

1st Score: _____	2nd Score: _____	3rd Score: _____	_____. ____ <b>Final Score</b>
S & G _____	S & G _____	S & G _____	
Grader: _____	Grader: _____	Grader: _____	

## PLACE LABEL BELOW

Name: \_\_\_\_\_ School: \_\_\_\_\_

SS/ID Number: \_\_\_\_\_ City: \_\_\_\_\_

Grade:    4    5    6    7    8                      Classification:    1A    2A    3A    4A    5A    6A



## TMSCA MIDDLE SCHOOL CALCULATOR

TEST #13 ©

MARCH 13, 2021

### GENERAL DIRECTIONS

**I. About this test:**

- A. You will be given 30 minutes to take this test. There are 80 problems on this test.
- B. ALL calculators must be cleared. HP Prime and Casio Prizm calculators are NOT permitted.**

**II. How to write the answers:**

- A. For all problems except stated problem as noted below write three significant digits.
  1. Examples (\* means correct, but not recommended)  
 Correct: 12.3, 123, 123.\*, 1.23x10\*, 1.23x10<sup>0</sup>\*, 1.23x10<sup>1</sup>, 1.23x10<sup>01</sup>, .0190, 1.90x10<sup>-2</sup>  
 Incorrect: 12.30, 123.0, 1.23(10)<sup>2</sup>, 1.23·10<sup>2</sup>, 1.230x10<sup>2</sup>, 1.23\*10<sup>2</sup>, 0.19, 1.9x10<sup>-2</sup>, 19.0x10<sup>-3</sup>, 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. The decimal point and cents are required for exact dollar answers.

**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:  $\pi$  for 3.14159 . . . ; e for 2.71828.
- D. Logarithms: Log means common (base 10); Ln means natural (base e).

**IV. Scoring:**

- A. All problems answered correctly are worth FIVE points. FOUR points will be deducted for all problems answered incorrectly or skipped before the last problem attempted.

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## 2020 – 2021 TMSCA Middle School Calculator Test #13

1.  $1230 - 433$  ----- 1=\_\_\_\_\_
2.  $-27 - 5 + 17$  ----- 2=\_\_\_\_\_
3.  $46.9 + 30.7 + 49.7$  ----- 3=\_\_\_\_\_
4.  $\pi - 27 - 14 + 28$  ----- 4=\_\_\_\_\_
5.  $465 - 387 - 448 + 110$  ----- 5=\_\_\_\_\_
6.  $-261 - 131 - 238 + 67.3 + 43.5$  ----- 6=\_\_\_\_\_
7.  $(4.84 - 1.64) + (1.32 - 4.29 - 3.21)$  ----- 7=\_\_\_\_\_
8.  $2.54 - 0.834 + \pi - 2.35 - 0.386$  ----- 8=\_\_\_\_\_
9.  $115 \times 540 \times 170$  ----- 9=\_\_\_\_\_
10.  $103 \times 75.7 \times 592 \times 532$  ----- 10=\_\_\_\_\_
11. Calculate the product of a perfect score on this test and the sum of the number of problems on this test and the number of minutes to take this test. ----- 11=\_\_\_\_\_INT.
12. Chloe completed number 78 on her calculator test when time ran out. She skipped 2 problems and missed 5. Calculate her score. 12=\_\_\_\_\_INT.
13. Calculate the Harmonic mean of all the two-digit palindromes. -- 13=\_\_\_\_\_

