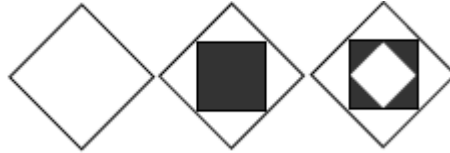


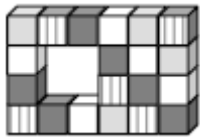
MathEdge Advance Level Contest Problems

1) $(1234567 \times 1234567) - (1234566 \times 1234566) = ?$



2) Draw the next two pictures: _____

3) Circle the shape at the right which fits into the open space of the graph given below:



4) Green and blue marbles are placed in the following way: one green, one blue, two green, two blue, three green, three blue, and so on. How many of the first 100 marbles are green?



5) The numbers in the sequence 3, 8, 13, 18, and so on, increase by 5's. The numbers in the sequence 5, 9, 13, 17, and so on, increase by 4's. The number 13 is in both sequences. What is the next number that appears in both sequences?

MathEdge Advance Level Contest Problems

- 6) For 15 weeks during the summer, Lesley had a job mowing her neighbour's lawn. When she accepted the job, her neighbour offered to pay a total of \$300 for the 15 weeks or 1¢ for the first week, 2¢ for the second week, 4¢ for the third week, and so on, doubling her pay each week. Would you choose \$300 or $1\text{¢} + 2\text{¢} + 4\text{¢} + \dots$? Explain please.
- 7) What is the remainder when 100000000001 is divided by 3?
- 8) Find the unit digit of $7 \times 9 \times 11 \times \dots \times 1999 \times 2001 \times 2003$.
- 9) Find a prime number p such that $23p + 1$ is also prime.
- 10) Michael and Fanny each thought of a number. It is known that Michael's number is larger than Fanny's. If the sum of the two numbers is 2002 and their difference is 1001, what is the number Fanny thought of? (Note: The number can be decimal.)
- 11) $398^2 = 158404$; $3998^2 = 15984004$; $39998^2 = 1599840004$; and $399998^2 = 159998400004$.
What is the sum of the digits of $3,999,999,998^2$?
- 12) Randomly select two different numbers from this set: $\{-5, -2, 4, 8\}$.
The probability that the **product** of the two selected number is **positive** is
- 13) M and N are Whole Numbers. $75M$ is a perfect square. $75N$ is a perfect cube. The smallest possible value of $M + N$ is

MathEdge Advance Level Contest Problems

14) $(1 + \frac{1}{2})(1 - \frac{1}{3})(1 + \frac{1}{4})(1 - \frac{1}{5})\dots\dots(1 + \frac{1}{n})(1 - \frac{1}{n+1})\dots\dots(1 + \frac{1}{48})(1 - \frac{1}{49})(1 + \frac{1}{50})$

What is the product of these 49 factors?

15) A 27-year old mother has a 5-year old daughter. In how many years will the mother be three times as old as her daughter?

16) From 1:08 PM to 5:46 PM, the hour hand of a clock moves through an angle of

17) A square piece of paper is folded in half twice: from top to bottom, then from top to bottom again. If the perimeter of the final rectangle is 35 cm, what was the perimeter of the original square?

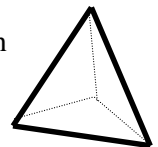
18) The natural numbers are written in sequence, without spaces:
1234567891011121314151617.... and so on. What is the **300th digit** in this sequence?

19) If $x - y = A$ and $xy = B$, then what is $(x + y)^2$ in terms of A and B?

20) A fair tetrahedral die has four faces and four vertices. Each vertex is numbered and each vertex is equally likely to "land up". You have two such dice.

On die #1, the vertices are labeled: 1, 2, 3, and 4.

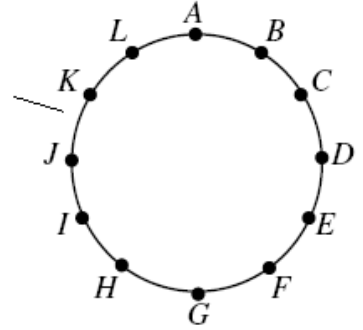
On die #2, the vertices are labeled: 2, 3, 4, and 5.



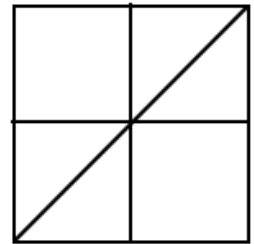
When these two dice are rolled, what is the probability that the sum of the two "up" vertices is 7?

MathEdge Advance Level Contest Problems

- 21) Twelve balloons are arranged in a circle as shown. Counting clockwise, every third balloon is popped. C is the first one popped. This continues around the circle until two unpopped balloons remain. What are the the last two remaining balloons?



- 22) In the game "TRISQUARE", three points are awarded for each triangle found, and four points for each square. What is the highest number of points that can be achieved for the given diagram?



- 23) In the diagram, all triangles are equilateral. What fraction of ΔABC is coloured black?



- 24) Each side of this square is trisected. What fraction of the square is shaded?

