"Math Is Cool" Championships-1996-7

March 7, 1997

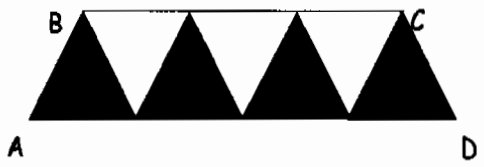
Individual Contest, Grade 8

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

1. I first increase 2 by one tenth. Next, I subtract one hundredth from the resulting sum. What is the result in terms of a decimal.

2. What will be the date be 800 days after March 7, 1997. (Answer must have month, day, and year)

3. AD = 10 and AD is parallel to BC. The distance between AD and BC is 4. What is the total area of the shaded triangles?



4. Evaluate:
$$3+\cfrac{3^4\div 9-2^2}{6-\cfrac{3+6}{2^2+\cfrac{3+2}{7-6}}}$$

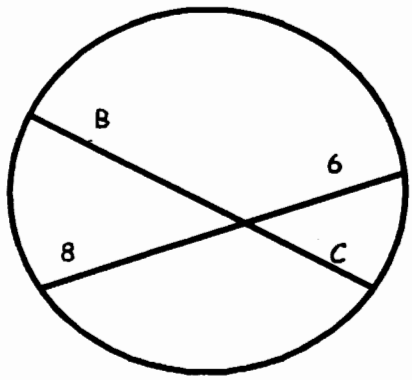
5. Solve for A: $15+30+45+60+75 = A(5+10+15+20+25)$

6. I am thinking of a number. When I add 2 to the number, then take 300% of the result, the number I get is my original number. What is my original number?

7. Expand: $x(x(x(x+1)+1)+1)+1$

8. Factor completely: $x^2+7x+10$

9. Find the product of B and C:



10. Find the negative value of x that makes the following equation true: $\frac{3}{X} = \frac{X}{243}$

11. Jina drives to work at 30 m.p.h., then drives home at 50 m.p.h. What was her average speed? (Write answer as a decimal)

12. Where does the line containing the points (0,4) and (3,10) and the line containing the points (0,-2) and (2,-10) intersect?

13. What is the distance between the points (4,5) and (9,17)?

14. Write $.\overline{39}$ as a fraction.

15. Evaluate: 13 + 15 + 17 + ... + 191 + 193

16. What is the volume of a sphere with a radius of 4?

17. For every 2 widgets I buy at regular price I get a third for a penny. If I spent 45¢ for 9 widgets, what is the prices for a regular widget, in cents? (Make sure answer has a cent symbol on it)

18. Silly Sampson and Dirty Dirks alternately draw cards from a (face down) deck of ordinary playing cards. Silly Sampson draws first and his first draw is the Ace of Diamonds. If they continue drawing alternately, what is the probability that Silly Sampson will be the one to draw the Ace of Spades?

19. What is the average of the first 50 positive integers?

20. Silly Sampson's ranch has cows and people. There is a total of 70 feet and 20 heads. How many cows are present?

21. Evaluate: $\sqrt{16+\sqrt{77+\sqrt{16}}}$

22. A math team with 57 students wins first place. If each student of the winning team shook the hands of all their team members once, how many hand shakes took place?

23. What is the only pair of integers (x,y) for which twice the square of the first integer equals three times the square of the second integer?

24. What is the area of a circle circumscribed about a square with side length $2\sqrt{2}$?

25. If $A\odot B = (A-B)(A+B) + (A+B)^2$
What is $13\odot 4$

26. What is the radius of a circle with area equal to 169π?

27. What is the units digit of the product of the first 50 prime numbers?

28. What is the surface area of a cube with side length 13?

29. At 11:45 a.m. a jar contained 243 jellybeans. If, at five minutes and at 35 minutes after each hour, one-third of the beans in the jar at the beginning of the half-hour were consumed, how many beans remained at 2 p.m.?

30. Find the four real values of x for which $|(2-|x|)|=1$

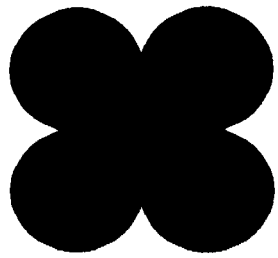
"Math Is Cool" Championships-1996-7

Team Test, Grade 8

March 7, 1997

Express all answers as reduced fractions in terms of radicals

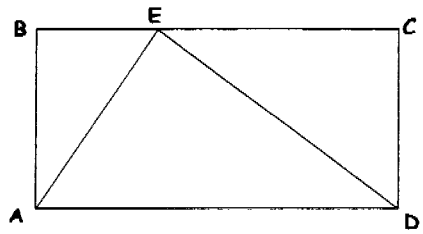
1. What is the area of the shaded region if the circles each have a radius of 3?



