"Math Is Cool" Championships-1996-7

April 25, 1997

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. Evaluate: $(3 \times 5^2 - 80)^2$

2. What is the sum of the interior angles of a four sided figure?

3. Evaluate: $6 + 9 \times 4$

4. List the prime factors of 210.

5. Find the perimeter of a regular pentagon with side length five.

6. Evaluate:
$$\frac{\frac{3}{5} - \frac{2}{7} + \frac{1}{9}}{\frac{1}{9} \times \frac{2}{7} \times \frac{3}{5}}$$

7. Jina scored 87, 95, 79, 98 and 85 on five tests. What does she need to score on the sixth test to have an average of 90?

8. How many different ways can you arrange the letters in "JENNY"?

9. The sum of two numbers is 44, and the difference is 12. What is the smaller of the two numbers?

10. Eliminate all radicals: $\sqrt{5+\sqrt{7+\sqrt{77+\sqrt{16}}}}$

11. What is the lowest common multiple of 28 and 77?

12. What is the surface area of a cube side length 2?

13. What is the probability of drawing a king from a standard deck of 52 cards that is missing the queen of spades, both red sevens and the king of hearts?

14. On the Galapagos Islands, Darwin saw tortoises and finches. If there were 25 heads and 90 feet how many tortoises were there?

15. Solve for x: $3(x-4)=\frac{1}{2}(2x+24)$

16. If A ♏ B = (A + 1) + (A + 2) + (1 + B).

    What is 7 ♏ 14

17. Into what geometric shape should you bend a piece of wire so that it will hold the maximum area?

18. Morten can mow a lawn in 3 hours and Lisa can mow the same lawn in 2 hours. Working together, how many minutes would it take them to mow the same lawn?

19. Convert $.\overline{36}$ to a fraction.

20. Nicole owns an apartment building with 29 units. She is placing new numbers on all the doors. How many digits does Nicole need to buy if she starts with one and skips thirteen?

21. Simplify: $2x(3x - 5) - 4(x + 7)$

22. What is the probability of rolling a sum of seven with three six-sided dice?

23. What is the product of the first five prime numbers?

24. Tasha has five pair of pants, three shirts, two hats, and seven pairs of shoes. How many different outfits could she wear?

25. Evaluate $3(x + 4) - y$ when $x = 7$ and $y = 3$.

26. What is the diameter of a circle with an area of 49π?

27. State the next term in the sequence: $a, a^2b, a^3b^2, a^4b^3,$ _____

28. Solve for x: $3^2 + 4^2 = 5^x$

29. What is 30% of 30?

30. Convert .125 to a fraction.

"Math Is Cool" Championships-1996-7

Team Contest, Grade 7

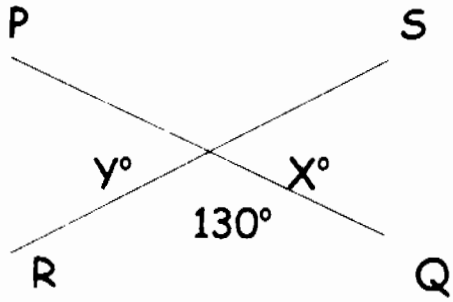
April 25, 1997

Express all answers as reduced fractions in terms of radicals.

1. I am thinking of a number. When I divide that number by $\frac{1}{2}$ I get 3 times my original number. What is my original number?

2. If the cost, in dollars, of a box of my favorite cereal is the same as the number of different values of x which satisfy $(x^2 - 9)^3 = 0$, then a box of this cereal costs how much?

3. If, in the figure, $\overline{PQ}$ and $\overline{RS}$ are intersecting line segments, what is x + y?



4. How many different ways can you arrange the following books on a shelf: War and Peace, BFG, 1984, and The Scarlet Letter?

5. Roy has 3 pennies, 3 nickels and 3 dimes. How many different amounts of money can Roy make using one or more of these 9 coins?

6. If $\frac{2}{3}\times\frac{3}{4}\times\frac{4}{5}\times\frac{5}{6}\times\frac{6}{7}\times\frac{7}{8}\times\frac{8}{9}\times\frac{9}{10}\times\frac{10}{11}\times\frac{11}{12}=\frac{1}{n}$, find n.

7. Evaluate: $\frac{2^{40}}{4^{20}}$

8. A math team of 13 people all shake hands with each other exactly once. How many hand shakes occur?

9. Roy drives to work at 70 mph and home that night along the same route at 30 mph. What is his average speed?

10. You have a bag of bagels. In the bag there are six blueberry, 12 plain, seven cinnamon-raisin, and one onion bagel. What is the probability of drawing a blueberry bagel from the bag in one draw?

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
Solve for x: $5x + 6 = 86$

Relay#1
Person#2
Find the radius of a circle with an area of $TNYWG\pi$.

Relay#1
Person#3
$5(TNYWG)^2 - 12(TNYWG)^3 - 4(TNYWG)^2 + 8(TNYWG)^3 - 3(TNYWG) + 4(TNYWG)^3 + 3(TNYWG)$

Relay#1
Person#4
Find the sum of the first $\sqrt{\sqrt{TNYWG}}$ odd numbers.

Relay#2
Person#1
What is the area of a triangle with a base of 4 and a height of 2?

Relay#2
Person#2
What is the sum of the first TNYWG primes?

Relay#2
Person#3
If the sum of $\frac{TNYWG}{4} + \frac{4}{3}$ is greater than 1 then pass "yes" to person 4, otherwise pass "no".

Relay#2
Person#4
If you received "yes" from person 3 solve equation "A" and give your answer to the proctor, otherwise solve equation "B" and give your answer to the proctor.

