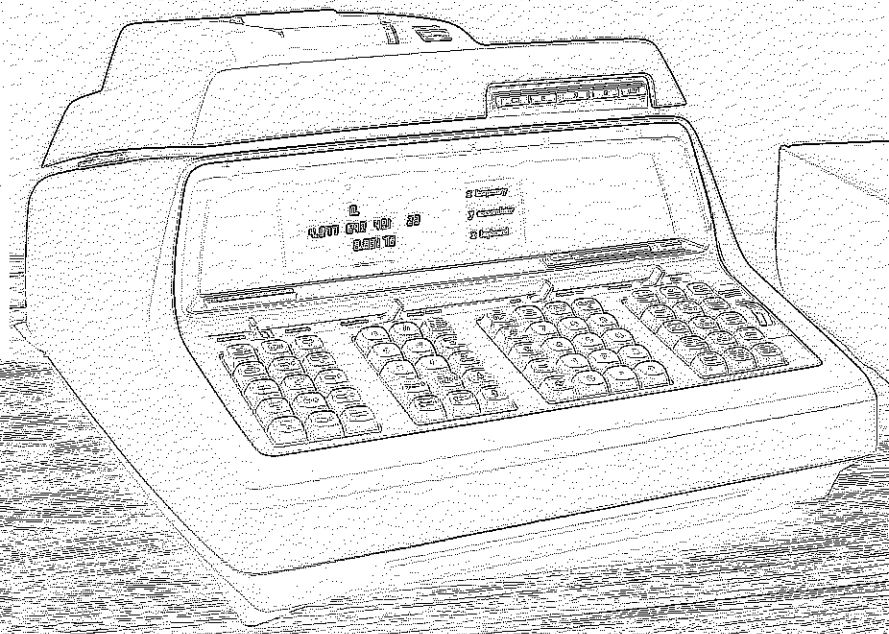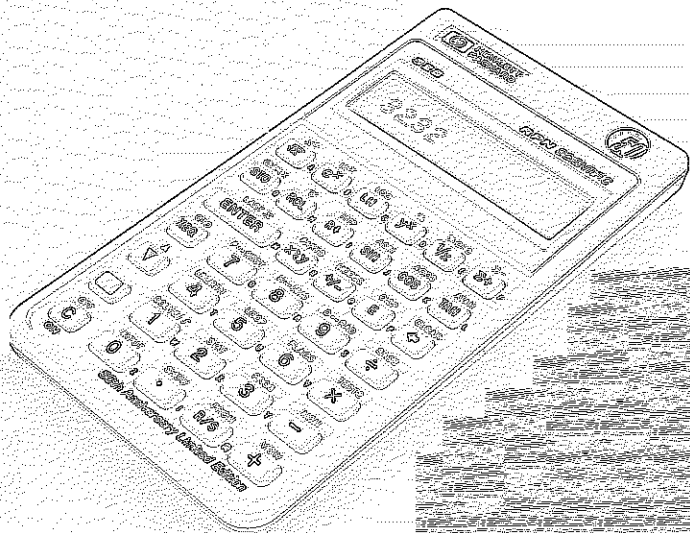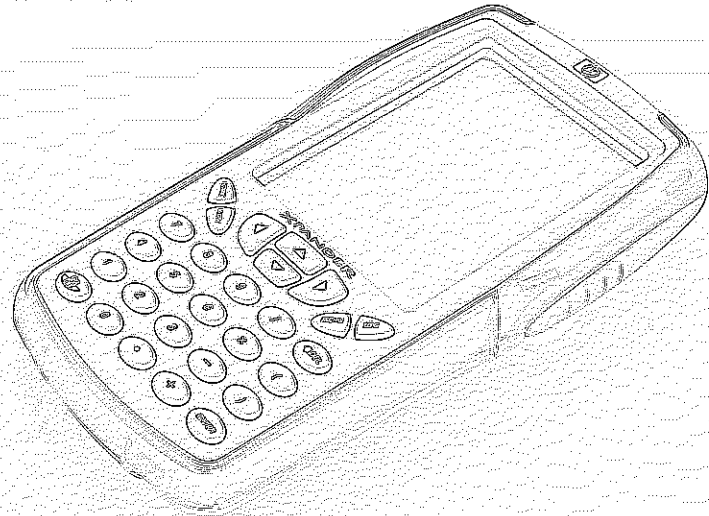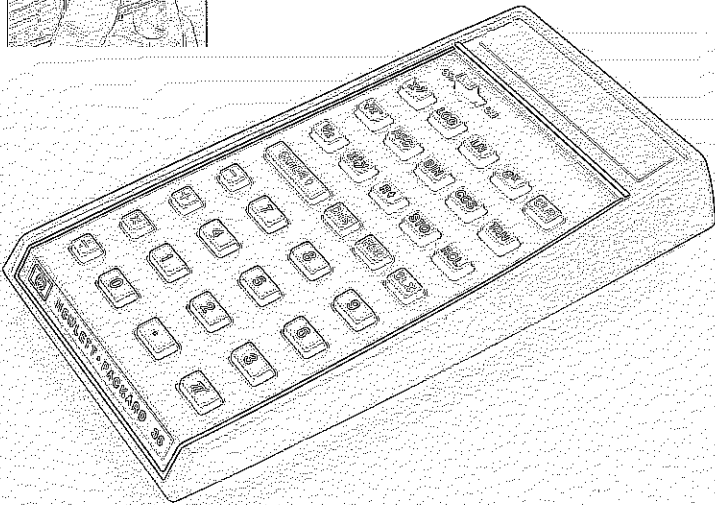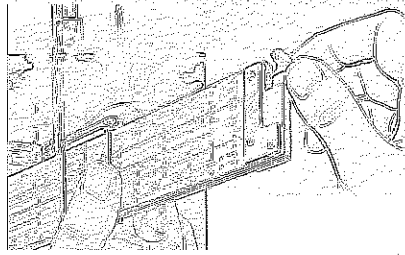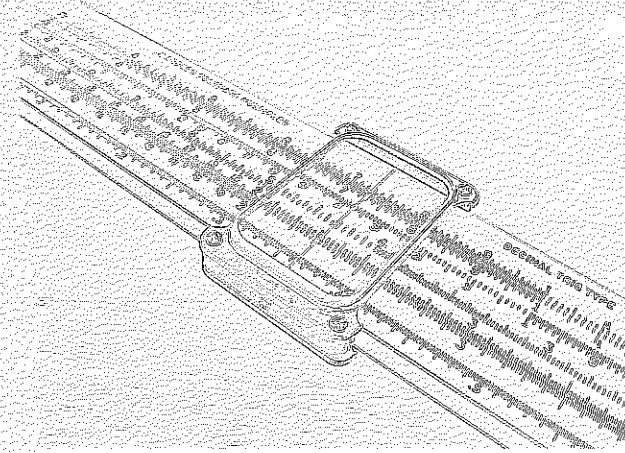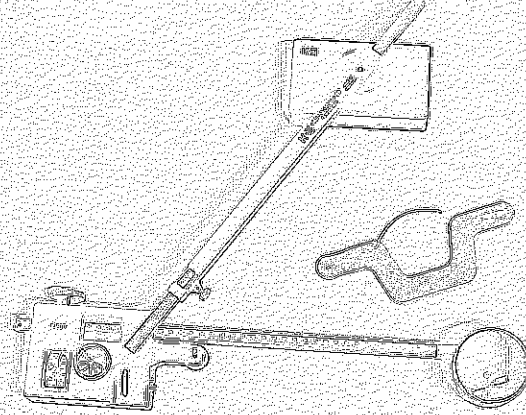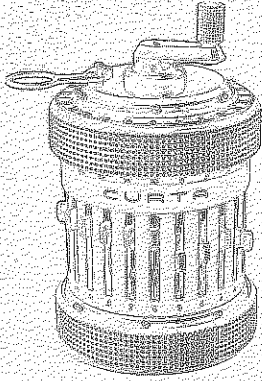
The University of Texas Interscholastic League

