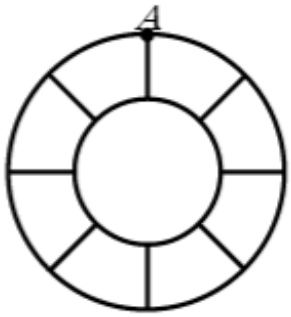
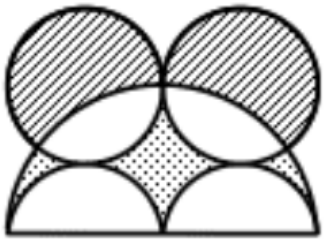
# P6 Spring Cup Mathematical Olympiad Sample Questions

1. (SCMO2016R1Q1) Calculate: $2016\times\dfrac{1}{1+\frac{1}{2}+\frac{1}{4}+\frac{1}{8}+\frac{1}{16}+\frac{1}{32}}$

2. (SCMO2012R2Q10) The diagram below shows the pathways around a fountain. Alex starts at point A and takes a walk around the fountain and returns to his starting position. How many possible routes can he take without overlaps in the routes he take?




3. (SCMO2012R2Q5) A big semicircle, two small semicircles and two small circles are arranged in the following way. The radius of the small semicircles and small circles is $10cm$. The shaded area outside the big semicircle is _____ $cm^2$ greater than the shaded area inside (take $\pi = 3.14$).



4. (SCMO2020R2PCQ4) A student is performing an experiment with a test-tube filled with 32% alcohol solution. First, he pour out $\frac{1}{2}$ of the solution and fill the test-tube with water. Then, he pour out $\frac{1}{3}$ of the solution and fill with pure alcohol. Finally, he pour out $\frac{1}{4}$ of the solution and fill with water. What is the alcohol concentration now?

5. (SCMO202R1Q12) Consider some black dots and white dots placed on a grid as shown in the figures below. They can be connected by a unique closed loop following 2 rules:
(1) The line must make a right angle turn when passing through a black dot and it has to be straight the grids before and after passing through a black dot.
(2) The line passing through the white chess must be a straight line and it has to make a turn (at least once) in the grid before and/or after passing through a white dot.
For example, closed loop drawn in figure 2 is unique to the black and white dots arrangement in figure 1. By following these two rules, how many turns does it take to form a unique closed loop in the third diagram?

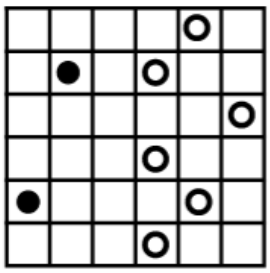


Diagram 1

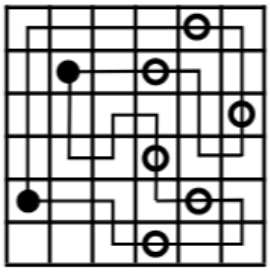


Diagram 2

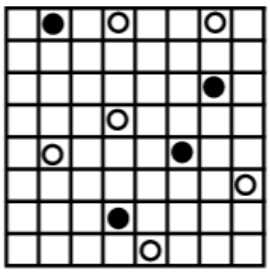


Diagram 3