

Name _____

Tie Breaker: Points scored on Stated and Geometry Problems
 + _____ + _____ + _____

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

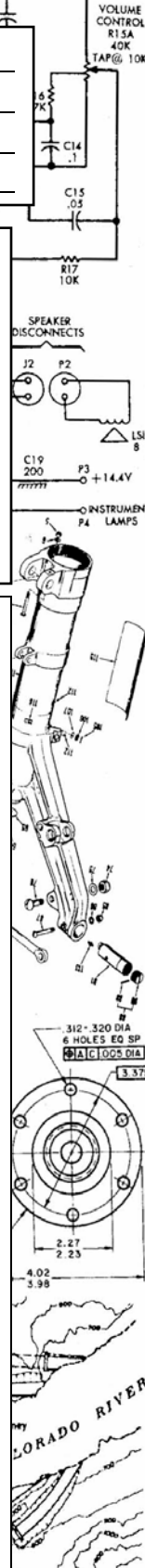
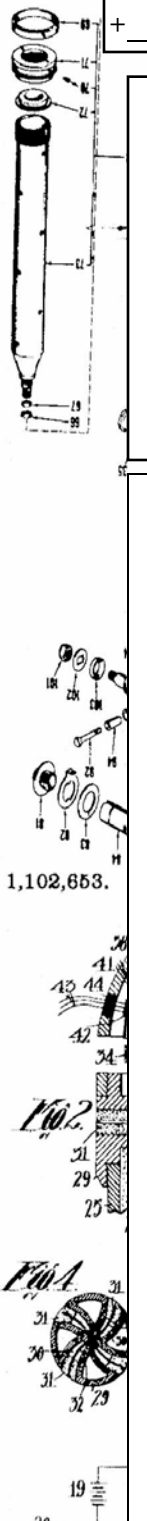
UIL Calculator Applications

Test 21H

(Region)

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
 J. J. Hartnett

21H-1. $(5.83/7.3) + 0.608$ ----- 1= _____

21H-2. $1.68/8.28 + 0.099 - 0.203$ ----- 2= _____

21H-3. $(0.889 - 0.11 + 0.136) \times (-0.27) - 0.309$ ----- 3= _____

21H-4. $\frac{(0.00743)(-0.0176 - 0.00402 + 0.0192)}{(-0.0768)(-0.0901)}$ ----- 4= _____

21H-5. $\frac{\{(0.0773 - 0.0607 + 0.079)/(-0.0198)\}}{\{(0.0952)(-0.0371)/(0.0583)\}}$ ----- 5= _____

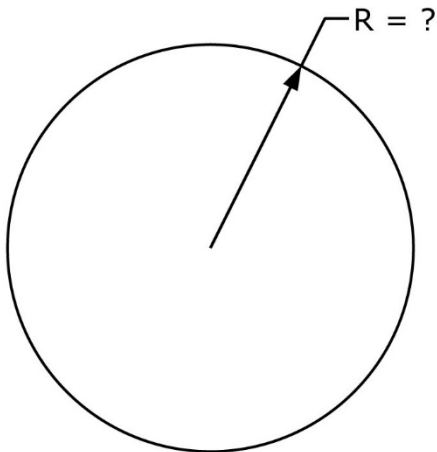
21H-6. What is 8690 divided by 0.418? ----- 6= _____

21H-7. What number when subtracted from 8765 yields 5678? ----- 7= _____ integer

21H-8. What is the remainder of 584 divided by 4.99? ----- 8= _____

21H-9.

CIRCLE

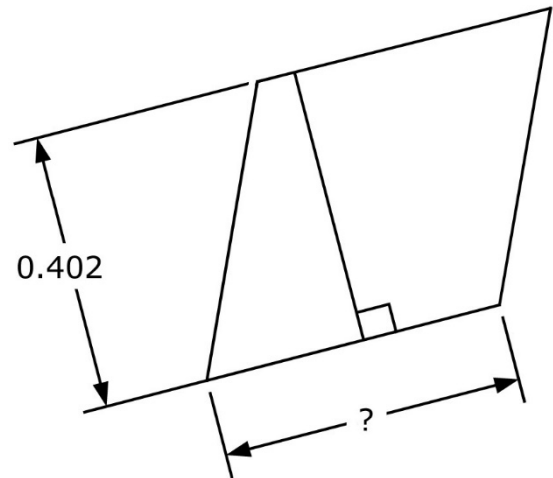


Circumference = 9.26

21H-9 = _____

21H-10.

