Spring 2016 McNabb GDCTM Contest
Algebra One

NO Calculators Allowed

1. Cindy is 3 miles away from home. If she walks at a rate of 4 miles per hour, in how many minutes will she arrive at home?

2. Music streaming company Ossify charges a flat monthly fee of $8 but charges 10 cents for each hour of listening over 50 hours for a given month. On the other hand, music streaming company Panaplex charges a flat monthly fee of $6 but charges 14 cents for each hour of listening over 40 hours for a given month. How many total hours of listening would be required per month to make the total charges for that month from these companies turn out to be the same?

3. Find all solutions of
$$20x^2 + 33x - 27 = 0$$

4. Three times the complement of what angle is equal to the supplement of that angle?

5. Hezy, Zeke, and Elias are running around a track in the same direction. Each of them runs at their own constant pace. Hezy is the fastest and passes Elias every 8 minutes. Meanwhile, Elias passes Zeke every 12 minutes. So how many seconds elapse between times Hezy passes Zeke?

6. Admission to a zoo was $ 20 per person when it was reduced to a new, lower rate. This caused the number of customers per day to increase by 40%. This in turn caused the amount collected by the zoo per day from admissions to increase by 12%. What is this new lower admission fee per person?

7. A group of 7th and 8th graders took the same math contest. The average score of all these students was 30. The average 7th grade score was 28 while the average 8th grade score was 33. What is the ratio of the number of 7th graders to the number of 8th graders?

8. Today my son is 1/5 of my age. Two years ago he was 1/7 of my age. In how many years from today will he be 1/3 of my age?

9. Find one ordered triple of distinct positive integers (p, q, r) so that $p < q < r$ and
$$\frac{3}{10} = \frac{1}{p} + \frac{1}{q} + \frac{1}{r}$$
Write your answer as (p, q, r)

10. If a, b, and c are positive integers satisfying $abc = 1560$, find the least possible value of $a + b + c$.

11. Find the least value of x that satisfies
$$|5x - 70| \leq |4x - 200|.$$

12. Find the area of the parallelogram formed by the four lines
$$y = 3x - 7$$
$$y = 3x + 7$$
$$y = 7x - 3$$
$$y = 7x + 3$$

13. I have only dimes and quarters in my pocket. There are b coins in all, and all together they are worth c cents. In terms of b and c, how many quarters do I have in my pocket?

14. When the cubic polynomial $x^3 - x^2 + kx - 2$ is divided by $x - 3$ the remainder is k. Find the value of the constant k.

15. Let $P = \{1, 4, 9, 16, 25, ...\}$ be the set of the squares of the positive integers. For how many elements p of P is $p + 144$ also an element of P?