# "Math is Cool" Championships-2001-02

November 9, 2001
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 - 5 + 6 - 9

2. Round 5,782 to the nearest hundreds place.

3. -5(3 - 2(5 - 3))

4. Evaluate 3(5x - 4) - 2y when x = 7 and y = 3.

5. Write forty-seven million, thirty-one thousand, two hundred five and fifty-five hundredths as a decimal.

6. Simplify: 5(2x + 3) - 3(x - 1)

7. Cliff bars cost $1.33 each. If Tealah buys 6 cliff bars at once how much does she pay?

8. A can of paint can cover a wall 3 feet wide by 18 feet tall. How many cans of paint are needed to paint a wall 12 feet wide by 54 feet tall?

9. In what quadrant is the point (3,-4) located? Describe the quadrant as 1, 2, 3 or 4

10. Convert .130 to a fraction and reduce it to lowest terms.

11. State the next term in the sequence: a^4b^2 , a^8b^4, $a^{12}b^6$, _____

12. Evaluate: $(3\cdot2^2 - 50)^2$

13. The sum of four consecutive numbers is 38.   What is the smallest number?

14. If the areas of the squares shown are 16 units^2, 25 units^2 and 36 units^2, what is the perimeter of the whole figure in units?
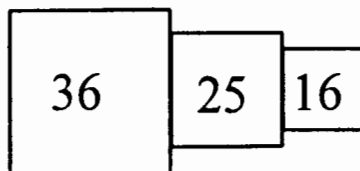
15. Yes or No: Is the converse to the following statement true? If a person likes to downhill ski they use a chairlift.

16. A ball bounces back to 1/3 of the height from which it falls. The ball is dropped from a height of 243 feet and keeps on bouncing. How far will it have traveled when it strikes the ground the 3rd time?

17. What is smallest difference between any different three digit prime numbers?

18. Red, yellow and green M & M's are placed in a bowl. All but fourteen are green, all but thirteen are red and all but fifteen are yellow. How many M & M's are in the bowl?

19. In the pattern SILASSILASSILAS......., what is the 400th letter?

20. Find the sum of all integer values of x that make the following statement true: $|5x - 3| \le 18$

21. What is 27% of 300?

22. Colin opened his math book and multiplied the two page numbers that were facing him. Their product was 14762. What was the smaller page number facing him?

23. How many distinct factors does 42 have?

24. Evaluate: $3 + \dfrac{25}{2 + \dfrac{23}{7 + \dfrac{2}{3}}}$

25. Find the slope of the line passing through the points (3,11) and (5,-1).

26. How many positive primes larger than 37 have a remainder of zero when divided by 53?

27. How many lines of symmetry does a equilateral triangle have?

28. What is the surface area of a sphere with diameter 20?

29. Fifty-five soldiers, numbered 1 through 55, 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 2001?

Challenge Questions

30. On a shelf there are 5 math books and 3 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?

31. What is the measure of the smallest angle, on degrees, of a triangle with the ratio of the angles being 3:4:5?

32. Solve the following equation for x: $3^{x+2} = 27^{3x-5}$

33. For how many different integer values of x is $\dfrac{120}{x}$ an integer?

34. Twenty-two students attend Tosch Middle School. Seven students take math and nine take science. If a student is chosen at random the probability that they are taking neither math or science is 4/11. How many students take both math and science?

35. How many ways can Christine choose 4 different flags out of a set of 7?

36. The cost of a garment was marked up 15%. By what percent, to the nearest whole number, must it decrease in order for the garment to return to its original price?

37. What is the sum of 13_4 and 21_4 in base 5?

38. The average of Berde's first five test scores is 60%. How many consecutive tests must Berde get 100% on in order to raise his average to 80%? (All tests are of equal value)

39. How many different triangles with integral side lengths can be made using the entire string of length 40?

40. Biff, Eho and Hank can mow a lawn together in 1 hours. Biff and Hank can mow the same lawn together in 1.5 hours. Eho and Hank can mow the same lawn together in 2 hours. How long, in minutes, will it take Biff and Eho to mow the same lawn together?

