

WCTM MATHEMATICS CONTEST, 2005

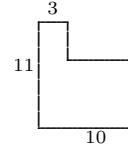
Test 1

NAME: _____

CLASS 7 & 8 Grade

SCHOOL: _____

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



1. How many feet of wood would be needed for a border around this patio?

- (a) 22 feet (b) 32 feet (c) 36 feet (d) 42 feet (e) 48 feet [1] _____

2. If you divide one-half of a pie equally among five people, what fraction of the whole pie does each person receive?

- (a) $\frac{1}{10}$ (b) $\frac{2}{5}$ (c) $\frac{7}{10}$ (d) $\frac{5}{3}$ (e) $\frac{10}{1}$ [2] _____

3. Given the equation $a = 4b(c - 5)$, find a when $b = 2$ and $c = 11$.

- (a) 451 (b) 252 (c) 68 (d) 48 (e) 40 [3] _____

4. Wendy makes \$15.00 per hour at her job. On February 1st her boss tells her he needs to cut expenses so he is going to give her a 10% cut in wages. On March 1st her boss decides he can give her a 10% raise. What will her hourly wage be after he gives her the raise?

- (a) \$14.50 (b) \$14.85 (c) \$15.00 (d) \$15.15 (e) \$16.35 [4] _____

5. Which **one** expression below best represents the sum of the reciprocals of a and b ?

- (a) $\frac{ab}{(a+b)}$ (b) ab (c) $a+b$ (d) $\frac{(a+b)}{2}$ (e) $\frac{a+b}{ab}$ [5] _____

6. In how many ways can eight floats be lined up for a parade down Main Street?

- (a) 1 (b) 8 (c) 2^8 (d) $\frac{8!}{4!}$ (e) $8!$ [6] _____

7. If a yardstick casts a shadow 10 feet long, how tall is a flagpole which casts a shadow 225 feet long at the same time?

- (a) 67 feet (b) 67.5 feet (c) 68 feet (d) 68.5 feet (e) 70 feet [7] _____

Go to back \Rightarrow

8. Express $0.8232323232323\dots$ as a reduced rational number. Find the sum of its numerator and denominator.

- (a) 122 (b) 343 (c) 361 (d) 1031 (e) 1805 [8] _____
-

9. A swimmer swims 100 meters at 3 meters per second and returns at 2 meters per second. How many seconds did this take?

- (a) 20 (b) 40 (c) $66\frac{2}{3}$ (d) $83\frac{1}{3}$ (e) 500 [9] _____
-

10. A large cube is dipped into red paint and then divided into 125 smaller cubes. How many of the smaller cubes will have at least 25% of their surface area painted?

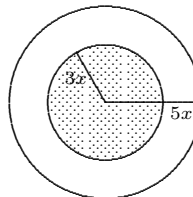
- (a) 27 (b) 40 (c) 44 (d) 54 (e) 150 [10] _____
-

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

1. Find the coordinate of the point on the number line which is one-sixth of the way from $\frac{1}{2}$ to $\frac{7}{8}$. Express your answer as a common fraction.

(a) $\frac{3}{4}$ (b) $\frac{5}{8}$ (c) $\frac{9}{16}$ (d) $\frac{11}{16}$ (e) $\frac{13}{16}$ [1] _____

2. Consider the two concentric circles shown here. They have radii $3x$ and $5x$. Find the **reduced** form of the ratio of the shaded area to the total area.



(a) 2:5 (b) 3:5 (c) $3x : 5x$ (d) 4:25 (e) 9 : 25 [2] _____

3. If the numbers $4\frac{3}{4}$, $4\frac{1}{3}$, 4.34, $\sqrt{20}$ and $4\frac{3}{5}$ are arranged from greatest to least, what is the middle number?

