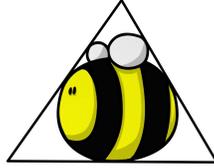
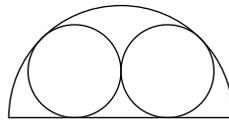


2018 Geometry Bee Preliminary Round



Friday, April 20th - Sunday, April 29th

1. Daniel gifts Jonathan a box whose base is a 4×5 rectangle. Jonathan wants to bake a cookie that fully utilizes his new box, i.e. he wishes to bake the largest possible circular cookie that can lay flat in the box. Assuming Jonathan does his calculations correctly, what is the area of the cookie he bakes?
2. In $\triangle ABC$, $AB = AC$ and $\angle A = 30^\circ$. Point D is chosen on side AB such that $\angle CDB = 40^\circ$. Find $\angle DCB$.
3. April the Antelope takes three hops of distance 1, 2, and 2018 (in any directions of her choice). She then hops back to where she started. Find the minimum possible total distance April could have hopped.
4. In $\triangle ABC$, $AB = AC$ and $\angle A = 10^\circ$. There exists a point D different than B on the circumcircle of $\triangle ABC$ such that $BC = CD$. Find $\angle ACD$.
5. Kenny the Koala sits at the point $(0, 0)$. There is a mango at the point $(2017, 2018)$ and a grapefruit at the point $(2016, 2019)$. The mango is m units away from Kenny and the grapefruit is g units away from Kenny. Find $|m^2 - g^2|$.
6. There is a square pen of side length $2\sqrt{3}$ that is filled with grass. Molly the Moat is attached to a leash of length 2 that is fixed at an end to the center of the square pen. Find the area that Molly can reach.
7. Jonathan gifts Daniel a box whose base is in the shape of a semicircle. Daniel fits two circular cookies in the semicircle as shown below. If each of these circles has area 2π , find the radius of the semicircle.



8. $\triangle ABC$ is isosceles with $AB = AC$ and $BC = 2$. Let G and I be the centroid and incenter of $\triangle ABC$, respectively. Let D be the midpoint of BC . If $GI = ID$, find AB .
9. $ABCD$ is a cyclic quadrilateral whose circumcircle has radius 4. Let AC and BD intersect at P . Given that $AP = 4$, $CP = 2$, and $AC \perp BD$, find the length of BD .
10. Consider a semicircle with diameter AB . P is chosen on segment AB such that $AP = 3$ and $BP = 1$. Points C and D lie on the semicircle such that $\angle CPB = \angle DPA = 45^\circ$. Find the area of $\triangle CDP$.