"Math is Cool" Championships-2001-02

November 9, 2001

Individual Multiple Choice Contest, Grade 7

Grampy Sampy's Hardware & Garden

Items	Cost per unit	Number of units bought	Retail sale price	Number of units sold	Net profit
Grime-B-gon Solution	$1.50	10	$3.00	5	$0.00
Golden Ring	$20.00	4	$35.00	4	$60.00
1 dozen worms	$.10	30	$.25	28	$4.00
2 in 1 Hammer/ Screwdriver	$5.50	10	$12.50	10	$70.00
Screws (pack of 100)	$.25	50	$.50	15	-$5.00
Nails (pack of 50)	$.30	50	$.60	45	$12.00
Hanging violets	$1.44	25	$5.00	20	$64
Euclid straight edge	$2.00	15	$3.50	10	$5.00
Potting soil 10 lb bag	$2.00	20	$5.00	5	-$15.00
Potting soil 25 lb bag	$2.50	30	$10.00	30	$225.00

Questions

1. If the cost of a Euclid straight edge increased by $.46 this year and Grampy Sampy bought the same amount for his stock as he did in 1999, how many more Euclid straight edges will he have to sell, at the same retail price, to profit the same amount (to the nearest whole number) as he did off them in 1999?

   A. 11   B. 12   C. 13   D. 14   E. answer not given

2.	If Kelly buys 10 dollars worth of goods and she needs at least one bottle of Grime-B-gon, what is the greatest number of things she could buy, spending exactly 10 dollars? A. 29 B. 28 C. 30 D. 25 E. answer not given
3.	What percentage of Grampy Sampy's total net profit was from the sales of potting soil? A. 15 % B. 20% C. 37.5 % D. 50 % E. answer not given
4.	If Bobby John buys 192 worms for his fishing tour group of 5 people, how much money should he collect from each member of the group so that each member of the group pays an equal amount and he pays none? A. $.75 B. $.80 C. $.95 D. $1.00 E. answer not given
5.	If Laineyye bought 20 packs of nails and screws and she ends up with a total of 1250 nails and screws combined. How many packs of nails must she have bought? A. 5 B. 7 C. 10 D. 15 E. answer not given
6.	If 2 bottles of Grime-B-gon solution can clean 1 golden ring after 2 years of wear, how much will Shougel Beege spend on a golden ring and just enough Grime-B-gon solution to keep the ring clean for 10 years? A. $50.00 B. $55.00 C. $60 D. $70 E. answer not given
7.	LeePe wants to completely cover his powder room ceiling, which has dimensions of 10 feet x 3 $\frac{1}{2}$ feet, with hanging violets, which are 3 feet x 2 1/3 feet. How many hanging violets will he have to buy to cover the ceiling? A. 5 B. 7 C. 9 D. 11 E. answer not given
8.	Grampy Sampy's survey shows that if he decreases the retail price of the 10 lb bags of potting soil by 30%, then 100% more people will buy the 10 lb bags of potting soil and 3 more hanging violets total would be sold. How much more money would Grampy Sampy make from this change than he did in 1999? A. $5 B. $25 C. $10 D. $30 E. answer no given
9.	Grampy Sampy's hardware store is expected to decrease total net profit by 1/6 in the year 2000 and increase net profit by 1/7 in 2001, decrease by 1/8 in 2002 and increase by 1/9 in 2003, and so on. What will the expected net profit be in the year 2004? A. 25 B. 38.89 C. 388.88 D. 350 E. answer not given

"Math is Cool" Championships-2001-02

November 9, 2001
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. A square piece of land 5,280 feet on a side is 640 acres. What is the length, in feet, of one side of a square piece of land that is 10 acres?