Number Sense Test, Series GG-1

Contestant's Number..   Contestant's Score..

Read Directions Carefully   **Do not Unfold This Sheet**
Before Beginning Test   **Until Told to Begin**

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Stop—Wait for Signal

(1) $289 + 2890 =$ ....

(2) $172 = 13 \times 13 +$ ....

(3) $65^2 =$ ....

(4) $31^2 =$ ....

(5) $48 \times 52 =$ ....

(6) $27 \times 21 =$ ....

(7) $2^6 =$ ....

(8) $12 \times 126 =$ ....

(9) $39^2 =$ ....

*(10) $1898 + 2789 + 3305 + 8 =$ ....

(11) $6\frac{1}{4}\% =$ .... (common fraction).

(12) $2\frac{1}{2}\% =$ .... (common fraction).

(13) $37\frac{1}{2}\%$ of $144 =$ ....

(14) $54 = 37\frac{1}{2}\%$ of ....

(15) $54 \div 144 =$ ....%.

(16) $7\frac{1}{2} \times 198 =$ ....

(17) $2\frac{1}{2} + 3\frac{1}{3} - 2\frac{2}{3} =$ ....

(18) $4\frac{1}{2} \times 6\frac{1}{3} =$ ....

(19) $2\frac{1}{3} \div 1\frac{1}{2} =$ ....

*(20) $197 \times 305 + 15 =$ ....

(21) $6\frac{1}{2} \times 18 - 2\frac{1}{2} \times 18 =$ ....

(22) The exponent on 6 for $(6^2)^3 \div 6^2$ is ....

(23) The cube root of 729 is ....

(24) $1728 \div 6 =$ ....

(25) 150 less 25% of $150 =$ ....

(26) The largest prime less than 104/2 is ....

(27) How many positive integral divisors does 18 have? ....

(28) The sum of the positive integral divisors of 18 is ....

(29) The remainder when 19267 is divided by 3 is ....

*(30) 38% of $19000 =$ ....

(31) The remainder when 19267 is divided by 9 is ....

(32) $1 + 2 + 3 + \ldots + 20 =$ ....

(33) The smallest number greater than each of .14, .1414, .141414, ... is ....

(34) The smallest positive integer n such that n/3 gives remainder 1 and n/5 gives remainder 2 is ....

(35) The greatest common divisor of 26 and 38 is ....

(36) If $x > 0$ and $x^2 + x - 6 = 0$, then $x =$ ....

(37) If $x - y = 7$ and $2x + y = 10$, then $x =$ ....

(38) The smallest integer, x, such that $2x - 3 > 7$ is ....

(39) The sum of the roots of $2x^2 + 5x - 6 = 0$ is ....

*(40) $9^4 + 39 =$ ....

(41) The third term of $(x + y)^4$ is ....x^2y^2.

(42) If $x^3 - y^3 = (x - y)(x^2 + xy + by^2)$ then $b =$ ....

(43) If $i^2 = -1$ and $1/i = ai$, then $a =$ ....

(44) If $\log_3 x = 2$, then $x =$ ....

(45) The sum of the first four terms of 1, 4, 16, 64, ... is ....

(46) The area of a rhombus with diagonals of 8 in. and 10 in. is .... sq in.

(47) A secant from P to a circle intersects the circle at A and B so that $\overline{PA} = 2'$ and $\overline{PB} = 8'$. The length of the tangent from P is .... ft.

(48) The area of a right triangle with hypotenuse of 13 ft. and one leg of 5 ft. is .... sq. ft.

(49) Each interior angle of a regular hexagon contains ....°.

*(50) $9^4 - 2^6 + 3 =$ ....

(51) The sum of the exterior angles of a nine sided polygon is ....°.

(52) The volume of a square pyramid with 8 in. as a side of the base and altitude of 9 in. is .... cu. in.

(53) How many classes of regular polyhedrons are there, when classified as to number of faces? ....

(54) How many lines intersecting at point P does it take to determine a plane? ....

