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This document contains ~~28~~²⁹ pages (including this one) and consists of

TMSCA Middle School Championship Meet Test Packet

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2000 - 2001 TMSCA Middle School State Number Sense Test

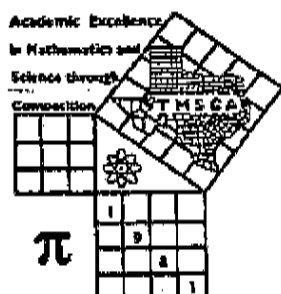
- 1) $17^2 =$ _____
- 2) $119 \div 7 =$ _____
- 3) $7.4 \times 10^5 =$ _____
- 4) $1988 + 73 =$ _____
- 5) $48\% =$ _____ fraction
- 6) $419 \times .11 =$ _____
- 7) $6 \times 9\frac{5}{6} =$ _____
- 8) $9 \times 32 + 28 \times 9 =$ _____
- 9) $6 \times 1997 + 18 =$ _____
- *10) $385 - 536 + 1148 =$ _____
- 11) $\frac{1}{3} + \frac{5}{15} + \frac{3}{9} =$ _____
- 12) $33\frac{1}{3} \times 57 =$ _____
- 13) $2.02 \times 14 =$ _____
- 14) $2 + 2 \div 2 - 2 \times 2 =$ _____
- 15) $777 =$ _____ Roman Numeral
- 16) $\frac{2}{3} =$ _____ %
- 17) $52 \times 75 =$ _____
- 18) Which is smaller $-\frac{5}{9}$ or $-\frac{9}{16}$? _____
- 19) $23^2 - 17^2 =$ _____
- *20) $293 \times 444 =$ _____
- 21) 4 hectograms = _____ centigrams
- 22) The area of a triangle with base 13 and height 18 is _____
- 23) $81 \times 89 =$ _____
- 24) $XXXV - XIV =$ _____ Arabic number
- 25) $60 \div 7\frac{1}{2} =$ _____
- 26) If $a = -4$, $b = -2$ and $c = -3$, then $\frac{abc}{8} =$ _____
- 27) $4\frac{2}{11} \times 4\frac{9}{11} =$ _____ mixed number
- 28) $104 \times 112 =$ _____
- 29) 18% of 12 is 72% of _____
- *30) $3946 \div 17 =$ _____
- 31) If $5n + 4 = 2n - 8$, then $n =$ _____
- 32) The sum of the prime factors of 70 is _____
- 33) $98 \times 18 =$ _____
- 34) The area of a circle with diameter 18 is _____
- 35) $89 \times 97 =$ _____
- 36) $\sqrt{676} =$ _____
- 37) $72 \times 125 =$ _____
- 38) The GCF of 48 and 66 is _____
- 39) The mean of 49, 46, 42 and 47 is _____
- *40) 58% of 7519 is _____
- 41) 2 is 8% of _____
- 42) $\frac{33}{40} =$ _____ decimal
- 43) $\frac{1}{3}$ gallon = _____ in³

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- 44) $4\frac{4}{9}\%$ = _____ fraction
- 45) If $\frac{1}{9} + \frac{1}{3} = \frac{1}{x}$, then $x =$ _____
- 46) $41 \times 39 =$ _____
- 47) $1 + 2 + 3 + \dots + 59 + 60 =$ _____
- 48) The simple interest on \$3600 at 9% interest for one month is \$ _____
- 49) $8\frac{2}{7} \times 6\frac{2}{7} =$ _____ mixed number
- *50) $\sqrt{37,000} =$ _____
- 51) The sum of the supplement and the complement of a 67° angle is _____ $^\circ$
- 52) $113_5 =$ _____ $_{10}$
- 53) $1234 \times 9 + 5 =$ _____
- 54) The edge of a cube with surface area 54 is _____
- 55) $19 \times 43 =$ _____
- 56) If $43_b = 27_{10}$, then $b =$ _____
- 57) $\sqrt{54} =$ _____
- 58) $12^2 + 36^2 =$ _____
- 59) $995 \times 988 =$ _____
- *60) $14 \times 16 \times 18 =$ _____
- 61) The diagonal of a rectangle with length 4 and width 1 is _____
- 62) $111 \times 35 =$ _____
- 63) $.5 + .5 + .2 + .1 =$ _____ mixed number
- 64) The y - coordinate of the midpoint between (4,-4) and (-4,4) is _____
- 65) If $x^3 = 43$, then $x =$ _____
- 66) $\frac{7}{11} + \frac{11}{7} =$ _____ mixed number
- 67) If the hypotenuse of a 30 - 60 - 90 triangle measures 12, then the long leg measures _____
- 68) $\sqrt{(32)(18)} =$ _____
- 69) The distance between the points (4,3) and (10,11) is _____
- *70) $\pi^8 =$ _____
- 71) 9 is what % less than 15 ? _____ %
- 72) $180^\circ =$ _____ radians
- 73) $39 \times 3367 =$ _____
- 74) $103 \times 95 =$ _____
- 75) $(2x - 9)(2x + 9) =$ _____
- 76) $20_4 - 13_4 =$ _____ $_4$
- 77) $17 \times \frac{17}{14} =$ _____ mixed number
- 78) How many days are there from March 24, 2000 to May 16, 2000 ? _____
- 79) If $8^n = 32,768$, then $n =$ _____
- *80) $2^9 =$ _____

1st Score: _____	2nd Score: _____	3rd Score: _____	Final Score _____
S & G _____	S & G _____	S & G _____	
Grader: _____	Grader: _____	Grader: _____	
			PLACE ID LABEL IN THIS SPACE



TMSCA MIDDLE SCHOOL CALCULATOR CHAMPIONSHIP MEET APRIL 7, 2001

GENERAL DIRECTIONS

I. About this test:

- A. You will be given 30 minutes to take this test.
- B. There are 80 problems on this test.

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^{0*}, 1.23x10⁰¹, 1.23x10⁰¹, .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. 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. Plus or minus one digit error in the last significant digit is permitted.

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).