2. If $(\frac{2}{x}-\frac{x}{2})^2=0$ what is the value of x^6?

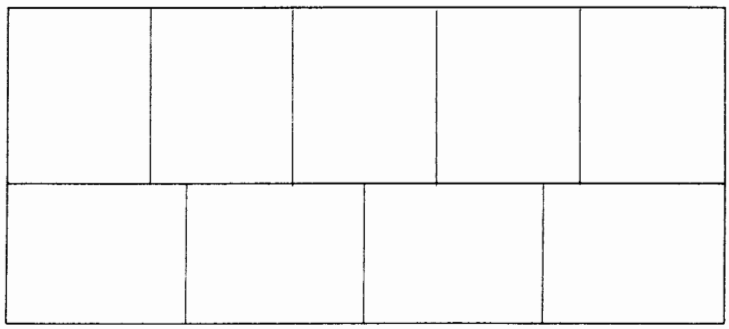
3. Roy, the babysitter, can clean the entire house in 30 minutes. The children can mess the entire house up in 55 minutes. If the entire house is a mess and Roy begins cleaning the house while the children are messing it up, how long will it take Roy to clean the whole house?

4. In the accompanying diagram, AE=3, DE=4, and AD=5. What is the area of rectangle ABCD?



5. I bought a new car. Joel said it was a blue Volvo, Jenny said it was a black Rabbit, and Tasha said it was a black Jeep. If each person correctly identified either the make of the car or its color, but not both, what was the color and make of my new car?

6. Nine congruent rectangles are placed as shown to form a large rectangle which has an area of 225. What is the perimeter of the large rectangle?



7. One stamp is randomly selected from a 9 x 9 sheet of 81 stamps. What is the probability that the stamp selected is not one of the sheet's border stamps? (Leave answer as a fraction)

8. If $2x^3 + 4x^2 + 6x + 8 = 2468$ and x is a positive real number, what is the value of $x^3 + 9x^2 + 9x + 7$?

9. If r(x) means the reciprocal of x, what is the value of x which satisfies $r(x) = r(2) + r(3) + r(6)$?

10. What is the sum of the integers which satisfy the following equation:

$$|4x+3| \leq 6$$

Practice relay
Person#1
5 + 13

Practice relay
Person#2
TNYWG/2

Practice relay
Person#3
TNYWG X 8

Practice relay
Person#4
TNYWG/3

Relay #1
Person#1
Evaluate: $33-\dfrac{2\times 8}{\dfrac{\frac{1}{2}\div\frac{1}{4}}{\dfrac{2+2}{\frac{1}{2}+\frac{1}{2}}}}$

Relay#1
Person#2
What is the distance between the points (TNYWG, 7) and (4, 11)?

Relay#1
Person#3
Evaluate
$5(\text{TNYWG})^3 + 2(\text{TNYWG})^2 - 2(\text{TNYWG})^3 + 2(\text{TNYWG}) - 3(\text{TNYWG})^3 + 5$

Relay#1
Person#4
Find the slope of a line containing the points (5, TNYWG) and (3, TNYWG)

Relay#2
Person#1
What is the sum of the first four perfect squares?

Relay#2
Person#2
What is the sum of the first TNYWG positive counting numbers?
Example: 1 + 2 + 3 + ... + TNYWG

Relay#2
Person#3

Let A * B = $\frac{A-5}{A+B}$

Evaluate: 5 * TNYWG

Relay#2
Person#4

TNYWG X (1 + 2 + 3 + 4 + 5 + ... + 999 + 1000)

"Math Is Cool" Championships-1996-7

March 7, 1997

Mental Math, Grade 8

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

Person #1

1. What is 11 squared?
2. What is the area of a rectangle with sides of length 5 and 23?
3. What is the diameter of a circle with area 25π?
4. What is one-third the sum of 17 and 16?

Person #2

1. List the factors of 12?
2. What is the lowest common multiple of 15 and 25?
3. If the sum of two angles in a triangle is 121° , what is the measure of the third in degrees?
4. What is one-fifth of the sum of 13 and 7?

Person#3

1. The sum of two numbers is 12, while there difference is 2. What is the smallest number?
2. List the first 5 primes?
3. What is the result when you multiply 8 and 5, then add 6?
4. What is 30% of 80?

Person#4

1. What is the sum of the interior angles of a regular convex pentagon?
2. What is the height of a cylinder with volume 18π units cubed and radius 3 units?
3. What is the length of the hypotenuse of a right triangle with legs of length 10 and 24?
4. What is the measure of one of the interior angles of a equilateral triangle?

"Math Is Cool" Championships -- 1996-7

8th Grade

College Knowledge Bowl Questions #1

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1. What is 2^8?