(55) Triangle ABC has $\angle A = 23°$, $\angle B = 91°$, and $\angle C = 66°$. How many degree are in the exterior angle at C?...............................°.

(56) Assuming that all teams are equally good, and the impossibility of tie games, what is the probability that a particular team will win exactly 8 of 9 games? ....

(57) At .6 miles per kilometer, how many miles are in 150 kilometers? .... mi.

(58) At 2.54 cm. per inch, 12 in. = ...cm.

(59) Assuming zero friction and that a two inch circular pipe can fill a container in 10 min., how long will it take a 3 inch circular pipe? .... min.

*(60) The largest integer less than the cube root of 513,112 is ....

(61) If sin A = ½ and A is in the second quadrant, then A = ...°.

(62) If sin A = ½ and A is in the second quadrant, and cos A = $a\sqrt{3}$, then a = ...

(63) The maximal possible value of cos X is ....

(64) If sin A = a, cos A = ½, sin B = ½, and cos B = b and sin (A + B) = ab + x, then x = ...

(65) The minimal possible absolute value of tan X is ....

(66) If the period of the tangent function is pi times a, then a = ...

(67) If sin A is negative and cos A is positive then A is in quadrant .... (number).

(68) Tan 135° = ...

(69) If sin A = ⅓, and cos A = $\pm \sqrt{a}$, then a = ...

*(70) 12960 ÷ 72 = ...

(71) The slope of the line 2y + 3x = 5 is ....

(72) The y-intercept of the 2x + 3y = 5 is ....

(73) The distance between (5,7) and (2,3) is ....

(74) The slope of the line through (5,7) and (2,3) is.................... .

(75) The x-value of the midpoint of the line through (5,7) and (2,3) is ....

(76) The slope of the line perpendicular to the one through (5,7) and (2,3) is ....

(77) The line L makes an angle A, measured in counter clockwise manner from the positive x-axis to L; and tan A = 1. The inclination of L is ....

(78) The radius of the circle $x^2 + y^2 = 25$ is ....

(79) The center of the circle $x^2 + y^2 = 25$ has an x value of x = ...

*(80) At 7½ gal. per cu. ft. a rectangular box with interior dimensions of 18' × 25' × 8' has a capacity of .... gal.

Number Sense Test, Series GG-2

Contestant's Number..   Contestant's Score............................

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Stop—Wait for Signal

(1) $28 + 19 + 17 =$ ....

(2) $12 \times 19 =$ ....

(3) $329 \div 7 =$ ....

(4) 45% of $60 =$ ....

(5) $7\frac{1}{2} \times 19 =$ ....

(6) $35 \times 35 =$ ....

(7) $8^3 =$ ....

(8) $11^3 =$ ....

(9) $42 \times 42 =$ ....

*(10) $285 \times 285 + 75 =$ ....

(11) $5/9 =$ ....%.

(12) $12\% =$ ....(common fraction).

(13) $3\frac{1}{2} \times 2\frac{1}{3} =$ ....

(14) $3\frac{1}{2} \div 2\frac{1}{3} =$ ....

(15) $2\frac{2}{3} \times 16 + 3\frac{1}{2} \times 16 =$ ....

(16) Write the greater of 19/27 and 58/81. ....

(17) The Arabic numeral for MCMXXIV is ....

(18) $2\frac{1}{2} + 3\frac{2}{3} =$ ....

(19) $47 \times 53 =$ ....

*(20) $197 \times 223 + 69 =$ ....

(21) If $450 is the simple interest on $18000 for one year, what is the rate? ....%.

(22) The tax on 18960 gal. at 9¢ per gal. is $..

(23) My house is valued at $24000. If the tax is $3.00 per 100, based on $\frac{3}{4}$ of the value, my yearly tax is $..

(24) The area of a square with diagonal $\sqrt{32}$ ft. is .... sq. ft.

(25) $1 + 2 + 3 + \ldots + 24 =$ ....

(26) Two circles are tangent externally. Their radii are 5" and 9". The length of the line of centers is .... in.

(27) The area of a triangle with 9" base and 79" altitude is............sq. in.

(28) Each exterior angle of a regular ten sided polygon contains ....°.

(29) Each interior angle of a regular decagon contains ....°.

*(30) $7^6 + 51 =$ ....

(31) Find the smallest positive integer x such that $7x - 3$ is exactly divisible by 5. x = ...

(32) The next term of 1/2, 1/3, 1/5, 1/7, 1/11, . . . is ....

(33) $\sqrt{30\frac{1}{4}} =$ ....

(34) $\log_3 5 + \log_3 \frac{1}{2} + \log_3 2 =$ ....

(35) If $x = 4$, then $x^4 - 2x^2 + 1 =$ ....

(36) If $4/6 = 6/x$, then x = ...

(37) Find x so that $2^x \cdot 7^2 = 196$. x = ...

(38) How many rational roots does $x^3 + x^2 + x = 0$ have? ....

(39) The sum of the roots of $x^3 + x^2 + x = 0$ is ....

*(40) If $x = 12$, then $5x^3 + 2x^2 + x =$ ....

(41) The product of the roots of $x^3 + x^2 + x$ is ....

(42) How many subsets with 5 elements are in a set with 6 elements? ....

(43) How many subsets are in $\{2,3\} \times \{1,2,3\}$? ....

(44) The largest prime less than 150 is ....

(45) The least common denominator for 1/50 and 1/20 is ....

(46) Reduce 60/55. ....

(47) The sum of the positive integral divisors of 28 is ....

(48) The number of positive integral divisors of $2^2 \times 3^2 \times 4^2$ is ....

(49) The positive square root of $20^2 + 21^2$ is ....

*(50) 23% of 270,000 is ....

(51) The sum in base 8 when 72 in base 8 is added to 26 in base 8 is ....

(52) The remainder when 3^6 is divided by 26 is ....

(53) 72 less 16⅔% of 72 less 16⅔% of 37½% of 72 is ....

(54) If each linear dimension of a jug is multiplied by 2½, its capacity is multiplied by ....

