

WCTM MATHEMATICS CONTEST, 2001

Test 1

NAME: _____

CLASS 7 & 8 Grade

SCHOOL: _____

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

1. A coin is weighted so the probability of a head is $\frac{4}{5}$ of the probability of a tail. The probability of a head is then
- (A) $\frac{4}{5}$ (B) $\frac{4}{9}$ (C) $\frac{1}{5}$ (D) $\frac{5}{9}$ (E) none of these [1] _____

2. The number of 4-digit house numbers with no zeros and no repeated digits is:
- (A) 9! (B) 10! (C) $\frac{9!}{5!}$ (D) $\frac{9!}{4!}$ (E) $\frac{10!}{6!}$ [2] _____

3. Shauna made three out of ten free throws in a game. In how many ways could she have made three in a row?
- (A) 7 (B) 10 (C) 6 (D) 8 (E) none of these [3] _____

4. $\frac{1}{2} + \frac{1}{3} + \frac{a}{6} = \frac{3}{4}$, $a =$
- (A) 1 (B) -1 (C) $-\frac{1}{2}$ (D) 2 (E) $\frac{1}{2}$ [4] _____

5. $\frac{\frac{a}{b} + \frac{c}{d}}{e} =$
- (A) $ab + cd$ (B) $a + c$ (C) $\frac{ad + bc}{(bd)^2}$ (D) $\frac{a + c}{(bd)^2}$ (E) $\frac{ad + bc}{e}$ [5] _____

6. $\frac{3x - 5}{2} = \frac{2x - 5}{3}$, $x =$
- (A) 0 (B) -1 (C) 2 (D) 1 (E) 3 [6] _____

7. A box contains N apples. Half of the apples in the box plus $\frac{1}{2}$ of an apple is 3 apples. So $N =$
- (A) 4 (B) 3 (C) 6 (D) $3\frac{1}{2}$ (E) 5 [7] _____

8. $(3^{a+b})^2 =$

- (A) $3^{a^2+b^2}$ (B) 3^{a^2+b} (C) 3^{a+b^2} (D) 9^{a+b} (E) $3^{a^2} + 3^{b^2}$ [8] _____

9. A pyramid with a square base five inches on each side and altitude six inches has how much volume?

- (A) 30 inches³ (B) 10 inches³ (C) 50 cubic inches (D) 150 inches³ (E) none of these [9] _____

10. A regular tetrahedron has four equilateral faces. Each edge has length two inches. The total length of all the edges is:

- (A) 9 inches (B) 12 inches (C) 16 inches (D) 10 inches (E) 14 inches [10] _____

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Test 2

NAME: _____

CLASS 7th & 8th Grade

SCHOOL: _____

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

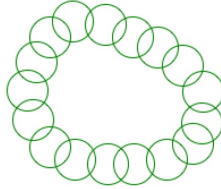
1. John has 100 baseball cards worth \$100. Some of the cards are worth \$5, some are worth \$1 and some are worth 50 cents. If John has at least one \$5 card, the number of 50-cent cards can be:

- (A) 2 (B) 4 (C) 6 (D) 8 (E) 5 [1] _____

2. A jeweler has five sets of gold chain



What is the minimum total number of cuts and welds (count one for a cut and one for a weld) that he must perform to make a chain like the long one shown below?



- (A) 6 (B) 8 (C) 10 (D) 12 (E) 14 [2] _____

3. There is an interesting 5-digit number. With a 1 after it, it is 3 times as large as with a 1 before it. The middle digit of the 5-digit number is:

- (A) 5 (B) 6 (C) 7 (D) 8 (E) 9 [3] _____

4. Exactly how many of the statements are true?

- (1) $4! = 24$ (2) $1 + 2 + 3 + \dots + 8 = 32$ (3) $4^3 \cdot 3^2 = 4^6$
 (4) $(4^2)^3 = 4^5$ (5) $(x^2 + 3x + 2) = (x + 2)(x + 1)$

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

5. If $r = \frac{1 - \sqrt{5}}{2}$ then

- (A) $r = 1 - \frac{1}{r}$ (B) $r = 1 + \frac{1}{r}$ (C) $r = 1 + \frac{r}{2}$ (D) $r = \frac{\sqrt{5}}{2}$ (E) $r = \frac{1 - r}{2}$ [5] _____

