Algebraic Expressions Name _____

For each set of problems, identify which arithmetic operation(s) you use when given values (such as 7 or 19) and apply those same operations to the problems with variables. Problems with specific values are called *concrete* (meaning unchanging) examples and those with variables are *abstract* problems.

1. Ramón is 19 years old.

   a. How old will he be in 6 years?

   b. How old will he be in *y* years?

   c. How old will he be 4 years after the *y* years?

   d. How old was Ramón 7 years ago?

   e. How old was Ramón *z* years ago.

   f. How old will Ramón be 4 years after *z* years ago?

   Betina is *B* years old.

   g. How old will she be in 12 years?

   h. How old will she be in x years?

   i. How old will she be in z years after that?

2. Hermione spends one minute more on homework each night than the night before.

   a. If she spent 25 minutes on homework one evening, how much time did she work on homework 6 days later?

   b. If she spent 25 minutes on homework one evening, how much time did she work on homework 3 weeks later?

   c. If she spent 25 minutes on homework one evening, how much time did she work on homework *d* days later?

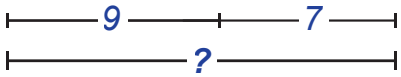
   d. If she spent 25 minutes on homework one evening, how much time did she work on homework *w* weeks later?

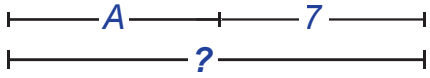
   e. If she spent 46 minutes on homework one evening, how much time did she work on homework 9 days ago?

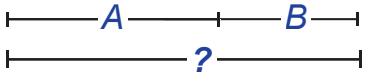
   f. If she spent 46 minutes on homework one evening, how much time did she work on homework *d* days ago?

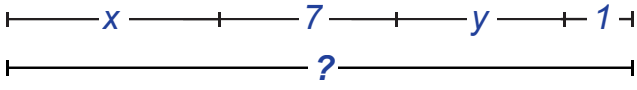
   g. If she spent *m* minutes on homework one evening, how much time did she work on homework *w* weeks and *d* days ago?

3. What is the length marked with a question mark in each of these figures?

   a. 

   b. 

   c. 

   d. 

4. The expression $w + z - 3$ represents subtracting three from the sum of w and z. If w is 8, the expression can be written as $8 + z - 3$ and simplified to $5 + z$. How can $w + z - 3$ be written in simplest form if:

   a. w is 100?

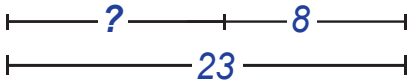
   b. w is –4 ?

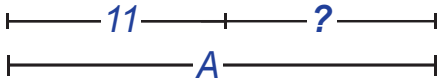
   c. z is 100?

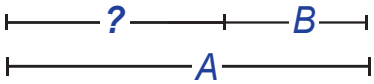
   d. z is 3?

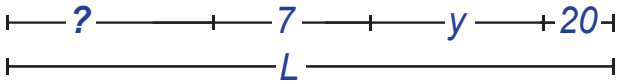
   e. w is 5 and z is 6?

5. What is the length marked with a question mark in each of these figures?

   a. 

   b. 

   c. 

   d. 

6. Usain Bolt set a world record in 2009 for the fastest 100m race. He ran 10.44 meters (almost 33 feet) every second.

   a. How many meters does he run in 5 seconds?

   b. How many meters does he run in S seconds?

   c. How far does he have remaining in the race to run after S seconds?

7. Rumeal has a bedroom that is 11 feet wide by 13 feet long.

   a. What is its area (in square feet or ft^2)?

   b. His sister's room is W by L, what is its area?

   c. His cat Carmine has a small room with an area of A that is 3 feet wide. How long is it?

8. There are 12 inches in each foot. There are 3 feet in each yard. There are 1,760 yards in a mile.

   a. How many inches are in 6 feet?

   b. How many inches are in 10 yards?

   c. How many inches are in 2 miles?

   d. How many inches are in Y yards?

   e. I am 74 inches tall. How many feet tall am I?

For each of the problems that follow, create your own concrete example: pick a value for the variables(s), make sure you know what steps you would take to calculate the answer, and then use those same operations for the actual question.
For example, if this is the problem:

> Alex's dad asked them to clean their room 23 times. They only got around to doing it C times. How many times didn't they clean their room?

i. Pick a value for the variable(s). **I will pick 4 for *C*.**
ii. Decide what operation makes sense. **I have to subtract 4 from 23 to find what is left.**
iii. Do the same thing with the variable. **They didn't clean their room 23 – *C* times.**

9. The seventh grade of Swen Noitca Middle School has 214 students.

    a. If x of them are 12 or younger, how many are older than 12?

    b. If p of them have pierced both ears and r of them have pierced one ear, how many ears are pierced in the grade? How many ears are not pierced?

10. Scitamehtam High School has T teachers. All students have an advisor, and each teacher advises A students.

    a. How many students are there in the school?

    b. There are C classrooms, and every student is currently in a classroom. How many students, on average, are in each classroom?

11. Patty's Pet Store sells fish and lizards.

    a. Each lizard costs Patty \$3 to buy. Each fish costs \$2. If she stocks up with f fish and l lizards, how much do they cost her?

    b. If she charges g dollars per fish and m dollars per lizard and she sells all of our animals, how much money does she collect from sales?

    c. How much profit does she make (profit is what she has left accounting for what she spent and what she received)?

12. A cake that weighs G grams is cut into P slices.

    a. How much does each slice weigh?

    b. If each slice has S sprinkles on it, how many sprinkles were used overall?

    c. I ate n slices. How many are left?

13. How many seconds are in M minutes?

14. How many seconds are in H hours?

15. How many hours are in W weeks?

16. How many weeks are made up of H hours?

17. Come up with your own problem like the ones above. Try to make it a challenge! There should be at least 3 sub-questions.