2. In the following figure, what is x°+y°+z°?
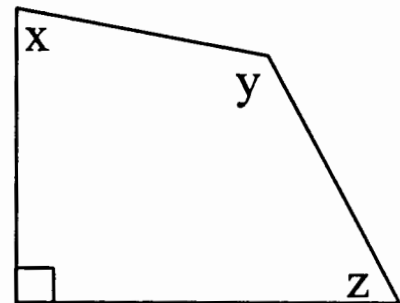
3. A bag is filled with red and blue socks. 30% of the socks are red. If 75% of the blue socks are light blue, what percentage of the total socks are dark blue?

4. A 120 foot string is cut into two pieces whose lengths are in ratio of 5:7. What is the length of the longer pieces in feet?

5. Simplify: - (5 - 3 + 2) - (4 - - 3) - 3 - 8

6. Evaluate the following when x = -2:
$$- 3x^4 + 2x^3 - 5x^2 + 4x - 5$$

7. A faucet can fill a tank in 1 hour. The drain can empty the same tank when it is full in 3 hours. If the tank is empty and a faucet is filling the tank simultaneously while the drain is emptying the tank, how long in minutes will it take to fill the tank?

8. A fish swims 16 miles downstream in 2 hours. He returns upstream in 8 hours. How fast does the fish swim in still water?

9. What is the first two-digit palindrome that is also the sum of two prime numbers?

10. Evaluate: $\sqrt[3]{\sqrt{729}}$

"Math is Cool" Championships-2001-02

1. For the following set of data, the mean is 20. What is x?
   2, 20, 20, 20, x

2. What number divided by 7 has a quotient of 3 and remainder of 2?

3. A 15 foot ladder is placed against a vertical wall. The foot of the ladder is 9 feet from the base of the wall. If the top of ladder slips down 3 feet, then how far will the foot of the ladder slide away from its original spot, in feet?

4. How many positive integers are there between the reciprocal of .002 and the reciprocal of .003?

5. How many prime factors does 421 have?

"Math is Cool" Championships-2001-02

November 9, 2001
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 one-fifth the sum of 13 and 17?	6
2	The sum of two numbers is 20 while their difference is 4. What is the largest number?	12
3	If two angles in a triangle measure 30° degrees and 70°. What is the measure of the third angle?	80(°)
4	What is 11 times 12?	132
	Person 2	
1	What is the sum of 1/8 and 1/2?	5/8
2	What is 15% of 60?	9
3	What is the units digit of the sum of the first three primes?	0
4	What is one third the sum of 13 and 11?	8
	Person 3	
1	How many different prime factors does 36 have?	2
2	What is the first prime larger than 80?	83
3	If today is Tuesday, what day of the week is it 15 days after today?	Wed
4	I have 15 identical coins whose sum is 75 cents, what type of coin do I have?	Nickel or 5¢
	Person 4	
1	How many odd numbers are between 20 and 60?	20
2	If 8x-10 =6, what is x?	2
3	What is the smallest value in the set of data? 10, 1/3, 2/5, 3/10	3/10
4	Find the diameter of a circle with area 64π.	16

"Math is Cool" Championships-2001-02

November 9, 2001

Grade 7

College Knowledge Bowl Questions #1

1	A cross country team found they could arrange themselves in rows of just 5 or just 7 or just 10 with no one left over. What is the minimum number of students on the team?	70
2	The math team sponsored a prime number party. A total of 47 people attended the party. All the males ate 5 cookies each and all the females ate 7 cookies each. If a total of 303 cookies were eaten, how many females attended the party?	34
3	Two whole numbers differ by 1. One number has two digits and the other has one digit. What is there product?	90
4	What is the average of seven 5's and a single 21?	7
5	Two trains are headed directly towards each other at 47 mph and 29 mph. How many miles apart are they 15 minutes before they meet?	19
6	Each side of a quadrilateral has a different positive integer as its length. What is the least possible perimeter of this quadrilateral?	10
7	How many different 3-digit license plates can be made if the leading digit can not be zero?	900
Number 8 is an extra question. Only use it if needed.		
8	Lee made a 7 gallons of fresh squeezed cider. How many pints of cider did he make?	56(pints)