(55) $x^4y^4 + x^2y^2 + 1 - (x^2y^2 - xy + 1)(x^2y^2 + xy + 1) =$
....

(56) If $ax^2 + ay^2 + x^2 + y^2 = 5(x^2 + y^2)$ then a = ...

(57) Change 123, base 8, to base 10. ....

(58) How many integers between 1 and 344 are positive integral powers of 7? ....

(59) $\sin(90° + 60°) =$ ....

*(60) 17 mi. = ...ft.

(61) $\cos 420° =$ ....

(62) If $\cos 2x = a\cos^2 x - 1$, then a = ...

(63) If $\csc x = a \div \sin x$, then a = ...

(64) $\cos^2 x + \sin^2 x =$ ....

(65) $\tan^2 x - \sec^2 x + 1 =$ ....

(66) If $\tan x = b \tan(-x)$ then b = ...

(67) If angles A, B and C are opposite sides a, b, and c in triangle ABC, then a/sin A — b/sin B = ...

(68) In the triangle of problem 67, if $a^2 = b^2 + c^2 - xbc \cos A$, then x = ...

(69) If $\sin A = -½$ and $\cos A = -\dfrac{\sqrt{3}}{2}$ and $\cot A = a\sqrt{3}$, then a = ...

*(70) $\cos 50° =$ ....

(71) If $i^2 = -1$, and $2i + 1 = a(4i + 2)$ then a = ...

(72) The slope of $5 = x - y$ is ....

(73) The inclination of $5 = x - y$ is ....

(74) The y-intercept of $5 = x - y$ is ....

(75) The distance between (21,20) and (0,0) is ....

(76) The radius of $x^2 - 10x + y^2 + 24x = 0$ is ....

(77) If (5,6) is the mid point of the line segment from (1,2) to (x,10). then x = ...

(78) The slope of the line through (5,6) and (1,2) is ....

(79) How many subsets of 4 elements are in a set of 6 elements?
....

*(80) $53 + 2 + 2^2 \ldots + 2^{10} =$ ....

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Number Sense Test, Series GG-3

Contestant's Number...   Contestant's Score...............................

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Stop—Wait for Signal

(1) $879 + 628 =$ ....

(2) $332 - 267 =$ ....

(3) $\frac{1}{2} \times \frac{3}{4} =$ ....

(4) $44\ 4/9\% =$ .... (common fraction)

(5) $6\frac{1}{2}\% =$ .... (common fraction).

(6) $37\frac{1}{2}\%$ of $192 =$ ....

(7) $2\frac{1}{2} + 3\frac{2}{3} =$ ....

(8) $3\frac{2}{3} \times 160 + 2\frac{1}{3} \times 160 =$ ....

(9) $65 \times 65 =$ ....

*(10) $1325 \times 1325 + 75 =$ ....

(11) $184 \times 176 =$ ....

(12) $32 \times 32 =$ ....

(13) $12 \times 96 =$ ....

(14) $2^6 =$ ....

(15) $11^3 =$ ....

(16) $5\frac{2}{3} \times 3\frac{1}{2} \div 1\frac{3}{4} =$ ....

(17) 24 is what percent of 64? ....%.

(18) $168 less $87\frac{1}{2}\%$ of $168 less $14\ 2/7\%$ of $87\frac{1}{2}\%$ of $168 =$ ....

(19) $343 \div 49 =$ ....

*(20) $3 + 2 \times 3 + 3 \times 3 + 4 \times 3 + \ldots + 20 \times 3 =$ ....

(21) $3\frac{1}{2} \div 1\frac{3}{4} =$ ....

(22) The least common denominator for 1/30 and 1/35 is ....

(23) The Arabic numeral for MCMVIII is ....

(24) $57 \times 63 =$ ....

(25) $16/300 =$ ....%.

(26) Reduce 185/210. ....

(27) $2^2 \times 3 \times 7^3 \div 2 \times 7 =$ ....(numeral).

(28) The number of integers between 1 and 35 which are relatively prime to 35 is ....

(29) The number of positive integral divisors of 35 is ....

*(30) $18,296 + 17,352 + 16,001 + 28,351 =$ ....

(31) The sum of the positive integral divisors of 35 is ....

(32) Which of 7/8, 22/25 is greater? ....

(33) Change 523 in base 8 to base 10. ....

(34) The remainder when 612×314 is divided by 9 is ....

(35) The next prime after 47 is ....

(36) The power set for $\{a,b\} \times \{a,b,c\}$ contains ....elements.

(37) At 231 cu. in. per gal., how many gallons are in a rectangular box $7'' \times 6'' \times 11''$? ....gal.

(38) The smallest number greater than each of .112, .112112, .112112112, . . . is ....

(39) How many subsets of three elements are in a set with 5 elements. ....

*(40) $\sqrt{225^3} + 25 =$ ....

(41) If $x^4 = 8x$ and $x > 0$, then $x =$ ....

(42) How many real roots does $x^4 = 8x$ have? ....

(43) $\log_4 8/6 + \log_4 6 =$ ....

(44) If $x = 140$ and $y = 120$, then $x^2 - y^2 =$ ....

(45) If $x^2 - 2 > 6$, and $x > 0$, the smallest such integer x is ....

(46) If $x^4 + x^2y^2 + y^4 = (x^2 + xy + y^2)(x^2 + bxy + y^2)$, then $b =$ ....

(47) The product of the roots of $2x^2 - 5x - 9 = 0$ is ....

(48) The sum of the roots of $2x^2 - 5x - 9 = 0$ is ....

(49) The largest rational k such that $2x^2 - 3x + k = 0$ has a real root is $k =$ ....

*(50) $32^3 + 32 =$ ....

(51) If O does a job in two hours which requires three for B, how long, at the same rate, will it take both? ....hr.

(52) If $x^5 - 1 = (x - 1)(x^4 - ax^3 + bx^2 + ex + d)$, then $a =$ ....

(53) If $i^2 = -1$, then $1 \div (1 + i)(1 - i) =$ ....

