# "Math Is Cool" Championships-1999-00

Sponsored by: Walter & Betty Davis

October 22, 1999

Individual Contest, Grade 8

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. Dillon climbed the Matterhorn Mountain in 4 hours. He traveled a total of 12 miles. What was his average speed in mph?

2. If the profit of an item is $4 and the sum of the cost and profit is $20, what is the cost of the item?

3. How many lines of symmetry does a square have?

4. What is the circumference of a circle with a radius of 12?

5. At 60 miles per hour, how far would a car travel in $2\frac{2}{3}$ hours?

6. Find the area of a square with a perimeter of 12.

7. A secretary types 54 words per minute. How many words can she type in 90 seconds?

8. What is the sum of the first 13 odd numbers?

9. What is the cube root of 64?

10. The sum of three consecutive positive integers is 42. What is the smallest of these numbers?

11. Sampson has 48 chickens, but two die every month. His neighbor has 18 chickens, and buys 3 every month. In how many months will they have the same number of chickens?

12. What is the probability of getting two heads and a tail in three flips of a coin?

13. Customers at a particular yogurt shop may select one of three flavors of yogurt. They may choose one of four toppings. How many one flavor/one topping combinations are possible?

14. Evaluate for $x=2$: $2x^2-3x+5$

15. What is the next number in the sequence? 1,2,6,24,120,...

16. How many integers belong to the sequence 4,6,8,10,...,120?

17. What is the center of a square with vertices (7,7), (5,9), (3,7) and (5,5)?

18. Write $.\overline{30}$ as a reduced fraction.

19. These nine separate cords are connected at two places. If each cord is a color and no two colors can meet at the same intersection, what is the least number of colors usable?

20. The average of x and y is 5. The average of x, y and z is 8. What is the value of z?

21. If $2^{(x+4)}=32^{(2x-1)}$, what is the value of x?

22. Find the next number in the sequence : $\frac{-1}{2}, \frac{3}{4}, \frac{-5}{8}$ _____.

23. Stephen takes a 4 question true/false quiz and randomly guesses on every problem. What is the probability that Stephen will score 100% on his test?

24. Krista and Amy are having a fight over who is cuter and they decide to roll dice to find out. They each roll one die. If the sum of the dice is greater than six, then Krista is cuter. If the sum of the dice is six or less, Amy is cuter. What is the probability that Krista is cutest?

25. The probability of passing a test is 9/10. The probability of rain is 3/4. What is the probability of both passing the test and having rain on the same day?

26. Two dice are tossed 72 times. How many times would you expect a sum of eleven?

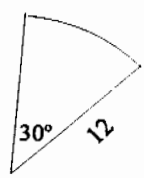
27. Find the slope (and only the slope) of the line with an x-intercept of 2 and a y-intercept of -2.

28. Divide $\frac{1999}{101}$ and round to the fourth decimal place.

29. There are 16 girls in a class of 30 students. Find the ratio of girls to boys.

30. James is twice as old as Jenny, who is twice as old as Ralph. If James is 20 years old, how old is Ralph?

31. What is the length of the crust on this piece of pizza?



32. Amy rented 5 videos one weekend but soon realized she would only have time to view 3 of them. How many different collections of three tapes could she select for viewing?

33. How many two digit numbers are divisible by 7, but not divisible by 3?

34. What is the millions digit of $30^6$?

35. At Holly Mason High the students have IQ's inversely proportional to the amount they can bench press. Mr. Smith can bench press 350, and his IQ is 50. Mr. Jones' IQ is 250. How much can Mr. Jones bench press?

36. If Silas says his 21st birthday is 1000 days from today, what day his 21st birthday? Specify month, day and year.

37. What is the difference of $18_9$ and $10_3$ in base 5?

38. It takes Pat 5 minutes to eat all the candy he inventories in Sampson's Big Shelf O' Candy . But when Jacob is there they can eat it all in 2 minutes. How many minutes would it take Jacob to eat all the candy by himself?

39. One year, the amount of young children that Krista tutored increased by 50%. The next year the amount decreased by 10%. If the amount of tutored kids is 7 higher than the original amount, what was the original amount?

40. Anne drove from Metropolis to Smallsville traveling 50 mph. On her return trip along the same road, she traveled 80 mph. What was Anne's average speed to the nearest tenth of a mph?

# "Math Is Cool" Championships-1999-00

## Sponsored by: Walter & Betty Davis

October 22, 1999

Individual Multiple Choice Contest, Grade 8

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1. A bag of marbles contains 7 red and 5 blue marbles. It two are selected one at a time, what is the probability that a red is removed, then a blue?

A) 1/2 B) 35/132 C) 332/451 D) 18/31 E) 6/23 F) Answer not given

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2. In a school of 112 students, 45 students take algebra and 66 take geometry. If 24 take both, how many take neither?

A) 25 B) 26 C) 27 D) 28 E) 29 F) Answer not given

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3. Which number's positive factors add up to twice the number?

A) 8 B) 12 C) 24 D) 28 E) 56 F) Answer not given

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4. What is the tenth smallest prime number?

A) 35 B) 10 C) 29 D) 13 E) 12 F) Answer not given

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5. If the ratio of the sides of two cubes is 5:2, what is the ratio of the volume of the larger cube to the volume of the smaller cube?

A) 5:2 B) 25:4 C) 7:8 D) 143 E) 125:8 F) Answer not given

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6. $5^{100}+5^{100}+5^{100}+5^{100}+5^{100}=$

A) $5^{500}$ B) $25^{100}$ C) $5^{501}$ D) $5^{100}$ E) $25^{500}$ F) Answer not given

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7. Mr. Sampson drives 27 miles one way to work. Gas costs $1.40 a

gallon, and his car averages 15 miles per gallon. How much will it cost to get back and forth to work for the 180 days of school?

A) \$120.20 B) \$453.80 C) \$907.20 D) \$123.45 E) \$2.50 F) Answer not given

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8. The sides of a square are increased by 50%. What is the percent increase in the area of the square?

A) $44.\overline{4}\%$ B) 50% C) 23% D) 18% E) 100% F) Answer not given

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9. A room has 7 doorways. A person enters the room and leaves the room through a different doorway. In how many ways can this be done?

A) 7 B) 42 C) 7 D) 12 E) 18 F) Answer not given

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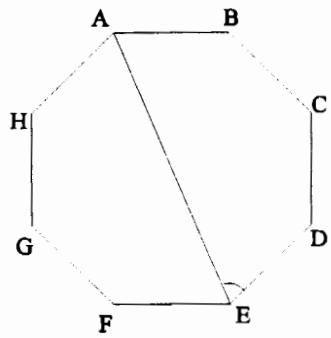
# "Math Is Cool" Championships-1999-00

## Sponsored by: Walter & Betty Davis

October 22, 1999

Team Contest, Grade 8

Express all answers as reduced fractions in terms of radicals.




1. In the octagon shown above, what is the measure of angle AED?

2. A number plus four times its reciprocal equals 4. What is the number?

3. Simplify: $\frac{(5!)^2}{4!6!}$.

4. How many 2 digit numbers are there where the tens digit is greater than the ones digit?

5. If the sides of an equilateral triangle are halved, by what percent is the area decreased?

6. A cube is made up of unit cubes, 36 on each face. If each face is painted, what fraction of the smaller cubes are unpainted?

7. If ac-ad+bd-bc=36, and c-d=8, what is a-b?

8. At Holly Mason High, 63 juniors are in AP classes. 52 people are on the cross country team, and 24 people are on the math team. If 3 people do all 3, and 7 people are on the math team and the cross country team, and 8 juniors in AP classes are on the math team, what is the largest possible number of cross country runners in junior AP classes?

9. If $\frac{2a+2b}{c} = \frac{d^2}{bcd}$, solve for "a" in terms of b, c, and d.

10. Find all values of x for which $x^3 + 4x^2 - 21x = 0$.

# "Math Is Cool" Championships-1999-00

## Sponsored by: Walter & Betty Davis

October 22, 1999

Pressure Round, Grade 8

1. What is the units digit of $19^{99}$?

2. Simplify:

$$3 + x + 4[(9x - 5) + 9(2x + 5)] - 5(2x + 3)$$

3. What is the largest counting number less than 1000 and divisible by 11?

4. How many counting numbers are between 30 and 65, not including 30 and 65?

5. What is the area of a triangle with sides of length 3, 4 and 5?

# "Math Is Cool" Championships-1999-00

## Sponsored by: Walter & Betty Davis

October 22, 1999

Mental Math, Grade 8

Express all answers as reduced fractions in terms of radicals and $\pi$, where applicable, unless otherwise instructed.

**Person A**

1. Round $\frac{2}{3}$ to the thousandths place.
2. What is the area of a circle with a diameter of 8?
3. What is $15^2$?
4. Evaluate: $\frac{1}{2}+\frac{1}{3}+\frac{1}{6}$.

**Person B**

1. List all the distinct prime factors of 60.
2. What is the greatest common factor of 18 and 30?
3. Evaluate 4!
4. Evaluate $3^4$.

**Person C**

1. What is the smallest prime number greater than 50?
2. What is the mean of 7, 1, and 13?
3. What is $\frac{2}{3}$ of $\frac{1}{2}$ of 3?
4. If a right triangle has sides of lengths of 6, 8, and 10, what is its area?

**Person D**

1. Convert $.\overline{5}$ to a fraction. (Read as: Convert point five repeating to a fraction reduced to lowest terms)
2. What is the reciprocal of the sum of $\frac{1}{3}$ and $\frac{1}{6}$?
3. What is the product of all numbers?
4. What is the distance between the points (2,0) and (-7,0)?

# "Math Is Cool" Championships-1999-00

## Sponsored by: Walter & Betty Davis

October 22, 1999

Grade 8

## College Knowledge Bowl Questions #1

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1. If Chase won 20% of his chess matches during the first half of the season, what percent of his remaining matches must he win to finish the season with 60% wins?

Answer: 100%

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2. What is the remainder when 3542 is divided by 11 ?

Answer: 0

---

3. Evaluate $4^4 + 3^5 - 891$

Answer: -392

---

4. What is the least common multiple of 45 and 72 ?

Answer:360

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5. What is the probability of rolling a sum of 6 on two six sided dice?

Answer:5/36

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6. Ten math team students all shake hands with each other. How many handshakes occur?

Answer:45

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7. The average of Roy's first three test scores is 60. What score must he receive on his next test to raise his average to 68?

Answer: 92

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Extra Question: What is the probability that a positive two digit number selected at random has its tens digit at least three more than its units digit?

Answer: 14/45

# "Math Is Cool" Championships-1999-00

## Sponsored by: Walter & Betty Davis

October 22, 1999

Grade 8

College Knowledge Bowl Questions #2

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1. How many ways can the letters in the word "crunch" be arranged?

Answer:360

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2. How many diagonals can be drawn in a convex pentagon?

Answer:5

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3. In a regular hexagon, what is the measure of each interior angle?

Answer:$120^0$

---

4. If the difference between two numbers is 14, and their sum is 50, what is the smaller of the two numbers?

Answer:18

---

5. Jonnie has 13 coins, all quarters and nickels, which add up to $2.05. How many quarters does he have?

Answer:7

---

6. If there are 8 competitors in a given math contest, in how many ways can first, second, and third place trophies be awarded?

Answer:336

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7. If 3 tics =4 tacs, and 2 tacs = 3 toes, then 1 toe is how many tics?

Answer:1/2

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Extra Question: April is now 20 years old. Katie is now 5 years older than April was 2 years ago. How old is Katie now?

Answer:23

# "Math Is Cool" Championships-1999-00

## Sponsored by: Walter & Betty Davis

October 22, 1999

Grade 8

College Knowledge Bowl Questions #3

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1. The sum of two prime numbers is 24. What is the smallest number that can be used in this sum?

Answer:5

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2. The product of 20 positive integers is 56 . What is the smallest possible sum of the 20 numbers?

Answer:29

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3. Five identical circus clowns are all exactly 50 inches tall. When one clown stands on the shoulders of another, their combined height is 96 inches. How tall would the five clowns be, in inches, if they all stood on each other's shoulders?

Answer:234

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4. What is the reciprocal of the sum of 3/10 and 1/15?

Answer:30/11 (Leave answer as improper fraction)

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5. How many ways can you arrange 6 different books on a shelf?

Answer:720

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6. Sean pushes Katherine up a 150 foot hill. Sean pushes Katherine up the hill 12 feet each day and Katherine slides down the hill 8 feet each night. How many days will it take Sean to get Katherine to the top of the hill?

Answer:36

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7. If Claudine counts backwards by 8, starting at 9,005, what will be the last positive number Claudine will say?

Answer:5

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Extra Question: When a certain number is divided by 8, the remainder is 3 and the quotient is 12. What is the number?

Answer:99

# Math Is Cool" Championships -- 1999-00

8th Grade - October 22, 1998

School Name_____Team #_____

Proctor Name_____Room #_____

**Key**

Full Name:_____

1st Score

Out of 40

## Individual Contest - Score Sheet

**DO NOT WRITE IN SHADED REGIONS**

| | Answer | | |
|---|---|---|---|
| 1. | 3(mph) | | |
| 2. | ($)16 | | |
| 3. | 4 | | |
| 4. | $24\pi$ | | |
| 5. | 160(miles) | | |
| 6. | 9 | | |
| 7. | 81 | | |
| 8. | 169 | | |
| 9. | 4 | | |
| 10. | 13 | | |
| 11. | 6 | | |
| 12. | 3/8 | | |
| 13. | 12 | | |
| 14. | 7 | | |
| 15. | 720 | | |
| 16. | 59 | | |
| 17. | (5,7) | | |
| 18. | 10/33 | | |
| 19. | 6 | | |
| 20. | 14 | | |
| | | | |

| | Answer | | |
|---|---|---|---|
| 21. | 1 | | |
| 22. | 7/16 | | |
| 23. | 1/16 | | |
| 24. | 7/12 | | |
| 25. | 27/40 | | |
| 26. | 4 | | |
| 27. | 1 | | |
| 28. | 19.7921 | | |
| 29. | 8/7 or 8:7 | | |
| 30. | 5 | | |
| 31. | $2\pi$ | | |
| 32. | 10 | | |
| 33. | 9 | | |
| 34. | 9 | | |
| 35. | 70 | | |
| 36. | July 19,2002 | | |
| 37. | $24_{(5)}$ | | |
| 38. | 3 | | |
| 39. | 20 | | |
| 40. | 61.5(mph) | | |
| | | | |

# Math Is Cool" Championships -- 1999-00

8th Grade - October 22, 1998

School Name_____Team #_____

Proctor Name_____Room #_____

**Key**

## Individual Multiple Choice Contest-Score Sheet

1st Score

Out of 18

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. | B | | |
| 2. | A | | |
| 3. | D | | |
| 4. | C | | |
| 5. | E | | |
| 6. | F | | |
| 7. | C | | |
| 8. | F | | |
| 9. | B | | |
| | | | |

# Math Is Cool" Championships -- 1999-00

8th Grade - October 22, 1998

School Name_____Team #_____

Proctor Name_____Room #_____

**Key**

## Team Contest-Score Sheet

| 1st Score |
|---|
| |

Out of 10

DO NOT WRITE IN SHADED REGIONS

| | Answer | | |
|---|---|---|---|
| 1. | 67.5° | | |
| 2. | 2 | | |
| 3. | 5/6 | | |
| 4. | 45 | | |
| 5. | 75% | | |
| 6. | 8/27 | | |
| 7. | 9/2 | | |
| 8. | 45 | | |
| 9. | $a = \frac{d}{2b} - b$ | | |
| 10. | 0,3,-7 | | |
| | | | |

# Math Is Cool" Championships -- 1999-00

8th Grade - October 22, 1998

School Name_____Team #_____

Proctor Name_____Room #_____

**Key**

## Pressure Round - Score Sheet

| | Answer | | |
|---|---|---|---|
| 1. | 9 | | |
| 2. | 99x+148 | | |
| 3. | 990 | | |
| 4. | 34 | | |
| 5. | 6 | | |
| | | | |

# Math Is Cool" Championships -- 1999-00

8th Grade - October 22, 1998

School Name_____Team #_____

Proctor Name_____Room #_____

**Key**

## Mental Math - Score Sheet

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A. 1. .667

2. $16\pi$

3. 225

4. 1

---

B. 1. 2,3,5

2. 6

3. 24

4. 81

---

C. 1. 53

2. 7

3. 1

4. 24

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D. 1. 5/9

2. 2

3. 0

4. 9