(a) $4\frac{3}{4}$ (b) $4\frac{1}{3}$ (c) 4.34 (d) $\sqrt{20}$ (e) $4\frac{3}{5}$ [3] _____

4. The sum of 6 and 8 is greater than the product of 2 and 6 by how much?

(a) 2 (b) 10 (c) 26 (d) 36 (e) 40 [4] _____

5. If a water tank weighs 240 metric tons when 40% full and 300 metric tons when completely full, how many metric tons does it weigh when it is empty?

(a) 60 (b) 100 (c) 200 (d) 300 (e) 600 [5] _____

6. A retailer marks up his prices by 40% near Christmas. In January, everything is reduced by 50%. Describe how the original prices compare to the January prices.

- (a) They are 110% of the original.
 (b) They are 90% of the original.
 (c) They are 70% of the original.
 (d) They are 20% of the original.
 (e) They are 20% of the original.

[6] _____

Go to back \Rightarrow

Test 3

NAME: _____

CLASS 7 & 8 Grade

SCHOOL: _____

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

1. Of all rectangles with perimeter 14, one has the largest area. What is that area?

- (a) 28.5 (b) 18 (c) 14 (d) 12.25 (e) 7.5 [1] _____
-

2. A 25-foot ladder is placed against a vertical wall so that its base is 7 feet from the wall. How far up the wall does the ladder touch?

- (a) 18 feet (b) 24 feet (c) 26 feet (d) $\sqrt{674}$ feet (e) 32 feet [2] _____
-

3. Bob and Mindy are brother and sister. Bob has as many brothers as sisters. Mindy has twice as many brothers as sisters. How many boys and how many girls are in the family?

- (a) 2 boys and 3 girls (b) 3 boys and 2 girls (c) 3 boys and 4 girls
(d) 4 boys and 3 girls (e) 2 boys and 1 girl

[3] _____

4. Consider the sums below. How many addends are there the first time the pattern no longer works?

$$1 + 11 =$$
$$1 + 11 + 111 =$$
$$1 + 11 + 111 + 1111 =$$

- (a) 8 (b) 9 (c) 10 (d) 11 (e) 12 [4] _____
-

5. How many counting numbers less than 36 are relatively prime to 36?

- (a) 8 (b) 9 (c) 10 (d) 12 (e) 16 [5] _____
-

6. If an orange is placed on a scale such that it just balances the weight of $\frac{7}{8}$ of an orange of the same weight and $\frac{7}{8}$ of an ounce, how much does the orange weigh?

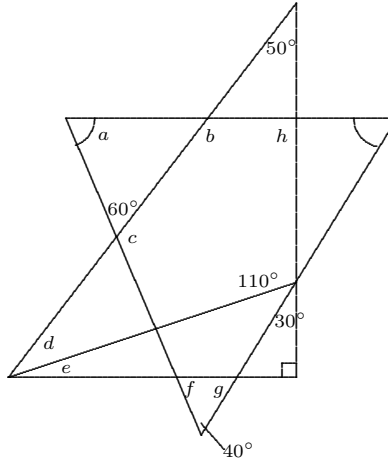
- (a) 1 oz. (b) 6 oz. (c) 7 oz. (d) 8 oz. (e) 10 oz. [6] _____
-

7. Jane has \$10 more than Bill. Bill has \$17 more than Tricia. Tricia has \$21 more than Steve. Their total of money is \$115. How much more do the girls have than the boys?

- (a) \$15 (b) \$31 (c) \$42 (d) \$65.50 (e) \$73 [7] _____
-

Go to back⇒

8. Consider the figure at the left. Some angles have their measures shown, and a few are named, e.g. angles a , b , c , etc. Congruent angles are marked with like arcs, and the only right interior angle in the figure is marked. Find the sum of the measures of angles a , e and f .



- (a) 110° (b) 150° (c) 170° (d) 180° (e) 200° [8] _____

9. Jack repairs VCRs. Last year he charged \$65 per hour for labor. This year he charges \$75 per hour. To the nearest percent, what is the rate of increase in his hourly charge?

