

## ENRICHMENT ACTIVITY 2-1

### Special Ops

There are many binary operations in arithmetic other than addition, subtraction, multiplication, and division. For example, the two operations below are defined for all real numbers.

#### Operation 1: the mean or average (avg)

If  $a$  and  $b$  are real numbers, then:

$$a \text{ avg } b = \frac{a+b}{2}.$$

$$\begin{aligned} \text{Example: } 33 \text{ avg } 19 &= \frac{33+19}{2} \\ &= \frac{52}{2} \\ &= 26 \end{aligned}$$

#### Operation 2: the maximum (max)

If  $a$  and  $b$  are real numbers and  $a \neq b$ , then:

$a \text{ max } b =$  the larger of  $a$  and  $b$ .

If  $a = b$ , then  $a \text{ max } a = a$ .

$$\begin{aligned} \text{Example: } \frac{2}{3} \text{ max } \frac{3}{5} &= \frac{10}{15} \text{ max } \frac{9}{15} \\ &= \frac{10}{15} = \frac{2}{3} \end{aligned}$$

The problem could also be solved using a calculator and decimal equivalents.

Find each answer using the set of real numbers.

- |                              |                                                 |                                                 |                                         |
|------------------------------|-------------------------------------------------|-------------------------------------------------|-----------------------------------------|
| 1. $8 \text{ avg } 6$ _____  | 2. $3.4 \text{ avg } 6.6$ _____                 | 3. $\frac{3}{8} \text{ avg } \frac{7}{8}$ _____ | 4. $0 \text{ avg } 12.4$ _____          |
| 5. $7 \text{ max } 11$ _____ | 6. $\frac{3}{5} \text{ max } \frac{5}{8}$ _____ | 7. $0.4 \text{ max } 0.40$ _____                | 8. $\frac{7}{5} \text{ max } 1.3$ _____ |

Find each missing number.

9. \_\_\_\_\_ avg 17 = 20      10. \_\_\_\_\_ avg 36 = 22      11.  $\frac{3}{4}$  avg \_\_\_\_\_ =  $\frac{1}{2}$

Study the following examples using the operation check (✓).

$$8 \checkmark 2 = 12 \quad 5 \checkmark 3 = 11 \quad 0.6 \checkmark 4 = 8.6 \quad 9 \checkmark \frac{3}{4} = 10\frac{1}{2}$$

12. a. Explain how to ✓ a number. \_\_\_\_\_

b. What is  $10 \checkmark (-3)$ ? \_\_\_\_\_

13. Create a new binary operation  $a \# b$ . Be creative. Define the operation and give examples. Tell if the operation is closed for the set of whole numbers, integers, rational numbers, and real numbers.