

WCTM MATHEMATICS CONTEST, 1999

Test 1

NAME: \_\_\_\_\_

CLASS 7 & 8 Grade

SCHOOL: \_\_\_\_\_

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

1. Cindy is making a circle graph to represent her typical 24-hour day. She spends 3 hours a day reading. How many degrees will be in that sector of her circle graph?

- (A) 30      (B) 45      (C) 50.25      (D) 60      (E) 62.15      [1] \_\_\_\_\_

2. Pat made the same error in each of the following multiplication problems.

$\begin{array}{r} 23 \\ \times 6 \\ \hline 188 \end{array}$	$\begin{array}{r} 47 \\ \times 5 \\ \hline 355 \end{array}$	$\begin{array}{r} 92 \\ \times 4 \\ \hline 368 \end{array}$	$\begin{array}{r} 127 \\ \times 8 \\ \hline 4866 \end{array}$
---	---	---	---

If Pat makes the same error in doing  $162 \times 9$ , the answer will be

- (A) 1458      (B) 1538      (C) 1161      (D) 6338      (E) Not given      [2] \_\_\_\_\_

3. If  $x$  is between 12 and 18 inclusive and  $y$  is between 3 and 8 inclusive, then  $x - y$  is

- (A) between 4 and 15 inclusive      (B) between 9 and 15 inclusive  
 (C) between 4 and 10 inclusive      (D) between 9 and 10 inclusive      [3] \_\_\_\_\_  
 (E) none of these

4. Which numeral names the number represented by: 5 thousands + 7 hundreds + 9 tens + 14 ones

- (A) 57914      (B) 5804      (C) 5794      (D) 5714      (E) none of these      [4] \_\_\_\_\_

5. Steve collects sports cards. He noticed that exactly one fourth of his card collection is from basketball and exactly one third of his collection is from baseball. He has nine more baseball cards than basketball cards. How many cards are in his collection?

- (A) 108      (B) 120      (C) 96      (D) 48      (E) none of these      [5] \_\_\_\_\_

6. Joe rolls 5 consecutive threes on 5 rolls of a fair die. What is the probability that Joe will roll a three on the next roll?

- (A)  $\frac{6}{6}$       (B)  $\frac{1}{6}$       (C)  $\frac{1}{5}$       (D)  $\frac{1}{2}$       (E) none of these      [6] \_\_\_\_\_

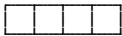
7. At the University of Wyoming, 70% of the students are from Wyoming and 10% of these are from Casper. What percent of the students at the university are from Casper?

- (A) .07%      (B) 7%      (C) .7%      (D) 35%      (E) none of these      [7] \_\_\_\_\_

8. There are just two ways in which 5 may be expressed as the sum of two different positive (non-zero) integers; namely  $4+1$  and  $3+2$ . In how many ways can 13 be expressed as the sum of two different positive (non-zero) integers? (Order is not important.)

- (A) 5      (B) 6      (C) 7      (D) 8      (E) none of these      [8] \_\_\_\_\_

9. A board 9 feet 8 inches long is cut into four equal parts. What is the length of each part. (Neglect the sawdust)



- (A) 2 feet 5 inches      (B) 2 feet 4 inches      (C) 2 feet 6 inches  
(D) 2 feet  $5\frac{3}{4}$  inches      (E) none of these      [9] \_\_\_\_\_

10.  $\frac{1}{6}$  of the roses in the garden are red and  $\frac{1}{12}$  of the roses are pink. What percentage of the roses are red or pink?

- (A) 11%      (B) 25%      (C) 15%      (D)  $33\frac{1}{3}\%$       (E) none of these      [10] \_\_\_\_\_

WCTM MATHEMATICS CONTEST, 1999

Test 2

NAME: \_\_\_\_\_

CLASS 7th & 8th Grade

SCHOOL: \_\_\_\_\_

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

1. Mr. Jones needs to tile a rectangular entry area 10 feet by 15 feet. The number of square tiles 5 inches on a side needed is

- (A) 6            (B) 1728            (C) 30            (D) 864            (E) none of these            [1] \_\_\_\_\_

2. How many triangles of all sizes can be found in a square with both diagonals drawn in?

- (A) 4            (B) 8            (C) 2            (D) 7            (E) none of these            [2] \_\_\_\_\_

3. The LCD (Least Common Denominator) for the fractions  $\frac{1}{36}$  and  $\frac{1}{48}$  is

- (A) 96            (B) 144            (C) 12            (D) 228            (E) none of these            [3] \_\_\_\_\_

4. Which of the following is a prime number?

- (A) 133            (B) 187            (C) 409            (D) 529            (E) none are prime numbers            [4] \_\_\_\_\_