"Math is Cool" Championships-2001-02

November 9, 2001
Grade 7

College Knowledge Bowl Questions #2

1	The product of 23 whole numbers is 1008. What is the least possible sum of the 23 whole numbers?	37
2	At 4:00 p.m everyday a local bakery lowers the price of fresh baked cookies from 25 cents to 20 cents. If Jimmy has $2.00 how many more cookies can he buy if he waits to make his purchase until after 4:00 p.m.?	2(cookies)
3	Two angles in an isosceles right triangle are equal. What is the measure of the equal angles?	45(°)
4	How many numbers between 31 and 40 have a remainder of zero when divided by 3?	3
5	How much would a ton of hay cost of one 80 pound bale cost $5?	$125
6	What is the mean of the following data set: {3, 17, 20, 40, 80}	32
7	What is the smallest whole number which I can multiply by 15 and still get a product whose value is more than 400?	27
Number 8 is an extra question. Only use it if needed.		
8	Find the units digit in 3^{2001}.	3

"Math is Cool" Championships-2001-02

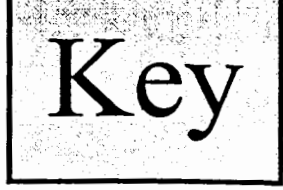November 9, 2001
Grade 7

College Knowledge Bowl Questions #3

1	What is the longest possible integer length that the side of a pentagon can have with sides of length 5, 4, 6, and 3?	17
2	If Carl turned 15 years old today, how old will he be, rounded to the nearest year, 400 months from now?	48
3	Sarah wants to cut a 20 foot board into two lengths of ratio 1:4. What is the length, in feet of the shorter board?	4 (feet)
4	Cale has five dollars. He bought 5 giant sized candy bars at 75¢ a piece. How many pencils can he buy at 20 cents a piece with the money he has left?	6
5	A train can haul 72 people. 400 people need to ride the train. How many trips will the train need to make in order to haul all of the people?	6
6	What is the base of a triangle with area 21 and height 6?	7
7	How many consecutive zero's would be at the end of the product of eleven factorial?	2
Number 8 is an extra question. Only use it if needed.		
8	What is the sum of the non-prime factors of 42?	84

Math is Cool" Championships -- 2001-02

7th Grade - November 9, 2001

School Name_____ Team #_____

Proctor Name_____ Room #_____

Key

Full Name:_____

Individual Contest - Score Sheet
DO NOT WRITE IN SHADED REGIONS

	Answer					Answer		
1	-11				21	81		
2	5800				22	121		
3	5				23	8		
4	87				24	8		
5	47031205.55				25	-6		
6	$7x + 18$				26	1		
7	$7.98				27	3		
8	12				28	400π		
9	4				29	21		
10	13/100				30	2880		
11	$a^{16}b^8$				31	45(°)		
12	1444				32	17/8		
13	8				33	16		
14	42				34	2		
15	No				35	35		
16	459 (ft)				36	13%		
17	2				37	$31_{(5)}$		
18	21				38	5		
19	S				39	33		
20	4				40	72 (mins)		

School Name_____Team #_____

Proctor Name_____Room #_____

Key

Individual Multiple Choice Contest-Score Sheet

1st Score

Correct responses are worth 2 points, incorrect responses are worth -1 point and no response is 0 points.

Out of 18

DO NOT WRITE IN SHADED REGIONS

	Answer		
1	B		
2	A		
3	D		
4	B		
5	D		
6	E		
7	A		
8	B		
9	D		

Math is Cool" Championships -- 2001-02

7th Grade - November 9, 2001

School Name_____ Team #_____

Proctor Name_____ Room #_____

Key

Team Contest-Score Sheet

1st Score

Out of 10

DO NOT WRITE IN SHADED REGIONS

	Answer		
1	660 (feet)		
2	270		
3	17.5(%)		
4	70 ft		
5	- 22		
6	-97		
7	90 (mins)		
8	5(mph)		
9	22		
10	3		

School Name_____Team #_____

Proctor Name_____Room #_____

Pressure Round - Score Sheet

	Answer		
1	38		
2	23		
3	3(ft)		
4	165		
5	1		