(54) The area of a rectangle with perimeter of 24 in. whose length is twice its width is .... sq. in.

(55) Neglecting friction, a pipe with rectangular cross section $2'' \times 3''$ carries how many times as much water per hour as one with triangular cross section with sides $3''$, $4''$, and $5''$? ....

(56) If the perimeter of a square decreases from 58 in. to 48 in., the area decreases by .... sq. in.

(57) Each interior angle of a regular nine sided polygon contains .... °.

(58) What is the probability that, when four coins are tossed, each will come up "tails"? ....

(59) A secant from A intersects a circle so that the segments formed are $2''$ and $6''$. The length of the tangent is ....in.

*(60) $21 (22^3 + 22^2) - 12 =$ ....

(61) If regular polyhedrons are classified by the number of faces, the number of classifications is ....

(62) The closest the centers of two tangent circles of areas 121 pi sq. in. and 196 pi sq. in. can be is ....in.

(63) The slope of $y + x = 5$ is ....

(64) The inclination of $y + x = 5$ is ....

(65) The perpendicular to the line through (2,3) and (5,1) has a slope of ....

(66) The length of the tangent from (5,0) to the circle $x^2 + y^2 = 9$ is ....

(67) The x value of the midpoint of the line segment from (1,9) to (-6,7) is $x =$ ....

(68) If the line $ax + by = 5$ passes through (1,4) and (5,0), then $a =$ ....

(69) The next term of $1, -1, -4, -8, -13, \ldots$ is ....

*(70) 185% of 712% of 9600 is ....

(71) If $\sec A = 2$ and A is in the 4th quadrant, then $A =$ .... °.

(72) If $\cos 2B = a \cos^2 B - 1$, then $a =$ ....

(73) If $\sin 60° \cdot \cos 40° = \frac{1}{2}(\sin 100° + \sin B°)$ then $B =$ ....

(74) If the area of a triangle with sides a and b and an angle of 30° between a and b is given by $abx \div 2$, then $x =$ ....

(75) The minimal value of $\sin A$ for all A is ....

(76) $\sin 45° \div \cos 45° =$ ....(numeral).

(77) If $\sin A = a/c$ and $\cos A = -a/c$, then $\tan A =$ ....

(78) If the law of cosines is $5^2 = 3^2 + 4^2 - 2x \cos y$, then $x =$ ....

(79) If $\tan B = a \tan -B$, then $a =$ ....

*(80) $\sqrt[3]{9261} - 1 =$ ....

The University of Texas Interscholastic League
Number Sense Test, Series GG-4

Contestant's Number...

Contestant's Score...

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Stop—Wait for Signal

(1) $115^2 = $ ....

(2) $34^2 = $ ....

(3) $4^4 = $ ....

(4) $43 \times 37 = $ ....

(5) $12 \times 121 = $ ....

(6) $186 + 27 - 19 = $ ....

(7) $2\ 1/3 \times 1\ 1/7 = $ ....

(8) $11\frac{1}{3}\% = $ ....(common fraction)

(9) $62\frac{1}{2}\%$ of $196 = $ ....

*(10) $5^6 + 75 = $ ....

(11) $44\ 4/9\% \div 66\ 2/3\% = $ ....(common fraction)

(12) 19 is what percent of 57? ....%.

(13) $6\frac{1}{2} \times 19 + 2\frac{1}{2} \times 19 = $ ....

(14) $17\frac{1}{2} \div 2\frac{1}{2} = $ ....

(15) $1/35 + 1/15 = $ ....

(16) The next term of $9\frac{1}{2}, 8\frac{1}{2}, 6\frac{1}{2}, 3\frac{1}{2}, \ldots$ is ....

(17) The Arabic numeral for MCMXCVIII is ....

(18) $5/300 = $ ....%.

(19) $30 \div (1\frac{1}{4} \times 3) = $ ....

*(20) $18^3 - 18^2 + 92 = $ ....

(21) The next prime after 90 is ....

(22) The larger of 3/19 and 10/57 is ....

(23) Multiply and give answer in base 7: $8 \times 9 = $ ....

(24) Reduce to lowest terms 69/92. ....

(25) If each of 15 and 21 is in base 9, their greatest common divisor in base 10 is ....

(26) The sum of positive integral divisors of 21 is ....

(27) The number of positive integral divisors of 28 is ....

(28) If 7623 is in base 8, find the remainder in base 10 when 7623 is divided by 7. ....

(29) If each of 17 and 31 is in base 8, the number of primes between 17 and 31 is ....

*(30) $\sqrt{36^5} + 24 = $ ....

(31) The total number of subsets with 3 elements in {1,2,3,4,5,} is ....

(32) The number of positive integers between 1 and 21 which are relatively prime to 21 is ....

(33) A six tooth gear meshes with a five tooth gear. How many revolutions does the five tooth one make when the other makes 9 revolutions. ....

(34) If twice Toni's age + 9 years is 33 years, his age is ....yrs.

(35) If $x = 11$, $(x^4 - 1) \div (x^3 + x^2 + x + 1) = $ ....

(36) If $x = 9$, $(x^4 + x^2 + 1) \div (x^2 + x + 1) = $ ....

(37) $\log_7 49/6 + \log_7 6 = $ ....

(38) The sum of the roots of $2x^2 + 5x + 9 = 0$ is ....

(39) The product of the roots of $2x^2 + 5x + 9 = 0$ is ....

*(40) If $x = 11$, then $(x - 1)(x + 1)(x^2 + 1) = $ ....

(41) $6^4 = $ ....

(42) The number of real roots of $2x^2 + 5x + 9 = 0$ is ....

(43) The coefficient of the x^2y^2 term of the expansion of $(x + y)^4$ is ....

(44) If $x^4 = x^2$ and $x > 0$ then $x = $ ....

(45) If the volume of a square pyramid of base B and altitude h is $Bh \div k$, then $k = $ ....

(46) The sum of the exterior angles of a 20 sided polygon contains .... degrees.

(47) If an interior angle A of a parallelogram contains 50°, the interior angle adjacent to A contains ....°.

