2004 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. A 4×4×4 cube is painted and then cut into 64 smaller cubes each 1×1×1. How many of the cubes have paint on exactly one side?

2. What is the value of *e* in this number square pattern?

1	2	3	4	5	6
2	4	7	11	16	22
3	7	14	25	41	63
4	11	25	50	*a*	*b*
5	16	41	*a*	*c*	*d*
6	22	63	*b*	*d*	*e*

3. What time will it be 1111 minutes after 11:11 p.m.?

4. A cell takes half a day to divide, forming two cells. If a cell culture starts with one cell, how many cells will there be after nine days?

5. Lance rides his bike for 20 minutes at 12 miles per hour. Then for an hour and a half he rides at 8 miles per hour, and finally for 24 minutes he rides at 15 miles per hour. How many miles has he traveled?

6. Genetic RNA is one-sided and is composed partially of four bases called Adenosine, Uracil, Guanine, and Cytosine, or A, U, G, and C. In a sequence that is 5 bases long, how many combinations of the four bases are possible?

7. Seven nurses, Ann, Bea, Cara, Dee, Elle, Fran, and Gina have 1 day off each Monday through Sunday week. No two of them have the same day off. Ann's day off is the day after Cara's. Dee's day off is 3 days after the day before Elle's. Bea's day off is 3 days before Gina's. Fran's day off is halfway between Bea's and Cara's and is Thursday. Find Dee's day off.

8. A certain number leaves a remainder of 1 when it is divided by 2, 3, 4, 5, or 6 but leaves no remainder when it is divided by 7. What is the smallest this number can be?

9. Each letter represents a different digit between 0-9. What is the value of F + P + O?

$$\begin{array}{r} P\ O\ P \\ +\quad O\ F \\ \hline O\ P\ P \end{array}$$

10. A boy agreed to work one year for $240 and a horse. At the end of seven months, he quit and received $100 and the horse. What was the value of the horse?

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Potpourri - Grade 6

1. A cell takes half a day to divide, forming two cells. If a cell culture starts with one cell, how many cells will there be after nine days?

2. Lance rides his bike for 20 minutes at 12 miles per hour. Then for an hour and a half he rides at 8 miles per hour, and finally for 24 minutes he rides at 15 miles per hour. How many miles has he traveled?

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6. Each letter represents a different digit between 0-9. What is the value of F + P + O?

$$\begin{array}{r} P\,O\,P \\ +\quad O\,F \\ \hline O\,P\,P \end{array}$$

7. A boy agreed to work one year for $240 and a horse. At the end of seven months, he quit and received $100 and the horse. What was the value of the horse?

8. A bottle and a cup exactly balance a coffeepot. The bottle balances a cup and a saucer. Three saucers can be used to balance two coffeepots. How many cups will it take to balance a bottle?

9. A survey of 1000 people found that 70% have a CD player, 85% have a telephone, and 45.2% have a computer. At least how many people have all three devices?

10. Suppose there are 7 matches on a table. Player 1 begins by picking up 1, 2, or 3 matches. Then player 2 picks up 1, 2, or 3 matches. The game continues in this fashion until the last match is picked up. The player who picks up the last match loses. How many match(es) should player 1 pick up on the first move to ensure that she can win?

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Potpourri - Grade 7

1. Seven nurses, Ann, Bea, Cara, Dee, Elle, Fran, and Gina have 1 day off each Monday through Sunday week. No two of them have the same day off. Ann's day off is the day after Cara's. Dee's day off is 3 days after the day before Elle's. Bea's day off is 3 days before Gina's. Fran's day off is halfway between Bea's and Cara's and is Thursday. Find Dee's day off.

2. A certain number leaves a remainder of 1 when it is divided by 2, 3, 4, 5, or 6 but leaves no remainder when it is divided by 7. What is the smallest this number can be?

3. Each letter represents a different digit between 0-9. What is the value of F + P + O?

$$\begin{array}{r} P\,O\,P \\ +\quad O\,F \\ \hline O\,P\,P \end{array}$$

4. A boy agreed to work one year for $240 and a horse. At the end of seven months, he quit and received $100 and the horse. What was the value of the horse?

