

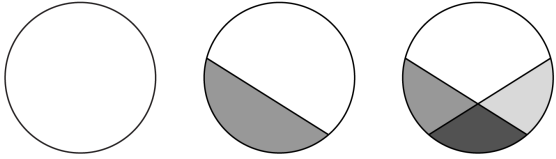
*2023 Castro Valley Junior Math Tournament
Hosted by CV Mu Alpha Theta*

Elementary School Division Geometry & Number Theory Group Round

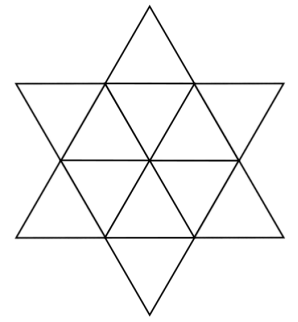
15 minutes 20 questions

Instructions

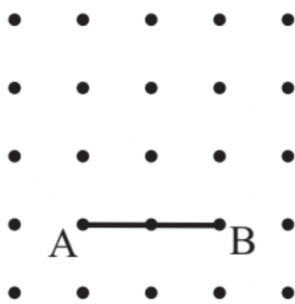
- Do not turn over this test until you are instructed to begin.
- Write your answers on the separate answer sheet.
- Express all of your answers in simplified form.
- Do not include units.

#	Problems
1	Two angles in a triangle measure 12 degrees and 34 degrees. What is the measure of the third angle?
2	There is a right triangle with legs of length 5 and 12. What is the area of the triangle?
3	What is the perimeter of a hexagon with side lengths of 4, 5, 8, 4, 5, and 8?
4	How many lines of symmetry are in an equilateral triangle?
5	What is the name of the polygon that has 5 sides?
6	<p data-bbox="159 541 1404 632">What is the maximum number of pizza slices that can be made with only 3 straight cuts? An example with 0, 1, and 2 cuts is shown below.</p> <div data-bbox="186 703 738 913" style="text-align: center;">  <p data-bbox="235 871 292 903">$n=0$</p> <p data-bbox="430 871 487 903">$n=1$</p> <p data-bbox="625 871 682 903">$n=2$</p> </div>
7	What is the smallest number that is divisible by both 4 and 5?
8	What is the smallest possible product of a two-digit number and a three-digit number obtained from five distinct digits?
9	How many three-digit numbers have a tens digit that is 5, 6, or 9?
10	There is a rectangle with a side length of 9 inches. The perimeter is 42 inches. What is the area of the rectangle?
11	How many rectangles have whole number side lengths and an area of 10? Note that an $m \times n$ rectangle is distinct from an $n \times m$ rectangle.
12	How many factors do prime numbers have?
13	How many prime numbers are there between 1 and 13 inclusive?
14	A number is called a Niven number if it is divisible by the sum of its digits. How many Niven numbers are there between 1 and 10 inclusive?
15	A Mersenne prime is a prime number of the form $2^n - 1$ for some integer n . In fact, the largest known prime number $2^{82,589,933} - 1$ is a Mersenne prime. How many Mersenne primes are there below 100?

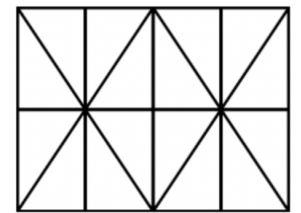
16 How many triangles of any size are in the figure shown?



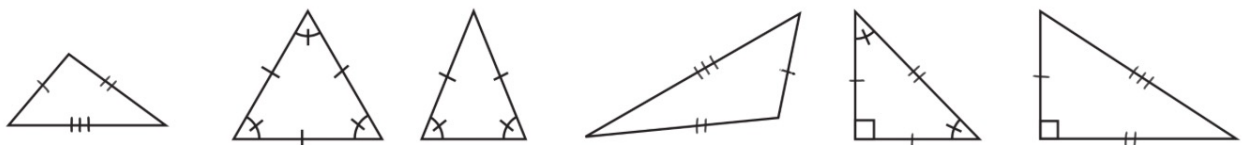
17 The dots are evenly spaced vertically and horizontally. Segment AB is drawn using two points, as shown. Point C is to be chosen from the remaining 23 points. How many of these 23 points will result in an isosceles triangle ABC?



18 How many triangles of any size are in the figure shown?



19 How many of these triangles are scalene triangles?



20 A circle is inscribed in a large square and circumscribed about a smaller square. The area of the larger square is 9 and the area of the smaller square is 4.5. What is the area of the shaded region?