(48) How many planes can be "passed through" two parallel lines? ....

(49) The most points of intersection possible for all the sets of two lines from a set of three lines is ....•

*(50) The tax on 1240 gal. gasoline at 5½¢ per gal. is $........................•

(51) If the sides of triangle A are 5', 12', and 13' and a similar triangle has a hypotenuse of 26', the area of the larger triangle is............ .... sq. ft.

(52) If a regular hexagon has side 3 and area $K \cdot \sqrt{3}$, then $K =$ ....•

(53) The distance between the lines $y = 4$ and $y = -2$ is ....•

(54) The inclination of the line $\sqrt{3}\ x = y\ ....\ 5$ is ....degrees.

(55) If (3,3) bisects the line from (5, –1) to (x,7) then $x =$ ....•

(56) The slope of the line through (3,3) and (5, –1) is............................•

(57) The radius of the circle $x^2 - 6x + y^2 + 8y = 0$ is ....•

(58) If the equation of the line with x-intercept 5 is $5x + 2y = k$, then $k =$ ....•

(59) The length of the altitude on the hypotenuse of a right triangle with legs of 3' and 4' is ....ft.

*(60) The number of seconds in 13 hr. and 20 min. is ....sec.

(61) The area of a triangle with sides 10", 10", and 16" is .... sq. in.

(62) If $\sin 120° = k\sqrt{3}$, then $k =$ ....•

(63) $\sin^2 A + \cos^2 A =$ ....•

(64) $\tan^2 A - \sec^2 A =$ ....•

(65) If the law of sines for a 30°–60° right triangle is given by $1 \div \sin 30° = k \div \sin 90°$, then $k =$ ....•

(66) If the law of cosines for a triangle with sides of 5', 6', 7' is given by $5^2 = a^2 + 7^2 - 2 \cdot 6 \cdot 7 \cos C$, then $a^2 =$ ....sq. ft.

(67) If $0° < A < 90°$ and $\tan A = 1$, and $\sin A = 1/t$, then $t^2 =$ ....•

(68) If $\tan 2B = 2 \tan B \div 1 + k \tan^2 B$, then $k =$ ....•

(69) If the area of a triangle with sides a, b, and c and γ opposite to c is $A = kab \sin \gamma$, then $k =$ ....•

*(70) $\tan 50° =$ ....•

(71) 1 cu. yd. = ...cu. ft.

(72) If one mile = 1609 meters, 11,263 meters = ...mi.

(73) The greatest common divisor of 60 and 126 is ....•

(74) The least common multiple of 15 and 35 is ....•

(75) $7½ \times 15 =$ ....•

(76) The product of the least common multiple and the greatest common divisor of 35 and 15 is ....•

(77) $1 + 2 + 3 + \ldots + 24 =$ ....•

(78) The next prime after 90 is ....•

(79) If $5^x 7^y = 1225$ and x and y are positive integers, then $x =$ ....•

*(80) 85% of 1924 = ...•

The University of Texas Interscholastic League
Number Sense Test, Series GG-5

Contestant's Number...   Contestant's Score...

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 answers 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) $862 - 354 =$ ....

(2) $623 + 888 =$ ....

(3) $2/3 \times 5/6 - 2/9 =$ ....

(4) $18 \, 2/11\% =$ ....(common fraction).

(5) $3\frac{1}{3}\% =$ ....(common fraction).

(6) $62\frac{1}{2}\%$ of $144 =$ ....

(7) $2\frac{2}{3} + 3\frac{1}{2} =$ ....

(8) $5\frac{1}{2} \times 16 + 4\frac{1}{2} \times 16 =$ ....

(9) $75 \times 75 =$ ....

*(10) $1215 \times 1325 + 25 =$ ....

(11) $195 \times 185 =$ ....

(12) $43 \times 43 =$ ....

(13) $12 \times 88 =$ ....

(14) $12^3 =$ ....

(15) $4^4 =$ ....

(16) $5\frac{2}{3} \times 1\frac{3}{4} \div 3\frac{1}{2} =$ ....

(17) 12 is what percent of 64? ....%.

(18) 1728 less $12\frac{1}{2}\%$ of 1728 less 50% of 25% of $1728 =$ ....

(19) $1331 \div 121 =$ ....

*(20) $4 + 2 \times 4 + 3 \times 4 + \ldots + 20 \times 4 =$ ....

(21) $5\frac{1}{4} \div 1\frac{3}{4} =$ ....

(22) The least common denominator for 1/28 and 1/49 is ....

(23) The Arabic numeral for MDCXLIV is ....

(24) $27 \times 33 =$ ....

(25) $8/300 =$ ....%.

26) Reduce 28/49. ....

(27) $(2^2 \times 3 \times 7)^2 \div 2^2 \times 7^2 =$ ....(numeral).

(28) The number of integers between 1 and 25 which are relatively prime to 25 is ....

(29) The number of positive integral divisors of 125 is ....

*(30) $12,936 + 872 + 13,145 + 47 =$ ....

(31) The sum of the positive integral divisors of 125 is ....

(32) Which of 50/51, 149/151 is the bigger?...

(33) Change 126, base 10, to base 8. ....

(34) The remainder when $8^3 \times 6^2$ is divided by 7 is ....

(35) The next prime after 115 is ....

(36) The power set for $\{1,2\} \times \{1,2\}$ contains ....elements.

(37) At 231 cu. in. per gal. a $7'' \times 3'' \times 11''$ rectangular box contains ....gal.

(38) The smallest number greater than each of .314, .314314, .314314314, ... is ....

(39) How many subsets of two elements are in a set with four elements? ....

*(40) $\sqrt{289^3} + 77 =$ ....

(41) If $x^3 - 1 = 0$ and $x \neq 1$ and $i^2 = -1$ and $x = a + bi$, then $a =$ ....

(42) How many real roots does $x^4 = 1$ have? ....

(43) $\log_4 4^3 + \log_4 16 =$ ....

(44.) If $(2 + i) \times (1 + 2i) = a + bi$ with $i^2 = -1$, then $b =$ ....

