# "Math Is Cool" Championships-1998-9

## Sponsored by: Walter & Betty Davis

November 13, 1998

Individual Contest, Grade 7

Express all answers as reduced fractions unless stated otherwise.
Leave answers in terms of $\pi$ where applicable.
Do not round any answers unless stated otherwise.

1. Evaluate: (5 times $2^3$ +10)$^2$

2. Find the sum of all integer values of $x$ that make the following statement true: $|3x + 1| \leq 5$

3. Two of the highest paid mathematicians, in recent years, were Roy and Jina of the Lewis and Clark Math Team. Together their salaries totaled 61.8 million dollars. Jina earned 18.4 million dollars more than Roy. What was Roy's salary?

4. Find the sum of the interior angles of a square.

5. What is the diameter of a circle with an area of $64\pi$?

6. In the pattern CALCULUSCALCULUS..., what is the 300$^{th}$ letter?

7. What is the probability of drawing a diamond face card on the fifth draw from a standard deck of 52 cards, knowing that the first four draws removed four kings from the deck?

8. If the space shuttle orbits the earth once every $\pi$ hours, how many complete orbits will it make in $\pi$ days? (give exact value)

9. In what quadrant is the point (3,-4) located?

10. When the human body temperature decreases to 88 degrees, your teeth begin to chatter. If, on a camping trip, you were thrown into a cold mountain stream with a body temperature of 99 degrees and your body lost .2 degrees per minute, how long would it be before your teeth would begin to chatter?

11. Silly Sampson was born in 1966. In 5 years, he will be 16 years older than Superficial Stephen. In what year was Superficial Stephen born?

12. Simplify: $\frac{6xh + 3h + h}{h}$

13. What is the next term in the sequence: 0, 3, 8, 15, 24, 35, __

14. Red, yellow and green M & M's are placed in a bowl. All but four are green, all but four are red and all but four are yellow. How many M & M's are in the bowl?

15. Eli has a total of 19 coins in her pocket. She has twice as many dimes as nickels. She has three more pennies than nickels. She has one dime more than the number of pennies. How many pennies does Eli have in her pocket?

16. A visitor to the planet Oog was greeted by 1 Foog and 2 Toogs. The visitor knew that Foogs always make false statements and that Toogs always make true statements. Each greeter made one statement:
*A* said, "*B* is a Foog." *B* said " I am a Toog." *C* said "I am not a Foog."
Which of the three can the visitor be *sure* is a Toog?

17. What number fits all the clues?
    - It is between 5 and 14.
    - It is a two digit number.
    - It is not a multiple of four.
    - If 3 is subtracted from it, the result is a multiple of 5.

18. Which of the following makes the statement true? <, > or =
    $\pi$ ____ 3.14

19. When a certain number is divided by 3 it has a remainder of 0. When divided by 2 it has a remainder of 1. When divided by 5 it has a reminder of 2. What is the number?

20. What is the smallest positive integer that is not a factor of the product of the first 100 primes?

21. Evaluate: $4 \times \dfrac{6}{4 \times \dfrac{3}{2 \times 7}}$

22. How many positive integers have a reciprocal larger than .001?

23. What is the length of the side of the square whose numeric value of the area is equal to the numeric value of the perimeter?

24. Ashley and Lindsey both counted to 1000. Ashley counted by 4's and started at 4. Lindsey counted 5 and started at 5. How many of the same numbers would Lindsey and Ashley say? (Example 20,40 etc)

25. The sum of two numbers is 23 and the sum of their squares is 409. What is the product of the two numbers?

26. If there are eight people in a room and they all shake hands once, how many hand shakes occur?

27. List the prime factors of 51.

28. An urn contains 3 red marbles, 8 green marbles and 9 purple marbles. Amy draws two marbles out of urn without replacement. What is the probability that the first was green and the second was red?

29. List all the numbers of which you can take the square root and get the same value with which you started.

30. The sum of the diameter and the radius of a certain circle is 12. What is the circumference of the circle?

# "Math Is Cool" Championships-1998-9

## Sponsored by: Walter & Betty Davis

### 7th Grade - November 13, 1998

### Individual Multiple Choice Contest

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1. Evaluate: $8^{1/3} + 16^{1/4} + 32^{1/5}$

A) 3 B) 4 C) 5 D) 6 E) 7 F) Answer not given

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2. If Beth had 60 cats and bought 5 more a week, how many cats would she have in 49 days?

