

Name _____

Tie Breaker: Points scored on Stated and Geometry Problems

By Symbol + + +

5x (Last Problem Attempted)	+	_____	+	_____	+	_____
7x (Number Incorrect)	-	_____	-	_____	-	_____
2x (Number Incorrect SDs)	-	_____	-	_____	-	_____
TOTAL SCORE		_____		_____		_____

UIL Calculator Applications

Test 23F (District)

DO NOT OPEN THE TEST UNTIL INSTRUCTED TO BEGIN

- I. Calculator Applications rules and scoring—See UIL Constitution
- II. How to write the answers

A. For all problems except stated problems as noted below—write three significant digits.

1. Examples (* means correct but not recommended)

Correct: 12.3, 123, 123.*, 1.23x10*, 1.23x10^{0*}
 1.23x10¹, 1.23x10⁰¹, .0190, 0.0190, 1.90x10⁻²

Incorrect: 12.30, 123.0, 1.23(10)², 1.23·10², 1.230x10²,
 1.23*10², 0.19, 1.9x10⁻², 19.0x10⁻³, 1.90E-02

2. Plus or minus one digit error in the third significant digit is permitted.

B. For stated problems

1. Except for integer, dollar sign, and significant digit problems, as detailed below, answers to stated problems should be written with three significant digits.

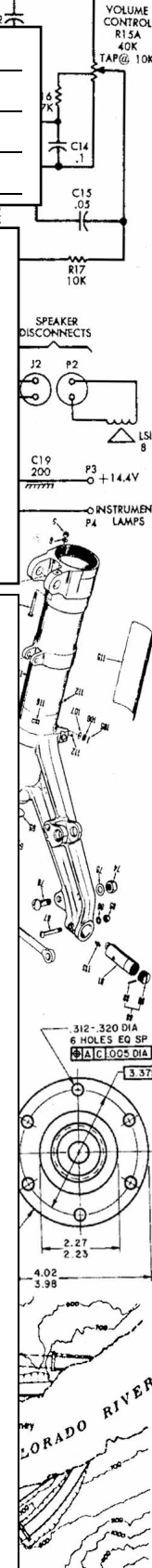
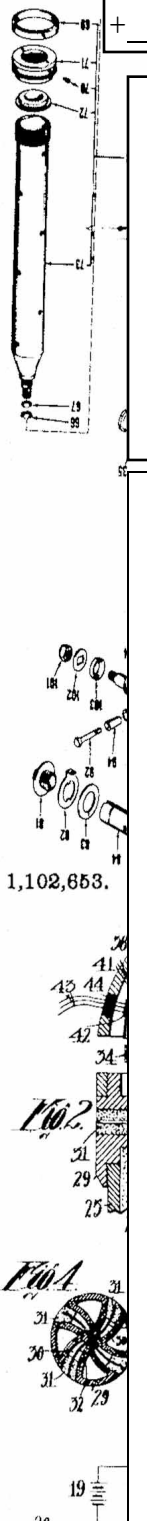
2. Integer problems are indicated by (integer) in the answer blank. Integer problems answers must be exact, no plus or minus one digit, no decimal point or scientific notation.

3. Dollar sign (\$) problems should be answered to the exact cent, but plus or minus one cent error is permitted. Answers must be in fixed notation. The decimal point and cents are required for exact-dollar answers.

4. Significant digit problems are indicated by underlined numbers and by (SD) in the answer blank. See the UIL Constitution and Contest Manual for details.

III. Some symbols used on the test

- A. Angle measure: rad means radians; deg means degrees.
- B. Inverse trigonometric functions: arcsin for inverse sine, etc.
- C. Special numbers: π for 3.14159 ...; e for 2.71828 ...
- D. Logarithms: Log means common (base 10); Ln means natural (base e); exp(u) means e^u.