RHOMBUS



Area = 0.177

21H-10 = _____

21H-11. $\frac{(-5.89 + 2.4)(8.15 + 14.3)}{(-4.53)(0.465)(9670 - 16100)}$ ----- 11 = _____

21H-12. $\frac{(0.552 + 0.238 - 0.301)(-0.4)(0.372)}{(9.27 - 4.26)(-0.647 - 1.13)}$ ----- 12 = _____

21H-13. $\frac{9.41 \times 10^5 + 2.88 \times 10^6}{(-0.594)(-0.702) + 0.419} + \frac{8610 - 2060 + 6020}{(-1.00 \times 10^{-5})(-220)}$ ----- 13 = _____

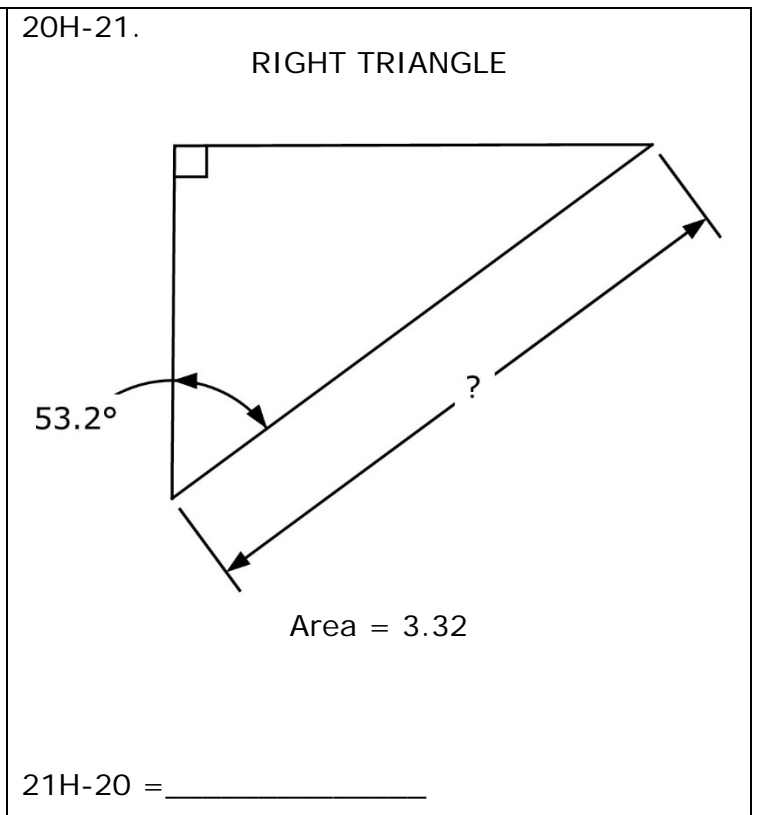
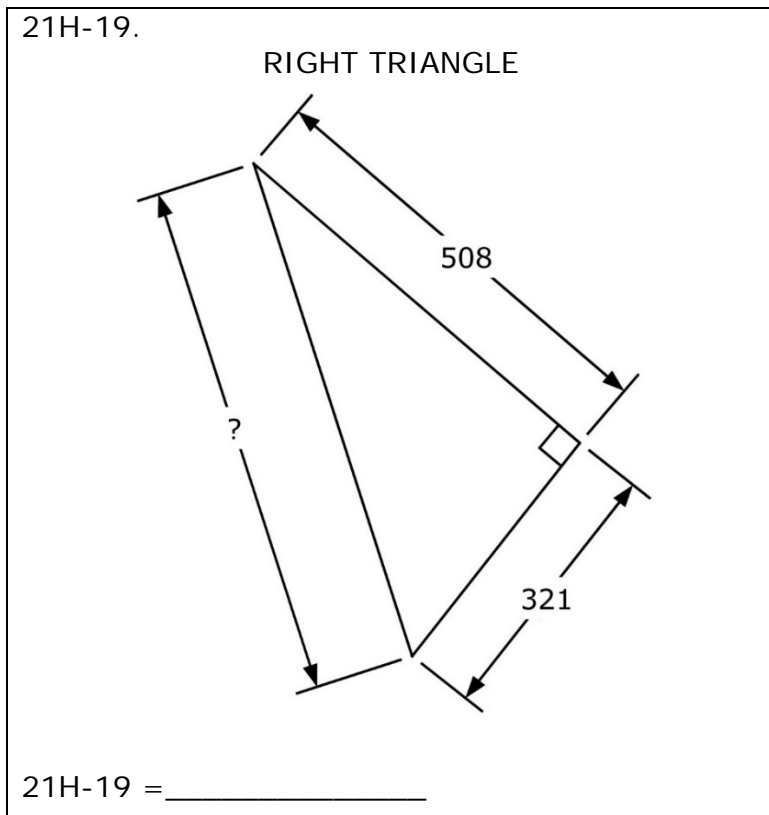
21H-14. $\frac{\{(0.178 + 0.186)(2.98 + 2.81) + 2.73 - 1.78\}}{(-308 - 33.5)(-9.74 + 12.2 - 6.61)}$ ----- 14 = _____

