MATH 100 SOLUTIONS: QUIZ III 20 SEPT 2018

(basic calculator only)

To obtain any credit, you must show your work for each problem! Place a box around each answer.

1. *[3 pts]* If Albertine was eight years old *x* years ago, how old will she be *y* years from now? (Your answer should involve both x and y. Your answer must be an expression, not an equation!)

Answer: *Since Albertine was 8 years old x years ago, her current age is x + 8. If we meet Albertine y years from now, her age will be (x + 8) + y, or*

x + y + 8 years old.

2. *[6 pts]* The sum of the ages of Archy and Mehitabel is 87 years; nine years from now Archy will be four times as old as Mehitabel. Write an equation in the variable x that determines the age of Archy now. *You need not solve.*
Hint: Let x = age of Archy now (in years) *Hint: Let x = age of Archy now (in years)*

Solution: Let x = Archy's current age. Then Mehitabel's current age is 87 – x.

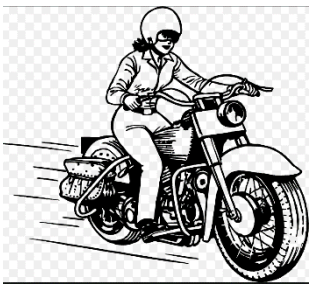
Nine years from now Archy will be x + 9 years old and Mehitabel will be (87 – x) + 9 = 96 – x years old. Now we are told that x + 9 = 4(96 – x). Thus

Answer: x + 9 = 384 – 4x.

If you wish to solve for x, then:

So 5x = 375, from which x = 75. Mehitabel is now 87 – 75 = 12 years old.

To summarize, ***Archy is now 75 years old, and Mehitabel is 12 years old.***



3. *[6 pts]* Albertine begins driving at a rate of 45 miles per hour on her way to Milwaukee where she has volunteered to assist in a voter registration drive. One hour after she leaves, her friend, Beatrice, realizes that Albertine has forgotten her driver's license. Beatrice immediately gets on her motorcycle and begins riding at a rate of 71 miles per hour along the same route that Albertine took. You wish to compute the distance from home when Albertine and Beatrice meet. You should introduce a variable and *write the equation* allowing you to solve for this distance. *You need not solve.*

Solution: Let d = the distance that Beatrice travels to catch up with Albertine.

Then Albertine's time is $\frac{d}{45}$ *hours and Beatrice's time is* $\frac{d}{71}$ *hours.*

Now we are told that Albertine's time is one hour greater than Beatrice's time.

Hence

$\frac{d}{45} = 1 + \frac{d}{71}$ is our answer.

If we wish to solve for d then:

$45(71)\frac{d}{45} = \left(1 + \frac{d}{71}\right)(45)(71)$

Cancellation yields

$(71)d = (45)(71) + 45d$

$26\,d = (45)(71)$

So $d = \frac{(45)(71)}{26} \approx 122.9$ *miles*

4. *[6 pts]* Find two numbers which differ by 4, and such that one-half of the greater exceeds one-sixth of the smaller by 8. *You need not solve.*

Solution: Let x be the smaller of the two numbers. Then the larger of the two is x + 4.

We are told that: ½ (x + 4) = (1/6) x + 8. Multiplying both sides by 6:

Answer: 3(x + 4) = x + 48.

If you wish to solve for x:

So 3x + 12 = x + 48

2x = 36

x = 18

*Thus the two numbers are **18 and 22**.*

EXTRA CREDIT:

5. *[1 pt]* Swann has twelve black socks and twelve white socks in his drawer. In complete darkness, and without looking, how many socks must he take from the drawer to be sure to get a pair that matches?

Solution: If Swann has removed either two black socks or two white socks, he stops. If not, he takes a third sock from the drawer in which case he now has a pair of socks of the same color.

6. *[3 pts]* There are three boxes. One is labeled "APPLES" another is labeled "ORANGES." The last one contains only oranges, and one contains both apples and oranges. The boxes have been incorrectly labeled such that no label identifies the actual contents of the box it labels. Opening just one box, and without looking in the box, you take out one piece of fruit. By looking at the fruit, how can you immediately label all of the boxes correctly?

Solution:

All you need to do is choose one fruit from the box labeled "Apples + Oranges."
If it is an Apple, then replace the label "Apple + Orange" to "Apple."
The "Apple" label changes to "Orange."
The "Orange label changes to "Apple + Orange."

If it is an Orange, then change "Apple + Orange" to "Orange."
Change "Apple" to "Apple + Orange."
The "Orange" one should be labeled as "Apple."

Your work is to discover your work and then with all your heart to give yourself to it.

- Buddha