Witnesses:
G. P. Wilson
A. J. Hartnett



23F-1. $(-21.1/95.9) + 0.211$ ----- 1= _____

23F-2. $0.891/0.765 + 0.549 - 1.16$ ----- 2= _____

23F-3. $(72 + 75.6 - 33.3)/(7.28) + 1.67$ ----- 3= _____

23F-4. $\frac{(-0.415)(-0.68 - 0.214 + 0.226)}{(0.251)(0.981)}$ ----- 4= _____

23F-5. $\pi + 1.1 - 3.7 + \frac{(-91500 + 33100)}{(-420)(371)}$ ----- 5= _____

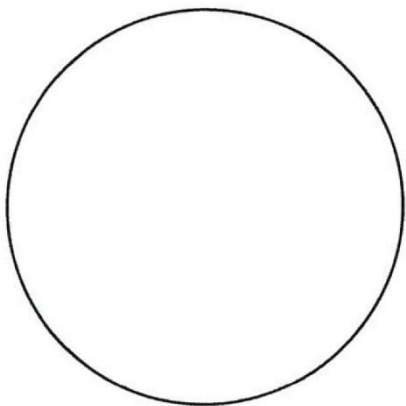
23F-6. Calculate the positive square root of the sum of 737 and 67.7. ----- 6= _____

23F-7. Calculate the reciprocal of the sum of 639 and 227. ----- 7= _____

23F-8. Calculate $\log(0.0402)/\ln(0.529)$. ----- 8= _____

23F-9.

CIRCLE



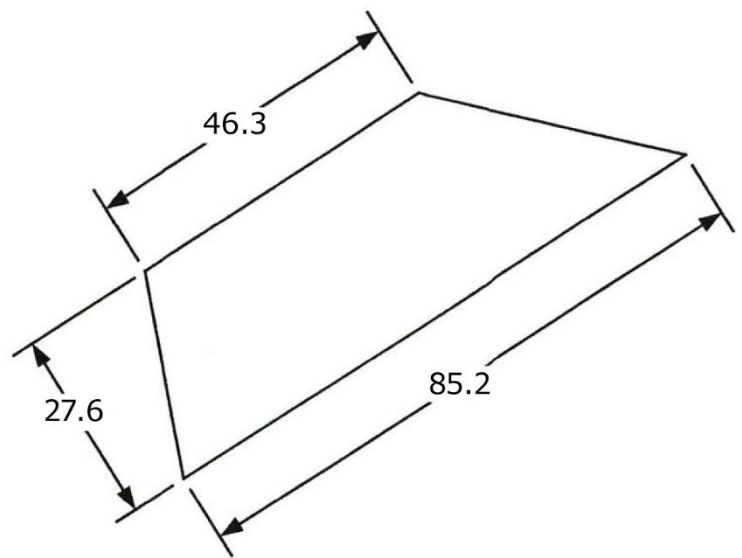
Circumference = 45.7

Area = ?

23F-9 = _____

23F-10.

TRAPEZOID



Area = ?

23F-10 = _____

23F-11. $\frac{(-68.4 + 7.79)(85.8 + 86.6)}{(\pi)(0.46)(5630 - 6200)}$ ----- 11= _____

23F-12. $\frac{0.572 + 0.272}{(0.433)(3.43)(2.08 \times 10^{-7})} + (944 + 1160)(606 - 82.2)$ ----- 12= _____

23F-13. $\frac{-39800 + 24700 - 29900 + 23800 + 75400}{(815)(62.5 + 37)(954 + 203)}$ ----- 13= _____

23F-14. $\frac{-31.7}{-0.913} + \frac{170 + 124 - 590}{0.849 - 4.92} + \frac{(7.90 \times 10^{-4} + 0.00195)}{\{(1.33 \times 10^{-5}) / (0.358)\}}$ ----- 14= _____

23F-15. $\frac{(14100 + 9170 - 10800)(0.625 - 0.0986 - 0.103)}{(0.0398)(-0.0673)(-0.0738)(\pi + 0.223 + 0.249)}$ ----- 15= _____

23F-16. What is the area of a rug that is 8 ft by 12 ft? ----- 16= _____ in²

23F-17. A group of 435 people is 34.5% women. How many men are there? ----- 17= _____ integer

23F-18. Carrie buys a dress marked at \$35.75. Including the 8.125% sales tax, how much change does she receive if she pays with a \$50 bill? ----- 18= \$ _____

23F-19. RIGHT TRIANGLE

Area = 0.00166

23F-19 = _____

23F-20. RIGHT TRIANGLE

Area = ?