21H-15. $\frac{32200 + 85900 - (58700 + 1.99 \times 10^5)(1.84 - 1.63)}{(-616)(27.4)(-94)(135 - 352 + 368)}$ ----- 15 = _____

21H-16. Gabe and Ginny have dinner. The total bill including the 15% tip comes to \$37.95. Ginny covers \$15 of the meal, and Gabe covers the rest of the meal as well as all of the tip. How much did Gabe pay? ----- 16 = \$ _____

21H-17. The universe has 5×10^{22} stars organized into 1.25×10^{11} galaxies. On average, how many stars are in a galaxy? ----- 17 = _____

21H-18. A cube has 2 in side dimensions. During heating the side dimensions each shrink 10%. What is the percent change in cube volume? ----- 18 = _____ %



21H-21. $\frac{-0.714 + 1/(-0.53)}{1/(0.247) + 7.3} + \frac{1}{(\pi)}$ ----- 21=_____

21H-22. $\frac{1}{-6.75 + 14.1} + \frac{1}{6.99 - 7.73} + \frac{1}{(1.84)}$ ----- 22=_____

21H-23. $[-72.5 + \sqrt{3630}]^2 \times [426 + 693]^2 \times \sqrt{0.0379/0.0168}$ ----- 23=_____

21H-24. $(0.0262)(17.7)\sqrt{(-0.873)^2/0.432} + 1/\sqrt{2.4 + \pi}$ ----- 24=_____

21H-25. $(0.0228)(982) + \sqrt{(2060)/(4.85)} + [(0.523)(8.87)]^2$ ----- 25=_____

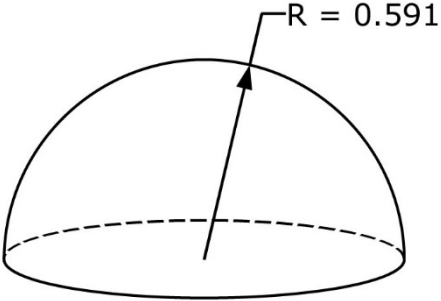
21H-26. The cloth on a 60 in bolt of fabric is 40 yd long. A lamp shade uses a square of fabric that is 30 in on a side. How many lamp shades can be made from one bolt of cloth? ----- 26=_____ integer

21H-27. A couple buys a new house, taking out a 30-yr loan. They borrow a principal of \$395,000 at an annual interest rate of 3.9%. If their monthly payment (principal and interest) is \$1725.16, how much of the first monthly payment goes to reduce the principal? ----- 27=\$_____

21H-28. Barney walks 3 mi to school in 1 hr 5 min. He can bike to school in 13 min. One day, he started biking but had a flat and walked the rest of the way. How far did he bike if the entire trip took 22 min? ----- 28=_____ mi

21H-29.