Equation A: $7(2x + 3) - 5(2x + 1) = 11$

Equation B: $4(2x + 3) - 2(5x - 7) = 8$

"Math Is Cool" Championships-1996-7

April 25, 1997

Mental Math, Grade 7

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

Person #1

1. What is the area of a square with side length 12?
2. What is one-fifth the sum of 12 and 8?
3. The sum of two numbers is 16 while their difference is two. What is the largest number?
4. If two angles are supplementary, what is their sum?

Person #2

1. If two angle in a triangle measure 20^0 and 60^0. What is the measure of the third angle?
2. What is 12 times 7?
3. What is the sum of 2/9 and 5/3?
4. What is the volume of a cube with side length 2?

Person#3

1. What is 15% of 40?
2. What is the circumference of a circle with a radius of 7?
3. What is the units digit of the product of the first three primes?
4. Evaluate: 2^5

Person#4

1. What is the sum of the interior angles of a pentagon?
2. There are 3 pink marbles, 5 blue marbles, 2 yellow marbles in a bag. What is the probability of drawing a blue marble in a single draw?
3. What is one third the sum of 7 and 14?
4. What are the prime factors of twelve?

"Math Is Cool" Championships-1996-7

7th Grade

College Knowledge Bowl Questions #1

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1. Is the sum of the first 87 primes odd or even?

Answer: even

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2. What is 12/5 divided by 2/15 ?

Answer: 18

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3. What is the volume of a rectangular box with length 10, width 2 and height 7?

Answer: 140

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4. What is the probability of drawing a king or black card from a deck of cards?

Answer: 7/13

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5. Morten rides his bike from point "A" to point "B" at 20 KMH and returns along the same path at 15 KMH. Will his average speed be equal to 17.5 KMH, less than 17.5 KMH, or greater than 17.5 KMH?

Answer: Less

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6. Solve the system of equations for x. The first equation is $2x + 3y = 12$ and the second equation is $-3x + y = -29$.

Answer: 9

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7. Evaluate: $\sqrt[3]{8^2}$

Answer: 4

Extra Question: What is the measure of an angle complementary to an angle with a measure of 69° ?

Answer: 21°

"Math Is Cool" Championships-1996-7

7th Grade

College Knowledge Bowl Questions #2

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1. The sum of three consecutive integers is 78. What is the mean of these three numbers?

Answer: 26

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2. A ball is dropped off a 100 foot building. Each time it hits the ground it bounces back up $\frac{1}{2}$ the distance it has just fallen. How many feet has the ball traveled when it hits the ground the second time?

Answer: 200

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3. In the L.C. Math Team, 15 students are taking geometry, 17 students are taking trigonometry, and 12 students are taking calculus. If you choose a member at random, what is the probability they are currently taking calculus?

Answer: 3/11

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4. If one of the angles in a triangle is 33°, and another is 70°, what is the measure in degrees of the other angle?

Answer: 77

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5. How many two digit numbers contain at least one three?

Answer: 18

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6. Jina has a rare collection of coins. The collection consists of snore flacks and flip-o-lops. A snore flack is worth 6¢ and a flip-o-lop is worth 11¢. This rare collection consists of 15 coins and has a face value of $1.15. How many flip-o-lops are in the collection?

Answer: 5

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7. Lisa rides her bike for 10 hours at 1 mph. How many feet did she go?

Answer: 52,800

Extra Question: What is the sum of the non-prime factors of 12?

Answer: 23

"Math Is Cool" Championships-1996-7
7th Grade
College Knowledge Bowl Questions #3

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1. A squares side is doubled. What is the ratio of the new area to the old area?

Answer: 4:1

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2. What is the probability of rolling a number larger than 2 when a die is rolled?

Answer: 2/3

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

Answer: 20

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4. How many prime numbers are between 0 and 50?

Answer: 15

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5. Is 1997 prime?

Answer: yes

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6. What is the next prime year we will live in?

Answer: 1999

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

Answer: 45

Extra Question: How many dimensions are in a cube?

Answer: 3

"Math Is Cool" Championships -- 1996-7

April 25, 1997

Individual Contest - Score Sheet

Score: KEY

Full Name:_____ School:_____

DO NOT WRITE IN SHADED REGIONS

	Answer		
1.	25		
2.	360°		
3.	42		
4.	2,3,5,7(order doesn't matter)		
5.	25		
6.	67/3 or 22 1/3		
7.	96		
8.	60		
9.	16		
10.	3		
11.	308		
12.	24		
13.	1/16		
14.	20		
15.	12		

	Answer		
16.	32		
17.	Circle		
18.	72		
19.	12/33		
20.	49		
21.	$6x^2 - 14x - 28$		
22.	5/72		
23.	2310		
24.	210		
25.	30		
26.	14		
27.	a^5b^4		
28.	2		
29.	9		
30.	1/8		

"Math Is Cool" Championships -- 1996-7

April 25, 1997

Team Contest - Score Sheet

Score:
KEY

School:_____ Team #:_____

DO NOT WRITE IN SHADED REGIONS

	Answer		
1.	0		
2.	2		
3.	100		
4.	24		
5.	39		
6.	6		
7.	1		
8.	78		
9.	42		
10.	3/13		

"Math Is Cool" Championships -- 1996-7

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Mental Math - Score Sheet

Score:
KEY

School:_____ Team #:_____

A. 1. 144

2. 4

3. 9

4. 180°

B. 1. 100

2. 84

3. 17/9

4. 8

C. 1. 6

2. 14π

3. 0

4. 32

D. 1. 540

2. 1/2

3. 7

4. 2, 3 (order doesn't matter)

"Math Is Cool" Championships -- 1996-7

April 25, 1997

Relay Contest - Score Sheet

Practice relay

24

Answer for relay #1

4

Answer for relay #2

-5/4