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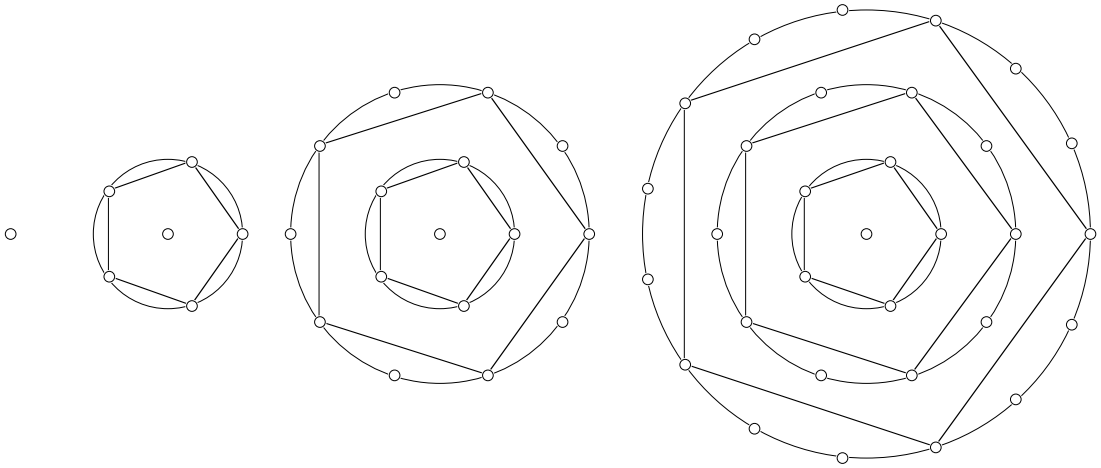
8. Suppose you work for James Bond School of spies and you want to compose 3-letter code words. How many such words are possible using the first 17 letters of the alphabet if letters can be repeated?

9. The Earth at its widest point, the Equator, is approximately is 25,000 miles around. A mile is 5,280 feet. (Round all calculated values to the nearest hundredth.) A roll of toilet paper is 400 sheets long and each sheet is four inches long. The grocery store sells a 12- roll pack of toilet paper for $7.00. You have a coupon to save $0.25 off of the price of every 12-pack of toilet paper that you buy. How much money are you saving by using your coupon to buy enough toilet paper to go around the equator once?

10. The first 4 designs are shown. How many dots will there be in the ninth design?



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Potpourri - Grade 8

1. A boy agreed to work one year for $240 and a horse. At the end of seven months, he quit and received $100 and the horse. What was the value of the horse?

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3. A survey of 1000 people found that 70% have a CD player, 85% have a telephone, and 45.2% have a computer. At least how many people have all three devices?

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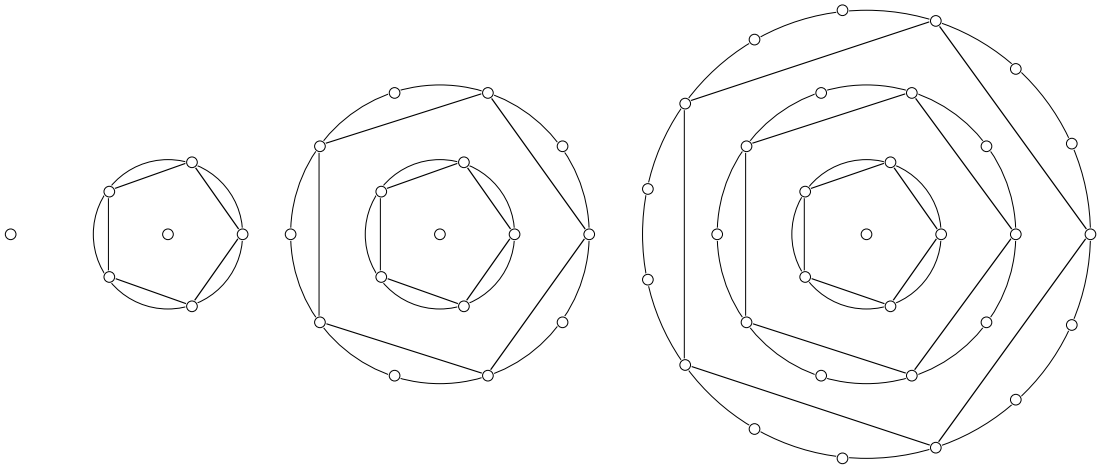
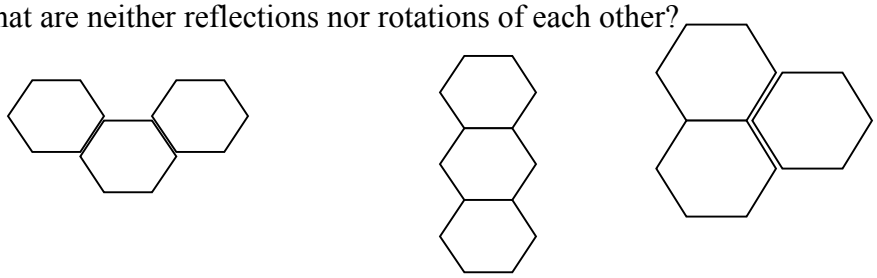


8. Using the digits 1, 2, 3, 4 each once to replace the variables a, b, c, and d, what is the maximum possible value for the expression $a + b(c^d)$

9. These are the three ways that three regular hexagons can be put together in an edge-to-edge manner that are neither reflections nor rotations of each other. How many ways can four regular hexagons be put together in and edge-to-edge manner that are neither reflections nor rotations of each other?



10. Each of the letters in the following addition problem stands for a different digit. What is the sum of the values of *TWENTY*?

$$\begin{array}{r} THREE \\ THREE \\ THREE \\ +\ ELEVEN \\ \hline TWENTY \end{array}$$