HEMISPHERE

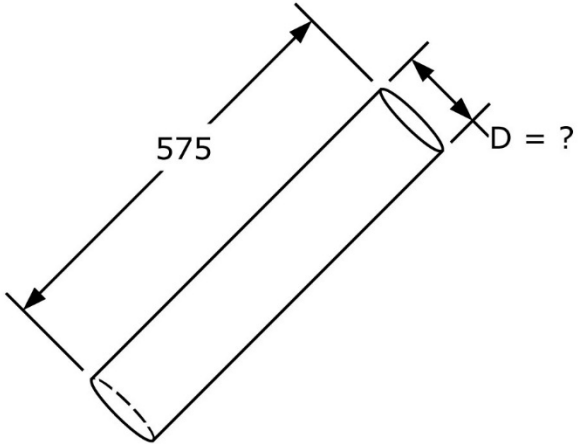


Total Surface Area = ?

21H-29 = _____

21H-30.

CYLINDER



Volume = 6.58×10^6

21H-30 = _____

21H-31. $\sqrt{\frac{1/(254 - 179)}{(174)(1.19 + 0.15)^2}} + (-82100)^2(6.58 \times 10^{-13})$ ----- 31 = _____

21H-32. $\sqrt{\frac{9.77}{\sqrt{32.8 + 5.23}}} \times \left[\frac{1}{(7.82 - 1.42)^2} + \frac{1}{(22.2 + 12)^2} \right]$ ----- 32 = _____

21H-33. $\frac{(6.30 \times 10^5)^2(1.74 \times 10^{-12} + 6.15 \times 10^{-13})}{459 + (-0.703)(1450)} + \frac{1}{\frac{1}{-0.00107} + \frac{1}{(0.00126)}}$ 33 = _____

21H-34. $\frac{(4.52)^2 + \sqrt{158}}{\sqrt{(6380)(-83.9)^2}} + \frac{\sqrt{\sqrt{(5.73 \times 10^{10})(0.342)}}}{9180 + 90200}$ ----- 34 = _____

21H-35. $\frac{\frac{1}{839} + \frac{369}{(644 + 515)^2} - \frac{\sqrt{32500}}{(-810)^2}}{(477 + 1360)^2 + (-3.46 \times 10^6)}$ ----- 35 = _____

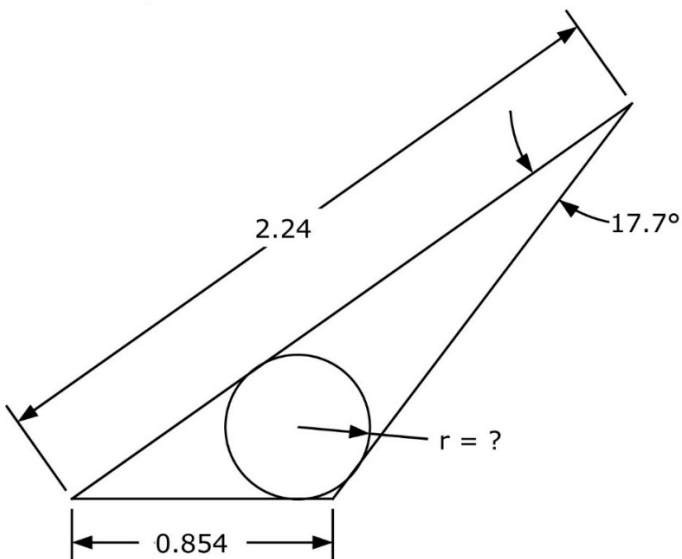
21H-36. What is the length of the line segment spanning from the origin to the tangent point on the circle $(y-8)^2 + x^2 = 45$? ----- 36 = _____

21H-37. Jupiter's diameter is 10.971 times earth's. Its mass is 317.8 times earth's. If the density of the earth is 5.509 g/cm³, what is the density of Jupiter? ----- 37 = _____ g/cm³(SD)

21H-38. The Great Pyramid of Giza has a square base 756 ft long. It is 481 ft tall. It is estimated that 2.3 million blocks of limestone and marble were used in its construction. What is the average volume of one block? ----- 38 = _____ ft³

21H-39.