- (a) 13% (b) 14% (c) 15% (d) 16% (e) 87% [9] _____

10. There is more than one pair of integers a and b whose $\text{g.c.d.}(a, b) = 15$ and whose $\text{l.c.m.}(a, b) = 180$. Select the **one** number from the list below that equals the sum of such a pair.

- (a) 78 (b) 90 (c) 105 (d) 108 (e) 120 [10] _____

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

1. In the sequence $\dots, a, b, c, d, 0, 1, 1, 2, 3, 5, 8, \dots$, each term is the sum of the two preceding terms. What is a ?

- (a) -4 (b) -3 (c) -2 (d) -1 (e) 0 [1] _____

2. A person has \$2.75 in dimes and quarters. If she has 3 times as many dimes as quarters, how many coins does she have?

- (a) 13 (b) 16 (c) 20 (d) 22 (e) 24 [2] _____

3. A bag contains three blue, four red, and three yellow marbles. How many blue marbles must be added to the bag for it to contain 75% blue marbles?

- (a) 12 (b) 13 (c) 15 (d) 18 (e) 21 [3] _____

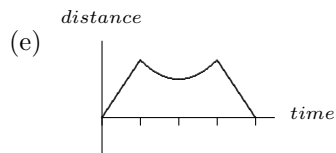
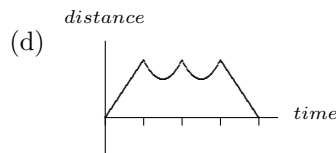
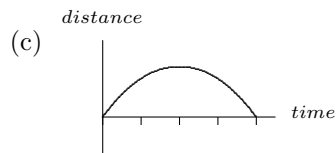
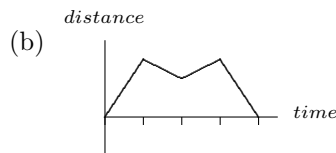
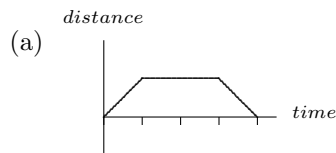
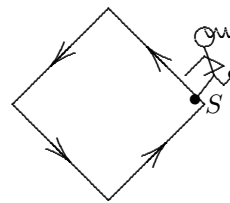
4. What is the sum of a central angle and the interior angle of an N -sided regular polygon?

- (a) 90 (b) 180 (c) 270 (d) 360 (e) $60n$ [4] _____

5. Minne Mouse is driving a sport utility vehicle along the interstate at a constant speed of 55 MPH. Mickey is driving a sports car one-half mile behind her that is moving at a constant rate of speed. If Mickey passes Minnie in exactly 60 seconds, at what speed, in MPH, is Mickey driving?

- (a) 60 MPH (b) 75 MPH (c) 85 MPH (d) 90 MPH (e) 100 MPH [5] _____

6. Nadia starts at S and walks at a steady pace once around the perimeter of a square park. Which graph best represents her distance from S as time passes?

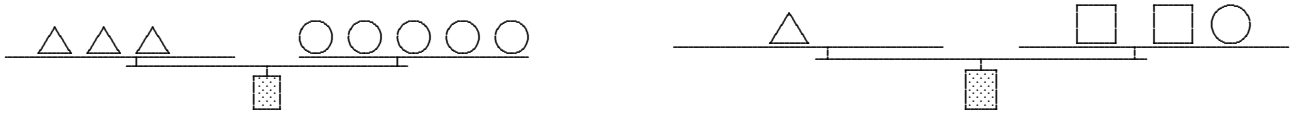


[6] _____

7. How many seconds longer is 2 percent of an hour than 30 percent of a minute?

- (a) 6 seconds (b) 45 seconds (c) 48 seconds (d) 54 seconds (e) 60 seconds [7] _____
-

8. In the diagram below, two equal-armed balances are shown. How many \square s would it take to balance one \bigcirc ?

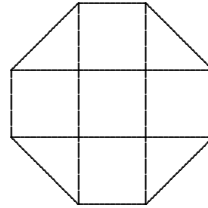


- (a) 1 (b) 2 (c) 3 (d) 4 (e) 5 [8] _____
-

9. According to publishers' records, 20% of the books published break even, 30% lose \$1000, 25% lose \$10,000, and 25% earn \$20,000. When a book is published, what is its expected income?

