

WCTM MATHEMATICS CONTEST, 2002

Test 1

NAME: _____

CLASS 7 & 8 Grade

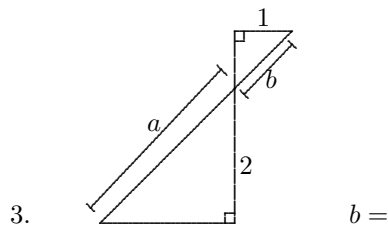
SCHOOL: _____

1. $(3^{a+2})^b =$

- (A) 3^{a+2+b} (B) 3^{ab+2} (C) 3^{a+2b} (D) 3^{ab+2b} (E) 3^{ab} [1] _____

2. If $2 - x = \frac{2}{1 - x}$ then

- (A) there are two solutions whose sum is 3;
 (B) there is one solution only, $x = 2$;
 (C) there are two solutions whose sum is -3
 (D) there is one solution only, $x = 0$
 (E) there are two solutions whose product is 2. [2] _____

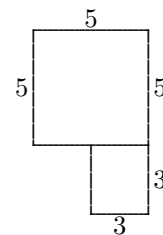


- (A) $\frac{a}{2}$ (B) $\frac{a}{\sqrt{a^2 - 4}}$ (C) $\sqrt{4 + a^2}$ (D) $\frac{2}{a}$ (E) $\frac{1}{\sqrt{4 + a^2}}$ [3] _____

4. Each face of a cube has area 4 sq in. The total length of all the edges of the cube is

- (A) 24 in.^2 (B) 24 in. (C) 12 in. (D) 16 in. (E) 8 in. [4] _____

5. A room has area 34 sq ft. If the floor is tiled with two colors, red and black, like a checkerboard with $12'' \times 12''$ tiles then



- (A) there are 2 more tiles of one color than the other;
 (B) there are 3 more tiles of one color than the other;
 (C) there are 15 more tiles of one color than the other;
 (D) there are 12 more tiles of one color than the other;
 (E) there are the same number of tiles of each color. [5] _____

6. A scale model of a 3-dimensional art piece weighs 10 lbs. The scale is 1:10. The final art piece, made of the same material as the scale model will weigh

- (A) 100 lbs. (B) 1,000 lbs. (C) 1 ton (D) 5 tons (E) None of these [6] _____

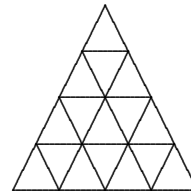
7. $\frac{\frac{1}{2} + \frac{1}{3}}{\frac{a}{b}} =$

- (A) $\frac{5a}{6b}$ (B) $\frac{2b}{3a}$ (C) $\frac{5b}{6a}$ (D) $\frac{2a}{5b}$ (E) None of these [7] _____

8. If $\frac{1}{3} - \frac{1}{2} + \frac{a}{4} = \frac{1}{6}$, then $a =$

- (A) $\frac{1}{3}$ (B) 2 (C) -1 (D) $\frac{4}{3}$ (E) 0 [8] _____

9. How many triangles are there in the picture with each side 2 units long?



- (A) 3 (B) 4 (C) 5 (D) 6 (E) 7 [9] _____

10. $\frac{2}{3 - \sqrt{2}} =$

- (A) $\frac{6 + 2\sqrt{2}}{7}$ (B) $\frac{6 + 2\sqrt{2}}{5}$ (C) $\frac{6 - 2\sqrt{2}}{5}$ (D) $6 - 2\sqrt{2}$ (E) $\frac{6 - 2\sqrt{5}}{7}$ [10] _____

WCTM MATHEMATICS CONTEST, 2002

Test 2

NAME: _____

CLASS 7th & 8th Grade

SCHOOL: _____

SCORING: 20 points for each correct answer, -5 for each wrong answer.

1. 2002 is a palindrome (reversing the digits does not change the number). My house number is the next palindrome after 2000, which leaves the same remainder as 2002 when divided by 3. The middle digits of my house number are:

- (A) 1's (B) 2's (C) 3's (D) 4's (E) 5's [1] _____

2. A number, n , is perfect if the sum of all the divisors of n is $2n$. For example, 6 is a perfect number. Another perfect number is

