"Math Is Cool" Championships-1999-00

Sponsored by: The Engraver

November 5, 1999

Individual Contest, Grade 7

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

1. The math team drives from Spokane to Marykayville and then from Marykayville to Kent. If it is 300 miles from Spokane to Marykayville and 60 miles from Marykayille to Kent, and it took the Math Team 6 hours to complete the trip, what was the average speed in mph?

2. Sobe teas cost $1.25 each. If Amy buys 5 Sobe's at once how much does she pay?

3. What is smallest difference between any two prime numbers?

4. A circle's radius is 10. What is its circumference?

5. What is the cube root of 27?

6. 80 schools compete in a math contest. Of these schools, 40% are private schools. How many public schools compete?

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

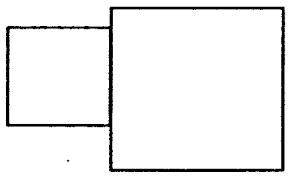
8. An isosceles triangle has a height of 6 and a base of 7. What is its area?

9. A right triangle has sides of length 5 and 12. What is the length of its hypotenuse?

10. The sum of four consecutive numbers is 14. What is the smallest number?

11. If 20 students took a driver's test and 8 of the students failed the test, what percentage of the students passed the test?

12. If the areas of the squares shown are 16 units^2 and 36 units^2, what is the perimeter of the figure?



13. Robert spent 3 days, 12 hours, and 15 minutes in Hungary. How many seconds was Robert in Hungary?

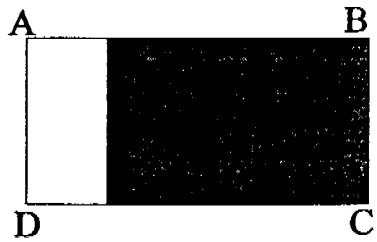
14. Sean and Jean are throwing a frisbee back and forth. If Jean always throws a frisbee so that Sean must walk 5 meters to retrieve it and Sean walks a total of 600 meters to retrieve the frisbee in the course of their game, how many times has Jean thrown the frisbee?

15. Solve the system of equations for x and y and write your answer as an ordered pair. $x+6y=16$ and $x = -2$

16. On the AP History Test, 30 people received 5's, 21 people received 4's, 19 people received 3's, 22 people received 2's and 8 people received a 1. If a 3 or higher is required to pass, what percentage of students passed.

17. How many positive primes have a remainder of zero when divided by 2?

18. The shaded area of the rectangle ABCD is three times as large as the unshaded area. If the unshaded area is 10, what is the area of ABCD?



19. What is the units digit of the product of the first 10 primes?

20. Find the slope of the line passing through the points (1,2) and (5,10).

21. Find the number of sides in a polygon whose interior angles have sum 2340°?

22. How many factors does 432 have?

23. Sean is normally the best free throw shooter on the team. So far this season, he has made only 9 out of 20. How many consecutive free throws must Sean make to raise his record to 75%.

24. On a shelf there are 3 math books and 2 history books, all of which are different. If the math books must be kept together, how many ways can the books be arranged on the shelf?

25. If Mr. Shoemaker has three bills and the first bill takes half of his money, the next bill takes two thirds of what's left and the last bill takes $5, how much money did he originally have if he is left with no money?

26. Of the 23 homes in a subdivision, 7 need roofing and 5 need landscaping. If two homes need both roofing and landscaping, how many need neither?

27. Solve the following equation for x: $4^x = 8^{2x+1}$

28. David opened his math book and multiplied the two page numbers that were facing him. Their product was 3192. What was the smaller page number facing him?

29. Diophantus was a Greek mathematician who lived about 200 A.D. He has been called the "father of algebra" because of his contributions to that field. After his death a student composed this puzzle problem based upon his life.

    His boyhood lasted for 1/6 of his life.
    His beard grew after 1/12 more of his life had passed.
    He married after 1/7 more of his life had passed.
    A son was born 5 years after his marriage.
    The son lived half as many years as his father.
    The father died 4 years after his son.

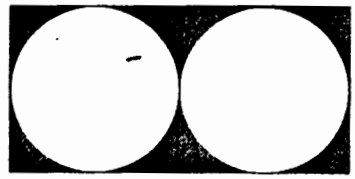
How old was Diophantus when he died?

30. A ball rebounds $\frac{1}{2}$ of the height from which it is falls. The ball is dropped from a height of 128 feet and keeps on bouncing. How far will it have traveled when it strikes the ground the fifth time?

31. A large group of students are standing in a circle and are evenly spaced. The 7^{th} student is directly opposite the 791^{st} . How many students are there altogether?

32. In a basketball game, the Nicks have four times as many points as the Lone Prime Rangers. The Lone Prime Rangers team makes a three point basket. The Nicks now only have two times as many points as the Lone Prime Rangers. How many points do the Nicks have?

33. What is the exact area of the shaded portion of the figure? The circles of radius 5 are inscribed in the rectangle.



34. Out of 150 students at the Math is Cool Academy for 5^{th} graders, 54 are taking probability, 48 are taking geometry, 12 are taking both geometry and probability, 9 are taking both algebra and probability, 8 are taking both algebra and geometry, 2 are taking all three classes, and 5 are not taking algebra, geometry, or probability. How many students are taking only algebra?

35. The population of Math Is Coolville raised by 30% in 1999. By what percent, to the nearest whole number, must it decrease the following year to return to the population it was in the beginning of 1999?

36. A 25 foot ladder is placed against a vertical wall. The foot of the ladder is 7 feet from the base of the wall. If the top of ladder slips down 4 feet, then how far will the foot of the ladder slide away from its original spot ?

37. How many points with integer coordinates are exactly 5 units away from (0,0)?

38. Find the perimeter of a rectangle with area 48 and diagonal of length 10?

39. If 5 hens can lay 24 eggs in 5 days, how many days are needed for 8 hens to lay 20 eggs?

40. The Lewis and Clark Math Team went on a backpack trip up the Wenahah River near Troy, Oregon. After seeing many snakes, they calculated the probability of seeing a snake within the next 20 minutes to be 609/625. What is the probability of seeing a snake within the next five minutes? Assume that the probability of seeing a snake at any moment is uniform (the same) for the entire 20 minutes.

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Individual Multiple Choice Contest, Grade 7

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1. What is the smallest positive perfect square that is also a perfect cube?

A) 4 B) 8 C) 27 D) 64 E) 125 F) Answer not given

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2. How many three digit positive numbers are there? (051 will not be considered a three digit number in this question)

A) 899 B) 900 C) 901 D) 999 E) 1000 F) Answer not given

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3. Which of the following could not be the sides of a triangle?

A) 4,5,5 B) 2,3,10 C) 7,8,9 D) 2,3,4 E) 12,15,20 F) Answer not given

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4. What are the odds in favor of a positive one-digit number being prime?

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

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5. If an airplane travels at 360 kilometers per hour, how many meters does it travel in one second?

A) 1 B) 10 C) 100 D) 1000 E) 10000 F) Answer not given

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6. What day of the week is 1000 days from Monday

A) Monday B) Tuesday C) Wednesday D) Thursday E) Answer not given

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7. Given the choices below, what is the greatest number that is divisible by both 7 and 8?

A) 1 B) 56 C) 2510 D) 784 E) 896 F) None given

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8. A speed limit sign reads 3960 yards per minute. How fast is that in mph?

A) 50 B) 15 C) 60 D) 135 E) 30 F) Answer not given

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9. What is the best unit of measurement to use to state the elevation above sea level of Spokane

A) inches B) feet C) miles D) Light years

"Math Is Cool" Championships-1999-00

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November 5, 1999

Team Contest, Grade 7

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1. The ratio of the areas of two squares is 6:1. Find the corresponding ratio of the lengths of the diagonals of the two squares.

2. A fish swims 8 miles downstream in 2 hours. He returns upstream in 14 hours. How fast does the fish swim in still water?

3. Ryan the babysitter decides to clean the house. He can clean the entire house in 5 hours. The children can mess the house up in 10 hours. If the house is completely a mess and Ryan starts cleaning the house and at the same instant the children follow along messing it up, how long will it take for him to have the house perfectly clean.

4. Five jars of candy contain a total of 100 pieces of candy. Each jar contains eight more pieces than the previous one. How many pieces are in the last jar?

5. Katherine and Claudine each have $10 in the bank. Every month Katherine plans to deposit $1 in his account. Every month Claudine plans to deposit $4 in her separate account. How many months will it be before Claudine has two times as much money as Katherine?

6. A square mile of land (1x1) has become contaminated. The city has regulated that no one can live within one mile of any point in the contaminated area. Find the area, in square miles, of uninhabitable land.

7.

1

3 5

7 9 11

13 15 17 19

21 23 25 27 29

What is the sum of the integers in the next row?

8. How many different ways can seven horses finish 1st and 2nd in a horse race?

9. How many factors does 144 have?

10. What is the sum of the first 3 perfect squares?

"Math Is Cool" Championships-1999-00

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November 5, 1999

Pressure Round, Grade 7

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1. Find the diameter of a sphere whose volume is 288π?

2. What percent of 20 is 13?

3. On the trip to the Fall Classic Math Competition the four member Math Team divided 26 cookies in the following way. Each Math Team member must have at least one cookie. Each Math Team Member must have a different number of cookies than any other Math Team member. Each Math Team member must have a prime number of cookies. How many cookies did the Math Team member with the most number of cookies have?

4. Find the sum of the first 50 positive integers?

5. How many times is the digit 3 used in the numbers 1 through 100?

"Math Is Cool" Championships-1999-00

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November 5, 1999

Mental Math, Grade 7

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

1. What is the sum of 17 integers whose average is 3?
2. Evaluate: 10^0 (Read as "Evaluate 10 to the zero power")
3. What is the largest prime number smaller than 100?
4. What is 4% of 200?

Person B

1. Evaluate $(-2)^3$ (Read as "The quantity -2 to the third power")
2. What is the perimeter of a rhombus with one side of length 13?
3. How many prime numbers are less than 25?
4. How many diagonals are in a square?

Person C

1. What is 10% of 20% of 150?
2. What is the mean of 2,3,5, and 6?
3. Find the diameter of a circle with area 49π.
4. What is the volume of a cube with side of length 1/3?

Person D

1. What is the area of a trapezoid with bases 2 and 4 and height of 3?
2. What % of 64 is 48?
3. Evaluate: $27^{2/3}$ (Read as "Evaluate 27 to the two-thirds power")
4. If the base of a right prism has area 9, and it has a height of 12, what is the volume of the prism?

"Math Is Cool" Championships-1999-00

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November 5, 1999

Grade 7

College Knowledge Bowl Questions #1

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1. If a coin is tossed 3 times what is the probability that heads appears at least once?

Answer:7/8

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2. State the next number in the sequence of: 2, 3, 6, 11, 18, ...

Answer: 27

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3. If Roy folds 3 papers every 6 seconds and Travis staples 20 papers a minute, how many minutes will it be before Roy folds 50 more papers than Travis staples?

Answer: 5(minutes)

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4. A student bought a calculator for 100 dollars. Later he sold the calculator for $115. He then repurchased the same calculator for $125. He then sold it for $135. What was his profit?

Answer: $25

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5. How many distinct arrangements of the letters in the word "algebra" are possible? (None of the letters are capital.)

Answer:2520

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6. What is the fewest number of Sundays that there can be in any one calender year?

Answer:52

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7. A school choir found they could arrange themselves in rows of 6, 8 and 10 with no one left over. What is the minimum number of students in the choir?

Answer:120

Extra Question: The measure of the angles of a triangle ore in ratio 4:5:6.What is the measure of the largest angle in degrees?

Answer:72^{0}

"Math Is Cool" Championships-1999-00

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November 5, 1999

Grade 7

College Knowledge Bowl Questions #2

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1. With the draw of a single card from a deck of 52 cards, what is the probability the card is a black king or red?

Answer:7/13

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2. Twelve people attended a party. The males all ate 2 cookies each and the females all ate 7 cookies each. If a total of 49 cookies were eaten, how many females attended the party?

Answer:5

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3. Two trains are headed directly towards each other at 90 mph and 74 mph. How many miles apart are they 30 minutes before impact?

Answer: 82

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4. Roy, Nicole, and Jenny took a math test. The average of their three scores was 89. Nicole's score was 93 and Jenny's score was 100. What was Roy's score?

Answer:74

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5. If you toss a fair coin seven times and get a head all seven times, what is the probability you will get a head on the eighth toss?

Answer:1/2

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6. Each day a snail crawls up a wall 12 inches. Each night the snail slides down 2 inches. On which day will the snail reach the top of the wall if the wall is 8 feet 7 inches tall?

Answer: 11

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7. Evaluate when $x = 5$; $3x^2 - 5x + 1$

Answer:51

Extra Question: State the Month, Day, Year and time of dat it is 73 hours after February 28th 1996 at 1:45 P.M.?

Answer: March 2, 1996 2:45 P.M.

"Math Is Cool" Championships-1999-00

Sponsored by: The Engraver

November 5, 1999

Grade 7

College Knowledge Bowl Questions #3

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1. Each side of a triangle has a different positive integer as its length. What is the least possible perimeter of this triangle?

Answer: 9

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2. If the difference between two numbers is 15 and their product is 76, what is the smaller number?

Answer:4

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3. Which of the following is the largest value of: a. 8/17 b. 21/43 c. 25/49

Answer: c or 25/49

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4. Krista has 57 coins in her pocket, all of which are dimes and nickels with a total value equal of $4.55. How many nickels does she have?

Answer: 23

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5. How many ways can you arrange the letters in "fritz"?

Answer:120

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6. How many 3-digit area codes are possible if the first digit cannot be zero and numbers can not be repeated.

Answer:648

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7. What is the probability, in reduced form, of drawing a black prime number from a deck of 52 cards?

Answer:2/13

Extra Question: Simplify: $\frac{1+2+3+4+5+6+7+8}{12}$

Answer:3

Math Is Cool" Championships -- 1999-00

7th Grade - November 5, 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.	60(mph)		
2.	($)6.25		
3.	1		
4.	20π		
5.	3		
6.	48		
7.	4		
8.	21		
9.	13		
10.	2		
11.	60(%)		
12.	32(units)		
13.	303300(secs)		
14.	120(throws)		
15.	(-2,3) Order matters		
16.	70(%)		
17.	1		
18.	40		
19.	0		
20.	2		

	Answer		
21.	15(sides)		
22.	20(factors)		
23.	24(Freethrows)		
24.	36(ways)		
25.	($)30		
26.	13(homes)		
27.	-3/4		
28.	56		
29.	84		
30.	368(feet)		
31.	1568(Students)		
32.	12(points)		
33.	$200-50\pi$(Miles^2)		
34.	55		
35.	23%		
36.	8(feet)		
37.	12		
38.	28		
39.	125/48 days		
40.	609/2500		

Math Is Cool" Championships -- 1999-00

7th Grade - November 5, 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.	F		
2.	B		
3.	B		
4.	A		
5.	C		
6.	E		
7.	E		
8.	D		
9.	B		

Math Is Cool" Championships -- 1999-00

7th Grade - November 5, 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.	$\sqrt{6}$:1		
2.	16/7 m.p.h.		
3.	10 hours		
4.	36		
5.	5 months		
6.	5+π(Square miles)		
7.	216		
8.	42		
9.	15		
10.	14		

Math Is Cool" Championships -- 1999-00

7th Grade - November 5, 1998

School Name_____Team #_____

Proctor Name_____Room #_____

Key

Mental Math - Score Sheet

A. 1. 51

2. 1

3. 97

4. 8

B. 1. -8

2. 52

3. 9

4. 2

C. 1. 3

2. 4

3. 14

4. 1/27

D. 1. 9

2. 75%

3. 9

4. 108

Math Is Cool" Championships -- 1999-00

7th Grade - November 5, 1998

School Name_____Team #_____

Proctor Name_____Room #_____

Key

Pressure Round - Score Sheet

	Answer		
1.	12		
2.	65(%)		
3.	11		
4.	1275		
5.	20		