2003 Washington State Math Championship

Unless a particular problem directs otherwise, give an exact answer or one rounded to the nearest thousandth.

Potpourri - Grade 5

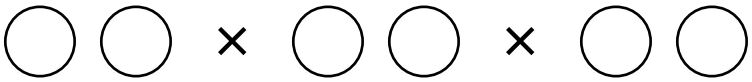
1. How many perfect squares are between 2003 and 3002?

2. Ernie ate half the cookies; Grover ate half of those remaining. The cookie monster ate the last five cookies remaining. How many cookies were there originally?

3. Le Wei counts backwards from 2003 by 19. What is the first 2 digit number that he reaches?

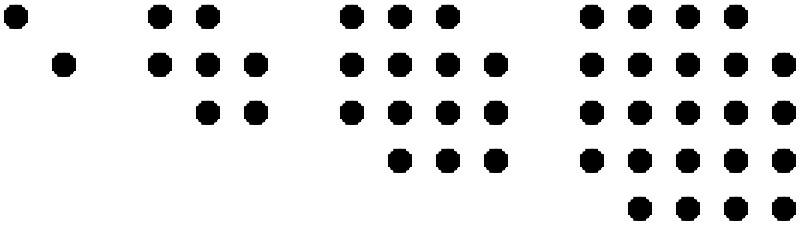
4. The difference between a number and its reciprocal is $\frac{56}{45}$. What is the sum of this number and its reciprocal? [Answer as an exact fraction.]

5. The numbers 1 through 6 are each to be used once in the following multiplication problem. What is the difference between the minimum and maximum values of the product?



6. Captain McKee flies an airline route that takes him around the world in 7 days. After working for 7 days he gets 14 days off. If he begins his first around the world trip on January 1, 2003, how many times will he travel around the world in 2003?

7. The first 4 dot patterns are shown. How many dots are in the tenth pattern?



8. What time is it 2003 minutes after 8:03 p.m. (20:03 in military time)?

9. What is the sum of the prime factors of 19,062,043?

10. Using the numbers 2, 3, 4, and 5 each once to replace the variables w, x, y, and z, what is the maximum possible value for the expression $w + x \bullet y^z$?

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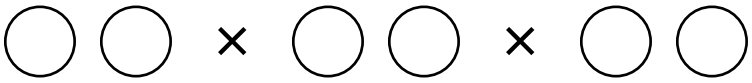
Potpourri - Grade 6

1. The difference between a number and its reciprocal is $\frac{56}{45}$. What is the sum of this number and its reciprocal? [Answer as an exact fraction.]

2 The numbers 1 through 6 are each to be used once in the following multiplication problem. What is the difference between the minimum and maximum values of the product?



3. Captain McKee flies an airline route that takes him around the world in 7 days. After working for 7 days he gets 14 days off. If he begins his first around the world trip on January 1, 2003, how many times will he travel around the world in 2003?

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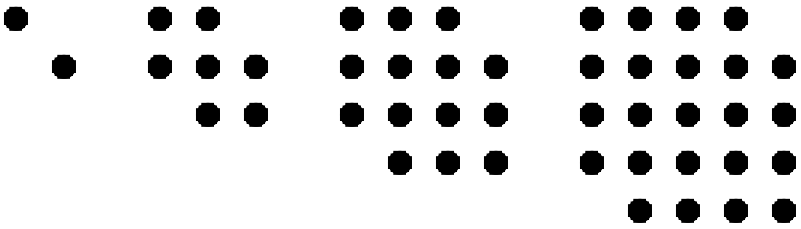

5. What time is it 2003 minutes after 8:03 p.m. (20:03 in military time)?

6. What is the sum of the prime factors of 19,062,043?

7. Using the numbers 2, 3, 4, and 5 each once to replace the variables w, x, y, and z, what is the maximum possible value for the expression $w + x \bullet y^z$?

8. Of the 28 students in the class 14 have cell phones and 11 have graphing calculators. If 7 of these students have both devices, how many have neither?

