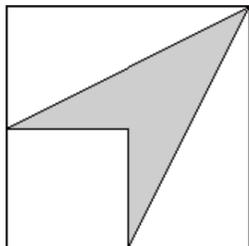# Math Awareness Month Competition 2011

Solutions for 5th-6th Grades

1. Natalie cut the gray piece below from a 6 by 6 inch square piece of paper. (Two vertexes of the grey quadrangle are the midpoints of the square's sides, and the third vertex is the center of the square.) What is the area of the gray quadrangle?

[Solution: Let us count the area of the non-grey parts. In the bottom left corner, a 3 by 3 inch square is dropped, whose area is 9 square inches. The other two dropped triangles make a 3 by 6 inch rectangle, whose area is 18 square inches. Hence, the area of the gray quadrangle is $6 \times 6 - 9 - 18 = $ **9** square inches.]

2. In a depot there is oil stored in two identical barrels. One barrel is full, and the other is filled half way. Their weights are 86 and 53 pounds. How many pounds are two full barrels heavier than one empty barrel?

[Solution: The difference between the weights of the barrels, 86-53=33, equals half the weight of a barrel of oil. Therefore, a barrel of oil is 66 pounds. The weight of an empty barrel must be 20 pounds. Thus, two full barrels are heavier than one empty barrel by $66 \times 2 + 20 \times 2 - 20 = $ **152** pounds.]

3. A martian visited the Earth. Martians eat at most once a day (in the morning, in the afternoon, or in the evening), but only on those days when they are in the mood to eat, and they can skip any number of days. The visiting martian ate 7 times during her visit. In addition we know that she did not eat in 7 mornings, 6 noons and 7 evenings during the visit. How many days did she stay on the Earth?

[Solution: Let us count the mornings, the noon times and the evenings. There were 7 when the martian ate, and 7+6+7=20 when he did not eat. These are 27 mornings, noon times and evenings in total, that makes **9** days.]

4. In the garden of Kristin, there are two plants. One is 44 inches high, and it grows 3 inches in each 2 years. The other is 80 inches high, and it grows 5 inches in each 6 years. In how many years will the two plants be equally high?

[Solution: The difference between the two plants' height is 36 inches currently. The smaller plant grows 9 inches in 6 years, and the taller plant grows 5 inches in 6 years. Thus, the smaller plant can make up 4 inches in each 6 years. Hence, it will take 36/4=9 times 6 years, that is, **54** years for the two plants to be equally high.]

5. Aaron, Brian, Jared and Kyle need to get through a dark and narrow tunnel. They have only one lamp available. Aaron can go through the tunnel in 1 minute, Brian in 2 minutes, Jared in 3 minutes, and Kyle in 4 minutes. Since they are afraid of dark, none of them

can go through without the lamp. The tunnel is so narrow that only two of them can go through at the same time. At least how much time is needed for all the four to get through the tunnel?

[Solution: First, Aaron and Brian should go, it will take 2 minutes. Aaron should return with the lamp, this will take 1 minute. Then, Jared and Kyle should go, it will take 4 minutes. Brian should return with the lamp, this will take 2 minutes. Finally, Aaron and Brian should go, it will take 2 minutes. In total, this will take **11** minutes. This is the minimum, because the number of passes or their times cannot be smaller.]