6. A decagon is a polygon with 10 sides. A regular decagon has how many diagonals?
(A) 10 (B) 20 (C) 30 (D) 35 (E) none of these [6] _____
7. The number 6 can be written as a sum of 3 positive numbers in how many ways? (*Note:* A number may be used more than once but the order is not important.)
(A) 7 (B) 3 (C) 18 (D) 4 (E) none of these [7] _____
8. The sum of the divisors of 108 is:
(A) 280 (B) 348 (C) 360 (D) 6 (E) 5 [8] _____
9. The least common multiple of 8,12 and 15 is:
(A) less than 61 (B) between 61 and 70 (C) between 79 and 119
(D) between 119 and 139 (E) greater than 139
[9] _____
10. In base 3
$$\begin{array}{r} 1211 \\ +2112 \\ \hline \end{array}$$
 is:
(A) 3323 (B) 10020 (C) 10100 (D) 11000 (E) none of these [10] _____

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Test 3

NAME: _____

CLASS 7th & 8th Grade

SCHOOL: _____

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

1. The distance between the points (2,1) and (-1, -3) is:

- (A) 7 (B) 5 (C) $\sqrt{5}$ (D) $\sqrt{18}$ (E) 2 [1] _____

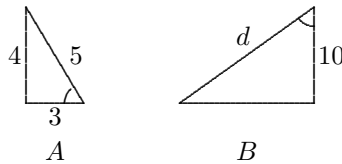
2. The equation of the line through (2,1) and (-1,2) is:

- (A) $3y + x = 5$ (B) $3y + x = -1$ (C) $x + 3y = 5$ (D) $x + 3y = -1$ (E) $3y = x - 2$ [2] _____

3. The equation of the line through (-1,2) and perpendicular to the line $3y - x = 7$ is:

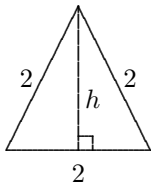
- (A) $y = -3x + 1$ (B) $y = -x - 1$ (C) $y = -x + 1$ (D) $y = -3x - 1$ (E) $y = 3x - 1$ [3] _____

4. $\triangle B$ is similar to $\triangle A$ so $d =$



- (A) 6 (B) $\frac{50}{3}$ (C) 8 (D) 50 (E) none of these [4] _____

5. $h =$



- (A) 5 (B) $\sqrt{5}$ (C) $\sqrt{3}$ (D) 1.5 (E) $2\sqrt{2}$ [5] _____

6. A polygon P has area 100in^2 . A similar polygon has each edge k times as large as the corresponding edge of the first polygon. The area of the second polygon is:

- (A) $(100k)$ inches² (B) $(1000k)$ inches² (C) $(100k^2)$ inches²
 (D) $(1000k^2)$ inches² (E) $(10,000k^2)$ inches²

[6] _____

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Test 4

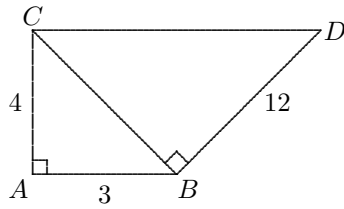
NAME: _____

CLASS 7th & 8th Grade

SCHOOL: _____

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

1. The length of CD is:



- (A) 16 (B) 14 (C) 13 (D) 15 (E) 20 [1] _____

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

- (A) $\frac{1}{2a} + \frac{2}{3a}$ (B) $\frac{3a}{5}$ (C) $\frac{3a}{6}$ (D) $\frac{7}{6a}$ (E) $\frac{7a}{6}$ [2] _____

3. 17 is 5% of:

- (A) 85 (B) 68 (C) .85 (D) 3400 (E) none of these [3] _____

4. If x is the sum of 5% of 50 and 7% of 40 and y is the sum of 7% of 50 and 5% of 40, then $x - y =$

- (A) 2 (B) .2 (C) -2 (D) -.2 (E) 20 [4] _____

5. Three boxes weigh 9lbs 6oz, 3lbs 14oz and 1lb 13oz respectively. The total weight is:

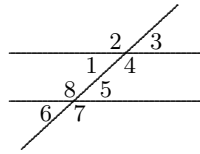
- (A) 16lbs 1oz (B) 15lbs 1oz (C) 16lbs 3oz (D) 15lbs 3oz (E) 13lb 1oz [5] _____

6. The telephone company has two rates. Rate A: 20 cents for the first minute and 7 cents per minute thereafter. Rate B: 9 cents per minute for each minute.