9. In how many ways can change for a quarter be made using standard U.S. coins?

10. The eight rules for each new row of the pattern are as follows:

$$\begin{bmatrix} 1 & 1 & 1 \\ & 0 & \end{bmatrix} \begin{bmatrix} 1 & 1 & 0 \\ & 0 & \end{bmatrix} \begin{bmatrix} 1 & 0 & 1 \\ & 0 & \end{bmatrix} \begin{bmatrix} 1 & 0 & 0 \\ & 1 & \end{bmatrix} \begin{bmatrix} 0 & 1 & 1 \\ & 1 & \end{bmatrix} \begin{bmatrix} 0 & 1 & 0 \\ & 1 & \end{bmatrix} \begin{bmatrix} 0 & 0 & 1 \\ & 1 & \end{bmatrix} \begin{bmatrix} 0 & 0 & 0 \\ & 0 & \end{bmatrix}$$

The pattern so far is

0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 1 1 1 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 1 1 0 0 1 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 1 1 0 1 1 1 1 0 0 0 0 0 0 0
0 0 0 0 0 0 1 1 0 0 1 0 0 0 1 0 0 0 0 0 0
0 0 0 0 0 1 1 0 1 1 1 1 0 1 1 1 0 0 0 0 0
0 0 0 0 1 1 0 0 1 0 0 0 0 1 0 0 1 0 0 0 0
0 0 0 1 1 0 1 1 1 1 0 0 1 1 1 1 1 1 0 0 0
0 0 1 1 0 0 1 0 0 0 1 1 1 0 0 0 0 0 1 0 0
0 0

What sequence of 19 0's and 1's completes the next row of the pattern?

2003 Washington State Math Championship

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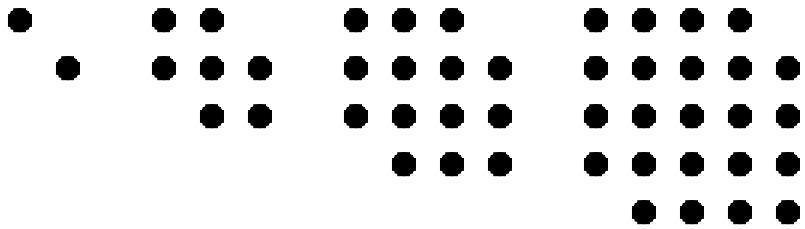
Potpourri - Grade 7

1. The first 4 dot patterns are shown. How many dots are in the tenth pattern?



2. What time is it 2003 minutes after 8:03 p.m. (20:03 in military time)?

3. What is the sum of the prime factors of 19,062,043?

4. Using the numbers 2, 3, 4, and 5 each once to replace the variables w, x, y, and z, what is the maximum possible value for the expression $w + x \bullet y^z$?

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The pattern so far is

0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 1 1 1 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 1 1 0 0 1 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 1 1 0 1 1 1 1 0 0 0 0 0 0 0
0 0 0 0 0 0 1 1 0 0 1 0 0 0 1 0 0 0 0 0 0
0 0 0 0 0 1 1 0 1 1 1 1 0 1 1 1 0 0 0 0 0
0 0 0 0 1 1 0 0 1 0 0 0 0 1 0 0 1 0 0 0 0
0 0 0 1 1 0 1 1 1 1 0 0 1 1 1 1 1 1 0 0 0
0 0 1 1 0 0 1 0 0 0 1 1 1 0 0 0 0 0 1 0 0
0 0

What sequence of 19 0's and 1's completes the next row of the pattern?

8. If all multiples of 5 and all multiples of 7 are removed from a list of integers from 1 to 200, how many numbers are left?

9. The ancient Egyptian mathematical system allowed only fractions with numerator 1 (except for $\frac{2}{3}$). For example, $\frac{7}{8}=\frac{1}{2}+\frac{1}{4}+\frac{1}{8}$. If $\frac{137}{360}$ is expressed a sum of three fractions each with a numerator of 1 and different denominators, what is the least possible sum of the denominators?