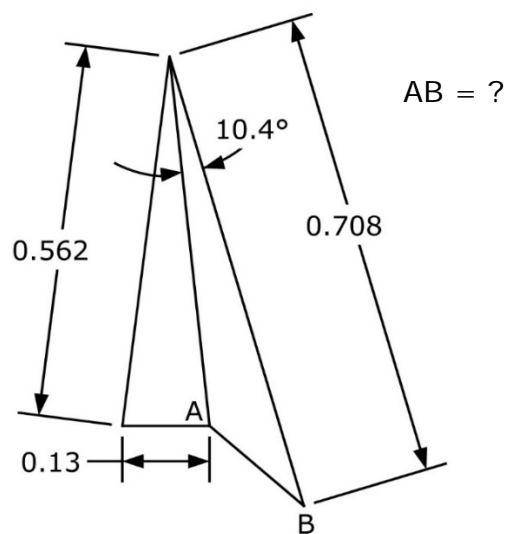
SCALENE TRIANGLE AND CIRCLE



21H-39 = _____

21H-40.

ISOSCELES AND SCALENE TRIANGLES



21H-40 = _____

21H-41. $10^{-\{(0.525 - 0.848)/(0.285 + 0.266)\}}$ ----- 41= _____

21H-42. $5.73 \times 10^7 e^{0.95} + (2.62 \times 10^7) e^{-0.163}$ ----- 42= _____

21H-43. $\frac{(-0.168)\text{Log}(0.771 - 0.499)}{(-0.998)}$ ----- 43= _____

21H-44. $(981 + 2500)^{1/3} + 1/\{(583)^{-0.12}\}$ ----- 44= _____

21H-45. (deg) $\{(9.70 \times 10^6)\sin(-109^\circ)\} \times \{(8.77 \times 10^6)\cos(-28.4^\circ)\}$ ----- 45= _____

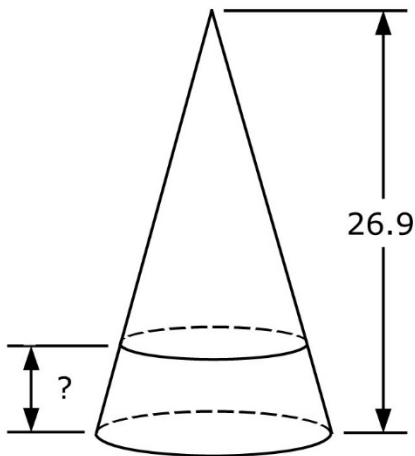
21H-46. 3D printers build at constant volume rate. If a plant building 3-in parts requires 12 3D printers to build 5000 parts/mo, how many machines will be needed to build monthly 8000 7-in parts of similar shape? ----- 46= _____ integer

21H-47. Ronald throws a shot put at 5 meter increments starting at 5 meters. His measured distances were: 4.5 m, 11.3 m, 13.3 m, 22.2 mm. Estimate the measured distance for a 12 m attempt. ----- 47= _____ m

21H-48. What is d if $d - \sqrt{d} = 10 + 100/d$? ----- 48= _____

21H-49.

FRUSTUM AND CONE

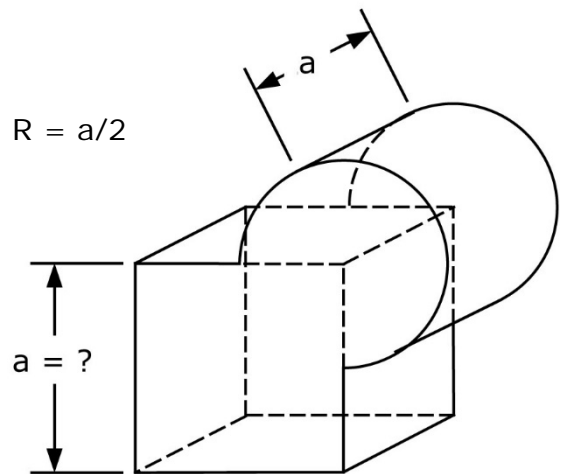


Small
Cone = Frustum
Volume = Volume

21H-49 = _____

21H-50.