A) 305 B) 110 C) 95 D) 25 E) 7 F) Answer not given

---

3. 5,000,000 minutes is most nearly equal to:

A) 1 day B) 1 month C) 1 year D) 1 decade E) 1 century

---

4. There are 75 students in a math class. Of the following, which could be a ratio of boys to girls in this math class?

A) 1:5 B) 3:4 C) 2:3 D) 9:8 E) 7:5 F) Answer not given

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5. If 22 of five dozen donuts have chocolate frosting, 13 have cream filling, and 7 have both, how many have neither chocolate frosting nor cream filling?

A) 18 B) 36 C) 32 D) 13 E) 17 F) Not enough information given

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6. A can of paint can cover a wall 9 feet wide by 12 feet tall. How many cans of paint are needed to paint a wall 18 feet wide by 48 feet tall?

A) 2 B) 4 C) 6 D) 8 E) 10 F) Answer not given

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7. A random chicken lays 360 eggs in the first year of life. The chicken lays 5 eggs less the next year, 5 less the next year etc. How many eggs will it lay in its life time?

A) 13140 B) 10000 C) 360 D) 1000 E) Answer not given F) Not enough information given

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8. What is the area of a circle inscribed in a square of area 16?

A) $4\pi$ B) $2\pi$ C) $8\pi$ D) $12\pi$ E) 16 F) Answer not given

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9. The difference between to two prime numbers can never be

A) 1 B) 2 C) 3 D) 4 E) 5 F) Answer not given

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# "Math Is Cool" Championships-1998-9

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7th Grade - November 13, 1998

Team Contest

Express all answers as reduced fractions unless stated otherwise.
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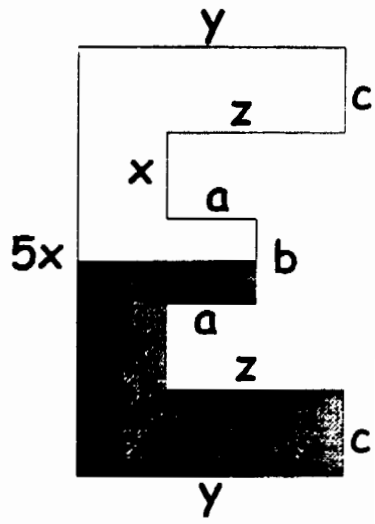
1. Find the perimeter of the shaded region in terms of x, y, and a if the shaded area is $\frac{1}{2}$ the total area and all lines that appear perpendicular or parallel are perpendicular and parallel.




2. Basketballs are stacked in a pyramid with a square base. Each basketball rests on four basketballs below it except in the base. How many basketballs would be in the bottom layer in a pyramid with a total of 91 basketballs?

3. How many distinct triangles have a perimeter of 15 units and integral length sides?

4. If a certain number is divided by 10 and the remainder is 3. When five times the number is divided by 10, what is the remainder?

5. Kathy has 10 red socks, 12 green socks, and 26 purple socks in her drawer. In the morning she begins taking a sock out of the drawer one at a time. How many socks must she take out of the drawer to ensure that she has matching green socks?

6. What is the smallest divisor of $3^{11} + 7^{25}$?

7. What is the sum of the factors of 32?

8. State the next number in the sequence:
1, 1, 1, 2, 2, 3, 3, 4, 5, 5, 8, 6, 13, 7, 21, 8, 34, 9, ___

9. Solve for x: $\sqrt{121} + \sqrt{100} = \sqrt{x} + \sqrt{225}$

10. Pat can read at a constant rate of 400 pages per 8 hours. How many seconds does it take Pat to read one page?

# "Math Is Cool" Championships-1998-9

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### 7th Grade - November 13, 1998

### Pressure Round Contest

Express all answers as reduced fractions unless stated otherwise.
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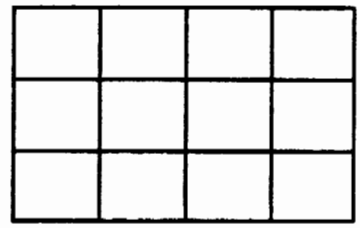
1. How many different rectangles can you find in the figure? Squares are rectangles.

