

Problem Solving - Math Kangaroo Practice¹

January 31, 2016

Part I: Multiple Choice

1. In what way should the last four circles be shaded so that the pattern is continued?



(A)



(B)



(C)



(D)



(E)



2. In a shop, you can buy oranges in boxes of three different sizes: boxes of 5 oranges, boxes of 9 oranges, or boxes of 10 oranges. Pedro wants to buy exactly 48 oranges. What is the smallest number of boxes he can buy?

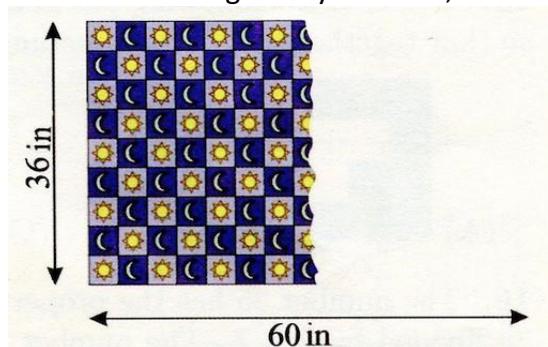
(A) 8 (B) 7 (C) 6 (D) 5 (E) 4

¹ Many of these problems are replicated or adapted from previous Math Kangaroo problems

3. The train to Atlanta leaves three-and-a-half hours from now. Paul got up two-and-a-half hours ago. How many hours before the train leaves did Paul get up?
- (A) two-and-a-half (B) three-and-a-half (C) four-and-a-half
 (D) five (E) six

4. After the First of January 2013, how many years will pass before the following event happens for the first time: the product of the digits in the year is greater than the sum of the digits?
- (A) 87 (B) 98 (C) 101 (D) 102 (E) 103

5. Peter bought a rug 36 in wide and 60 in long. The rug has a pattern of small squares containing either a sun or a moon, as can be seen in the figure. You can see that along the width, there are 9 squares. When the rug is fully unrolled, how many moons can be seen?



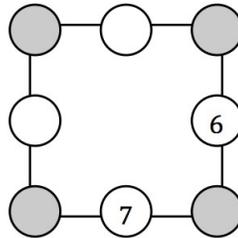
- (A) 68 (B) 67 (C) 65 (D) 63 (E) 60

6. Robert wrote down several numbers using only the digits 0 and 1. The sum of these numbers is 2013. It turned out that it is impossible to get the same sum by adding up fewer numbers of this kind. How many numbers did Robert write?
(A) 2 (B) 3 (C) 4 (D) 5 (E) 204

7. During a party, two identical cakes were each divided into four equal pieces. Then, each of these pieces was divided into three equal pieces. After that, each person at this party got a piece of the cake and three pieces were left over. How many people were at this party?
(A) 13 (B) 18 (C) 21 (D) 24 (E) 27

8. A certain quiz show has the following rules: every participant has 10 points at the beginning and has to answer 10 questions. For each correct answer, the participant earns 1 point. For each incorrect answer, the participant loses 1 point. Mrs. Smith had 14 points at the end of the quiz show. How many correct answers did she give?
(A) 7 (B) 8 (C) 9 (D) 6 (E) 4

9. Chris wrote the numbers 6 and 7 in the circles as shown in the picture. He will then write each of the numbers 1, 2, 3, 4, 5, and 8 in the circles so that the sum of the numbers on each of the sides of the square is equal to 13. What will the sum of the numbers in the shaded circles be?



- (A) 12 (B) 13 (C) 14 (D) 15 (E) 16
10. Adam spent five days preparing for a test. The first day he solved one problem, and on each consecutive day he solved twice as many problems as the day before. How many problems did Adam solve altogether preparing for the test?
- (A) 15 (B) 16 (C) 31 (D) 33 (E) 63
11. Eva the centipede has 50 pairs of feet. She had shoes on some of her feet, but on the rest of her feet she did not have shoes. Today, she bought 16 pairs of new shoes and put them on the feet that were without shoes. She still has 7 pairs of feet without shoes. On how many feet did she have shoes before she bought the 16 pairs of shoes?
- (A) 27 (B) 40 (C) 54 (D) 70 (E) 77

Part II: Short Answer

1. In a number, the first digit is greater than the second by 4, and the second digit is greater than the third by 3. The third digit is odd. What number is this?

2. Which digit does the star represent?

$$\begin{array}{r} 2 \\ \star 7 \\ \star \\ + 21 \\ \hline 6\star \end{array}$$

3. Michael chose a positive number, multiplied it by itself, added 1, multiplied the result by 10, added 3, and multiplied the result by 4. His final answer was 2012. What number did Michael choose?
4. Kim takes 25 minutes to walk to her favorite store. If she leaves her house at 4:05 PM, she will get to the store a half hour after it closes. If she leaves at 7:45 AM, she will get to the store 20 minutes before the store opens. What hours is the store open?

5. Place an operator (+,-,x,÷) in between each number so that the following equations are correct:

$$1 \quad 1 \quad 2 \quad 3 \quad 5 = 8$$

$$1 \quad 10 \quad 100 \quad 1000 = 1$$

6. Jack has \$10 and goes into a store to buy notebook and pens. Each notebook costs \$1.80 and each pen costs \$0.70. He needs to buy 4 notebooks for his classes. What is the maximum number of pens he can buy?

7. The Math Circle Hotel has rooms that can hold either 2 or 4 people. The maximum occupancy of the hotel is 62 people. If the hotel has 11 rooms that can accommodate 4 people, how many 2 person rooms are there?

11. Gregor forms two numbers using the digits 1, 2, 3, 4, 5, 6. Both numbers have three digits, and each digit is used only once. He adds these two numbers. What is the greatest sum Gregor can get?

12. There were 45 pieces of chocolate in a box. The box was passed down a row of people. The first person took 1 piece of chocolate, and every person after took more chocolates than the person before. The box was passed down the row until there were no more chocolates. What is the largest number of people who could take at least one piece of chocolate?

13. In how many ways can 6 people be arranged into 6 desks?

14. Donald's grandfather sleeps through exactly a quarter of the day. Donald sleeps one and a half times as long as his grandfather. What fraction of the day does Donald spend sleeping?

- A) $\frac{1}{6}$ B) $\frac{1}{2}$ C) $\frac{1}{8}$ D) $\frac{3}{8}$ E) $\frac{3}{4}$

15. Which of the numbers below is even? (Circle all that apply.)

- A) 2016 B) $2 + 0 + 1 + 6$ C) $201 - 6$ D) 201×6 E) $201 + 6$

16. Which number is the smallest?

- A) $2 + 0 + 1 + 6$ B) $201 \div 6$ C) $2 \times 0 \times 1 \times 6$ D) $201 - 6$ E) $6 + 1 + 0 - 2$