5. If the area of Figure 1 is 1 square unit, then the area of Figure 2 is how many square units?

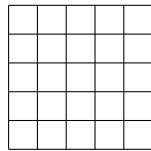


Figure 1

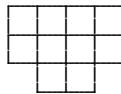
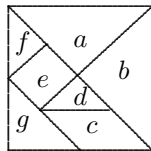


Figure 2

- (A) 0.12            (B) 0.24            (C) 0.30            (D)  $\frac{2}{5}$             (E) none of these            [5] \_\_\_\_\_

6. The tangram figure below is made of silver and the total value of the square is \$8.00. What is the value of piece  $c$ ?



- (A) \$1.50            (B) \$2.00            (C) \$1.00            (D) \$0.50            (E) none of these            [6] \_\_\_\_\_

7. A store is charged a monthly rent of \$1,350 or 6% of sales, whichever is greater. What is the rent if the store's monthly sales total \$17,500?

- (A) \$1050      (B) \$2400      (C) \$81      (D) \$1350      (E) none of these      [7] \_\_\_\_\_

8. A particular load exerts pressure of 26 pounds per square inch. How many pounds per square foot is that?

- (A) 312      (B) 1872      (C) 3744      (D) 624      (E) none of these      [8] \_\_\_\_\_

9. Solve the following equation for  $y$ :  $(53 \times 15) - 45 = y \times 15$

- (A) 50      (B) 8      (C) 114      (D) 45      (E) none of these      [9] \_\_\_\_\_

10. You know that an unknown number has 6 and 15 as factors. Complete the following list of all known factors of the unknown number by filling in the blanks.

1, 2, \_\_\_\_\_, \_\_\_\_\_, 6, \_\_\_\_\_, 15, \_\_\_\_\_

- (A) 3,5,20,40      (B) 3,5,10,30      (C) 4,5,10,25      (D) 3,4,12,36      (E) none of these      [10] \_\_\_\_\_

WCTM MATHEMATICS CONTEST, 1999

Test 3

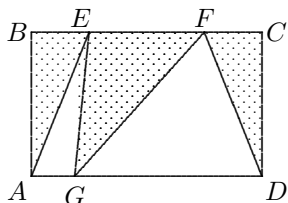
NAME: \_\_\_\_\_

CLASS 7th & 8th Grade

SCHOOL: \_\_\_\_\_

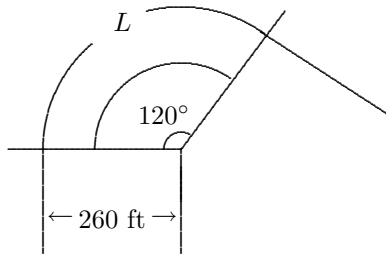
SCORING: 20 points for each correct answer, -5 for each wrong answer.

1. In the rectangle  $ABCD$  pictured below,  $\overline{AD} = 12$ ,  $\overline{AB} = 7$ , and  $\overline{EF} = 5$ . Find the area of the shaded part of the rectangle.



- (A) 84 square units      (B) 35 square units      (C) 42 square units  
 (D) impossible to determine      (E) none of these      [1] \_\_\_\_\_
2. Which of the following is closest to one square centimeter in area?  
 (A) a tennis court      (B) your thumbnail      (C) a slice of bread  
 (D) a standard CD box      (E) none of these      [2] \_\_\_\_\_
3. The length of a rectangle is three times its width. If the width is reduced by 1 foot and the length increased by 3 feet, the area will be 72 ft<sup>2</sup>. What are the dimensions of the original rectangle?  
 (A) 5 × 15 feet      (B) 6 × 18 feet      (C) 4 × 12 feet      (D) 7 × 21 feet      (E) none of these      [3] \_\_\_\_\_
4. The following expression is equivalent to:  $\frac{13n - 6(n + 4)}{n}$   
 (A)  $7 - \frac{24}{n}$       (B)  $17 - 6n$       (C)  $13n - \frac{6}{n}$       (D)  $17 - \frac{6}{n}$       (E) none of these      [4] \_\_\_\_\_
5. It takes John 6 hours longer than Mark to assemble a machine. Together they can do it in 4 hours. How long would it take each working alone to do the job?  
 (A) Mark 5 hours and John 11 hours      (B) Mark 6 hours and John 12 hours  
 (C) Mark 7 hours and John 13 hours      (D) Mark 10 hours and John 16 hours  
 (E) none of these      [5] \_\_\_\_\_
6. The operation  $x\#y$  means  $12x - 2y$ . The operation  $x\$y$  means  $3y^x$ , and the operation  $x*y$  means  $3x \div y$ . What is the value of  $3\#[(5\$2)*(3\$2)]$ ?  
 (A) 45      (B) 12      (C) 96      (D) 36      (E) none of these      [6] \_\_\_\_\_