23F-20 = _____

23F-21. $\left[\frac{\sqrt{2.36 - 0.591}}{-7.92} + \frac{(-0.871)}{9.33} \right]^2$ ----- 21= _____

23F-22. $\frac{-0.128 + 1/(-1.25)}{1/(0.158) + 8.7} + \frac{1}{(-15.4)}$ ----- 22= _____

23F-23. $\frac{\sqrt{4.53 + 1.6 + (20.4)/(\pi)}}{4.52 + 0.841}$ ----- 23= _____

23F-24. $[-61.2 + \sqrt{478}]^2 \times [674 + 762]^2 \times \sqrt{0.798/0.415}$ ----- 24= _____

23F-25. $(7.82)(2.93) + \sqrt{(41.4)/(\pi)} + [(0.281)(7.13)]^2$ ----- 25= _____

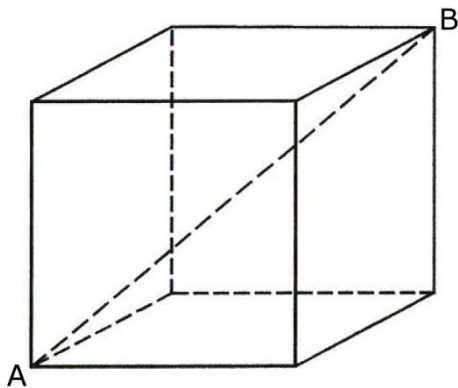
23F-26. A gallon of gas cost \$3.86. Several months later, it cost \$4.35.
 What is the percent increase in gas price? ----- 26= _____ %

23F-27. The most distant artificial spacecraft is Voyager 1 which is 14.5 billion mi from earth. How long does it take a communication signal (light) to travel from Voyager to earth, if the speed of light is 186,000 mi/s? ----- 27= _____ hr

23F-28. The Great Pyramid of Giza, Egypt was originally 481 ft tall. Today, it is 454 ft tall. If it was completed 4600 years ago, what is the erosion rate? ----- 28= _____ mm/yr(SD)

23F-29.

CUBE



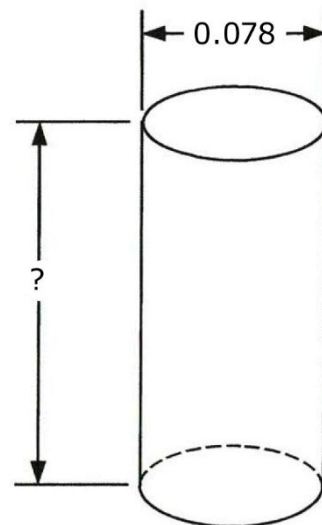
AB = 2.97

Volume = ?

23F-29 = _____

23F-30.

CYLINDER



Total Surface Area = 0.0458

23F-30 = _____

23F-31. $\frac{(3.71 \times 10^{-4} + 0.00132)^2}{\sqrt{34.1 - 32.1}} + \frac{2.56 \times 10^{-8}}{\sqrt{3.33 \times 10^{-4} + 0.00108}}$ ----- 31= _____

23F-32. $\frac{1}{0.00158} + \frac{1}{\sqrt{2.71 \times 10^{-6}}} + \frac{(9.16 + 26.8 - 14.4)^2}{\sqrt{2.23 - 1.26}}$ ----- 32= _____

23F-33. $\frac{[(6.8 - 3.95)(0.211/0.283)]^{1/2}}{(0.636)^2 + (0.337 + 0.6)^2 + 0.716}$ ----- 33= _____

23F-34. $\frac{\sqrt{(6.71)/\{(9.67)/\sqrt{9.94}\}}}{1.16 + (0.944)(1.14)} + \{0.0781 + 0.17\}^{1/2}$ ----- 34= _____