14.  $(-338)[118 \times 121 \times 202]$  ----- 14=\_\_\_\_\_
15.  $(52/25)[60 - 48]$  ----- 15=\_\_\_\_\_
16.  $\left[\frac{126}{286}\right] [(212/303) + 0.108]$  ----- 16=\_\_\_\_\_
17.  $\{34/215\} \left[\frac{283}{211 + 175}\right]$  ----- 17=\_\_\_\_\_
18.  $\frac{(151/111) + (261/131)}{(338 - 95.6)}$  ----- 18=\_\_\_\_\_
19.  $\left[\frac{42/34}{112/83}\right] \{11.3 + 13.4 - 11\}$  ----- 19=\_\_\_\_\_
20.  $\frac{(0.00143)(0.00373)}{446} (2060 - 2780)$  ----- 20=\_\_\_\_\_
21.  $\frac{(\pi)(14/16)(19/9)}{92}$  ----- 21=\_\_\_\_\_
22.  $\left[\frac{191 + 818}{830 - 547}\right] \left[\frac{1140}{468}\right]$  ----- 22=\_\_\_\_\_
23.  $\frac{(209 \times 411)/866}{(1120 \times 9.30 \times 10^{-4}) + 0.7}$  ----- 23=\_\_\_\_\_
24. Leah loves to shop online. She purchased \$355.00 worth of shoes from one online store, \$125 from another and \$55 from another. Each purchase has a 6.25% sales tax, but shipping is free on purchases over \$100 and 10% on purchases under \$100. Calculate her total spent on this shopping spree. ----- 24=\$\_\_\_\_\_
25. Stan weighs 12% more than Rick and Rick weighs 22% more than Randy. If Randy weighs 189 pounds, calculate the weight of Stan in pounds. ----- 25=\_\_\_\_\_ lbs.
26. The lengths of the sides of a quadrilateral are in the ratio of 4:7:2:8. The length of the shortest side 71 cm. Calculate the perimeter of the quadrilateral. ----- 26=\_\_\_\_\_ cm

27.  $[1210 - (4440 + 1590)] + [(-5.18)(3020 - 2120)]$  ----- 27=\_\_\_\_\_

28.  $\frac{(620 + 688)(0.0359 + 0.141)}{(1.78 \times 10^{12})}$  ----- 28=\_\_\_\_\_

29.  $\frac{(1.04 \times 10^7) + (1.17 \times 10^7)}{(-0.243)(0.163) - 0.00874}$  ----- 29=\_\_\_\_\_

30.  $(0.0063) \left[ \frac{29}{(2.03 \times 10^6)} \right]$  ----- 30=\_\_\_\_\_

31.  $(72.1) [(2.98 \times 10^8) - (5.10 \times 10^8)]$  ----- 31=\_\_\_\_\_

32.  $[0.963] \left[ \frac{1/14.8}{1/(73.5)} \right]$  ----- 32=\_\_\_\_\_

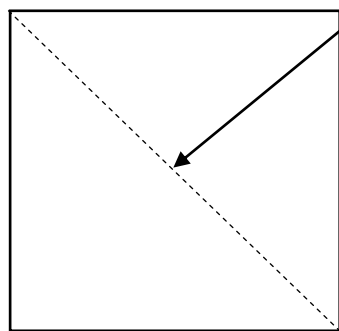
33.  $\frac{1}{1700} - \frac{1}{1650} + \frac{1}{524}$  ----- 33=\_\_\_\_\_

34.  $\left[ \frac{1/254}{1/151} \right] + [0.622]$  ----- 34=\_\_\_\_\_

35. Calculate the sum of the exterior angles in a regular dodecagon in degrees. ----- 35=\_\_\_\_\_°

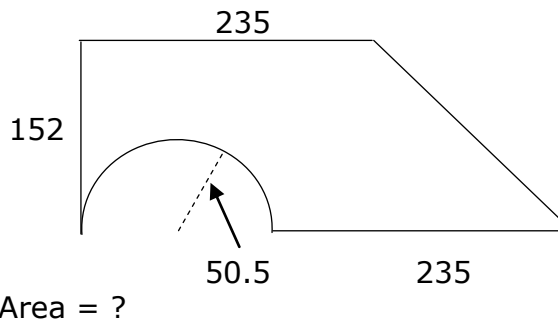
36. Gina drives east from point A at 57mph at 10:30 A.M. At noon, Tina heads west from the same point. At 2:00 P.M. they are 350 miles apart. Calculate Tina's speed in mph. ----- 36=\_\_\_\_\_mph.

37. **SQUARE**  
Diagonal = 771



37=\_\_\_\_\_

38. **TRAPEZOID WITH SEMICIRCLE INDENT**



38=\_\_\_\_\_

39.  $\left[ \frac{13800 + (1/(1.99 \times 10^{-5}))}{(18000/76600) - 0.103} \right]^2$  ----- 39=\_\_\_\_\_