CUBE AND 3/4 CYLINDER



Total Volume = 6240

21H-50 = _____

21H-51. $10^{+(0.29)} + 10^{-(0.65)} + [10^{(0.709/0.999)} - 10^{(0.0991)}]^{1/2}$ -- 51=_____

21H-52. $\frac{2.48 + e^{(0.943 + 0.48)}}{0.944 - e^{-(0.657 - 0.828)}}$ ----- 52=_____

21H-53. $\frac{(-74600) \text{ Log}(48200 + 99700)}{\text{Log}(0.751) - (0.737)(0.449)}$ ----- 53=_____

21H-54. $\frac{(5.15 + 11.3)^{-0.67}}{(1.89)^{-(0.749 + 0.148)}}$ ----- 54=_____

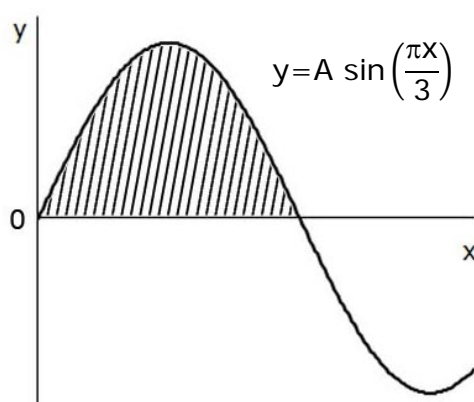
21H-55. (rad) $\arctan\left[\frac{(2490)(0.435)}{(8.17)(98.1)}\right] + (0.152)(1.25)$ ----- 55=_____

21H-56. What is the maximum value of y for the function $y = -3x^2 + 25x + 300$? ----- 56=_____

21H-57. A farmer has 150 ft of fencing and wants to build a pen that is a rectangle with one semicircle attached to one side such that the semicircle diameter equals the side dimension of the rectangle. She wants to maximize the pen area. What is the radius of the semicircular portion of the pen? ----- 57=_____ ft

21H-58. What is positive t if the determinant of $\begin{bmatrix} t & 32 & 14 \\ 32 & -25 & 18 \\ 14 & 18 & t \end{bmatrix}$ equals 120? --- 58=_____

21H-59. RADIANS

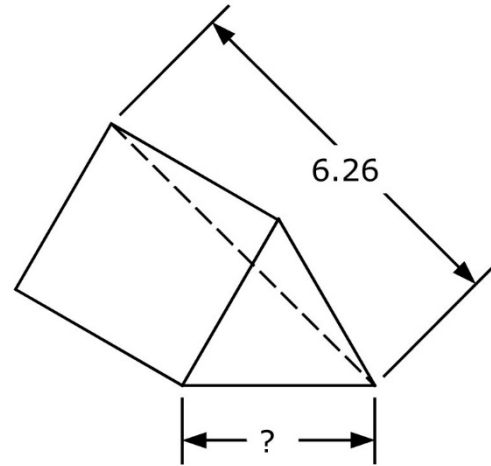


$y = A \sin\left(\frac{\pi x}{3}\right)$

Hatched Area = 5
A = ?

21H-59 = _____

21H-60. SQUARE AND EQUILATERAL TRIANGLE



6.26

?

21H-60 = _____

21H-61. A ball is rolled on level ground at an initial velocity of 20 ft/s. It rolls to a stop 35 ft away. What was the deceleration, a negative number? --- 61 = _____ ft/s²

21H-62. The largest prime number known is a Mersenne prime, $2^{82,589,933} - 1$. Solve this number. ----- 62 = _____

21H-63. Dana tosses a ball to her friend who is 30 ft away. If the release angle is 28°, what is the necessary release velocity? ----- 63 = _____ mph

21H-64.
CONGRUENT RIGHT TRIANGLES

21H-64 = _____

21H-65.
SQUARE, RECTANGLE, LARGE AND SMALL ISOSCELES TRIANGLES

Area of Small Isosceles Triangle = Hatched Area

21H-65 = _____

21H-66. $\text{Log}[(1.67)^{-4.67}] + (\pi)\text{Log}[(1.67)^{(5.66)}]$ ----- 66 = _____

21H-67. (rad) $\sin(4.22)\cos(1.62) - \cos(4.22)\sin(1.62)$ ----- 67 = _____

21H-68. (rad) $(8.67)\left[\frac{\cos(-2.82)}{(-2.82)} + \frac{\cos(2.16)}{(2.16)}\right]$ ----- 68 = _____