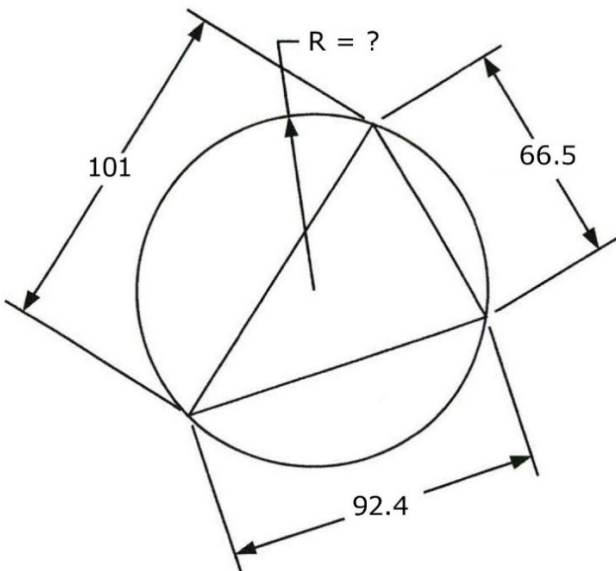
23F-35. $\frac{\frac{1}{149} + \frac{976}{(346 + 331)^2} - \frac{\sqrt{1.73 \times 10^{10}}}{(-7860)^2}}{(-6990 + 18800)^2 + (-1.73 \times 10^8)}$ ----- 35= _____

23F-36. The half-life of tritium is 12.3 yr. What percent of a tritium sample decays in 1 day? ----- 36= _____ %

23F-37. The deck of Columbus' ship, *La Niña*, was 17 m by 5.36 m. What is the average space per person, if all 27 crew members were on deck? ----- 37= _____ ft²

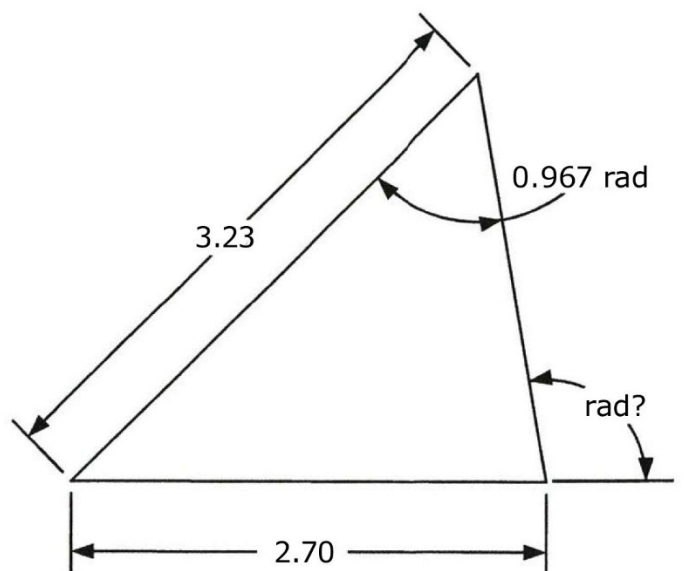
23F-38. Hanna can bike from Paradise TX to Eden TX in 17 hr 48 min, and she drives the same route in 3 hr 35 min. What is the percent increase in her velocity? ----- 38= _____ %(SD)

23F-39. CIRCLE AND SCALENE TRIANGLE



23F-39 = _____

23F-40. SCALENE TRIANGLE



23F-40 = _____

23F-41. $10^{-\{(0.0732 - 0.186)/(0.451 + 0.408)\}}$ ----- 41= _____

23F-42. $-9.03 \times 10^6 e^{0.21} + (-9.86 \times 10^5) e^{-0.812}$ ----- 42= _____