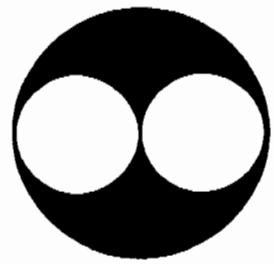


2. What is the sum of the two largest primes less than 100?

3. In a standard deck of 52 cards, what is the probability in two draws that the first will be a king and the second will be a jack?

4. If 2 bales of hay weigh 15 lbs, how much do 120 bales of hay weigh?

5. Each smaller circle has a radius of 5. Each smaller circle is tangent to the larger circle and passes through the center of the larger circle. Find the area of the shaded region.



# "Math Is Cool" Championships-1998-9

## Sponsored by: Walter & Betty Davis

### 7th Grade - November 13, 1998

### Mental Math

Express all answers as reduced fractions unless stated otherwise.
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**Person A**

1. What is the sum of the first 4 primes?
2. What is the sum of the reduced numerator and denominator of 15/45?
3. Evaluate: $11^2$
4. How many cubes, 3 inches on a side, does it take to make a cube 1 foot an a side?

**Person B**

1. List the prime factors of 45.
2. The sum of two numbers is 5, while the difference of these two numbers is 1. What is the product of the two numbers?
3. Evaluate: $2^6$
4. What is one-sixth of the sum of 14 and 52?

**Person C**

1. How many sides does a decagon have?
2. What is the first prime larger than 50?
3. What is 20% of 75?
4. What is the length of the hypotenuse of a right triangle with legs of length 3 & 4?

**Person D**

1. How many degrees is each angle of an equilateral triangle?
2. If a square's area is 169 $in^2$, find the length of one side.
3. How many dollars is 4840 quarters?
4. By how much do the hours in a week exceed the seconds in a minute?

# "Math Is Cool" Championships-1998-9

## Sponsored by: Walter & Betty Davis

### 7th Grade - November 13, 1998

## College Knowledge Bowl Questions #1

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1. What is the volume of a pyramid with a base area of 20 and a height of 15?

Answer:100

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2. The sum of three consecutive even integers is 306. What is the largest of the three integers?

Answer:104

---

3. A fair coin is tossed 10 times. What is the probability the 3rd toss is heads?

Answer:1/2

---

4. How many 2-digit numbers contain at least two threes?

Answer: 27

---

5. Nicole rode her bike for 15 minutes at 10 miles per hour. How many feet did she go?

Answer: 52,800

---

6. Drew made a large batch of cookies. The cookie recipe called for 3½ gallons of milk. How many cups of milk did he need?

Answer: 56

---

7. The sum of the interior angles of a regular polygon is $540^0$. How many sides does the polygon have?

Answer:5

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Extra Question: The sum of two numbers is 23 while the difference between the two numbers is 19. What is the product of the two numbers?

Answer:42

# "Math Is Cool" Championships-1998-9

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### 7th Grade - November 13, 1998

## College Knowledge Bowl Questions #2

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1. What is the product of the different prime factors of 28?

Answer: 14

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2. How many different ways can you arrange the letters in the word "NISSAN"? (Assume all letters are capital.)

Answer: 180

---

3. What is the median of the following data set: {2,12,17,25,33,49,2}?

Answer: 17

---

4. The number 9 can be written as the sum of 9 consecutive integers. What is the product of these 9 integers?

Answer: 0

---

5. What is 171 in base 5?

Answer: [illegible]

---

6. What is the product of all real numbers?

Answer: 0

---

7. What is the units digit of $8^{3145}$?

Answer: 8

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Extra Question: What is the only two months that can have back to back Friday the 13th's?

Answer: February and March

# "Math Is Cool" Championships-1998-9

## Sponsored by: Walter & Betty Davis

### 7th Grade - November 13, 1998

## College Knowledge Bowl Questions #3

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1. Four standard decks of 52 cards are combined. What is the probability of drawing a queen from this combined deck of cards in one draw?

Answer: 1/13

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2. There are ducks and cows in a field. The ducks and cows have 15 heads and 44 feet. How many ducks are in the field?

Answer: 8

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3. How much would a gallon of milk cost if each cup costs 2[illegible]?

Answer: $3.68 or [illegible]

---

4. What is the largest common multiple of the following set of numbers? {3,17,51,102}

Answer: 102

---

5. How many factors does 24 times 20 have?

Answer:

---

6. How many whole numbers between 1 and 200 are divisible by 6 and not by 30?

Answer: 30

---

7. In a right triangle, the sum of the two smaller angles is what percent of the larger angle?

Answer: 100% or 100

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Extra Question: What is the greatest common factor of 81, 54 , and 45?

Answer: 9

# Math Is Cool" Championships -- 1998-9

7th Grade - November 13, 1998

School Name_____Team #_____

Proctor Name_____Room #_____

**Key**

Full Name:_____

1st Score

Out of 30

## Individual Contest - Score Sheet

**DO NOT WRITE IN SHADED REGIONS**

| | Answer | | |
|---|---|---|---|
| 1. | 2500 | | |
| 2. | -2 | | |
| 3. | 21.7(Million) | | |
| 4. | 360(degrees) | | |
| 5. | 16 | | |
| 6. | C | | |
| 7. | 1/24 | | |
| 8. | 24 | | |
| 9. | 4 or IV | | |
| 10. | 55(Min) | | |
| 11. | 1982 | | |
| 12. | 6x + 4 | | |
| 13. | 48 | | |
| 14. | 6 | | |
| 15. | 7 | | |
| | | | |

| | Answer | | |
|---|---|---|---|
| 16. | C | | |
| 17. | 13 | | |
| 18. | > | | |
| 19. | 27 | | |
| 20. | 4 | | |
| 21. | 28 | | |
| 22. | 999 | | |
| 23. | 4 | | |
| 24. | 50 | | |
| 25. | 60 | | |
| 26. | 28 | | |
| 27. | 3 and 17 | | |
| 28. | 6/95 | | |
| 29. | 0 and 1 | | |
| 30. | $8\pi$ | | |
| | | | |

# Math Is Cool" Championships -- 1998-9

7th Grade - November 13, 1998

School Name_____Team #_____

Proctor Name_____Room #_____

**Key**

## Individual Multiple Choice Contest-Score Sheet

1st Score
1st Score

Out of 18
Out of 10

Correct responses are worth 2 points, incorrect responses are worth -1 point and no response is 0 points.

**DO NOT WRITE IN SHADED REGIONS**

| | Answer | | |
|---|---|---|---|
| 1. | D | | |
| 2. | C | | |
| 3. | D | | |
| 4. | C | | |
| 5. | C | | |
| 6. | D | | |
| 7. | A | | |
| 8. | A | | |
| 9. | F | | |
| | | | |

## Team Contest-Score Sheet

# Math Is Cool" Championships -- 1998-9

7th Grade - November 13, 1998

School Name_____Team #_____

Proctor Name_____Room #_____

**Key**

DO NOT WRITE IN SHADED REGIONS

| | Answer | | |
|---|---|---|---|
| 1. | 5x + 2y + 2a | | |
| 2. | 36 | | |
| 3. | 7 | | |
| 4. | 5 | | |
| 5. | 38 | | |
| 6. | 2 | | |
| 7. | 63 | | |
| 8. | 55 | | |
| 9. | 36 | | |
| 10. | 72 | | |
| | | | |

Mental Math - Score Sheet

# Math Is Cool" Championships -- 1998-9

7th Grade - November 13, 1998

School Name_____Team #_____

Proctor Name_____Room #_____

**Key**

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A. 1. 17

2. 4

3. 121

4. 64

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B. 1. 3,5

2. 6

3. 64

4. 11

---

C. 1. 10

2. 53

3. 15

4. 5

---

D. 1. $60^0$

2. 13

3. 1210

4. 108

# Math Is Cool" Championships -- 1998-9

7th Grade - November 13, 1998

School Name_____Team #_____

Proctor Name_____Room #_____

Key

## Pressure Round - Score Sheet

| | Answer | | |
|---|---|---|---|
| 1. | 56 | | |
| 2. | 186 | | |
| 3. | 4/663 | | |
| 4. | 900 | | |
| 5. | $50\pi$ | | |
| | | | |