MB3 Advanced Diagnostic Test

1. One morning each member of Angela's family drank an 8-ounce mixture of coffee with milk. The amounts of coffee and milk varied from cup to cup, but were never zero. Angela drank a quarter of the total amount of milk and a sixth of the total amount of coffee. How many people are in the family?

2. If f is a function for which $f(x/3) = x^2 + x + 1$ find the sum of all the values for which $f(3z) = 7$

3. Addi, Subbi, Multi and Divi, are given two distinct nonzero numbers. Addi adds the two numbers. Subbi subtracts the lesser number from the greater. Multi multiplies the two numbers. Divi divides the greater number by the lesser. If the results obtained by Addi, Multi and Divi are the same, what is Subbi's result? Express your answer as a common fraction.

4. A telephone number has the form of ABC - DEF - GHIJ, where each letter represents a different digit. The digits in each part of the numbers are in decreasing order; that is,

   $A > B > C$

   $D > E > F$

   $G > H > I > J$

   If D, E, and F are consecutive even digits, G, H, I, and J are consecutive odd digits, and $A + B + C = 9$, what is the value of A?

5. Tina's parents agreed to buy her concert tickets to see her favorite band if she spends an average of 13 hours per week helping around the house for 8 weeks. For the first six weeks, she helps around for 9, 11, 14, 12, 13, and 10 hours respectively.

   a. How many hours must she work for the last two weeks combined to earn the tickets?

   b. If Tina's parents tell her that they have only covered 60 percent of the cost of the concert ticket, which is $460. If Tina works part-time at a restaurant where she is paid 50 dollars a week, how many weeks will she have had to have worked in order to cover the rest of the concert ticket?

6. Mary and Jack are playing cards. They must each draw two cards from a standard deck of 52 cards. What is the probability that Jack will draw a king and then another king?

7. A right circular cylinder with its diameter equal to its height is inscribed in a right circular cone. The cone has a diameter of 10 and an altitude of 12, and the axes of the cylinder and the cone coincide. What is the radius of the cylinder?

8. A parabola with the equation $y = x^2 + bx + c$ passes through the points (2, 3) and (4, 3). What is the value of c?

9. A house has 4 bedrooms. Each bedroom is 12 feet long, 10 feet wide, and 8 feet high. A painter must paint the walls of all of the bedrooms. Doorways and windows, which will not be painted, occupy 60 square feet in each bedroom. How many square feet of walls must be painted?

10. All the sides of a convex pentagon ABCDE are of equal length. If $\angle A = \angle B = 90°$, what is the degree measure of $\angle E$?

MB3 Advanced Diagnostic Test Answer Key

1. 5
2. -1/9
3. 3/2
4. 8
5. a) 35
   b) 4
6. 3/676
7. 30/11
8. 11
9. 1168
10. 150