2010 SCSU MATH CONTEST 9th and 10th Grade Test

DIRECTIONS: Select the BEST completion or response from among those given. Scientific and graphing calculators are allowed. Symbolic calculators are not allowed.

1.	If the sum of the first N counting numbers is 15N, find N.											
	a.	25	b.	27		c.	29		d.	31	e.	33
2.	Joe nicl	Joe has quarters, dimes, and nickels worth \$7.20. He has five times as many dimes as quarters and four more nickels than dimes. How many coins does Joe have?										
	a.	80	b.	81		c.	82		d.	83	e.	84
3.	Bef ave exa	ore she took her la rage for all the exa ms?	ast ex ams v	am, the average vill be 90. If Tara	of T a sco	Tara ores	's exam scores v 73 on the last e	was 8 exam,	89. wł	If she scores 97 on nat will her final ave	the l erage	ast exam, her be for all
	a.	84	b.	85		c.	86		d.	87	e.	88
4.	Lari The bea whe	ry and Lisa share a ey each grow whea ans in the ratio of 7 eat to beans for Lis	piece it and ':3. C sa's p	e of land. The ra beans on their In Larry's portion ortion?	itio d piec n of	of th e of the	ne area of Larry' land. The entir land, the ratio o	's por re pie of wh	tior ce (eat	n to the area of Lisa of land is covered b to beans is 4:1. W	's pc y wh hat i	ortion is 3:2. leat and s the ratio of
	a.	4:3	b.	5:3		c.	7:5		d.	9:7	e.	11:9
5.	A ri Wh	ght triangular pris at is the actual len	m has igth o	s its edge length f the longest ed	s in ge?	the	ratio 3:4:5:10. T	The vo	olur	ne of this prism is 2	202.5	cubic units.
	a.	10	b.	15		c.	20		d.	25	e.	30
6. Let A, B, and C be integers between and including 0 and 9. If the 7-digit number 2A5B4C6 is a A + B + C CANNOT equal								mult	iple of 12,			
	a.	1	b.	7		c.	13		d.	17	e.	19
7.	Ехр	press $0.1 + 0.12 + 0.1$	23 as	a fraction in sin	nple	st fo	orm.					
	a.	<u>43</u> 99	b.	<u>56</u> 121		C.	73 549	1	d.	256 999	e.	<u>434</u> 1221
8.	Tot Ass Wh	is now half as old ume that each age at is the sum of Te	as Te e is a v enag	enager was whe whole number a er's and Tot's ag	en To nd t ges?	ot w hat	as a third as old Teenager is a te	d as To eenag	een ger.	ager is now.		
	a.	20	b.	22		c.	24		d.	26	e.	28
9.	The Wh	e point (1, 2) is refl at are the coordin	ected ates d	over the x-axis of the point (1, 2	and) aft	this er t	image is then r hese transform	reflec ation	ted s?	over the line y = x.		
	a.	(2,1)	b. (-2,1)	c.	(1,	-2) d	. (1	,2)	e. (-1	, -2)	

10. On a small island, all the inhabitants are Derfs, Enajs, and/or Sivads. All Derfs are Enajs. One-third of all Enajs are Derfs. Half of all Sivads are Enajs. One Sivad is a Derf. Eight Sivads are Enajs. The number of Enjas is 90. How many Enajs are neither Derfs nor Sivads?									
a. 38	b. 44	c. 52	d. 53	e. 60					
11. A regular polygon has interior angles of measure 162 degrees. How many sides does this polygon have?									
a. 18	b. 19	c. 20	d. 21	e. 22					
12. Consider these four	statements.								
i. $A + B \le A + B $ ii. $\sqrt{A^2} = A$ iii. $\sqrt{A} \le A$ iv. $ A + B \le A + B $ How many of these statements are true for all real numbers A and B?									
a. 0	b. 1	c. 2	d. 3	e. 4					
13. Six pipes, each with a radius <i>a</i>, are stacked as shown in the figure.Find the height of the pile in terms of <i>a</i>.									
a. 6 <i>a</i>	b. 3 <i>a</i>	C. 2 <i>a</i> √3	d. $(4\sqrt{3}+2)a$	e. $(2\sqrt{3}+2)a$					
14. A mathematician lays out six cards as shown below. Each card has a letter on one side and a positive integer on the other. You are told that any card with a prime number on one side must have a vowel on the other side. What is the minimum number of cards you must flip over to verify that none of the cards violate the rule?									
45	G	53	E 1	Q					
a. 1	b. 2	c. 3	d. 4	e. 5					
15. How many positive factors does 10,000 have?									
a. 25	b. 26	c. 27	d. 28	e. 29					
16 Concentric circles a	re constructed so the	t the innermost circle is	of radius 1 unit						

- 16. Concentric circles are constructed so that the innermost circle is of radius 1 unit, the second is of radius 2, the third is of radius 3, etc. This is continued for n circles. What is the area of the outermost ring?
 - a. $(2n-1)\pi$ b. $n^2\pi$ c. $(n^2-n)\pi$ e. $(n^2-2n+1)\pi$
- 17. A sample of ten numbers has a mean of nine, a maximum of fourteen, and a minimum of four. What is the highest value that the standard deviation, *s*, could have?