IV. Scoring:

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

2000-01 TMSCA Middle School Calculator State Test

1. $2407 - 8890 + 9041$ ----- 1= _____
2. $2255 + 7416 + 3676 - 4597$ ----- 2= _____
3. $9172 + 6451 + 3585 + 124$ ----- 3= _____
4. $28.9 + 36.7 + 72.5 + 12.14$ ----- 4= _____
5. $21.7 + 42.9 - \pi - 101.4$ ----- 5= _____
6. $51.4 - 34.7 - 2.93 / 87.6 + 45.9$ ----- 6= _____
7. $24.7 + 24.7 \times 24.7 + 24.7 + 24.7$ ----- 7= _____
8. $18.5 \times 2.6 \times 11.9 \times (11.6 + 12.1)$ ----- 8= _____
9. $109 \times 552 \times 2.9 \times 0.00414$ ----- 9= _____
10. $9.08 \times 52.1 \times 0.817 + 10.9 \times 885$ ----- 10= _____
11. You work to problem number 71 on your calculator test today. You miss 2 number crunchers, 1 geometry, and 3 stated problems. Calculate your score. 11. _____ int
12. Three time a number decreased by twenty-four is seven less than the opposite of the number. Find the number. 12. _____
13. Christopher has \$10.35 in quarters and dimes. He has a total of 63 coins. How many quarters does he have? 13. _____ int

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14. $-104 - \frac{30.6}{2.4 + 3.81}$ ----- 14= _____
15. $-(-80.41) - (-20.4 + 50.7)$ ----- 15= _____
16. $\frac{(90.7 + 84.2)/0.241}{(2.6 + 3.67) \times 241}$ ----- 16= _____
17. $\frac{(30.4/50.7) + (84.6/17.8)}{(204 + 2.4)}$ ----- 17= _____
18. $(84/97)[206 \times 2.06 \times 20.6]$ ----- 18= _____
19. $\frac{30.4 + 50.7}{206} - \frac{20.6}{(304 + 507)}$ ----- 19= _____
20. $\left[\frac{506}{702}\right] \left[\frac{70.9 - 20.4}{104 - 88.6}\right]$ ----- 20= _____
21. $\frac{(2.72/30.6)}{(0.091/7.4)}$ ----- 21= _____
22. $3\pi[(42.6/8.7) + (17.1/5.9)]$ ----- 22= _____
23. $\frac{\pi(0.41/8.97)(18/36)}{(3\pi/3.14)}$ ----- 23= _____
24. Mr. Mack is giving a test with 10 multiple choice questions on it. Each question has four possible answers. How many different combinations of answers does the test have? 24. _____
25. In a $30^\circ - 60^\circ$ right triangle the hypotenuse is 59.4 centimeters long. Find the length of the side opposite the 30° angle in centimeters. 25. _____ cm
26. Regan paid \$5437.49, including an $8\frac{3}{4}\%$ sales tax, for a new 4-wheeler. Find the original cost of the 4-wheeler. 26.\$ _____

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27. $(37,800)[(341.5/0.124)(8790+1427)]$ ----- 27= _____
28. $[(109)(3.67-3.01)]-[(827)(967-527)]$ ----- 28= _____
29. $(\pi)(0.00825)(6.81 \times 10^9)$ ----- 29= _____
30. $\frac{(3.82 \times 10^{-7})-(4.16 \times 10^{-7})}{[455,000]}$ ----- 30= _____
31. $\frac{3.05 \times 10^7}{0.014} + \frac{140}{2.76 \times 10^{-6}}$ ----- 31= _____
32. $\left[\frac{1/84.6}{1/54.9}\right][305,000]$ ----- 32= _____
33. $\left[\frac{1}{2.79 \times 10^5}\right](85,000+174,000)$ ----- 33= _____
34. $\frac{607(2.08 \times 10^4)}{20800(6.07 \times 10^2)}$ ----- 34= _____
35. In an election for class president at South Bend Middle School, 761 students voted for one of two candidates. Ariel won by 77 votes. How many students voted for Ariel in the election? 35. _____ int
36. A guywire 30 feet long is attached to the top of a telephone pole. The guywire is attached to the ground 21 feet from the base of the telephone pole. What is the height of the telephone pole in feet? 36. _____ ft

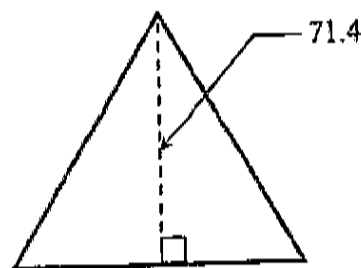
SECTOR OF A CIRCLE



Area = ?

37= _____

EQUILATERAL TRIANGLE



Area = ?

38= _____

39. $\left[\frac{504}{321}\right]^3 (42.7 + 36.8)^2$ ----- 39= _____

40. $\pi\sqrt{0.247(524 + 376)}$ ----- 40= _____

41. $(0.00427 + 0.00118)^3 [45,000 - 27,500]^2$ ----- 41= _____

42. $\left[\frac{51,000 - (1/\pi)}{(1/\pi) - 14,000}\right]^2$ ----- 42= _____

43. $(5\pi)\sqrt{\frac{4.25 - \pi}{\pi - 0.0149}}$ ----- 43= _____

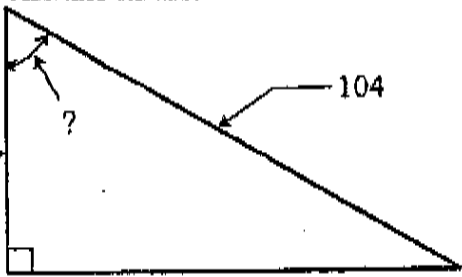
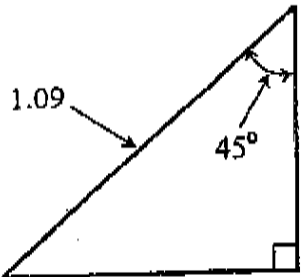
44. $\left[\frac{\sqrt{15.4 + \pi} + 206}{17.6 + 28.1} + \frac{206}{17.1}\right]^2$ ----- 44= _____

45. $\sqrt{(54/17)(5.69 \times 10^{-11})[540,000 - 37,000]}$ ----- 45= _____

46. $\frac{\sqrt{(4.15 + 3.79)(1.38 \times 10^{12})}}{(\pi)(2.17 \times 10^8)}$ ----- 46= _____