23F-43. $(-7500 - 12600) \ln\{(-1410)(-7650)\}$ ----- 43= _____

23F-44. $(301 + 2630)^{1/3} + 1/\{(238)^{-0.467}\}$ ----- 44= _____

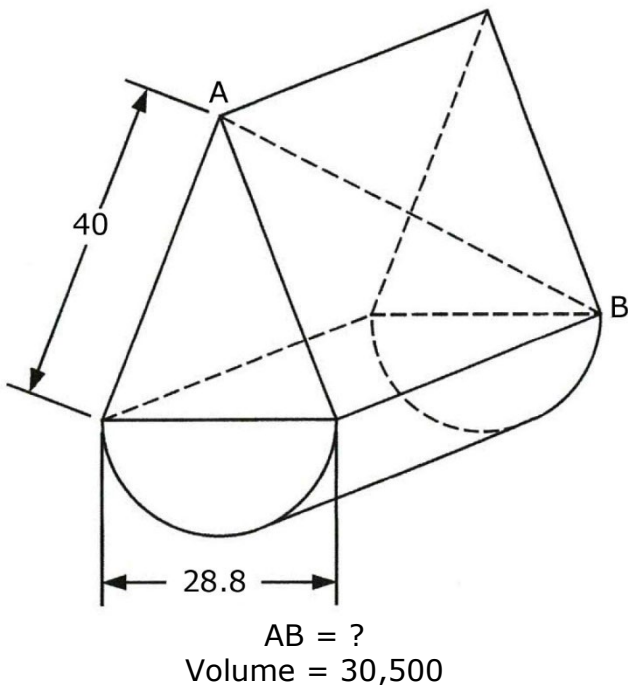
23F-45. (deg) $\frac{\cos\{(27.8^\circ)/(7.94)\}}{\sin\{58.7^\circ - 115^\circ\}}$ ----- 45= _____

23F-46. Roof pitch is the vertical rise in inches divided by a 12-inch horizontal run. A square of shingles will cover 100 ft² of roof. The roof on a 2500-ft² house was planned to have a pitch of 4 and required 33 squares of shingles. How many shingles are needed for a 3700-ft² house with a pitch of 5.5? ----- 46= squares(integer)

23F-47. A goliath beetle is 4.3 in long with a mass of 3 oz. The rhinoceros beetle is 68 mm long with mass equal to 23 g. The dung beetle is 0.7 in long and weighs 10 g. How long is a scarab beetle that weighs 3.5 oz? ----- 47= _____ in

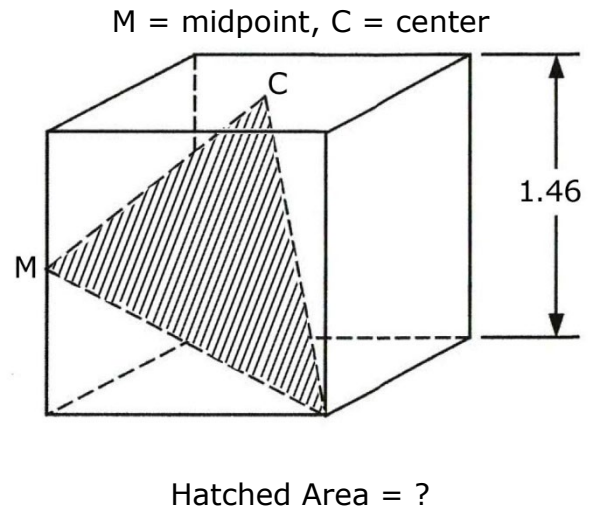
23F-48. (rad) For what positive value of f does $\sin(f)/f = f^2$? ----- 48= _____

23F-49. SEMICIRCLE AND ISOSCELES TRIANGLE PRISM



23F-49 = _____

23F-50. CUBE



23F-50 = _____

23F-51. $10^{+(0.648)} + 10^{-(0.1)} + [10^{(0.632/0.567)} - 10^{(0.274)}]^{1/2}$ ----- 51=_____

23F-52. $\frac{137 + e^{(3.16 + 2.35)}}{0.371 - e^{-(0.606 - 0.979)}}$ ----- 52=_____

23F-53. $\frac{(22800) \text{Log}(50700 + 56200)}{\text{Log}(0.355) - (0.681)(0.359)}$ ----- 53=_____