7. A proposed road curves sharply as shown in the figure below. ( $L$  is part of a circle.) Calculate the length of the curve ( $L$ ) to the nearest tenth of a foot. (Use  $\pi = 3.14$ )



- (A) 544.3 feet      (B) 520.0 feet      (C) 367.7 feet      (D) 1,633.6 feet      (E) none of these      [7] \_\_\_\_\_
8. The Landsat satellite, which is used to study the earth's natural resources, must be able to discern 250 shades of brightness. The picture is then sent to the ground by a radio wave carrying a series of binary digits. How many digits are required to transmit all 250 shades of brightness?
- (A) 7      (B) 8      (C) 9      (D) 10      (E) none of these      [8] \_\_\_\_\_
9. How many cubic yards of concrete are needed to build a concrete pipe 9 feet long and 9 inches thick if the interior diameter must be 54 inches? (Round to the nearest hundreth.)
- (A) 4.12 yd<sup>3</sup>      (B) 7.66 yd<sup>3</sup>      (C) 1.91 yd<sup>3</sup>      (D) 3.83 yd<sup>3</sup>      (E) none of these      [9] \_\_\_\_\_
10. Two men start at the same time from the same place and travel along roads that are at right angles to each other. One man travels 4 miles per hour faster than the other, and at the end of 2 hours they are 40 miles apart. What were their rates of travel?
- (A) 10 mph and 14 mph      (B) 11 mph and 15 mph      (C) 12 mph and 16 mph  
(D) 13 mph and 17 mph      (E) none of these      [10] \_\_\_\_\_

WCTM MATHEMATICS CONTEST, 1999

Test 4

NAME: \_\_\_\_\_

CLASS 7th & 8th Grade

SCHOOL: \_\_\_\_\_

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

1. Huck travels 36 miles down a river and back in 8 hours. (72 total miles) If the rate of his raft in still water is 12 miles per hour, what is the rate of the river current?

- (A) 10 mph      (B) 5 mph      (C) 7 mph      (D) 6 mph      (E) none of these      [1] \_\_\_\_\_

2. The diagonal of a rectangle is 85 inches long. If the short side is increased by 11 inches and the long side is decreased by 7 inches, the length of the diagonals remains the same. What are the dimensions of the original rectangle?

- (A) 40 in.  $\times$  75 in.    (B) 35 in.  $\times$  70 in.    (C) 33 in.  $\times$  86 in.    (D) 51 in.  $\times$  68 in.    (E) none of these    [2] \_\_\_\_\_

3. The distance covered by an object falling freely from rest varies directly as the square of the time of falling. If an object falls 144 feet in 3 seconds, how far will it fall in 10 seconds?

- (A) 480 feet      (B) 1600 feet      (C) 1440 feet      (D) 432 feet      (E) none of these      [3] \_\_\_\_\_

4. What is the area of the figure with vertices  $(2, 2)$ ,  $(6, -2)$ , and  $(-3, -3)$ ?

- (A) 20 square units      (B)  $10\sqrt{2}$  square units      (C) 11 square units      [4] \_\_\_\_\_  
 (D)  $20\sqrt{2}$  square units      (E) none of these

5. A set contains a prime number, an even number, an odd number, and a perfect square number. What is the smallest number of elements possible for this set?

- (A) 1      (B) 2      (C) 3      (D) 4      (E) 7      [5] \_\_\_\_\_

6. A library charges a 25 cent fine for a book that is 1 to 3 days overdue. Additionally, for each day beyond 3, the library charges 15 cents a day. How many cents will a customer pay for a book that is  $d$  days overdue where  $d$  is greater than 3?

- (A)  $15d + 40$       (B)  $40d - 3$       (C)  $15(d - 3) + 25$       (D)  $75 + 15d$       (E)  $10(15d - 3)$       [6] \_\_\_\_\_

7. If  $n$  is a positive integer, then  $(-1)^{2n-1}$  will always be:

- (A)  $-1$       (B)  $1$       (C)  $1$  or  $-1$       (D)  $\geq 1$       (E)  $\leq 1$       [7] \_\_\_\_\_

8. Three friends went to the theater and found five empty seats. If all three friends sat next to each other, how many different ways could they seat themselves in the five seats?