47. How many centiliters of water must be added to 1000 centiliters of a 60% acid solution in order to produce a 35% acid solution? 47. _____ cl

48. Find the slope of a line perpendicular to the line passing through the points (6,-4) and (-5,-7) on a coordinate plane. 48. _____

RIGHT TRIANGLE	RIGHT TRIANGLE
 <p style="text-align: center;">51.4 → ? 104</p>	 <p style="text-align: center;">1.09 45°</p>
49= _____ (deg)	Perimeter = ? 50= _____

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$$51. \frac{(\pi/2)\sqrt{(2.14 \times 10^5)}[897,000 - 254,000]}{(\pi/2)(6.43 \times 10^5)(231.3)} \quad 51 = \underline{\hspace{2cm}}$$

$$52. \frac{\sqrt{(0.495 + 0.171 + 0.368)^2}}{\sqrt{4.1\pi - \pi}} \quad 52 = \underline{\hspace{2cm}}$$

$$53. \left[\left(9\frac{11}{12} \right) + \left(8\frac{15}{16} \right) + \left(7\frac{5}{9} \right) \right]^8 \quad 53 = \underline{\hspace{2cm}}$$

$$54. \frac{\pi^8(91.76 + 84.2)^2}{\sqrt{(5\pi)(24.7)(2.47 \times 10^6)}} \quad 54 = \underline{\hspace{2cm}}$$

$$55. \frac{6\pi \left[\frac{972 + 467 - 593}{846} \right]^4 [8.61 \times 41.6 \times 0.472]^3}{18} \quad 55 = \underline{\hspace{2cm}}$$

$$56. \frac{\left[\frac{\sqrt{(6.4 - 3.75)(6.4 - 3.75)}}{(6.4 - 3.75)\sqrt{(2.08 \times 10^8)}} \right]^3}{1} \quad 56 = \underline{\hspace{2cm}}$$

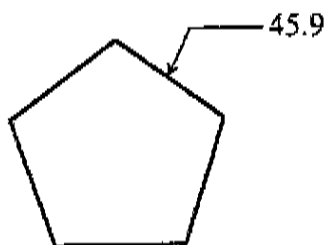
$$57. \sqrt[3]{\frac{(15)(2001)(87,000)}{(12)(1980)(365,000)}} + [\pi(8.91)^3]^3 \quad 57 = \underline{\hspace{2cm}}$$

$$58. \sqrt[3]{\frac{(54.7 + 2.16)^3}{(17.5 - 2.4)^{-5}(0.0612 + 0.0147)^0}} \quad 58 = \underline{\hspace{2cm}}$$

59. Convert 240 pounds per square inch to kilograms per square centimeter. 59. kg/cm²

60. Billy Joe paddled his canoe 4 miles down a river in 1 hour with the current. The return trip against the current took 2 hours and 45 minutes. Find the rate of the current in miles per hour. 60. mi/h

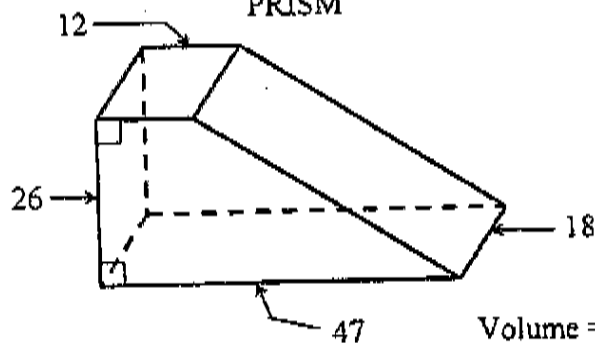
REGULAR PENTAGON



Area = ?

61= _____

PRISM



Volume = ?

62= _____

63. $11! \times 7!$ _____ 63= _____

64. $(7\pi)^3 (0.00497 + 0.00515)^0 (4.85 \times 10^{-6})^{-3}$ _____ 64= _____

65. $1 \times \frac{1}{2} \times \frac{1}{4} \times \frac{1}{6} \times \frac{1}{8}$ _____ 65= _____

66. (deg) $\frac{\cos(71.4^\circ)}{\sin(71.4^\circ)}$ _____ 66= _____

67. (rad) $\tan\left(\frac{\pi}{4}\right) / \cos(\pi)$ _____ 67= _____

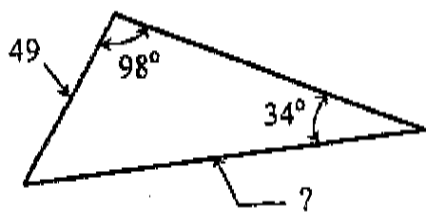
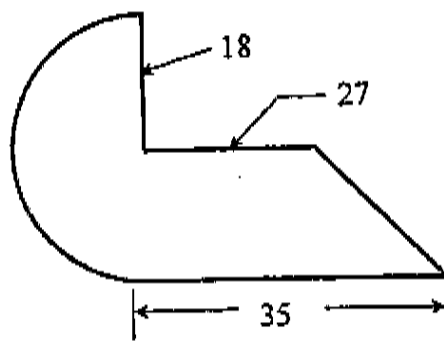
68. (rad) $\sin\left(\frac{\pi}{4}\right) \cos\left(\frac{\pi}{4}\right) \tan\left(\frac{\pi}{4}\right)$ _____ 68= _____

69. (deg) $(84.7) \tan(140^\circ)$ _____ 69= _____

70. $\left[\frac{(2.7 - \pi)^2}{(46.9 - 32.7)^0 (\pi + 7\pi)^{-3}} \right]^{\frac{2}{3}}$ _____ 70= _____

71. The radius of a sphere is two thousand two hundred two meters. Find the volume of the sphere in cubic meters. 71. _____ m^3

72. Calculate 527^{527} . 72. _____

SCALENE TRIANGLE	SEMICIRCLE, TRAPEZOID
	
73= _____	74= _____

75. $\left[\frac{1}{\sqrt{\sqrt{\sqrt{759,000}}}} \right]^8$ ----- 75= _____

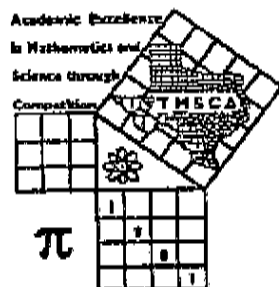
76. $\text{Ln}[24.9 + 36.7 - 22.4]$ ----- 76= _____