23F-54. $\frac{(6.77)^{0.602} - (7.75)^{-0.244}}{-51900 + 8660}$ ----- 54=_____

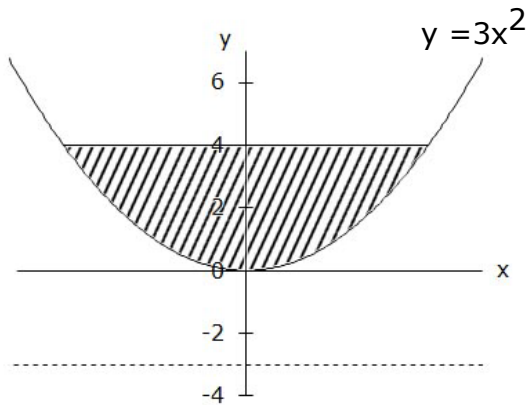
23F-55.(rad) $\frac{\arctan\{3.43 + (1.86)(0.916)\}}{\arcsin\{(8.23 \times 10^5 + 6.78 \times 10^5)/1.99 \times 10^6\}}$ ----- 55=_____

23F-56. (rad) Calculate the slope of the function $y = 2\sin(x/\pi)$ at $x = 15$. ----- 56=_____

23F-57. An excavator can scoop a volume V of earth in one scoop. The energy consumed E for one scoop is given by $E = (20 \frac{\text{ft-lb}}{\text{ft}^{4.5}}) V^{1.5} + 50 \text{ ft-lb}$.
 What should the scoop volume V be to remove a large volume of earth, if it is desired to minimize the total energy consumed? ----- 57=_____ ft^3

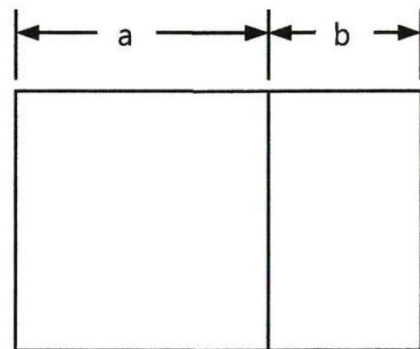
23F-58. What is M_3 if $\mathbf{M} = \mathbf{NP}$, $\mathbf{N} = \begin{bmatrix} 9 & -5 & 6 \\ -5 & 3 & 12 \\ -4 & 12 & 12 \end{bmatrix}$ and $\mathbf{P} = \begin{bmatrix} -6 \\ 5 \\ 5 \end{bmatrix}$? ----- 58=_____

23F-59. SOLID OF REVOLUTION ($y = -3$)



23F-59 = _____

23F-60. SQUARE AND RECTANGLE



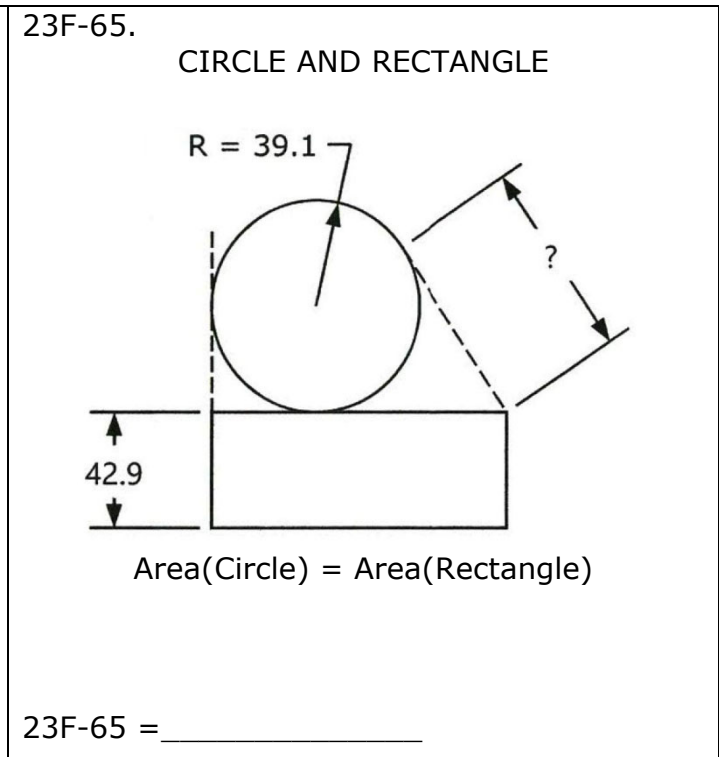
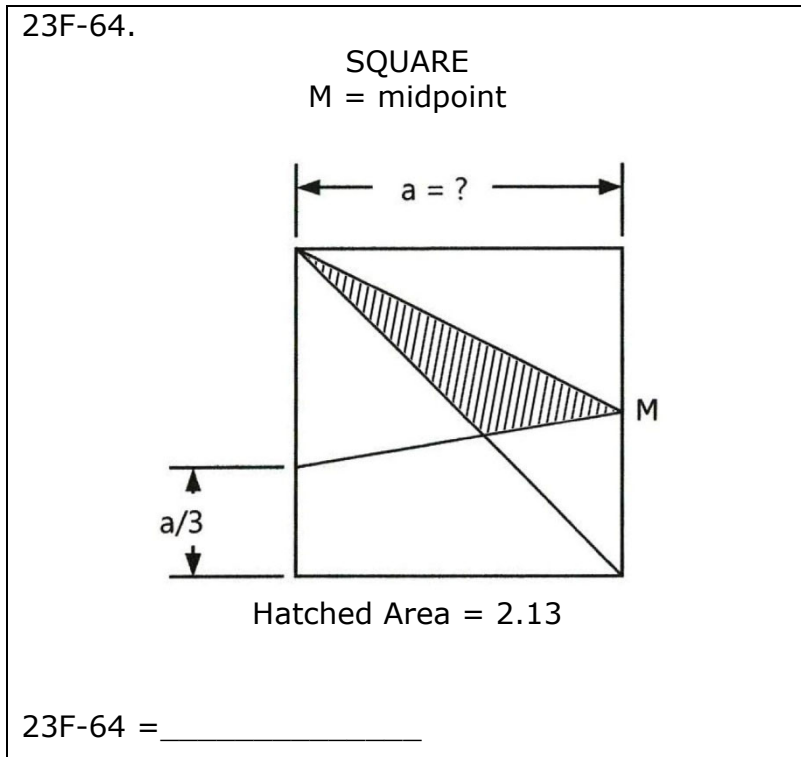
$$\frac{a+b}{a} = \frac{a}{b} = ?$$

23F-60 = _____

23F-61. A speeder traveling at 45 mph passes an idle police car. After a 3 second delay, the police car accelerates at a constant rate to catch the speeder. If the police car catches up after 11 s of acceleration, what was the acceleration? ----- 61= _____ ft/s²

23F-62. The probability of getting heads in a coin toss is 0.5. What is the probability of tossing heads one million times in a row? ----- 62= _____

23F-63. A bazooka projectile is fired with an initial velocity of 900 ft/s and a release angle of 33°. It overshoots the target by 55 ft. What should the angle be lowered to, to hit the target? ----- 63= _____ deg



23F-66. $2\text{Log} \sqrt{\frac{(2.26)(8.83)(4.78)}{(3.75)^3(7.12)^3}}$ ----- 66= _____

23F-67. $e^{\text{Ln}[(\pi)(98.5)]} + 10^{\text{Log}[(0.292)(425)]}$ ----- 67= _____

23F-68. (deg) $\left\{ \cos^2(59.3^\circ) - \sin^2(59.3^\circ) \right\} \times \frac{\tan(59.3^\circ)}{1 - \tan^2(59.3^\circ)}$ ----- 68= _____

23F-69. $(0.97) - \frac{(0.97)^2}{2} + \frac{(0.97)^3}{3} - \frac{(0.97)^4}{4}$ ----- 69= _____