- (a) \$2200 (b) \$2250 (c) \$7750 (d) \$7800 (e) \$9000 [9] _____
-

10. If the area of the center square is four square units, what is the area of the regular octagon?



- (a) $4 + 4\sqrt{2}$ (b) $8 + 4\sqrt{2}$ (c) $8\sqrt{2}$ (d) $4 + 8\sqrt{2}$ (e) $8 + 8\sqrt{2}$ [10] _____
-

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

1. Consider two figures, a circle and a square. The square has a side length equal to the diameter of the circle. What is the ratio of circle's area to the square's area?

(a) $\frac{2}{\pi}$ (b) $\frac{\pi}{4}$ (c) $\frac{4}{\pi}$ (d) $\frac{\pi}{2}$ (e) π [1] _____

2. Which of the following can not be the units digit of a square of an integer?

(a) 2 and 3, only (b) 3 and 8, only (c) 3, 7, and 8, only [2] _____
(d) 2, 3, and 8, only (e) 2, 3, 7, and 8, only

3. \$1890 is to be divided among three people so that the second has \$200 more than the first and the third has \$200 more than the second. How much will the second person receive?

(a) \$430 (b) \$630 (c) \$830 (d) \$890 (e) \$900 [3] _____

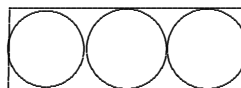
4. It is possible to earn 0,1,3,7 or 10 points with each shot of a game of "Flippy." How many positive scores less than 30 cannot be made in three shots?

(a) 3 (b) 4 (c) 5 (d) 6 (e) 7 [4] _____

5. Three circles of any size may be drawn in any location in a plane. What is the maximum number of parts into which the plane may be divided by the circles?

(a) 4 (b) 5 (c) 6 (d) 7 (e) 8 [5] _____

6. The area of each circle in the rectangle is 9π . What is the perimeter of the rectangle?



(a) 18 (b) 24 (c) 36 (d) 48 (e) 72 [6] _____

7. My total bill at Wal-Mart came to \$2,750. The sales tax rate is 6%. How much was the cost of goods before the tax is added?

(a) \$155.66 (b) \$165 (c) \$2,585 (d) \$2,594.34 (e) \$2,915 [7] _____

Go to back \Rightarrow

8. \$10,000 is invested at interest rate r , compounded annually. In two years it grows to \$12,000. What is the interest rate?

- (a) less than 5% (b) between 5% and 7% (c) between 7% and 9%
(d) between 9% and 11% (e) more than 11%

[8] _____

9. What is the sum of the following sequence: $1 - 2 + 3 - 4 + \dots - 98 + 99 = ?$

- (a) 48 (b) 49 (c) 50 (d) 51 (e) 52

[9] _____

10. A grade distribution for an algebra exam is given in the chart below. To display this same information in a circle graph, one computes values for central angles. What is the central angle (in degrees) for the grade B?

| grades | A | B | C | D | F |
|-----------|---|---|----|---|---|
| frequency | 7 | 6 | 15 | 8 | 4 |

- (a) 36° (b) 54° (c) 63° (d) 72° (e) 135°

[10] _____

Answer Key – 7/8 Test 2005

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|--------|---|---|---|---|---|---|---|---|---|----|
| test 1 | d | a | d | b | e | e | b | c | d | c |
| test 2 | c | e | d | a | c | c | b | c | b | c |
| test 3 | d | b | d | c | d | c | b | c | c | c |
| test 4 | b | c | d | b | c | c | d | c | a | e |
| test 5 | b | e | b | e | e | d | d | d | c | b |