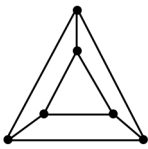
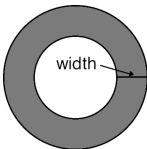


# The Mandelbrot Competition

## Round Three Test

Name: \_\_\_\_\_

*Time Limit:*  
40 minutes

1. Neeyanth, Veer and Joshua throw a Frisbee to one another without dropping it. After a few moments Neeyanth has made 10 catches and 9 throws, Veer has made 8 catches and 8 throws, while Joshua has made 7 throws and 6 catches. Who has the Frisbee at this point?		①
2. In the diagram at right, how many ways are there to color two of the dots red, two of the dots blue, and two of the dots green so that dots of the same color are joined by a segment?		①
3. A pair of concentric circles create a ring-shaped region with shaded area $20\pi$ and total boundary (counting both the inside and outside circles) of $14\pi$ . What is the width of the ring?		②
4. Stuart asks Shivani, “What is your favorite integer?” She replies, “If you multiply one more than my favorite integer by 14 and subtract our classroom number, you get the square of my integer.” If this is enough information for Stuart to deduce Shivani’s integer, then what is their classroom number?		②
5. There is a power of 2 whose final five digits are each either 3 or 6. What are these final five digits, in order?		②
6. Suppose that for five people, given any pair of them exactly one knows the other’s phone number, with each of these two possibilities being equally likely. What is the probability that every person can reach every other person, perhaps by calling several intermediate people if necessary?		③
7. Let $b$ and $c$ be real numbers for which the curves $y = x^3 - 2014x$ and $y = x^2 + bx + c$ intersect at three points, in such a way that the difference between the $x$ -coordinates of the leftmost and rightmost points is 42. Find the maximum possible area of the triangle having these three points as vertices.		③

SCORE: