"Math is Cool" Championships-2000-01

November 10, 2000

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.
Record all answers on the green cover sheet.

1. Yes or No: Is the converse to the following statement true? If two people are blue eyed, they do not have green eyes.

2. Solve for x: $5x + 3 = 53$

3. What is the mean of the set of data: 5, 7 ,13, 15?

4. What is the area of a rectangle with side lengths 8 and 6?

5. Mr. Sampson gives his math students .3 % to their semester grade if they get kicked out of Mr. Walther's science class for doing math homework. Aaron has a 51.7% in Mr. Sampson's class, but has been kicked out of Mr. Walther's class 110 times for doing math homework. What is Aaron's grade in Mr. Sampson's class after the boost? (round answer to the nearest percentage point)

6. Seven people eat in Mr. Sampson's room at lunch. If one day a meeting is held in the room and twenty-eight people attend in addition to the original group, then what is the ratio of the regulars to the all of the people at the meeting?

7. What is the area of a circle with diameter 20?

8. What is the next number in the sequence 1,2,4,8,16,32,___?

9. What is the area of a triangle with a base of 7 and a height of 24?

10. Juan wants to invest in two companies, Keisha's Computers and Carl's Software. He has 4,212 dollars to invest. After a month, stock in Keisha's company doubled. The return from the investment was 1, 650 dollars. What was his investment in Carl's Software if he invested all of his 4,212?

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

12. What is the greatest common factor of 45 and 30?

13. What is 22% of 150?

14. Express .55 as a fraction in reduced form.

15. How many rectangles with integral side lengths can be made with a string of length 80?

16. If the difference between two numbers is 20, and their sum is 4, what is the smaller of the two numbers?

17. Evaluate when $x = -4$: $-2x^2 - 7x - 4$

18. If Josh rides his tricycle to Yakima at 9 miles per hour, how many minutes will it take him to go from mile marker 210 to mile marker 12?

19. Sarah has 27 coins, all quarters and nickels, which add up to $6.55. How many quarters does she have?

20. Twenty-seven soldiers, numbered 1 through 27, stood in a circle in clockwise numerical order, all facing the center. They began to count out loud in clockwise order: the first soldier called out the number 1, the second called out 2; and each soldier then called out the number 1 more than the number called to his right. What was the number of the soldier who called out the number 2000?

21. Katie has a drawer of socks that consists of three brown socks, four red socks and five purple socks. How many socks must be drawn out of the drawer to ensure a match?

22. Biff goes to the ice cream shop and notices that there are 17 kinds of ice cream, 4 different kinds of cones and 13 different toppings. How many different kinds of cones an be made if only one type of ice cream, one type of cone and one type of topping maybe used on each ice cream cone?

23. How many 3 foot by 7 foot tiles would be needed to cover the floor of a room 81 feet by 49 feet?

24. How many ways can Colin choose 3 different flags out of a set of 5?

25. What is the measure of each interior angle in a regular pentagon?

26. What is the slope of a line that passes through the points (6,-3) and (1,-4)?

27. The average of Paul's first five test scores is 85. How many consecutive tests must Paul get 100% on in order to raise his average to 95? (All test are of equal value)

28. What is the measure of the smallest angle in a triangle with the ratio of the angles being 1:2:3?

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

30. If the number of apples in a bag is divided by 4, 7, or 8 the remainder is 2. What is the smallest number of apples in the bag if there are at least 3 apples in the bag?

Challenge Questions

31. Lee has a 90.1% in Mrs. Slaughter's english class. He needs a 91 % to get an "A" in her class, but Mrs. Slaughter rounds up to the nearest percentage point. There are 300 points total per quarter, and there are only 2 points left. Can Lee get an "A" by quarter?

32. Two dice are tossed 72 times. How many times would you expect to roll a sum of six?

33. Silas has three jars of beans. The second jar has two-thirds as many beans in it as the first jar and the third jar has two-thirds as many beans in it as the second jar. How many beans are in the first jar if all three jars have a total of 171 beans in them?

34. The total height of 1 Lego is $\frac{1}{2}$ inch. The total height of three Lego's stacked on top of each other locked together is one inch. What is the total height in inches of 12 Lego's stacked on top of each other?

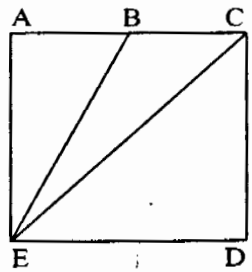
35. Stevie is three times as old as KC, and KC is 3 years older than Kelly. In 5 years Stevie will be twice as old as KC. How old will KC be in 5 years?

36. The sides of a right triangle are of lengths 3,4, and 5. Lines are drawn parallel to the legs of the right triangle through the midpoint of the hypotenuse, so that the triangle is divided into a rectangle and two smaller right triangles. What is the area of the rectangle?

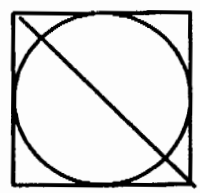
37. Krista has 4 pennies, 2 nickels and 5 dimes. How many different amounts of money can Krista make using one or more of these 11 coins?

38. At a school, 25 students are taking math, 35 are taking Spanish and 14 are taking neither math or Spanish. If a student is chosen at random and the probability that the student is taking both math and Spanish is 1/36, how many students are taking both math and Spanish?

39. In the rectangle ABCD, AE = 3. Also the $m\angle AEB$, $m\angle BEC$, and $m\angle CED$ form a sequence x, x, 2x. What is the area of the rectangle?



40. The area of the square is three. Find the exact area of the shaded region.



"Math is Cool" Championships-2000-01

November 10, 2000

Individual Multiple Choice Contest, Grade 7

During the summer, the Math Team Expedition Force (MTEF) climbed several mountains. Use the tables below to answer the questions. For purposes of this round, assume all hikes rise at a constant rate.

Hike Statistics			
Mountain	Maximum Elevation	Initial Elevation	Length of Hike in One Direction
Old Baldy	10,000 feet	5,000 feet	10 miles
Grizzly Peak	7,000 feet	4,000 feet	15 miles
Mt. Chillytoes	15,000 feet	8,000 feet	5 miles
Glacier Ridge	8,000 feet	3,000 feet	2 miles

Percentage of Hike Completed in One Direction				
MTEF Member	Old Baldy	Grizzly Peak	Mt. Chillytoes	Glacier Ridge
Sampson	90%	100%	90%	100%
Carl	40%	20%	70%	100%
Silas	30%	20%	70%	100%
Dillon	10%	60%	70%	100%
Sarah	20%	80%	100%	20%
Kirsten	100%	20%	70%	20%

1. Which hike had the least elevation gain?
   A. Old Baldy B. Grizzly Peak C. Mt. Chillytoes D. Glacier Ridge
2. Which hike had the greatest elevation gain?
   A. Old Baldy B. Grizzly Peak C. Mt. Chillytoes D. Glacier Ridge
3. Which hike was the steepest climb?
   A. Old Baldy B. Grizzly Peak C. Mt. Chillytoes D. Glacier Ridge
4. Who hiked the least number of miles over the summer?
   A. Sampson B. Carl C. Silas D. Dillon E. Sarah F. Kirsten
5. Who reached the highest elevation above sea level over the summer?
   A. Sampson B. Carl C. Silas D. Dillon E. Sarah F. Kirsten
6. Who gained the most elevation?
   A. Sampson B. Carl C. Silas D. Dillon E. Sarah F. Kirsten
7. How much elevation was gained by the whole MTEF?
   A. 70,000 B. 77,500 C. 80,000 D. 80,100 E. Answer not given
8. How many total miles hiked by the whole MTEF?
   A. 80.5 B. 150.6 C. 200 D. 212.6 E. Answer not given
9. What is the least number of members it would take to match or surpass the total elevation gained by Mr. Sampson?
   A. 1 B. 2 C. 3 D. 4 E. 5

"Math is Cool" Championships-2000-01

November 10, 2000

Team 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. In a preliminary race of 8 competitors, the top three 3 competitors get to move on to the next level with no advantage given to the competitors based upon the way they finish the race, 1^{st}, 2^{nd} or 3^{rd} . How many ways can three competitors be chosen to move to the next level?

2. How many seconds will it take a car traveling at 45 miles per hour to go 660 feet?

3. A regular pentagon with side lengths of a/2 is placed in the center of a regular pentagon with side lengths of a. What is the ratio of the area of the larger pentagon and the area between the smaller and larger pentagon?

4. What are the odds of drawing a heart from a standard deck of cards in one draw?

5. Asa walked completely around a circle and walked a distance of 49π meters. As he walked he pulled a rake behind him 2 meters wide. (He was carful to keep the rake centered on the line that was the edge of the circle). How much area did the rake cover?

6. Two different prime numbers are chosen between 10 and 20. The difference between their product and sum is 179. What is the smallest of the two prime numbers?

7. Captain Chaos buys a lottery ticket that requires him to pick 4 distinct numbers from 1 to 30 inclusive. Captain Chaos will only pick numbers from the sequence 1,1,2,3,5,8,.... As it turns out the numbers on the winning ticket only had numbers this sequence. What is the probability he has a winning ticket?

8. What is the area of the convex quadrilateral made by connecting the following four points? (2,2) , (-3,1), (1,-7), and (5,-1)

9. Lee can say π 800 times in 40 minutes and Aaron can say π 40 times a minute. How many times would π be said in one hour if the both were saying π at the listed rates at the same time?

10. Biff is counting backwards from 1000 by three's, what is the last positive integer he would say?

"Math is Cool" Championships-2000-01

November 10, 2000

Pressure Round, Grade 7

1. Berde can bench press his own weight. Sampson can bench press two Berde's. Silas can bench press twice his weight. Berde weighs half as much as Silas. Can Sampson bench press Silas?

2. For dinner each member of the Smith family has a 15-ounce mixture of macaroni and cheese. The amounts of macaroni and cheese may vary for each family member. Carl doesn't like cheese very much and only took one-tenth of the total amount of cheese. The total amount of cheese was 10-ounces. He took 14/65 of the total amount of macaroni. How many family members are there in the Smith family?

3. When the mean, median and mode of the following set of data are arranged in increasing order they form a sequence $x, x+1, x+2$. Find the missing piece of data.

   4, 2, 3, 6, 5, 12, ___

4. When a number is divide by 7, the quotient is 12 and the remainder is 3. What is the number?

5. How many positive x integers satisfy the equation $x^3 \leq 51$?

"Math is Cool" Championships-2000-01

November 10, 2000

Mental Math, Grade 7

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

Person A

1. List the prime factors of 12.
2. Evaluate 3 to the fourth.
3. What is 15% of 300?
4. What is the area of a circle with diameter 12?

Person B

1. What is the first prime number greater than 50?
2. What is the sum of the first 5 positive integers?
3. What is the sum of two-thirds and five-sevenths?
4. What is the area of a rectangle with perimeter 24 with the length twice the width?

Person C

1. What is the greatest common factor of 12 and 32?
2. Evaluate 4! (Read as: Evaluate 4 factorial)
3. What is the length of a diagonal in a rectangle with sides of length 5 and 12?
4. What is the volume of a cube with side length 4?

Person D

1. What is the square root of 196?
2. What is the area of a triangle with sides of length 6, 8 and 10?
3. What is the reciprocal of the sum of one-half and one-fourth?
4. Every dimension of a pyramid is tripled. What is the ratio of the old volume to the new volume?

"Math is Cool" Championships-2000-01

November 10, 2000

Grade 7

College Knowledge Bowl Questions #1

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1. How many distinct ways can the letters in the word PASCAL be arranged?

Ans: 360

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2. Evaluate for x=6: x^2-6x+7

Ans: 7

---

3. A turtle moves at 1 inch per second. If it takes him 3 minutes to cross the road, how many feet did he travel?

Ans: 15(feet)

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4. What is the diameter of a circle with area 121π?

Ans: 22

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5. Jenny is printing a 30 page report. The status bar says it will take 25 minutes and 15 seconds to finish the job. If it is 4:51:36,[read as four fifty-one and 36 seconds] at what time will the printer be done if the estimated time is correct. (Answer must include hour, minute, and second.)

Ans: 5:16:51

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6. Kyla has Ostriches and llamas on her farm. If there are 30 heads and 100 feet, how many Ostriches are there?

Ans: 10 (ostriches)

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7. A CD is 1 hr, 15 minutes long. The average length of a track is 5 minutes. How many tracks are there?

Ans: 15 (tracks)

Extra Question:
Adam, Bill, Carl, and Dean were buying tickets to a movie. In how many different ways could they line up?

Ans:24(ways)

"Math is Cool" Championships-2000-01

November 10, 2000

Grade 7

College Knowledge Bowl Questions #2

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1. What is the larger of the smallest two distinct primes whose sum will be a perfect square?

Ans: 7

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2. My Father and Father-in-Law turned 60 and 54 this year in October. In what year was my Father twice the age of my Father-in-Law?

Ans: 1952 or 52

---

3. Krista, Josh, and Kristen took a math test. The average of their three scores was 97. Krista's score was 98 and Josh's score was 99. What was Kristen's score?

Ans: 94

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4. If there are pigs and chickens in a field, and there is a total of 22 heads and 64 feet, how many chickens are in the field?

Ans: 12(chickens)

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5. Each day a snail crawls up a wall 10 inches. Each night the snail slides down 3 inches. On which day will the snail reach the top of the wall if the wall is 12 feet 6 inches tall?

Ans: 21(days)

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6. What is the probability of drawing a king or a red card from a standard deck of 52 cards on the second draw knowing that the first card was a king?

Ans: 9/17

---

7. What is the length of the hypotenuse of a right triangle with legs of length 15 and 36?

Answer: 39

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

Answer: 72^0

"Math is Cool" Championships-2000-01

November 10, 2000

Grade 7

College Knowledge Bowl Questions #3

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1. Solve for x: $3^x = 243$

Answer: 5

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2. If the difference between two numbers is 2, and their product is 35, what is the larger number?

Answer: 7

---

3. The Lewis and Clark drill team found they could arrange themselves in rows of 5, 9 and 15 with no one left over. What is the minimum number of students on the drill team?

Answer:45

---

4. Two trains are headed directly towards each other at 35 mph and 33 mph. How many miles apart are they 15 minutes before impact?

Answer: 17 miles or 17

---

5. How many diagonals can be drawn in a regular 12 sided figure?

Answer: 54

---

6. What is the sum of the interior angles of an octagon?

Answer: 1080

---

7. What is the probability of rolling a sum of 4 on two six sided dice?

Answer: 1/12

Extra Question: Simplify: $\sqrt[4]{\frac{16}{81}}$ (Read: The fourth root of the quantity 16 divided by 81)

Answer: 2/3

Math is Cool" Championships -- 2000-01

7th Grade - November 10, 2000

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	No		
2	10		
3	10		
4	48		
5	85%		
6	1:5		
7	100π		
8	64		
9	84		
10	($)3387		
11	4		
12	15		
13	33		
14	11/20		
15	20		
16	-8		
17	-8		
18	1320(mins)		
19	26		
20	2		

	Answer		
21	4		
22	884		
23	189		
24	60		
25	108(°)		
26	1/5		
27	10(tests)		
28	$30(^{0})$		
29	120		
30	58		
31	No		
32	12		
33	81		
34	4(inches)		
35	10		
36	3		
37	64		
38	2		
39	9		
40	$\frac{9\pi + 12}{32}$		

Math is Cool" Championships -- 2000-01

7th Grade - November 10, 2000

School Name_____Team #_____

Proctor Name_____Room #_____

Key

1st Score

Out of 18

Individual Multiple Choice Contest-Score Sheet

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

Math is Cool" Championships -- 2000-01

7th Grade - November 10, 2000

School Name_____Team #_____

Proctor Name_____Room #_____

Key

Team Contest-Score Sheet

1st Score

Out of 10

DO NOT WRITE IN SHADED REGIONS

	Answer		
1.	56		
2.	10		
3.	3		
4.	1:3		
5.	28π		
6.	11		
7.	4/7		
8.	37		
9.	3600		
10.	1		

Math is Cool" Championships -- 2000-01

7th Grade - November 10, 2000

School Name_____Team #_____

Proctor Name_____Room #_____

Key

Pressure Round - Score Sheet

	Answer		
1.	Yes		
2.	5(members)		
3.	6		
4.	87		
5.	3		

Math is Cool" Championships -- 2000-01

7th Grade - November 10, 2000

School Name_____Team #_____

Proctor Name_____Room #_____

Key

Mental Math - Score Sheet

A. 1. 2, 3

2. 81

3. 45

4. 36π

B. 1. 53

2. 15

3. 29/21 or 1 8/21

4. 32

C. 1. 4

2. 24

3. 13

4. 64

D. 1. 14

2. 24

3. 4/3 or 1 1/3

4. 1:27