- (A) Plan A is always cheaper (B) Plan B is always cheaper
 (C) Plan A is cheaper for all calls longer than 6.5 minutes (D) Plan B is cheaper for all calls longer than 6.5 minutes
 (E) Plan B is cheaper for all calls less than 10 minutes

[6] _____

7. A pair of alternate interior angles is:



- (A) $\angle 1$ and $\angle 3$ (B) $\angle 4$ and $\angle 5$ (C) $\angle 1$ and $\angle 6$ (D) $\angle 1$ and $\angle 5$ (E) $\angle 1$ and $\angle 8$ [7] _____

8. The slope of the line through the points $(4,5)$ and $(5,4)$ is:

- (A) 1 (B) -1 (C) 0 (D) 9 (E) -9 [8] _____

9. The midpoint of the segment AB , where $A = (2, 3)$, $B = (-4, 5)$ is:

- (A) $(1,4)$ (B) $(-1,4)$ (C) $(-2, 2)$ (D) $(-2, 8)$ (E) $(3,7)$ [9] _____

10. If A, B, C, D, E , and F are six points, no three on a line, then there are how many lines determined by these points?

- (A) 12 (B) 30 (C) 15 (D) 36 (E) 18 [10] _____

WCTM MATHEMATICS CONTEST, 2001

Test 5

NAME: _____

CLASS 7th & 8th Grade

SCHOOL: _____

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

1. If $b^2 - a + 2c - x = 0$ and $a = -2$, $b = 3$ and $c = -1$ then $x =$
 (A) -9 (B) 9 (C) 13 (D) -13 (E) 5 [1] _____

2. If A and B are two sets with 23 and 25 elements respectively, and there are 5 elements in common, then the number in A or B is:
 (A) 48 (B) 37 (C) 53 (D) 43 (E) none of these [2] _____

3. If two boxes have equal surface area and have dimensions $4 \times 6 \times h$ and $4 \times 5 \times 2h$, then $h =$
 (A) 1 (B) 2 (C) $\frac{4}{5}$ (D) $\frac{5}{4}$ (E) $\frac{1}{2}$ [3] _____

4. $(3^2x^3y^2)(3^1x^2y^3) =$
 (A) $9\frac{x}{y}$ (B) $3\frac{x}{y}$ (C) $3x^6y^{-6}$ (D) $-3\frac{x}{y^6}$ (E) $3^3x^5y^5$ [4] _____

5. A 10.5' pole is leaning against a building. The base of the pole is 10' from the building. The distance from the top of the pole to the ground is:
 (A) less than 1' (B) between 2' and 3' (C) between 3' and 4' (D) between 4' and 5' (E) greater than 5' [5] _____

6. The coefficient of x^3 when $(2x^2 - x + 7)$ is multiplied by $(x^2 - x + 2)$ is:
 (A) -2 (B) 2 (C) 14 (D) -5 (E) -3 [6] _____

7. A Union Pacific crew must replace 280' of rail. They have some 50' pieces and some 20' pieces. They want to use some of each and do not want the same number of each. They also do not want to cut and weld any rails. They could use how many rails all together?
 (A) 7 (B) 11 (C) 9 (D) 10 (E) 6 [7] _____

8. The number of divisors of $2^3 \cdot 3^4 \cdot 5^2 \cdot 7^5$ is:
 (A) $2 \cdot 3 \cdot 4 \cdot 5$ (B) 4 (C) $3 \cdot 4 \cdot 5 \cdot 6$ (D) 210 (E) none of these [8] _____

9. In Florida the last three digits of a man's driver's license are given by $31(m - 1) + b$ where m and b are the month and day of his birthday. Which of the following cannot be the last three digits of a man's Florida driver's license?

(A) 061

(B) 060

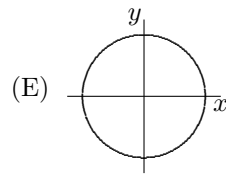
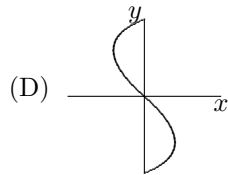
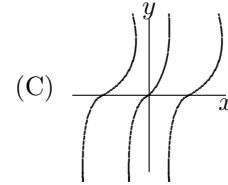
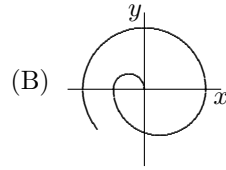
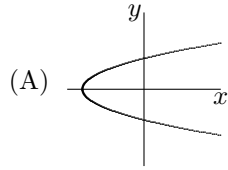
(C) 128

(D) 165

(E) 103

[9] _____

10. Which graph is the graph of a function?



[10] _____

Grades JHS
2001 Math Contest Exam

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