

Name \_\_\_\_\_ ANSWER KEY \_\_\_\_\_ School Team \_\_\_\_\_

Event 5: Team Problems (with calculators)

5th/6th grade Math Meet '08

Problem 3: Digit sum operation

The operation DS, which stands for digit sum, takes the digits of a number and adds them together.

Example:  $DS(25) = 2 + 5 = 7$       $DS(184) = 1 + 8 + 4 = 13$

DS can be applied multiple times.

Example:  $DS(DS(184)) = DS(13) = 4$

DS applied to a single digit number results in zero.

Example:  $DS(3) = 0$

For the following problems, apply the DS operation and give the result.  
(1 pt. each)

1)  $DS(862,931) =$  29

2)  $DS(DS(5,871,024)) =$  9

3)  $DS(DS(DS(6,518,379))) =$  3

4)  $DS(DS(DS(7,623,895))) =$  0

5)  $DS(DS(DS(138,406)) + DS(DS(290,518))) =$  2

## Problem 3: Digit sum operation

For the following properties of the DS operation, circle the correct answer.  
(1 pt. each)

	<u>Always</u>	<u>Sometimes</u>	<u>Never</u>
1) If $N$ is divisible by 2, then $DS(N)$ is divisible by 2:	A	<input checked="" type="checkbox"/> S	N
2) If $N$ is divisible by 3, then $DS(N)$ is divisible by 3:	<input checked="" type="checkbox"/> A	S	N
3) If $N$ is divisible by 4, then $DS(N)$ is divisible by 4:	A	<input checked="" type="checkbox"/> S	N
4) If $N$ is divisible by 5, then $DS(N)$ is divisible by 5:	A	<input checked="" type="checkbox"/> S	N
5) If $N$ is divisible by 6, then $DS(N)$ is divisible by 6:	A	<input checked="" type="checkbox"/> S	N
6) If $N$ is divisible by 7, then $DS(N)$ is divisible by 7:	A	<input checked="" type="checkbox"/> S	N
7) If $N$ is divisible by 8, then $DS(N)$ is divisible by 8:	A	<input checked="" type="checkbox"/> S	N
8) If $N$ is divisible by 9, then $DS(N)$ is divisible by 9:	<input checked="" type="checkbox"/> A	S	N

## Problem 3: Digit sum operation

For the following properties of the DS operation, circle the correct answer.  
(2 pts. each)

	<u>Always</u>	<u>Sometimes</u>	<u>Never</u>
1) For any positive, whole number $M$ , $DS(M) < M$ :	<input checked="" type="checkbox"/> A	S	N
		<u>True</u>	<u>False</u>
2) If $DS(P) = DS(Q)$ , then $P = Q$ .		T	<input checked="" type="checkbox"/> F
3) If $DS(P) > DS(Q)$ , then $P > Q$ .		T	<input checked="" type="checkbox"/> F

For the following questions, state the desired number. (2 pts. each)

- 1) What is the smallest positive number  $X$   
such that  $DS(X) > 0$ ?  $X = \underline{\quad 10 \quad}$
- 2) What is the smallest positive number  $X$   
such that  $DS(DS(X)) > 0$ ?  $X = \underline{\quad 19 \quad}$
- 3) What is the smallest positive number  $X$   
such that  $DS(DS(DS(X))) > 0$ ?  $X = \underline{\quad 199 \quad}$