(45) The smallest integer x such that x is positive and $x^2 - 3 > 6$ is $x =$ ....

(46) If $x^3 + x^2 + x + 1 = (x^2 + 1)(x + a)$ then $a =$ ....

(47) The product of the roots of $x^3 + 2x^2 + x + 1 = 0$ is ....

(48) The sum of the roots of $x^3 + 2x^2 + x + 1 = 0$ is ....

(49) If $5x^2 + 10x + k = 0$ has equal roots, then $k =$ ....

*(50) $31^3 + 9 =$ ....

(51) If pipe A can fill a tank in 7 hours which requires 10 hours for pipe B, how long will it take both pipes? ....hrs.

(52) If $x^6 + y^6 = (x^2 + y^2)(x^4 - ax^2y^2 + y^4)$, then $a =$ ....

(53) If $i^2 = -1$, find $i^4 (i^2 - 1)$. ....

(54) The combined perimeters of two squares is 40 in. If they are placed so that the side of one is along a side of the other, and this common part is removed to form a single polygon, the perimeter is 32 in. What is the side of the smaller square? ....in.

(55) Neglecting friction, a pipe with 3 in diameter carries how many times as much liquid as one with 2 in. diameter? ....

(56) If the diameter d of a circle is reduced by 2 in., the area is reduced by $\pi\left(\dfrac{d^2}{4} - a\right)$. Here a = ...

(57) Each exterior angle of a regular octagon contains.........................°.

(58) The ratio of the number of subsets of two elements of a set of four elements, to the total number of subsets is ....

(59) If two cords of a circle intersect so that the segments of one are 2 and 6 and of the other are 4 and x, then x = ...

*(60) $21^2 (21^2 - 21) =$ ....

(61) The number of plane faces of a cube is ....

(62) The greatest possible distance between the centers of tangent circles of areas 121 pi sq. in. and 196 pi sq. in. is.........................in.

(63) The slope of the line with y-intercept 1 and x-intercept –1 is ....

(64) The inclination of the line of problem 63 is ....°.

(65) The slope of the line perpendicular to the line $y = -x$ is ....

(66) The length of the tangent from a pt P to a circle of radius 4 is 3. The distance from P to the center is ....

(67) The x value of a point which is ⅓ the distance from (1.3) (3,5) is x = ...

(68) If the equation of the line with x-intercept 2 and y–intercept 1 is $y = ax + 1$, then a = ...

(69) The numerical equivalent of $x = 1 + 1/2 + 1/4 + 1/8 + 1/16 +$ . . .is x = ...

*(70) $31680 \div 176 =$ ....

(71) If sec A = 2 and A is in the first quadrant, then A = ...°.

(72) If $\cos 2B = 2 \cos^2 B - a$, then a = ...

(73) If $\cos 60° \sin 40° = (\sin 100° - \sin B°) \div 2$, then b = ...

(74) If the area of a triangle with sides of a and 2 and angle x between them is ½ab sin x, then b = ...

(75) The minimal value of cos x for all x is ....

(76) $(\tan^2 A + 1) \div \sec^2 A =$ ....

(77) If sin A = a/c and cos A = a/c, then tan A = ... (numeral).

(78) If for a given triangle, the law of cosines is given by $13^2 = 12^2 + 5^2 - 120 \cos \gamma$, then cos γ = ...

(79) If tan B = a ÷ cot (–B), then a = ...

*(80) $\sqrt{33124} - 2 =$ ....

The University of Texas Interscholastic League
Number Sense Test, Series GG-6

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 answers 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) $1623 + 1524 =$ ....

(2) $327 - 422 =$ ....

(3) $526 \times 3 + 526 \times 4 =$ ....

(4) $87\frac{1}{2}\%$ of $152 =$ ....

(5) $8^4 =$ ....

(6) $35^2 =$ ....

(7) $41^2 - 39^2 =$ ....

(8) $\sqrt[3]{343} =$ ....

(9) $87\frac{1}{2}\% \div 37\frac{1}{2}\% =$ .... (common fraction)

*(10) $11^5 + 9 =$ ....

(11) $2\frac{1}{3} + 3\frac{1}{4} =$ ....

(12) $7\frac{1}{2} \div 12\frac{1}{2} =$ ....

(13) $(47 + 50 + 53) \div 3 =$ ....

(14) 20% of $90\% =$ ....%.

(15) $8.9 + .92 + 5. =$ ....

(16) $7\frac{1}{4} \div 3\frac{5}{8} =$ ....

(17) Reduce $38/57$. ....

(18) $3\frac{2}{3}\% =$ .... (common fraction).

(19) $21 \times 12 =$ ....

*(20) $124 \times 135 =$ ....

(21) If 3 men do a job in 17 days, how long, at the same rate, will it take 7 men? .... days.

(22) Two of nine people are selected at random. What is the probability that a certain two of the nine are selected? ....

(23) The least common denominator for $1/95$ and $1/38$ is ....

(24) The greatest integer less than $5\sqrt{2}$ is ....

(25) 21 sq. yd. $=$ .... sq. ft.

(26) Sets A_5, A_7, and A_9 contain, respectively 5, 7, and 9 elements, while $A_5 \cap A_7 \cap A_9$ contains 1 element, and each of $A_5 \cap A_7$, $A_5 \cap A_9$ and $A_7 \cap A_9$ contains two elements. Then $A_5 \cup A_7 \cup A_9$ contains .... elements.

(27) At 12.5 pesos to the dollar, 240 pesos $=$ .... dollars.

(28) At $3.25 each, how many shirts will $29.25 buy? ....

(29) The largest prime less than 60 is ....

*(30) $1,826 + 32,812 + 59,612 + 9,950 =$ ....

(31) The number of elements in $\{2, 3, 5, 6\} \times \{1, 2, 5\}$ is ....

(32) Reduce to lowest terms: $120/72$. ....

(33) How many positive integers divide 120? ....

(34) The sum of the positive integral divisors of 60 is ....