77. $(e^\pi)(e^{3\pi})(e^{5\pi})$ ----- 77= _____

78. $\frac{-(0.118)\text{Log}(36,000 + 15,000)}{\text{Ln}(36.7) + (6.14 \times 10^5)}$ ----- 78= _____

79. $(0.915)10^{(\pi) + (\pi)}$ ----- 79= _____

80. $\frac{1}{1.3} + \frac{1}{3.5} + \frac{1}{5.7} + \frac{1}{7.9} + \frac{1}{9.11}$ ----- 80= _____



**TMSCA MIDDLE SCHOOL
MATHEMATICS
CHAMPIONSHIP MEET
APRIL 7, 2001**

GENERAL DIRECTIONS

1. About this test:

- A. You will be given 40 minutes to take this test.
- B. There are 50 problems on this test.

2. All answers must be written on the answer sheet/Scantron form/Chatsworth card provided. If you are using an answer sheet be sure to use CAPITAL LETTERS. Clean erasures are necessary for accurate grading.

3. If using a scantron answer form be sure to correctly denote the number of problems not attempted.

4. You may write anywhere on the test itself. You must write only answers on the answer sheet.

5. You may use additional scratch paper provided by the contest director.

6. All questions have ONE and ONLY ONE correct [BEST] answer. There is a penalty for all incorrect answers.

7. Calculators MAY NOT be used on this test.

8. All questions answered correctly are worth FIVE points. TWO points will be deducted for all questions answered incorrectly. No points will be added or subtracted for questions not answered.

9. In case of ties, percent accuracy will be used as a tie breaker.

2000-2001 TMSCA Middle School Mathematics State Test

1. $489 \times 697 =$
 A. 339,933 B. 340,923 C. 339,823 D. 340,833 E. NOT
2. Find the quotient if the dividend is 0.55 and the divisor is 125.
 A. 0.0044 B. 68.75 C. 227.27 D. 0.6875 E. NOT
3. $4 + 8 + 12 + 16 + \dots + 92 + 96 =$
 A. 2,400 B. 1,200 C. 1,296 D. 384 E. NOT
4. $(24 \times 18) + (76 \times 18) - (37 \times 18) =$
 A. 1,134 B. 1,124 C. 1,114 D. 1,144 E. NOT
5. 1,000 decimeters - 1,000 decameters = $\frac{\quad}{\quad}$ meters
 A. 99 B. 990 C. 9,900 D. 99,000 E. NOT
6. $5[2(3 - 6) - (5 - 8)^2] =$
 A. -75 B. 75 C. -15 D. 15 E. NOT
7. Find the number half-way between $\frac{3}{8}$ and 0.48.
 A. 0.3875 B. 0.4275 C. 0.4475 D. 0.4875 E. NOT
8. $4\frac{7}{8} \div 3\frac{2}{3} \times 5\frac{1}{2} \div 3\frac{1}{4} =$
 A. $\frac{4}{9}$ B. $\frac{9}{4}$ C. $\frac{121}{4}$ D. $\frac{4}{121}$ E. NOT
9. Find the product of the LCM and GCF of 21, 28 and 81.
 A. 1,134 B. 2,268 C. 4,536 D. 47,628 E. NOT
10. A rectangular prism with dimensions 7 in. by 11 in. by 39 in. will hold how many gallons of water?
 A. 3,003 B. 273 C. 13 D. 11 E. NOT
11. $\frac{10!}{9 \cdot 7 \cdot 5 \cdot 3 \cdot 1} =$
 A. 3,840 B. 3,940 C. 3,750 D. 3,850 E. NOT
12. $17\frac{1}{8}\% =$ _____ (fraction)
 A. $\frac{137}{800}$ B. $\frac{139}{800}$ C. $\frac{141}{800}$ D. $\frac{143}{800}$ E. NOT
13. Simplify: $\frac{4x^2yz - 16xy}{4xyz}$
 A. $x - 4z$ B. $\frac{xz - 4}{z}$ C. $3x^2y$ D. $\frac{x - 4}{z}$ E. NOT

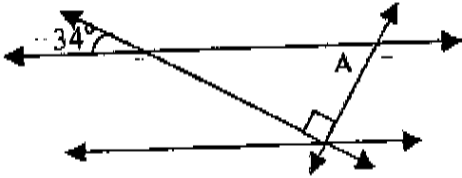
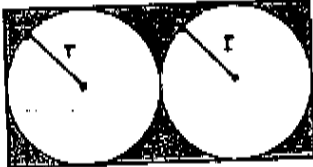
TMSCA 00-01 MSMA State Test

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14. Chris is going to enroll in Taekwondo for one year. He can pay \$57.99 per month or there is a cash price of \$569.99 for one year. How much will he save by paying cash for the entire year?
 A. 120.89 B. 123.89 C. \$125.89 D. 127.89 E. NOT
15. Estimate $\sqrt[3]{628}$ to the nearest whole number.
 A. 10 B. 9 C. 8 D. 7 E. NOT
16. Find the 10th pentagonal number.
 A. 135 B. 138 C. 142 D. 145 E. NOT
17. Find the distance between the points $(-7,4)$ and $(11,-6)$ on a coordinate plane.
 A. $2\sqrt{106}$ B. $4\sqrt{53}$ C. $3\sqrt{53}$ D. $2\sqrt{29}$ E. NOT
-
18. $0.\overline{13} \in$ _____
 A. Natural Numbers B. Rationals C. Irrationals D. Integers E. NOT
19. $8888_9 - 7777_8 =$ _____
 A. 10120 B. 10121 C. 10122 D. 10123 E. NOT
20. 20% of _____ equals 50% of 99.
 A. 39.6 B. 49.5 C. 123.75 D. 247.5 E. NOT
21. The product of the 1st five whole numbers is _____
 A. 15 B. 30 C. 60 D. 120 E. NOT
22. Find the probability of drawing a spade from a standard deck of playing cards and rolling an even number on a die.
 A. $1/8$ B. $1/6$ C. $1/4$ D. $1/2$ E. NOT
23. A DVD player cost \$189.99 plus and 8 $\frac{1}{4}$ % sales tax. Find the total cost of the DVD player.
 A. \$204.76 B. \$204.86 C. \$205.66 D. \$205.86 E. NOT
24. $1101101_2 =$ _____₈
 A. 145 B. 155 C. 147 D. 153 E. NOT
25. MCDXCIV = _____ (Arabic Numerals)
 A. 1,494 B. 1,584 C. 1,694 D. 1,594 E. NOT
26. Regan ran the 100-meter dash in 9.6 seconds. Find her speed in kilometers per hour.
 A. 35.5 B. 37.5 C. 38.5 D. 39.5 E. NOT
27. Lynn is three times as old as Julie. Ten years from now, Lynn will be 28 years older than Julie. How old is Lynn now?
 A. 30 B. 32 C. 40 D. 42 E. NOT