- (A) 15                      (B) 18                      (C) 30                      (D) 36                      (E) 45                      [8] \_\_\_\_\_

9. A rope is tied to the top of a pole which is 50 feet high and to the top of another pole which is 20 feet high. The poles are 16 feet apart at the base. What is the length of the shortest rope that will reach from the top of the taller pole to the top of the smaller pole? Express your answer to the nearest foot.

- (A) 16 ft.                      (B) 20 ft.                      (C) 30 ft.                      (D) 34 ft.                      (E) 37 ft.                      [9] \_\_\_\_\_

10. An equation of the line whose  $x$ -intercept is 3 and whose  $y$ -intercept is  $-3$  is:

- (A)  $x + y = 3$                       (B)  $y - x = 3$                       (C)  $x + y = -3$                       (D)  $x - y = 3$                       (E)  $xy = -3$                       [10] \_\_\_\_\_

WCTM MATHEMATICS CONTEST, 1999

Test 5

NAME: \_\_\_\_\_

CLASS 7th & 8th Grade

SCHOOL: \_\_\_\_\_

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

1. The average of  $n$  numbers is 53. How large must the next number be in order to raise the average to 54?

- (A)  $53n$       (B)  $53 + n$       (C)  $54n$       (D)  $54 + n$       (E)  $53n + 54$

[1] \_\_\_\_\_

2. What is the remainder when  $(10^{35})^4$  is divided by 99?

- (A) 1      (B) 10      (C) 11      (D) 74      (E) 98

[2] \_\_\_\_\_

3. The graph of the equation  $(x - 3)^2 + (y + 1)^2 = 9$  is:

- (A) a parabola      (B) a line      (C) a hyperbola      (D) a circle      (E) an ellipse

[3] \_\_\_\_\_

4. Given  $x + y = 7$  and  $xy = 3$ , what is the value of  $x^2 + y^2$ ?

- (A) 43      (B) 58      (C) 92      (D) 370      (E) 445

[4] \_\_\_\_\_

5. If a square with a side of length 2 inches is rotated about its diagonal, what will be the volume of the resulting figure?

- (A)  $8 \text{ in.}^3$       (B)  $8\pi \text{ in.}^3$       (C)  $\frac{4\sqrt{2}\pi}{3} \text{ in.}^3$       (D)  $2\sqrt{3}\pi \text{ in.}^3$       (E)  $\frac{16\pi}{3} \text{ in.}^3$

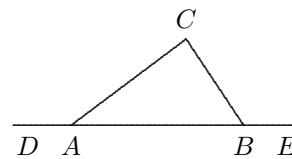
[5] \_\_\_\_\_

6. If  $m$  is a factor of  $p$ , and  $n$  is a multiple of  $p$ , which of these statements is true?

- (A)  $m$  is a factor of  $n$       (B)  $n$  is a factor of  $m$       (C)  $m$  is a multiple of  $n$   
 (D)  $mn$  is a factor of  $p$       (E)  $\frac{n}{m}$  is 1

[6] \_\_\_\_\_

7. If  $m\angle CAD = 145^\circ$  and  $m\angle CBE = 125^\circ$ , what is the measure of  $\angle ACB$ ?



- (A)  $35^\circ$       (B)  $55^\circ$       (C)  $60^\circ$       (D)  $80^\circ$       (E)  $90^\circ$

[7] \_\_\_\_\_

8. In a drum and bugle team, the ratio of drum players to bugle horn players is 3:5. What fractional part of the team plays the bugle?

- (A)  $\frac{2}{5}$       (B)  $\frac{3}{5}$       (C)  $\frac{3}{8}$       (D)  $\frac{5}{8}$       (E)  $\frac{2}{3}$       [8] \_\_\_\_\_

9. If  $x^3 = -3$ , then what is the value of  $x^6$ ?

- (A)  $-9$       (B)  $-6$       (C)  $6$       (D)  $9$       (E)  $-27$       [9] \_\_\_\_\_

10. A farmer has 24 meters of fencing. She wants to use it to make a rectangular dog pen with the largest possible area. If she uses only whole numbers of meters, what dimensions would produce the largest area?

- (A) 5 m by 7 m    (B) 6 m by 6 m    (C) 7 m by 6 m  
(D) 8 m by 4 m    (E) 8 m by 5 m      [10] \_\_\_\_\_

Grades 7th and 8th  
1999 Math Contest Exam

Exam	T1	T2	T3	T4	T5
P1	B	D	C	D	D
P2	D	B	B	A	A
P3	A	B	A	B	D
P4	B	C	A	A	A
P5	A	D	B	B	C
P6	B	C	B	C	A
P7	B	D	A	A	E
P8	B	C	B	B	D
P9	A	A	A	D	D
P10	B	B	C	D	B