(35) The remainder when $97 + 156$ is divided by 3 is ....

(36) Add 87 which is in base 9 to 63 which is in base 9 and give an answer in base 9. ....

(37) Change 3021 in base 4 to base 2. ....

(38) The number of integers between 1 and 12 which are relatively prime to 12 is ....

(39) The larger root of $x^2 - 12x + 35 = 0$ is ....

*(40) If $x = 19$, then $x^3 + x^2 + 20 =$ ....

(41) If three times his age less 20 years is 160, his age is .... yr.

(42) The sum of the roots of $2x^3 - 4x^2 + 5x = 20$ is ....

(43) The larger root of $x^2 - x - 6 = 0$ is ....

(44) The cube of the root of $2x + 5 = 9$ is ....

(45) If $x^3 + x^2 + x + 1 = (x + 1)(x^n + 1)$, then $n =$ ....

(46) The maximal number of roots of any cubic equation is ....

(47) The coefficient of a^2b^2 in $(2a - b)^4$ is ....

(48) The largest integer x such that $2x - 7 < 3$ is ....

(49) How many real roots does $x^2 + x + 1 = 0$ have? ....

*(50) If $x^2 = 3,534,400$ and $x > 0$, then $x =$ ....

(51) If $i^2 = -1$, then $(i + 1)(i - 1) =$ ....

(52) $\log_3 3^9 =$ ....

(53) The number of subsets of $\{a, b, c, d\}$ with two elements is ....

(54) The area of a rhombus with side of 1 ft. and an interior angle of 30° is .... sq. ft.

(55) The sum of the interior angles of a pentagon is ....°.

(56) The slope of the line $2x + y = 9$ is ....

(57) The perpendicular to the line through (3,1) and(2,3) has a slope of ....

(58) The x value of the midpoint of a line from (3,1) to (2,3) is x = ...

(59) The y-intercept of $2x - y = 7$ is ....

*(60) The number of ½ inch cubes in a rectangular box 25 in. by 16 in. by 27 in. is at most ....

(61) If the distance between the centers of two tangent circles of radii 5 in. and 4 in. is not 9 in., then it is .... in.

(62) Two chords intersect in a circle so that the segments of one are 4 in. and 3 in. and one segment of the other is 2 in. The second segment of the other is .... in.

(63) The y-value of the center of $x^2 + 2x + y^2 - y = 5$ is y = ...

(64) The ratio of the area of the triangle with sides of 19″, 20″, 21″ to that of sides 57″, 60″, 63″ is ....

(65) If the area of an equilateral triangle of side s is $s^2\sqrt{3} \div b$, then b = ...

(66) If a pyramid of base of area B and of altitude h has a volume of $Bh \div k$, then k = ...

(67) If the diameter of a circle circumscribed about a square is $2\sqrt{2}$ in. the side of the square is .... in.

(68) The interest on $1620 for 270 days at 6% is $ ....

(69) If $81/x = x/9$ and $x < 0$, then x = ...

*(70) $5^6 + 75 =$ ....

(71) If $\sin^2 A + \cos^2 A = b$, then b = ...

(72) Csc. 210° = ...

(73) If $\sec A = b \,(\sec (-A))$, then b = ...

(74) If $\cos (A + B) = \cos A \cos B + d \sin A \sin B$, then d = ...

(75) In triangle ABC, sides a, 5, and c are respectively opposite angles A, B, and C. If $a \div \sin A = x \div \sin B$, then x = ...

(76) In this same triangle, if $\cos A = (25 + c^2 - a^2) \div 2xc$, then x = ...

(77) If the area of this same triangle is $5c \sin A \div y$, then y = ...

(78) 5 miles = ... yd.

(79) The fulcrum of a 20 ft. pole is 1 ft. from a rock of weight 1900 lb. How much weight must be put on the long end to lift the rock? .... lb.

*(80) $1820^2 - 1540^2 =$ ....

The University of Texas Interscholastic League

Answer Key — Number Sense Test GG-1

No.	Answer
1.	2178
2.	228
3.	435
4.	941
5.	2494
6.	507
7.	144
8.	512
9.	1512
10.	7800–8800
11.	1/40
12.	1/18
13.	8½%
14.	148
15.	37½%
16.	87/6 or 14 1/6
17.	8 7/6
18.	87/6 or 11 1/6
19.	72
20.	6756–8156
21.	895
22.	113% or 225/2 or 112.5
23.	6
24.	9
25.	670–890
26.	14 in.
27.	5 or six
28.	30
29.	144°
30.	6960–7661
31.	210
32.	1/99
33.	4
34.	5
35.	900
36.	9
37.	17/8 or 5 2/3
...	...
67.	4 or four
68.	0
69.	171–189
70.	8/9
71.	–3/2
72.	5/2
73.	44°
74.	4/3
75.	3½ or 7/2 or 3.5
...	...
80.	5660–6860 gal.

Answer Key — Number Sense Test GG-2

No.	Answer
1.	64
2.	228
3.	47
4.	27
5.	285/2 or 142½
6.	1225
7.	72
8.	1851
9.	960
10.	77235–85585
...	...
80.	1866–2366

Answer Key — Number Sense Test GG-3

No.	Answer
1.	1507
2.	65
3.	%
4.	1/9
5.	18/200
6.	72
7.	6 1/6 or 37/6
...	...
80.	1688.68–1717.17

Answer Key — Number Sense Test GG-4

No.	Answer
1.	11,286
...	...
80.	1653.68–1717.17

Answer Key — Number Sense Test GG-5

No.	Answer
1.	508
2.	1511
3.	1/8
4.	2/11
5.	1/80
6.	90
7.	61/6
8.	160
9.	5625
10.	1,529,405–1,690,395
...	...
80.	798–832

Answer Key — Number Sense Test GG-6

No.	Answer
1.	3147
2.	–95
3.	3662
4.	138
5.	4096
6.	1225
7.	160
8.	7/8 or 21/8
9.	153,007–169,118
10.	5 7/12 or 67/12
...	...
80.	832,760–937,840