- (A) 8 (B) 12 (C) 16 (D) 24 (E) 28 [2] _____

3. The least common multiple of $2^3 \cdot 3^2 \cdot 5^4$, $2 \cdot 3^4 \cdot 5^2$, and $3 \cdot 5 \cdot 7$ is

- (A) $2^3 \cdot 3^4 \cdot 5^4 \cdot 7$ (B) $3 \cdot 5$ (C) $2^4 \cdot 3^7 \cdot 5^8 \cdot 7$ (D) $2 \cdot 3 \cdot 5 \cdot 7$ (E) None of these [3] _____

4. In base 5 312_5 means $3 \cdot 5^2 + 1 \cdot 5 + 2$. So what is the sum of

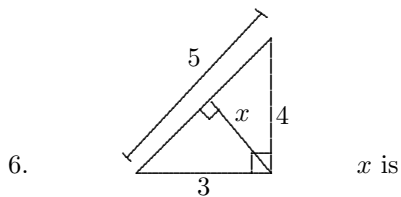
$$\begin{array}{r} 1211_5 \\ + 2442_5 \\ \hline \end{array}$$

- (A) 325_{25} (B) 4203_5 (C) 3103_5 (D) 3203 (E) None of these [4] _____

5. A quick check to see if a large number, n , is divisible by 8 is to ask if

- (A) 8 divides the sum of the digits of n ;
 (B) 8 divides the first 3 digits of n ; (as a 3-digit number)
 (C) 8 divides the last 3 digits of n ; (as a 3-digit number)
 (D) the last digit is even;
 (E) all the last 3 digits are even.

[5] _____



- (A) $\frac{5}{12}$ (B) $\frac{15}{4}$ (C) $\frac{12}{5}$ (D) $\frac{4}{15}$ (E) $\frac{6}{10}$ [6] _____

7. Both $(2, 1)$ and $(-1, 2)$ are on the line

- (A) $3x - y = 5$ (B) $x + 3y = 5$ (C) $3x - y = -1$ (D) $-x + 3y = 1$ (E) $3x + y = 4$ [7] _____

8. The distance between point $P(3, 4)$ and $Q(5, 12)$ is

- (A) 68 (B) $\sqrt{68}$ (C) 10 (D) $\sqrt{10}$ (E) $\sqrt{60}$ [8] _____

9. A whole number is selected from 25 to 35, inclusive. The probability that the sum of the digits is 7 is

- (A) $\frac{2}{10}$ (B) $\frac{1}{10}$ (C) $\frac{2}{9}$ (D) $\frac{1}{11}$ (E) $\frac{2}{11}$ [9] _____

10. The table shows the quiz scores and the frequency (number of students with that score). The top 10% of the students scored at least how many points?

Score	Frequency
3	6
4	4
7	4
8	7
10	3
12	2

- (A) 12 (B) 8 (C) 10 (D) 3 (E) 4 [10] _____

WCTM MATHEMATICS CONTEST, 2002

Test 3

NAME: _____

CLASS 7th & 8th Grade

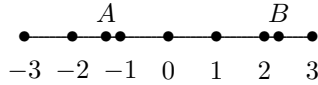
SCHOOL: _____

SCORING: 20 points for each correct answer, -5 for each wrong answer.

1. The probability that an event happens is $\frac{5}{9}$. The odds for the event are:

- (A) 5 : 9 (B) 9 : 5 (C) 4 : 9 (D) 9 : 4 (E) 5 : 4 [1] _____

2. The length of \overline{AB} is



- (A) $A - B$ (B) $B - A$ (C) $A + B$ (D) $|A + B|$ (E) 3 [2] _____

3. $\left(\frac{1}{2} + \frac{2}{a}\right) \div \left(\frac{1}{3}\right) =$

- (A) $\frac{3(a+2)}{a}$ (B) $\frac{3(a+2)}{2a}$ (C) $\frac{9}{2a}$ (D) $\frac{1}{2a}$ (E) $\frac{3(a+4)}{2a}$ [3] _____

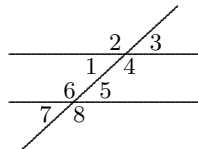
4. Telephone company "Squint" charges \$1.00 for the first 20 minutes and 7 cents a minute after the first 20 minutes. "Pwest" charges 6 cents for each minute. A particular phone call costs the same under each plan. The phone call lasted how many minutes?

- (A) 40 minutes (B) 400 minutes (C) 30 minutes (D) 10 minutes (E) No such call is possible. [4] _____

5. A geometric figure has seven lines. No set of three lines intersect at a point and no lines are parallel. There are how many points of intersection?

- (A) 35 (B) 30 (C) 21 (D) 6 (E) 42 [5] _____

6. A pair of vertical angles is



- (A) $\angle 1$ and $\angle 2$ (B) $\angle 1$ and $\angle 6$ (C) $\angle 6$ and $\angle 4$ (D) $\angle 3$ and $\angle 4$ (E) $\angle 2$ and $\angle 4$ [6] _____

7. The slope of the line perpendicular to the line through (2,3) and (-1,4) is:

- (A) $-\frac{1}{3}$ (B) $\frac{1}{3}$ (C) -3 (D) 3 (E) None of these [7] _____

8. On January 2001 Sue made x dollars per month. On February 1 she got a 10% raise. On July 1 she got a 10% reduction in pay. On Sept 1 she again received a 10% increase. If $x=\$2,000$, then Sue is now making how much per month?

- (A) \$2,000 (B) \$2,200 (C) \$2,178 (D) \$2,660 (E) \$2,600 [8] _____

9. Points A and B have coordinates $(-3, 1)$ and $(3, 4)$ respectively. C is on \overleftrightarrow{AB} and is $\frac{1}{3}$ of the way from A to B . The coordinates of C are

- (A) (2,1) (B) (-1, 2) (C) (-2, 1) (D) $\left(0, \frac{5}{2}\right)$ (E) $\left(0, \frac{3}{2}\right)$ [9] _____

10. 22% of x is 15. So x is

- (A) (.22)15 (B) 22(15) (C) $\frac{15 \cdot 100}{22}$ (D) 15+22 (E) $15 + \frac{22}{100}$ [10] _____

Test 4

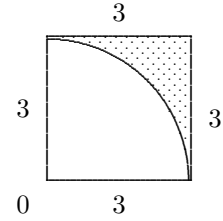
NAME: _____

CLASS 7th & 8th Grade

SCHOOL: _____

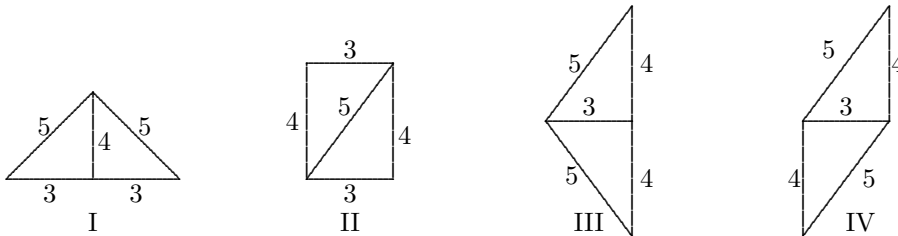
SCORING: 20 points for each correct answer, -5 for each wrong answer.

1. Part of a circle with center 0 is cut from a square. The shaded area is:



- (A) $9 - \frac{3\pi}{2}$ (B) $9 - \frac{9}{4}\pi$ (C) $9 - \frac{3}{4}\pi$ (D) $\frac{9 - 3\pi}{4}$ (E) $\frac{9 - 9\pi}{4}$ [1] _____

2.



For the areas above in I,II,III and IV

- (A) Area I and Area II are the same, Area III and Area IV are different;
 (B) All the areas are the same;
 (C) Area II is larger than the others;
 (D) Area IV is larger than the others;
 (E) Area I is larger than the others. [2] _____

3. When $(a + 2b)(a - 3b)$ is expanded, the coefficient of ab is

- (A) 6 (B) $-ab$ (C) 5 (D) $-5ab$ (E) -1 [3] _____

4. The number of divisors of 96 is

- (A) 12 (B) 11 (C) 10 (D) 9 (E) 8 [4] _____

5. The ISBN(International Standard Book Number) for books has 10 digits. The last digit is a check digit for errors. The check method is this: if $n = abcdefghij$ then $10a + 9b + 8c + 7d + 6e + 5f + 4g + 3h + 2i + 1j$ is divisible by 11. What would the value of j be for 173254615 j to be an ISBN number?