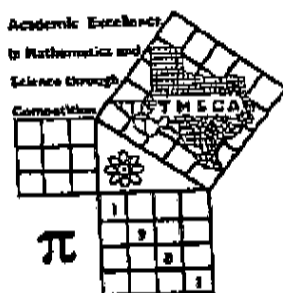
TMSCA 00-01 MSMA State Test

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28. Bob averaged 36 points in the 1st ten games of the season. He only averaged 22 points in the last eight games of the season. Find his overall average.
 A. 29 B. $29\frac{7}{8}$ C. 29.8 D. 30 E. NOT
29. $\sqrt[3]{5\frac{23}{64}} =$
 A. $7\sqrt{7}/4$ B. $7\sqrt{7}/8$ C. $7/8$ D. $7/4$ E. NOT
30. $0.\overline{336} =$ _____ (fraction)
 A. $67/198$ B. $37/110$ C. $166/495$ D. $329/990$ E. NOT
31. Find the volume in cubic inches of a right circular cone whose radius is $4\sqrt{2}$ inches and whose height is 21 inches. Assume $\pi = 22/7$.
 A. 672 B. 704 C. 2,112 D. 1,056 E. NOT
32. Name the property illustrated: if $a = b$ and $b = c$, then $a = c$.
 A. Reflexive B. Transitive C. Symmetric D. Commutative E. NOT
33. Find the measure of angle A. The horizontal lines are parallel.
 A. 112 B. 116 C. 124 D. 128 E. NOT
- 
34. Find the odds of rolling a number greater than nine on a pair of dice.
 A. 1/5 B. 1/6 C. 1/4 D. 1/2 E. NOT
35. Which formula can be used to find the shaded area of the rectangle?
 A. $2r^2\pi - 8r^2$ B. $2r^2(4 - \pi)$ C. $2r(4r) - 2\pi r$
 D. $2r(4r - \pi)$ E. NOT
- 
36. $0.\overline{24} + 0.\overline{36} =$
 A. 0.6 B. 0.606 C. $12/33$ D. $20/33$ E. NOT
37. Find the largest fraction from the following set of data: $\frac{7}{11}, \frac{13}{15}, \frac{5}{6}, \frac{4}{5}, \frac{8}{9}$.
 A. $7/11$ B. $13/15$ C. $5/6$ D. $4/5$ E. NOT
38. Find the total surface area of a rectangular prism that measures $27'' \times 34'' \times 16''$ in square inches.
 A. 14,688 B. 1,894 C. 3,788 D. 1,836 E. NOT
39. Which of the following lines is perpendicular to $3x - 2y = 8$?
 A. $3x - 2y = 12$ B. $3x + 2y = 12$ C. $4x + 6y = 18$
 D. $4x - 6y = 18$ E. NOT

TMSCA 00-01 MSMA State Test

40. Sharrod rode out of town on his scooter at a rate of 45 mi/h. When his scooter had a flat, he walked back to town at a rate of 5 miles per hour. If he was gone 4 hours, how many miles from town did his scooter have a flat?
A. 20 B. 22 C. 18 D. 24 E. NOT
41. The ratio of boys to girls at the Math and Science Meet was 7:5. The total number of students at the Meet was 840. How many girls attended the Math and Science Meet?
A. 350 B. 490 C. 600 D. 1,176 E. NOT
42. How many whole number divisors does 48 have?
A. 6 B. 8 C. 9 D. 10 E. NOT
43. Add: $\frac{t}{t^2-4} + \frac{-4}{t^2-t-6} =$
A. $\frac{t^2-8t+8}{t^3-3t^2-4t+12}$ B. $\frac{t^2-7t+8}{t^3-3t^2-4t+12}$ C. $\frac{t^2+7t-8}{t^3-3t^2-4t-12}$ D. $\frac{t-4}{t^2-t-10}$ E. NOT
44. Solve for x: $(4-3x)-(x-7)=2x-(12+2x)$
~~A. -9/8~~ B. 8/9 C. 23/4 D. 4/23 E. NOT
45. A gear with 48 teeth makes 60 revolutions per minute and meshes with a gear having 20 teeth. What is the speed of the second gear if the number of r.p.m. varies inversely as the number of teeth?
A. 16 B. 25 C. 57,600 D. 144 E. NOT
46. Simplify: $x^{6y-4} \div x^{3y} \cdot x^{2y-2} \cdot x^3$
A. x^{4y+24} B. x^{12y-2} C. x^{5y-3} D. x^{4y-2} E. NOT
47. Simplify: $\frac{-3x^{-3}y^3}{(x^2y^{-1})^{-2}} - \frac{4xy^{-3}z^0}{x^{-2}(y^{-1})^3z^{-2}}$
A. $-3xy-4x^3z^2$ B. $-3x^7y^6-4x$ C. $-3x-4x^3z^2$ D. $-3x^{-7}y-4x^{-1}y^{-6}z^{-2}$ E. NOT
48. How many kilograms of water must be added to 240 kilograms of a 70% salt solution in order to produce a 25% solution?
A. 412 B. 416 C. 424 D. 432 E. NOT
49. Rationalize the denominator: $\frac{4}{\sqrt{3}-\sqrt{5}}$
A. $4\sqrt{3}-4\sqrt{5}$ B. $4\sqrt{3}+4\sqrt{5}$ C. $2\sqrt{3}-2\sqrt{5}$ D. $2\sqrt{3}+2\sqrt{5}$ E. NOT
50. Factor: $8y^2-10y-7$
A. $(8y-7)(y+1)$ B. $(4y+7)(2y-1)$ C. $(4y-1)(2y-7)$ D. $(4y-7)(2y+1)$ E. NOT