40.  $\frac{(33000 + 40800)^3}{(0.0914 - 0.101)^2}$  ----- 40=\_\_\_\_\_

41.  $(0.321 + 0.184 + 0.375)^2(8190 + 8820)^2$  ----- 41=\_\_\_\_\_

42.  $(773)\sqrt{131 + 231 + 64}$  ----- 42=\_\_\_\_\_

43.  $(1/\pi)\sqrt[3]{\frac{0.0294 + 0.138}{4.44 - 0.605}}$  ----- 43=\_\_\_\_\_

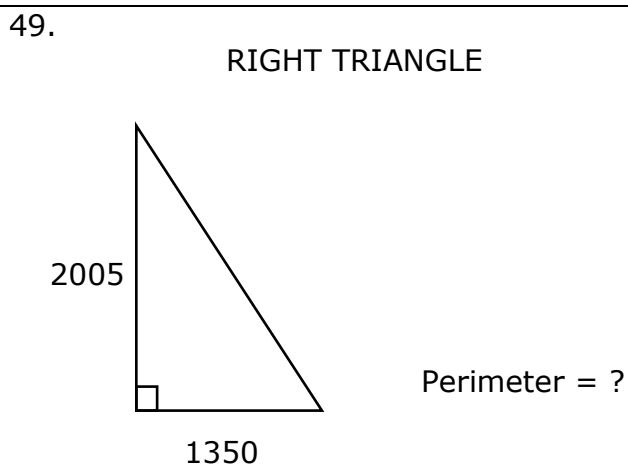
44.  $(1/(0.018))(33400 - 6710)^3$  ----- 44=\_\_\_\_\_

45.  $\frac{(137 + 540)^{1/2}}{(2250 - 569)^{1/2}}$  ----- 45=\_\_\_\_\_

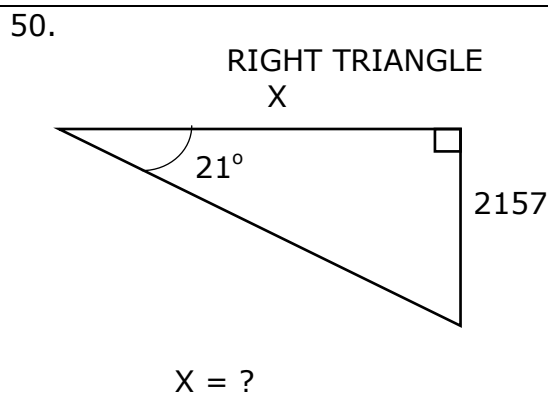
46.  $\left[ \sqrt[3]{(3620/1850)(11800)} \right]^4$  ----- 46=\_\_\_\_\_

47. Calculate the distance between the points (-4, -22) and (17,-2). 47=\_\_\_\_\_

48. Calculate the number of terms that must be added in the sum  $e^0 + e^1 + e^2 + e^3 + \dots e^n$  so that the sum exceeds one thousand. 48=\_\_\_\_\_INT.



49=\_\_\_\_\_



50=\_\_\_\_\_

51.  $\left[ \frac{2840 + 1800 + \sqrt{7.63 \times 10^6 + 2.07 \times 10^7}}{23.7/9.01} \right]^3$  ----- 51=\_\_\_\_\_

52.  $\left[ \frac{39 - 26.6 + \sqrt{5580/133}}{-374 + 865} \right]^4$  ----- 52=\_\_\_\_\_

53.  $\frac{\sqrt{0.642 + \pi + 0.72}}{(6810 - 2860 + 4400)^4}$  ----- 53=\_\_\_\_\_

54.  $(402)^2 \sqrt{(39.6)/(6.85)} - (77600 + 3.65 \times 10^5)$  ----- 54=\_\_\_\_\_

55.  $\sqrt{\frac{1/(195 - 93.8)}{(42.7)(65.9 + 133)^5}}$  ----- 55=\_\_\_\_\_

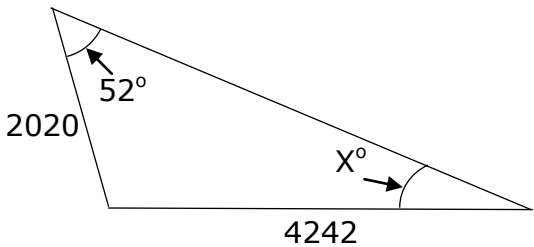
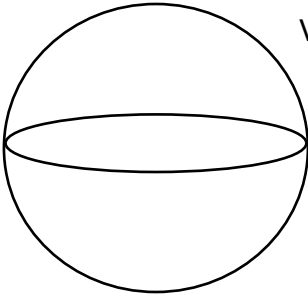
56.  $\sqrt{\frac{(7790)(87100)}{(3470)(70900)}} - 0.539 + 0.943$  ----- 56=\_\_\_\_\_