10. A cylindrical can of tennis balls with a $2\frac{3}{4}$-inch diameter contains 3 spherical tennis balls stacked one on top the other. What percentage of the space in the cylinder is also contained within the spheres? [Answer to the nearest tenth of a percent.]

2002 Washington State Math Championship

Unless a particular problem directs otherwise, give an exact answer or one rounded to the nearest thousandth.

Potpourri - Grade 8

1. Using the numbers 2, 3, 4, and 5 each once to replace the variables w, x, y, and z, what is the maximum possible value for the expression $w + x \bullet y^z$?

2. Of the 28 students in the class 14 have cell phones and 11 have graphing calculators. If 7 of these students have both devices, how many have neither?

3. In how many ways can change for a quarter be made using standard U.S. coins?

4. The eight rules for each new row of the pattern are as follows:

$$\begin{bmatrix} 1 & 1 & 1 \\ & 0 & \end{bmatrix} \begin{bmatrix} 1 & 1 & 0 \\ & 0 & \end{bmatrix} \begin{bmatrix} 1 & 0 & 1 \\ & 0 & \end{bmatrix} \begin{bmatrix} 1 & 0 & 0 \\ & 1 & \end{bmatrix} \begin{bmatrix} 0 & 1 & 1 \\ & 1 & \end{bmatrix} \begin{bmatrix} 0 & 1 & 0 \\ & 1 & \end{bmatrix} \begin{bmatrix} 0 & 0 & 1 \\ & 1 & \end{bmatrix} \begin{bmatrix} 0 & 0 & 0 \\ & 0 & \end{bmatrix}$$

The pattern so far is

0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 1 1 1 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 1 1 0 0 1 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 1 1 0 1 1 1 1 0 0 0 0 0 0 0
0 0 0 0 0 0 1 1 0 0 1 0 0 0 1 0 0 0 0 0 0
0 0 0 0 0 1 1 0 1 1 1 1 0 1 1 1 0 0 0 0 0
0 0 0 0 1 1 0 0 1 0 0 0 0 1 0 0 1 0 0 0 0
0 0 0 1 1 0 1 1 1 1 0 0 1 1 1 1 1 1 0 0 0
0 0 1 1 0 0 1 0 0 0 1 1 1 0 0 0 0 0 1 0 0
0 0

What sequence of 19 0's and 1's completes the next row of the pattern?

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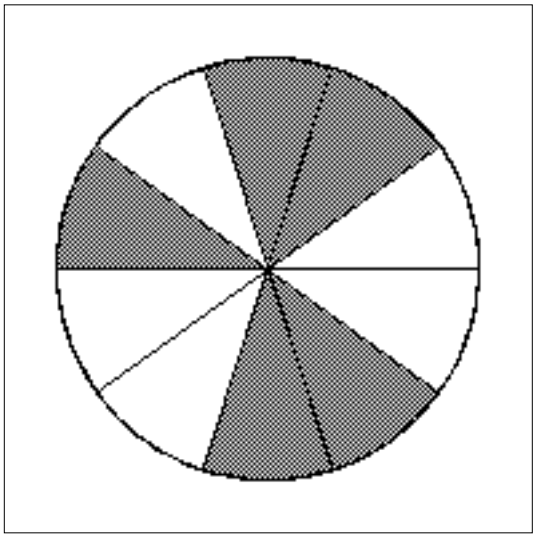
7. A cylindrical can of tennis balls with a $2\frac{3}{4}$-inch diameter contains 3 spherical tennis balls stacked one on top the other. What percentage of the space in the cylinder is also contained within the spheres? [Answer to the nearest tenth of a percent.]

8. The sum of 13 consecutive integers is 1859. What is the largest of these integers?

9. A circle is divided into tenths and half of it is shaded by coloring in half of the sectors. How many different ways are there to do this that are not reflections or rotations of each other? One example of shading is shown.



10. The first 10 numbers of a sequence are given below. What is the 20th number in the sequence?

-1, 0, 1, 0, 1, 2, 3, 6, 11, 20, ...