TMSCA MIDDLE SCHOOL SCIENCE CHAMPIONSHIP MEET APRIL 7, 2001

GENERAL DIRECTIONS

1. About this test:
 - A. You will be given 40 minutes to take this test.
 - B. There are 50 problems on this test.
2. All answers must be written on the answer sheet/Scantron form/Chatsworth card provided. If you are using an answer sheet be sure to use CAPITAL LETTERS. Clean erasures are necessary for accurate grading.
3. If using a scantron answer form be sure to correctly denote the number of problems not attempted.
4. You may write anywhere on the test itself. You must write only answers on the answer sheet.
5. You may use additional scratch paper provided by the contest director.
6. All questions have **ONE** and **ONLY ONE** correct [BEST] answer. There is a penalty for all incorrect answers.
7. On the back of this page is a copy of the periodic table of the elements as well as a list of some potentially useful information in answering the questions.
8. Calculators may be used. Calculators must be silent and hand-held that do not need an external power source. Each contestant may bring one spare calculator. Calculators shall not contain built in features such as measurement or unit conversions, scientific constant (except π and e) or ROM base scientific formulas. Small hand-held computers are not permitted. Examples of allowed functions would include $+$, $-$, \times , \div , $\%$, $\sqrt{\quad}$, 10^x , $\log(x)$, e^x , $\ln(x)$, \sin , \sin^{-1} , \cos , \cos^{-1} , \tan , \tan^{-1} , with scientific notation and degree/radian capability. **CALCULATORS USED MUST BE ON THE UIL APPROVED LIST FOR MATH & SCIENCE COMPETITION. THE CONTEST DIRECTOR SHALL HAVE AUTHORITY TO APPROVE OR DISAPPROVE ANY CALCULATOR. NO GRAPHING CALCULATORS ALLOWED.**
9. All answers within $\pm 5\%$ will be considered correct.
10. All questions answered correctly are worth FIVE points. TWO points will be deducted for all questions answered incorrectly. no points will be added or subtracted for questions not answered.
11. In case of ties, percent accuracy will be used as a tie breaker.

2001 TMSCA Championship Meet Science Test

1. The H-R diagram showing the relationship between a star's brightness and its temperature was constructed by
A. Hertswilde and Remmington C. Himmelmann and Rogers E. N. O. T.
B. Hertzsprung and Russell D. Hawkings and Renault
2. A _____ is characterized by a definite volume but no definite shape.
A. liquid B. solid C. gas D. solution E. N.O.T.
3. The region on an enzyme to which a substrate binds is called the
A. catalyst B. activated complex C. active site D. carboxyl group E. N.O.T.
4. Animals in the phylum Cnidaria include
A. flukes B. roundworms C. medusae D. sponges E. N.O.T.
5. An immature animal that looks and acts nothing like the adult of that species is called a
A. gemmule B. larva C. bud D. proglottid E.N.O.T.
6. A mixture whose composition is uniform throughout is _____
A. homogeneous B. heterogeneous C. heterozygous D. homiletic E. N.O.T.
7. A chunk of ice, dust, and gas from the Oort cloud that moves around the sun is called a (an)
A. asteroid B. comet C. meteoroid D. planet E. N.O.T.
8. A nutrient that plants use for proper leaf growth and color is
A. zinc B. potassium C. calcium D. nitrogen E. N.O.T.
9. Cooling a gas far enough causes it to _____, or turn to a liquid.
A. vaporize B. condense C. melt D. sublimate E. N.O.T.
10. To which organelles does messenger RNA attach?
A. chloroplasts B. ribosomes C. mitochondria D. lysosomes E. N.O.T.
11. Pulsars are
A. red dwarfs B. white dwarfs C. supergiants D. novas E. N.O.T.
12. A reaction that releases heat is said to be
A. thermal B. explosive C. exothermic D. endothermic E. N.O.T.

TMSCA 00-01MSSC Test 15

2

13. Chunks of rock in a belt between the orbits of Mars and Jupiter are called
 A. asteroids B. comets C. meteors D. meteorites E. N.O.T.
14. Trilobites
 A. are primarily terrestrial C. communicate by "dancing"
 B. are extinct D. have highly specialized appendages E. N.O.T.
15. The ability of an organism to maintain constant conditions within the body is called
 A. irritability B. homeostasis C. metabolism D. stimulus E. N.O.T.
16. Which fishes do not have jaws, scales, or paired fins?
 A. sharks C. sturgeons E. N.O.T.
 B. lampreys and hagfishes D. ocean sunfish
17. _____ is the point at which a lever is supported when it is lifting.
 A. load B. effort C. force D. fulcrum E. N.O.T.
18. A person with the blood type B will be able to receive blood from the following types:
 A. A, B B. B, O C. AB, A, B D. A, B, AB, O E. N.O.T.
19. A four chambered heart is an advantage because
 A. it keeps oxygen-rich and oxygen-poor blood separate C. it allows oxygen-rich and oxygen-poor blood to mix E. N.O.T.
 B. it slows the flow of blood D. blood can move through it quickly
20. The energy of motion or "active" energy is _____
 A. potential B. chemical C. kinetic D. exothermic E. N.O.T.
21. _____ changes may affect the size, shape, state, etc. of a substance but not its composition.
 A. Physical B. Chemical C. External D. Thermal E. N.O.T.
22. With respect to the H-R diagram of the stars, our Sun is a (n):
 A. red giant B. white dwarf C. main sequence D. blue giant E. N.O.T.
23. The transport of water in the xylem is thought to depend on the fact that water molecules
 A. freeze at 0 degrees Celsius C. hold tightly to each other E. N.O.T.
 B. are made up of oxygen and hydrogen D. prefer to move downward in response to gravity
24. Which of these is not used as evidence for evolution?
 A. DNA sequences C. body size E. N.O.T.
 B. stages of development D. body structures