- (A) 1 (B) 2 (C) 0 (D) 4 (E) 5 [5] _____

6. Bill has saved some \$2 bills and some \$7 bills from his vacation in Elbonia. The total value is \$29. Bill must have a total of (both cases must be possible)

- (A) 7 or 5 bills
- (B) 3 or 5 bills
- (C) 5 or 2 bills
- (D) 7 or 2 bills
- (E) None of the previous answers are possible

[6] _____

7. The equation to convert fahrenheit temperature readings F to celsius readings C° is $C = \frac{5}{9}(F - 32)$. A celsius thermometer and a fahrenheit thermometer read the same when the temperature is

- (A) the temperature of boiling water at sea level
- (B) 180°
- (C) 40°
- (D) the temperature at which water freezes at sea level
- (E) -40°

[7] _____

8. If $(x + y)^5$ is expanded the coefficient of x^2y^3 is

- (A) 5
- (B) 10
- (C) 4
- (D) 8
- (E) 3

[8] _____

9. $(5^3 \cdot 7^2 \cdot 11^{-2})(5^2 \cdot 7^{-3} \cdot 11^3 \cdot 4) =$

- (A) $5^3 \cdot 7^2 \cdot 11^{-6} \cdot 2^2$
- (B) $5^5 \cdot 7^5 \cdot 11^{-1} \cdot 2^2$
- (C) $5^5 \cdot 7^{-1} \cdot 11^1 \cdot 4^2$
- (D) $5^7 \cdot 7^{-1} \cdot 11^2$
- (E) None of these

[9] _____

10. Tami has some pingpong balls each with a number (one or two digits). Each number is divisible by 2 or 3. If 6 numbers are divisible by 3, 5 are divisible by 2, and 4 are divisible by 6 then Tami has how many pingpong balls?

- (A) 7
- (B) 8
- (C) 9
- (D) 10
- (E) 11

[10] _____

WCTM MATHEMATICS CONTEST, 2002

Test 5

NAME: _____

CLASS 7th & 8th Grade

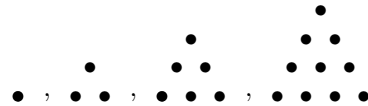
SCHOOL: _____

SCORING: 20 points for each correct answer, -5 for each wrong answer.

1. A picture is to be taken with 4 girls and 2 boys in a row. Of course, the boys refuse to stand next to each other. How many different ways can the photographer arrange the 6 people?

- (A) $9 \cdot 48$ (B) $10 \cdot 48$ (C) $4 \cdot 48$ (D) $5 \cdot 48$ (E) $6 \cdot 48$ [1] _____

2. The sixth picture in this pattern will have how many dots?



- (A) 19 (B) 20 (C) 21 (D) 22 (E) 23 [2] _____

3. If $f(k) = (k + 1)^2 + 4$, then $f(7) =$

- (A) 54 (B) 52 (C) 53 (D) 68 (E) 20 [3] _____

4. A retail store marks up the price 50% of the final selling price. If a coat costs the store \$45, the coat is priced at

- (A) \$67.50 (B) \$90 (C) \$60 (D) \$100 (E) None of these [4] _____

5. If $x = \frac{19}{8}, y = \frac{18}{7}, z = \frac{20}{9}$, then

- (A) $x < y < z$ (B) $x < z < y$ (C) $y < x < z$ (D) $y < z < x$ (E) None of these [5] _____

6. The 6th term in the pattern $\frac{1}{2}, \frac{3}{4}, \frac{9}{8}$ is

- (A) $\frac{243}{64}$ (B) $\frac{81}{16}$ (C) $\frac{27}{16}$ (D) $\frac{162}{32}$ (E) None of these [6] _____

7. On a 10-question math test, Test V, 25 points are given for each correct answer and 5 points deducted for each wrong answer. If Dawn scores 70 points and answers each question then she has

- (A) 3 correct (B) 4 correct (C) 5 correct (D) 6 correct (E) 2 correct [7] _____

8. The average of 10,20,23,25,17,13,29,31,13 is

- (A) 20 (B) 18 (C) 22.625 (D) $20.\bar{1}$ (E) None of these [8] _____

9. There are integers q and r such that $-73 = 8q + r$ where $0 \leq r \leq 8$. $q \cdot r =$

- (A) -70 (B) 27 (C) 9 (D) 72 (E) None of these [9] _____

10. x is inversely proportional to y when $y = 6, x = 2$. When $y=4$ what does $x =?$

- (A) 2 (B) $\frac{1}{2}$ (C) 3 (D) 4 (E) 8 [10] _____

Grades JHS
2002 Math Contest Exam

Exam	T1	T2	T3	T4	T5
P1	d	c	e	b	b
P2	a	e	b	b	c
P3	b	a	e	e	d
P4	b	b	a	a	b
P5	e	c	c	c	e
P6	d	c	e	e	a
P7	c	b	d	e	b
P8	d	b	c	b	d
P9	e	e	b	e	a
P10	a	c	c	a	c