23F-70. $\frac{(1.85)}{(0.865)} - \frac{(-0.573)}{(0.94)^2} \text{Ln} \left[\frac{(-0.0847)^2 + (0.00442)}{(0.258) + \sqrt{0.147}} \right]$ ----- 70= _____

23F-1	= -0.00902 = -9.02×10^{-3}	23F-11	= 12.7 = 1.27×10^1	23F-21	= 0.0683 = 6.83×10^{-2}
23F-2	= 0.554 = 5.54×10^{-1}	23F-12	= 3.83×10^6	23F-22	= -0.127 = -1.27×10^{-1}
23F-3	= 17.4 = 1.74×10^1	23F-13	= 0.000578 = 5.78×10^{-4}	23F-23	= 0.663 = 6.63×10^{-1}
23F-4	= 1.13 = 1.13×10^0	23F-14	= 181 = 1.81×10^2	23F-24	= 4.42×10^9
23F-5	= 0.916 = 9.16×10^{-1}	23F-15	= 7.39×10^6	23F-25	= 30.6 = 3.06×10^1
23F-6	= 28.4 = 2.84×10^1	23F-16	= 13,800 = 1.38×10^4	23F-26	= 12.7 = 1.27×10^1
23F-7	= 0.00115 = 1.15×10^{-3}	23F-17	= 285 integer	23F-27	= 21.7 = 2.17×10^1
23F-8	= 2.19 = 2.19×10^0	23F-18	= \$11.35	23F-28	= 1.8 = 1.8×10^0 (2SD)
23F-9	= 166 = 1.66×10^2	23F-19	= 48.4 = 4.84×10^1	23F-29	= 5.04 = 5.04×10^0
23F-10	= 1810 = 1.81×10^3	23F-20	= 180 = 1.80×10^2	23F-30	= 0.148 = 1.48×10^{-1}

23F-31	= 2.70x10 ⁻⁶	23F-41	= 1.35 = 1.35x10 ⁰	23F-51	= 8.58 = 8.58x10 ⁰	23F-61	= 15.3 = 1.53x10 ¹
23F-32	= 1710 = 1.71x10 ³	23F-42	= -1.16x10 ⁷	23F-52	= -355 = -3.55x10 ²	23F-62	= 1.01x10 ^{-301,030}
23F-33	= 0.729 = 7.29x10 ⁻¹	23F-43	= -325000 = -3.25x10 ⁵	23F-53	= -165000 = -1.65x10 ⁵	23F-63	= 32.8 = 3.28x10 ¹
23F-34	= 1.16 = 1.16x10 ⁰	23F-44	= 27.2 = 2.72x10 ¹	23F-54	= -5.91x10 ⁻⁵	23F-64	= 3.86 = 3.86x10 ⁰
23F-35	= -2.00x10 ⁻¹⁰	23F-45	= -1.20 = -1.20x10 ⁰	23F-55	= 1.61 = 1.61x10 ⁰	23F-65	= 72.9 = 7.29x10 ¹
23F-36	= 0.0154 = 1.54x10 ⁻²	23F-46	= 51 integer	23F-56	= 0.0396 = 3.96x10 ⁻²	23F-66	= -2.30 = -2.30x10 ⁰
23F-37	= 36.3 = 3.63x10 ¹	23F-47	= 4.56 = 4.56x10 ⁰	23F-57	= 2.92 = 2.92x10 ⁰	23F-67	= 434 = 4.34x10 ²
23F-38	= 397 = 3.97x10 ² (3SD)	23F-48	= 0.929 = 9.29x10 ⁻¹	23F-58	= 144 = 1.44x10 ²	23F-68	= 0.439 = 4.39x10 ⁻¹
23F-39	= 51.8 = 5.18x10 ¹	23F-49	= 53.4 = 5.34x10 ¹	23F-59	= 209 = 2.09x10 ²	23F-69	= 0.582 = 5.82x10 ⁻¹
23F-40	= 1.75 = 1.75x10 ⁰	23F-50	= 0.997 = 9.97x10 ⁻¹	23F-60	= 1.62 = 1.62x10 ⁰	23F-70	= -0.464 = -4.64x10 ⁻¹