TMSCA 00-01MSSC Test 15

4

39. Chromatids are held together by a
 A. spindle B. chloroplast C. centromere D. cell membrane E. N.O.T.
40. Uncontrolled cell division is known as
 A. cancer B. mitosis C. cytokinesis D. growth E. N.O.T.
41. Starch is an example of a
 A. nucleic acid B. protein C. lipid D. carbohydrate E. N.O.T.
42. Pneumonia is a _____ infection of the lungs.
 A. viral B. bacterial C. viral or bacterial D. neither viral or bacterial E. N.O.T.
43. Proteins are polymers of
 A. fatty acids B. amino acids C. sterols D. nucleic acids E. N.O.T.
44. Which animal is a medusa
 A. coral B. jellyfish C. planarian D. sea anemone E. N.O.T.
45. The pyloric sphincter is located between the _____ and the _____.
 A. esophagus, stomach B. stomach, duodenum C. small intestine, large intestine D. liver, large intestine E. N.O.T.
46. What causes the lift that allows a bird's wing to rise?
 A. reduced air pressure beneath the wing B. air that is not moving C. reduced air pressure above the wing D. jet propulsion E. N.O.T.
47. The legs of arthropods always
 A. number six. B. are rigid. C. are jointed. D. are attached to the abdomen. E. N.O.T.
48. The process by which water vapor changes to liquid water is
 A. evaporation B. transpiration C. condensation D. precipitation E. N.O.T.
49. Energy from the Sun travels to Earth's surface by
 A. radiation B. convection C. evaporation D. conduction E. N.O.T.
50. A planet whose rotation is retrograde is
 A. Mercury B. Mars C. Jupiter D. Venus E. N.O.T.

2000 - 2001 TMSCA Middle School State Number Sense Key

- | | | | |
|------------------------------------|------------------------|---------------------------------------|----------------------|
| 1) 289 | 22) 117 | 44) $\frac{2}{45}$ | 64) 0 |
| 2) 17 | 23) 7209 | 45) $\frac{9}{4}, 2\frac{1}{4}, 2.25$ | 65) $\sqrt[3]{43}$ |
| 3) 740,000 | 24) 21 | 46) 1599 | 66) $2\frac{16}{77}$ |
| 4) 2061 | 25) 8 | 47) 1830 | 67) $6\sqrt{3}$ |
| 5) $\frac{12}{25}$ | 26) -3 | 48) 27.00 | 68) 24 |
| 6) 46.09 | 27) $20\frac{18}{121}$ | 49) $52\frac{4}{49}$ | 69) 10 |
| 7) 59 | 28) 11,648 | 50) 183 - 201 | 70) 9015 - 9962 |
| 8) 540 | 29) 3 | 51) 136 | 71) 40 |
| 9) 12,000 | 30) 221 - 243 | 52) 33 | 72) π |
| 10) 948 - 1046 | 31) -4 | 53) 11,111 | 73) 131,313 |
| 11) 1 | 32) 14 | 54) 3 | 74) 9785 |
| 12) 1900 | 33) 1764 | 55) 817 | 75) $4x^2 - 81$ |
| 13) 28.28 | 34) 81π | 56) 6 | 76) 1 |
| 14) -1 | 35) 8633 | 57) $3\sqrt{6}$ | 77) $20\frac{9}{14}$ |
| 15) DCCLXXVII | 36) 26 | 58) 1440 | 78) 53 |
| 16) $\frac{200}{3}, 66\frac{2}{3}$ | 37) 9000 | 59) 983,060 | 79) 5 |
| 17) 3900 | 38) 6 | 60) 3831 - 4233 | 80) 487 - 537 |
| 18) $\frac{9}{16}$ | 39) 46 | 61) $\sqrt{17}$ | |
| 19) 240 | 40) 4143 - 4579 | 62) 3885 | |
| 20) 123,588 - 136,596 | 41) 25 | 63) $1\frac{4}{9}$ | |
| 21) 40,000 | 42) .825 | | |
| | 43) 77 | | |

2000-2001 Middle School Science Test # 15

Answer Key

- | | | |
|-----------------------|-----------------|-----------------------------|
| 1. B | 17. D | 33. C |
| 2. A | 18. B | 34. D |
| 3. C | 19. A | 35. E (gravity of the Moon) |
| 4. C | 20. C | 36. A |
| 5. B | 21. A | 37. A |
| 6. A | 22. C | 38. A |
| 7. B | 23. C | 39. C |
| 8. D | 24. C | 40. A |
| 9. B | 25. D | 41. D |
| 10. B | 26. B | 42. C |
| 11. E (neutron stars) | 27. B | 43. B |
| 12. C | 28. A | 44. B |
| 13. A | 29. C | 45. B |
| 14. B | 30. D | 46. C |
| 15. B | 31. B | 47. C |
| 16. B | 32. E (gravity) | 48. C |
| | | 49. A |
| | | 50. D |

2000-01 TMSCA MIDDLE SCHOOL CALCULATOR STATE Key

Page 1	Page 2	Page 3	Page 4
1= 2560 2.56x10 ³	14= -109 -1.09x10 ²	27= 1.06x10 ¹²	39= 24500 2.45x10 ⁴
2= 8750 8.75x10 ³	15= 50.1 5.01x10 ¹	28= -364000 -3.64x10 ⁵	40= 46.8 4.68x10 ¹
3= 19300 1.93x10 ⁴	16= 0.480 4.80x10 ⁻¹	29= 1.77x10 ⁸	41= 49.6 4.96x10 ¹
4= 150 1.50x10 ²	17= 0.0259 2.59x10 ⁻²	30= -7.47x10 ⁻¹⁴	42= 13.3 1.33x10 ¹
5= -39.9 -3.99x10 ¹	18= 7570 7.57x10 ³	31= 2.23x10 ⁹	43= 9.35 9.35x10 ⁰
6= 62.6 6.26x10 ¹	19= 0.368 3.68x10 ⁻¹	32= 1.98000 1.98x10 ⁵	44= 147 1.47x10 ²
7= 684 6.84x10 ²	20= 2.36 2.36x10 ⁰	33= 0.928 9.28x10 ⁻¹	45= 0.00953 9.53x10 ⁻³
8= 13600 1.36x10 ⁴	21= 7.23 7.23x10 ⁰	34= 1.00 1.00x10 ⁰	46= 0.00486 4.86x10 ⁻³
9= 722 7.22x10 ²	22= 73.5 7.35x10 ¹	35= 419 int	47= 714 7.14x10 ²
10= 10000 1.00x10 ⁴	23= 0.0239 2.39x10 ⁻²	36= 21.4 2.14x10 ¹	48= -3.67 -3.67x10 ⁰
11= 301 int	24= 1050000 1.05x10 ⁶	37= 66300 6.63x10 ⁴	49= 60.4 6.04x10 ¹
12= 4.25 4.25x10 ⁰	25= 29.7 2.97x10 ¹	38= 2940 2.94x10 ³	50= 2.63 2.63x10 ⁰
13= 27 int	26= \$4999.99		