57.  $(\text{rad}) \cos(26) + (21.2/12.8)$  ----- 57=\_\_\_\_\_

58.  $\sqrt{\frac{(584)(24.8)}{(9.96) + (6.84)}} + 1/(0.43)^4$  ----- 58=\_\_\_\_\_

59. If the odds of an event happening is 5:9, calculate the probability of that event happening. ----- 59=\_\_\_\_\_

60. If a cube's edge and a sphere's radius are the same, calculate the ratio of the volume of the cube to the volume of the sphere. ---- 60=\_\_\_\_\_

<p>61. SCALENE TRIANGLE</p>  <p style="text-align: right;"><math>X^\circ = ?</math></p> <p>61= _____</p>	<p>62. SPHERE</p>  <p style="text-align: right;">Volume = <math>5.91 \times 10^7</math></p> <p style="text-align: right;">Surface Area = ?</p> <p>62= _____</p>
---	---

63.  $\frac{30!/28!}{6! + 3!}$  ----- 63= \_\_\_\_\_

64. (deg)  $(8.28 + 10.7)\sin(4.76^\circ)$  ----- 64= \_\_\_\_\_

65.  $(13.2 - \pi)e^{0.355}$  ----- 65= \_\_\_\_\_

66. (rad)  $\tan\left[\frac{(222)(\pi)}{(54.8)(12.3)}\right]$  ----- 66= \_\_\_\_\_

67. (deg)  $(109 - 103)\sin(1.26^\circ) + 0.11$  ----- 67= \_\_\_\_\_

68. (deg)  $\frac{\sin(1.36^\circ) - \tan(1.36^\circ)}{\sin(1.36^\circ)}$  ----- 68= \_\_\_\_\_

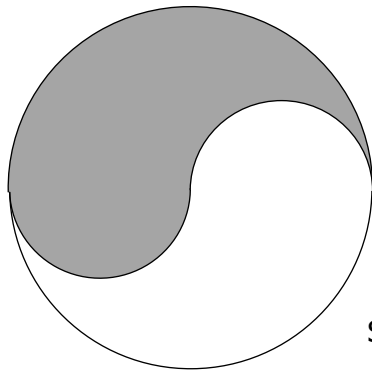
69. (deg)  $\frac{\cos(9.73^\circ)}{17.9 + 32.2}$  ----- 69= \_\_\_\_\_

70.  $(103 - 92)e^{\pi - 0.739}$  ----- 70= \_\_\_\_\_

71. Destiny needs 500 ml of a 10% alcohol solution. She has a 15% solution and a 6% solution. Calculate how much of the 15% solution she will need to mix with the 6% solution to get the solution she needs. ----- 71= \_\_\_\_\_ ml

72. A right circular cylinder holds 32,000 gallons. If the height and diameter of the of the cylinder are equal, calculate the circumference of the tank in inches. ----- 72= \_\_\_\_\_

73. CIRCLES AND EQUAL SEMICIRCLES

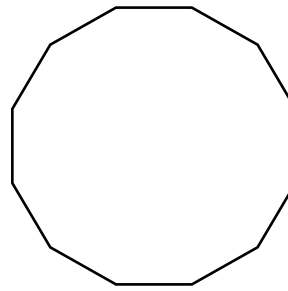


Radius of Large  
Circle = 28.5

Shaded area = ?

73= \_\_\_\_\_

74. REGULAR DODECAGON



Area = 8888

Length of side = ?

74= \_\_\_\_\_

75.  $\frac{\text{Log}(26.8 + 13.2)}{1.62 - 0.937}$  ----- 75= \_\_\_\_\_

76.  $\frac{(1.69)^{0.24}(32.2)^{0.225}}{(9.34 - 3.52)^{-12}}$  ----- 76= \_\_\_\_\_

77.  $\text{Log}(5.5 + 15.5 + 29.5)$  ----- 77= \_\_\_\_\_

78.  $\frac{(e^{0.535})(e^{0.51})(e^{0.234})}{\text{Ln}(11.9 + 56.1)}$  ----- 78= \_\_\_\_\_

79.  $1 + 2 + 3 + \dots + 688$  ----- 79= \_\_\_\_\_

80.  $1 + 0.55 + (0.55)^2 + \frac{(0.55)^4}{8} - \frac{(0.55)^5}{15}$  ----- 80= \_\_\_\_\_