a. $1 \le s < 2$ b. $2 \le s < 3$ c. $3 \le s < 4$ d. $4 \le s < 5$ e. $5 \le s < 6$

c. $(n^2 - 1)\pi$

18. A teacher said his class had 100 students, 24 of whom were boys and 32 of whom were girls. What number base did this teacher use in this statement?

a. 5 b. 6 c. 7 d. 8 e. 9

- 19. The increasing list of five different integers {3, 4, 5, 8, 9} has a sum of 29. How many increasing lists of five different single-digit positive integers have a sum of 33?
 - a. 1 b. 2 c. 3 d. 4 e. 5
- 20. On Monday, Layton drove to work at an average speed of 70 km/hr and arrived 1 minute late. On Tuesday, he left at the same time and took the same route. This time he drove at an average speed of 75 km/hr and arrived 1 minute early. How long is his route to work?
 - a. 30 km b. 35 km c. 45 km d. 50 km e. 60 km
- 21. A line with slope equal to 1 and a line with slope equal to 2 intersect at the point P(1,6), as shown below and to the left. Find the area of ΔPQR .



- 22. In the diagram above and to the right, \overline{PQ} and \overline{RS} are diameters of a circle with radius 4. If \overline{PQ} and \overline{RS} are perpendicular, what is the area of the shaded region?
 - a. 8+4π b. 8+8π c. 16+4π d. 16+8π e. 16+16π
- 23. Consider a circle of radius 5. A chord is constructed so that it is the perpendicular bisector of a radius of the given circle. Find the length of this chord, to the nearest tenth.

a. 4.3 b. 5.4 c. 6.5 d. 7.6 e. 8.7

- 24. An isosceles trapezoid has area 126 cm² and bases of length 6 cm and 8 cm. Find the perimeter of the trapezoid, to the nearest hundredth.
 - a. 50.06 cm b. 50.11 cm c. 51.12 cm d. 51.24 cm e. 52.13 cm
- Assume that a day's weather depends only on the previous day in the following way:
 If the weather is sunny on Day N-1, the probability that it will be sunny on Day N is 0.6.
 If the weather is not sunny on Day N-1, the probability that it will be sunny on Day N is 0.3.
 Suppose that today is sunny. Find the probability that the weather two days from now will be sunny.
 - a. 0.32 b. 0.40 c. 0.48 d. 0.54 e. 0.60

- 26. Each time a customer visits a restaurant he/she is given a game card. Suppose the probability of winning a prize with the game card is 0.1. What is the probability, to the nearest hundredth, that a customer will win a prize in five or fewer visits?
 - a. 0.40 b. 0.41 c. 0.45 d. 0.52 e. 0.62
- 27. The sum of two numbers is 8 and the sum of their cubes is 20. What is the sum of the squares of these two numbers?
 - a. 10 b. 13 c. 17 d. 21 e. 23
- 28. Consider the family of quadratic equations given by $y = (m^2 m + 1)x^2 (2m)x + 1$, where m is any real number. For what values of m will the graphs of the equations lie above the x-axis?
 - a. $(-1,\infty)$ b. $(\frac{3}{2},\infty)$ c. $(-\infty,1)$ d. $(-\infty,1)\cup(\frac{3}{2},\infty)$ e. $(-\infty,\frac{-3}{2})\cup(1,\infty)$

29. Marissa found all positive solutions to: $(\log_{10} x^2)^2 = \log_{10} (x^4)$. She then added these numbers. What sum should Marissa get?

a. 7 b. 8 c. 9 d. 10 e. 11

30. Eight congruent spheres are packed into a cube of length *e* so that each of the spheres is tangent to three faces of the cube and to three other spheres.What is the ratio of the total volume of the eight spheres to the volume of the cube?

а. π:2 b. π:3 c. π:4 d. π:6 e. π:8



- 31. The number $2^{48} 1$ has two divisors between 50 and 75. Find the sum of the two numbers.
 - a. 113 b. 118 c. 123 d. 128 e. 133
- 32. Find the area of a rhombus that has one side of length 10 and diagonals that differ by 4.

a.	96	b.	100	с.	104	d.	108	e.	112

33. If $\log_{15}5 = a$, express $\log_{15} 9$ in terms of a.

- a. $\frac{9}{5}a$ b. 2a c. $1 \frac{9}{5}a$ d. 2 2a e. $2 \frac{9}{5}a$
- 34. Four positive integers sum to 125. If you increase the first of these numbers by 4, decrease the second by 4, multiply the third by 4, and divide the fourth by 4, you produce four equal numbers. What is the difference between the largest and smallest of these four numbers?
 - a. 55 b. 60 c. 65 d. 70 e. 75
- 35. When Rachel divides her favorite number by 7, she gets a remainder of 5. What will the remainder be if she multiplies her favorite number by 5 and then divides by 7?

a. 2 b. 3 c. 4 d. 5 e. 6