2000-01 TMSCA MIDDLE SCHOOL CALCULATOR STATE

Page 5

Page 6

Page 7

$$51 = 2.00$$

$$2.00 \times 10^0$$

$$52 = 0.585$$

$$5.85 \times 10^{-1}$$

$$53 = 2.37 \times 10^{11}$$

$$54 = 9490$$

$$9.49 \times 10^3$$

$$55 = 5060000$$

$$5.06 \times 10^6$$

$$56 = 3.33 \times 10^{-13}$$

$$57 = 1.10 \times 10^{10}$$

$$58 = 5250$$

$$5.25 \times 10^3$$

$$59 = 16.9$$

$$1.69 \times 10^1$$

$$60 = 1.27$$

$$1.27 \times 10^0$$

$$61 = 3620$$

$$3.62 \times 10^3$$

$$62 = 13800$$

$$1.38 \times 10^4$$

$$63 = 2.01 \times 10^{11}$$

$$64 = 9.32 \times 10^{19}$$

$$65 = 0.00260$$

$$2.60 \times 10^{-3}$$

$$66 = 0.337$$

$$3.37 \times 10^{-1}$$

$$67 = -1.00$$

$$-1.00 \times 10^0$$

$$68 = 0.500$$

$$5.00 \times 10^{-1}$$

$$69 = -71.1$$

$$-7.11 \times 10^1$$

$$70 = 212$$

$$2.12 \times 10^2$$

$$71 = 4.47 \times 10^{10}$$

$$72 = 2.48 \times 10^{1434}$$

$$73 = 86.8$$

$$8.68 \times 10^1$$

$$74 = 1070$$

$$1.07 \times 10^3$$

$$75 = 1.32 \times 10^{-6}$$

$$76 = 3.67$$

$$3.67 \times 10^0$$

$$77 = 1.90 \times 10^{12}$$

$$78 = -9.05 \times 10^{-7}$$

$$79 = 1760000$$

$$1.76 \times 10^6$$

$$80 = 0.455$$

$$4.55 \times 10^{-1}$$

2000-2001 Middle School Mathematics State Test

Answer Key

- | | | |
|---------------|-----------|----------------------------------|
| 1. D | 17. A | 33. C |
| 2. A | 18. B | 34. A |
| 3. B | 19. B | 35. B |
| 4. A | 20. D | 36. D |
| 5. E (-9,900) | 21. E (0) | 37. E (8/9) |
| 6. A | 22. A | 38. C |
| 7. B | 23. C | 39. C |
| 8. B | 24. B | 40. C |
| 9. B | 25. A | 41. A |
| 10. C | 26. B | 42. D |
| 11. A | 27. D | 43. B |
| 12. A | 28. B | 44. C |
| 13. B | 29. D | 45. D |
| 14. C | 30. B | 46. C |
| 15. B | 31. B | 47. A |
| 16. D | 32. B | 48. D |
| | | 49. E $(-2\sqrt{3} - 2\sqrt{5})$ |
| | | 50. D |

2000-2001 Middle School Mathematics State Test

Selected Solutions

7. Average the two: $\frac{3}{8} + 0.48 = 0.375 + 0.48 = 0.855 / 2 = 0.4275$

12. $17\frac{1}{8}\% = 0.17125 = \frac{17125}{100000} = \frac{137}{800}$

13. $\frac{4x^2yz - 16xy}{4xyz} = \frac{4xy(xz - 4)}{4xyz} = \frac{xz - 4}{z}$

16. Pentagonal Number = $\frac{3}{2}n^2 - \frac{n}{2} = \frac{3}{2}(10)^2 - \frac{10}{2} = 150 - 5 = 145$

21. $0 \cdot 1 \cdot 2 \cdot 3 \cdot 4 = 0$

27. $L = 3J \quad L + 10 = J + 28 + 10$

$$3J + 10 = J + 38$$

$$2J = 28$$

$$J = 14 \quad 3J = 42$$

40. $d_1 = d_2 \quad r_1 t_1 = r_2 t_2 \quad r_1 = 45 \quad r_2 = 5 \quad t_1 = 4 - t_2$

$$45(4 - t_2) = 5t_2$$

$$180 - 45t_2 = 5t_2$$

$$180 = 50t_2$$

$$t_2 = 3.6 \quad d = rt \quad d = 5(3.6) = 18$$

43. $\frac{t}{t^2 - 4} + \frac{-4}{t^2 - t - 6} = \frac{t}{(t-2)(t+2)} + \frac{-4}{(t-3)(t+2)} = \frac{t}{(t-2)(t+2)} \cdot \frac{(t-3)}{(t-3)} + \frac{-4}{(t-3)(t+2)} \cdot \frac{(t-2)}{(t-2)} =$

$$\frac{t^2 - 3t}{(t-2)(t+2)(t-3)} + \frac{-4t + 8}{(t-2)(t+2)(t-3)} = \frac{t^2 - 7t + 8}{t^3 - 3t^2 - 4t + 12}$$

46. $x^{6y-4} \div x^{3y} \cdot x^{2y-2} \cdot x^3 = x^{6y-4-3y+2y-2+3} = x^{5y-3}$

48. $0.7(240) = 0.25(240 + x)$

$$168 = 60 + 0.25x$$

$$108 = 0.25x$$

$$x = 432$$