# 2020 – 2021 TMSCA Middle School Calculator Test #13 Answer Key

Page 1	Page 2	Page 3	Page 4
1 = 797 = $7.97 \times 10^2$	14 = $-9.75 \times 10^8$	27 = -9480 = $-9.48 \times 10^3$	39 = $2.36 \times 10^{11}$
2 = -15.0 = $-1.50 \times 10^1$	15 = 25.0 = $2.50 \times 10^1$	28 = $1.30 \times 10^{-10}$	40 = $4.36 \times 10^{18}$
3 = 127 = $1.27 \times 10^2$	16 = 0.356 = $3.56 \times 10^{-1}$	29 = $-4.57 \times 10^8$	41 = $2.24 \times 10^8$
4 = -9.86 = $-9.86 \times 10^0$	17 = 0.116 = $1.16 \times 10^{-1}$	30 = $9.00 \times 10^{-8}$	42 = 16000 = $1.60 \times 10^4$
5 = -260 = $-2.60 \times 10^2$	18 = 0.0138 = $1.38 \times 10^{-2}$	31 = $-1.53 \times 10^{10}$	43 = 0.112 = $1.12 \times 10^{-1}$
6 = -519 = $-5.19 \times 10^2$	19 = 12.5 = $1.25 \times 10^1$	32 = 4.78 = $4.78 \times 10^0$	44 = $1.06 \times 10^{15}$
7 = -2.98 = $-2.98 \times 10^0$	20 = $-8.61 \times 10^{-6}$	33 = 0.00189 = $1.89 \times 10^{-3}$	45 = 0.635 = $6.35 \times 10^{-1}$
8 = 2.11 = $2.11 \times 10^0$	21 = 0.0631 = $6.31 \times 10^{-2}$	34 = 1.22 = $1.22 \times 10^0$	46 = 657000 = $6.57 \times 10^5$
9 = $1.06 \times 10^7$	22 = 8.68 = $8.68 \times 10^0$		
10 = $2.46 \times 10^9$	23 = 57.0 = $5.70 \times 10^1$		
		35 = 360 = $3.60 \times 10^2$	47 = 29.0 = $2.90 \times 10^1$
11 = 44000 INT.	24 = \$573.94	36 = 75.3 = $7.53 \times 10^1$	48 = 8 INT. = $X.XX \times 10^{XX}$
12 = 327 INT.	25 = 258 = $2.58 \times 10^2$	37 = 297000 = $2.97 \times 10^5$	49 = 5770 = $5.77 \times 10^3$
13 = 35.0 = $3.50 \times 10^1$	26 = 746 = $7.46 \times 10^2$	38 = 39400 = $3.94 \times 10^4$	50 = 5620 = $5.62 \times 10^3$