Answer: 256

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2. 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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3. How many primes are between 0 and 100?

Answer: 25

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4. What are the prime factors of 210?

Answer: 2,3,5,7 (order does not matter)

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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?

6.

Answer: 1/2

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6. What is the length of the hypotenuse of a right triangle with legs of length 16 and 30?.

Answer: 34

---

7. What is the slope of a line passing through the points (-5/4, 2/3) and (-2/3, 1/5)?

Answer:-4/5

Extra: Only Use if Needed

In a 45-45-90 triangle, the length of the hypotenuse is 1. What is the length of one of the legs?

Answer:

$$\frac{\sqrt{2}}{2} \text{ OR } \frac{1}{\sqrt{2}}$$

"Math Is Cool" Championships-1996-7
8th Grade
College Knowledge Bowl Questions #2

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1. List the prime factors of 197?

Answer: 197

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2. How many ways can the letters in the word "PIZZA" be arranged?

Answer: 60

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3. A sphere of radius 3 is inflated so it has a radius of 6. What is the ratio of the new volume to the old volume?

Answer: 8:1

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4. How many diagonals can be drawn in a convex octagon?

Answer: 20

---

5. What is 5!? (read as five factorial)

Answer: 120

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6. Greg can mow a lawn in 15 minutes by himself. Tim can mow the same lawn in 30 minutes by himself. How long will it take them if they mow it together? (Answer must be in minutes?)

Answer: 10

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7. If there are pigs and chickens in a field, and there is a total of 14 heads and 36 feet, how many chickens are in the field?

Answer: 10

Extra Question if needed
What is the length of the hypotenuse of a right triangle with legs of length 10 and 24?

Answer: 26

"Math Is Cool" Championships-1996-7

8th Grade

College Knowledge Bowl Questions #3

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1. What is the radius of a sphere with a volume of 36π?

Answer: 3

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2. 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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3. What is the probability of drawing a king or a red card from a standard deck of 52 cards?

Answer: 7/13

---

4. Solve for x: $(x + 4)^2 = 16$

Answer: 0 and -8

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5. Each dimension of a cube is doubled, what is the ratio of the new surface area to the old surface area?

Answer: 4:1

---

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

Answer: 51

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7. What time and day is it 73 hours after February 28th 1996 at 1:45 P.M.?

Answer: March 2nd 1996 at 2:45 P.M.

Extra question if needed:

A drain can empty a sink in 2 minutes. A faucet can fill the same sink in 5 minutes. How long will it take to empty the sink if it is completely full and you open the drain and start filling it at the same time? (Give answer in minutes and seconds)

Answer: 3 minutes 20 seconds

"Math Is Cool" Championships -- 1996-7

March 7, 1997

Individual Contest - Score Sheet

Score:

KEY

Full Name: _____

School: _____

DO NOT WRITE IN SHADED REGIONS

Answer		
1.	2.09	
2.	May 16, 1999	
3.	20	
4.	4	
5.	3	
6.	-3	
7.	$x^4+x^3+x^2+x+1$	
8.	(X+2)(x+5) order doesn't matter	
9.	48	
10.	-27	
11.	37.5	
12.	(-1,2)	
13.	13	
14.	13/33	
15.	9373	

Answer		
16.	$(256/3)\pi$	
17.	7¢	
18.	25/51	
19.	51/2	
20.	15	
21.	5	
22.	1596	
23.	(0,0)	
24.	4π	
25.	442	
26.	13	
27.	0	
28.	1014	
29.	48	
30.	1,-1,3,-3 order doesn't matter	

"Math Is Cool" Championships -- 1996-7

March 7, 1997

Team Contest - Score Sheet

Score:

KEY

School:_____ Team #:_____

DO NOT WRITE IN SHADED REGIONS

	Answer
1.	$27\pi + 36$ order doesn't matter
2.	64
3.	66 mins
4.	12
5.	Black Volvo
6.	$29\sqrt{5}$
7.	49/81
8.	1997
9.	1
10.	-3

"Math Is Cool" Championships -- 1996-7

March 7, 1997

Mental Math - Score Sheet

Score: KEY

School:_____ Team #:_____

A. 1. 121

2. 115

3. 10

4. 11

B. 1. 1,2,3,4,6,12 (order doesn't matter)

2. 75

3. 59

4. 4

C. 1. 5

2. 2,3,5,7,11 (Order doesn't matter)

3. 46

4. 24

D. 1. 540

2. 2

3. 26

4. 60

"Math Is Cool" Championships -- 1996-7

March 7, 1997

Relay Contest - Score Sheet

Practice relay

24

Answer for relay #1

0

Answer for relay #2

0