21H-69. $(0.27) - \frac{(0.27)^2}{2} + \frac{(0.27)^3}{3} - \frac{(0.27)^4}{4}$ ----- 69 = _____

21H-70. (rad) $\frac{\arctan\left\{e^{-(0.552)(0.755)}\sqrt{(-24.2)/(-93.8)}\right\}}{(61)\sqrt{(97.7)(73.2)(73.4)}}$ ----- 70 = _____

21H-1	= 1.41 = 1.41×10^0	21H-11	= -0.00578 = -5.78×10^{-3}	21H-21	= 0.0891 = 8.91×10^{-2}
21H-2	= 0.0989 = 9.89×10^{-2}	21H-12	= 0.00817 = 8.17×10^{-3}	21H-22	= -0.672 = -6.72×10^{-1}
21H-3	= -0.556 = -5.56×10^{-1}	21H-13	= 1.03×10^7	21H-23	= 2.82×10^8
21H-4	= -0.00260 = -2.60×10^{-3}	21H-14	= 0.00216 = 2.16×10^{-3}	21H-24	= 1.04 = 1.04×10^0
21H-5	= 79.7 = 7.97×10^1	21H-15	= 0.000267 = 2.67×10^{-4}	21H-25	= 64.5 = 6.45×10^1
21H-6	= 20800 = 2.08×10^4	21H-16	= \$22.95	21H-26	= 96 integer
21H-7	= 3087 integer	21H-17	= 4.00×10^{11}	21H-27	= \$441.41
21H-8	= 0.170 = 1.70×10^{-1}	21H-18	= -27.1 = -2.71×10^1	21H-28	= 2.48 = 2.48×10^0
21H-9	= 1.47 = 1.47×10^0	21H-19	= 601 = 6.01×10^2	21H-29	= 3.29 = 3.29×10^0
21H-10	= 0.440 = 4.40×10^{-1}	21H-20	= 3.72 = 3.72×10^0	21H-30	= 121 = 1.21×10^2

21H-31	= 0.0110 = 1.10×10^{-2}	21H-41	= 3.86 = 3.86×10^0	21H-51	= 4.14 = 4.14×10^0	21H-61	= -5.71 = -5.71×10^0
21H-32	= 0.0318 = 3.18×10^{-2}	21H-42	= 1.70×10^8	21H-52	= -27.3 = -2.73×10^1	21H-62	= 1.49×10^{24} , 862,047
21H-33	= -0.00876 = -8.76×10^{-3}	21H-43	= -0.0952 = -9.52×10^{-2}	21H-53	= 847000 = 8.47×10^5	21H-63	= 23.3 = 2.33×10^1
21H-34	= 0.00869 = 8.69×10^{-3}	21H-44	= 17.3 = 1.73×10^1	21H-54	= 0.271 = 2.71×10^{-1}	21H-64	= 47.9 = 4.79×10^1
21H-35	= -1.40×10^{-8}	21H-45	= -7.08×10^{13}	21H-55	= 1.12 = 1.12×10^0	21H-65	= 318 = 3.18×10^2
21H-36	= 4.36 = 4.36×10^0	21H-46	= 244 integer	21H-56	= 352 = 3.52×10^2	21H-66	= 2.92 = 2.92×10^0
21H-37	= 1.326 = 1.326×10^0 (4SD)	21H-47	= 12.3 = 1.23×10^1	21H-57	= 21.0 = 2.10×10^1	21H-67	= 0.516 = 5.16×10^{-1}
21H-38	= 39.8 = 3.98×10^1	21H-48	= 19.5 = 1.95×10^1	21H-58	= 12.6 = 1.26×10^1	21H-68	= 0.686 = 6.86×10^{-1}
21H-39	= 0.234 = 2.34×10^{-1}	21H-49	= 5.55 = 5.55×10^0	21H-59	= 2.62 = 2.62×10^0	21H-69	= 0.239 = 2.39×10^{-1}
21H-40	= 0.185 = 1.85×10^{-1}	21H-50	= 15.8 = 1.58×10^1	21H-60	= 3.24 = 3.24×10^0	21H-70	= 7.31×10^{-6}