## 2020 – 2021 TMSCA Middle School Calculator Test #13 Answer Key

### Page 5

$$51 = 5.43 \times 10^{10}$$

$$52 = 2.18 \times 10^{-6}$$

$$53 = 4.37 \times 10^{-16}$$

$$54 = -54000$$
$$= -5.40 \times 10^4$$

$$55 = 2.73 \times 10^{-8}$$

$$56 = 2.06$$
$$= 2.06 \times 10^0$$

$$57 = 2.30$$
$$= 2.30 \times 10^0$$

$$58 = 58.6$$
$$= 5.86 \times 10^1$$

$$59 = 0.357$$
$$= 3.57 \times 10^{-1}$$

$$60 = 0.239$$
$$= 2.39 \times 10^{-1}$$

### Page 6

$$61 = 22.0$$
$$= 2.20 \times 10^1$$

$$62 = 734000$$
$$= 7.34 \times 10^5$$

$$63 = 1.20$$
$$= 1.20 \times 10^0$$

$$64 = 1.58$$
$$= 1.58 \times 10^0$$

$$65 = 14.3$$
$$= 1.43 \times 10^1$$

$$66 = 1.68$$
$$= 1.68 \times 10^0$$

$$67 = 0.242$$
$$= 2.42 \times 10^{-1}$$

$$68 = -0.000282$$
$$= -2.82 \times 10^{-4}$$

$$69 = 0.0197$$
$$= 1.97 \times 10^{-2}$$

$$70 = 122$$
$$= 1.22 \times 10^2$$

$$71 = 222$$
$$= 2.22 \times 10^2$$

$$72 = 663$$
$$= 6.63 \times 10^2$$

### Page 7

$$73 = 1280$$
$$= 1.28 \times 10^3$$

$$74 = 28.2$$
$$= 2.82 \times 10^1$$

$$75 = 2.35$$
$$= 2.35 \times 10^0$$

$$76 = 3.74 \times 10^9$$

$$77 = 1.70$$
$$= 1.70 \times 10^0$$

$$78 = 0.852$$
$$= 8.52 \times 10^{-1}$$

$$79 = 237000$$
$$= 2.37 \times 10^5$$

$$80 = 1.86$$
$$= 1.86 \times 10^0$$

**11.**  $400(80 + 30)$

**12.**  $78(5) - 7(9)$

**13.** 9 two-digit palindromes:

11, 22, 33, ...99

$$\frac{1}{11} + \frac{1}{22} + \frac{1}{33} + \cdots \frac{1}{99}$$

This is a simplified form of the reciprocal of the mean of the reciprocals.

**24.**

$$(355 + 125 + 55)1.0625 + .1(55)$$

**25.** Randy: 189

Rick:  $189(1.22)$

Stan:  $189(1.22)(1.12)$

**26.**  $2x = 71$ ;  $x = \frac{71}{2}$

Perimeter:

$$(4 + 7 + 2 + 8)\left(\frac{71}{2}\right)$$

**35.** Always 360 degrees

**36.**

$$2x + 57(3.5) = 350$$

$$x = \frac{350 - 57(3.5)}{2}$$

**37.**  $A = \frac{d^2}{2} = \frac{771^2}{2}$

**38.**  $\frac{(235+101+235)152}{2} - \frac{50.5^2\pi}{2}$

**47.**

$$\sqrt{[17 - (-4)]^2 + [-2 - (-22)]^2}$$

**48.** Add powers of  $e$  until the sum is greater than 1000.

Remember that  $e^0$  counts as one of these.

$$e^0 + e^1 + e^2 + \cdots e^7 > 1000$$

There are 8 terms.

**49.** Hypotenuse =

$$\sqrt{2005^2 + 1350^2}$$

Perimeter =

$$\sqrt{2005^2 + 1350^2} + 2005 + 1350$$

**50.**  $\frac{\tan 21}{1} = \frac{2157}{x}$ ;  $x = \frac{2157}{\tan 21}$

**59.** 5 successes, 9 failures,

14 total Probability of success  $\frac{5}{14}$

**60.**  $\frac{x^3}{\frac{4}{3}\pi x^3} = \frac{1}{\frac{4}{3}\pi}$

**61.**  $\frac{\sin 52}{4242} = \frac{\sin x}{2020}$

$$x = \arcsin\left[\frac{2020(\sin 52)}{4242}\right]$$

**62.**  $\frac{4}{3}\pi r^3 = 5.91 \times 10^7$

$$r = \sqrt[3]{\frac{5.91 \times 10^7}{\frac{4}{3}\pi}}$$

**62. contd.**

Surface Area =  $4\pi r^2$

$$4\pi \left( \sqrt[3]{\frac{5.91 \times 10^7}{\frac{4}{3}\pi}} \right)^2$$

**71.**

ml	% acid	Pure acid
$x$	6	$6x$
$y$	15	$15y$
500	10	5000

$$\begin{cases} x + y = 500 \\ 6x + 15y = 5000 \end{cases}$$

$$x = 500 - y$$

$$6(500 - y) + 15y = 5000$$

$$3000 - 6y + 15y = 5000$$

$$9y = 2000$$

$$y = \frac{2000}{9}$$

**72.**  $231 \text{ in}^3 = 1 \text{ gal.}$

$$32000(231) = \pi r^2 \cdot 2r$$

$$32000(231) = 2\pi r^3$$

$$r = \sqrt[3]{\frac{32000(231)}{2\pi}}$$

Circumference =  $2\pi r =$

$$2\pi \left( \sqrt[3]{\frac{32000(231)}{2\pi}} \right)$$

**73.**  $\frac{\pi r^2}{2} = \frac{\pi(28.5)^2}{2}$

**74.**  $\frac{(12x)^2}{\tan\left(\frac{180}{12}\right)(4(12))} = 8888$

$$x = \sqrt{\frac{8888[\tan 15](48)}{144}}$$