WinMaC 2018

Theme Round

Name: _____ Score: _____ / 45

Grade: _____ Team: _____

This is a round consisting of **9 problems** that is to be done in **35 minutes**. The problems are split into **3 themes**, which are in ascending difficulty. The problems within each theme are also in ascending difficulty. For example, problem 3 in category 3 is significantly harder than problem 3 in category 1. The problems are each worth **5 points**.

No aids are permitted aside from pencils, pens, and provided scratch paper. In particular, no calculators or other computers are permitted. Communication with other people is not permitted.

Record your answers in the box corresponding to the correct problem. Only answers printed in the boxes below will be scored.

Your Answers

Pleasant Goat	Sanic Mice	Quizzical Quadrilaterals
1.	4.	7.
2.	5.	8.
3.	6.	9.

Pleasant Goat

1. There are 100 weeds in a garden. Every day, Kevin the pleasant goat removes 10 weeds. If there is at least one weed remaining in the garden, 8 grows back at night. How many days will it take for Kevin to remove all the weed in the garden?

2. Robert is a very pleasant goat living in a very pleasant goat village. Every day at exactly 2:00, each goat in the village either makes a clone of itself or fuses with two other goats to form a single goat. If the village had 17 goats immediately before 2:00 today, then what is the minimum possible number of goats in the village immediately after 2:00?

3. A single pleasant goat lives in another very pleasant village. Every day, each goat in the village chooses whether or not they will fuse with another goat to form a single goat. After all fusion is done, all remaining goats divide into two clones. What is the least number of individual divisions needed to have exactly 2018 pleasant goats in the village?

Note: "Pleasant Goat and Big Big Wolf," better known as "喜羊羊与灰太狼," is a popular Chinese cartoon series. However, note that there are several issues; namely, the fact that 喜羊羊 is actually a sheep, and also that this round has nothing to do with the actual series.
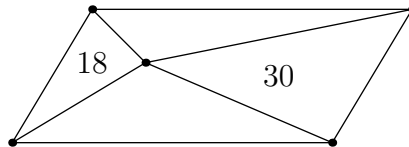
Sanic Mice

1. Brandon has a cage of mice. There are 15 sanic mice and 28 lazy mice. All sanic mice are aggressive while all lazy mice have an equal chance of being aggressive or friendly. Brandon randomly takes out a mouse. What is the chance that it is friendly?

2. Sanic mouse has a fridge with magnetic letters that spells out "sanic mice". He randomly swaps two letters. What is the probability that the two words are unchanged?

3. Sanic mouse starts running at 10 mph. After each minute, he increases his speed by 2 mph. How many minutes will it take sanic mouse to travel 6 miles?
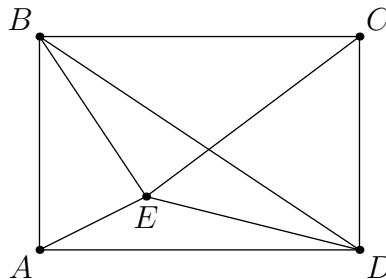
Note: "Sanic Mice" is intentionally spelled this way.
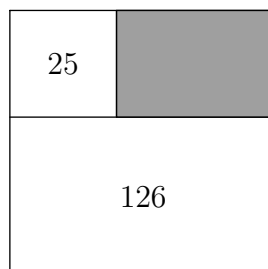
Quizzical Quadrilaterals

1. A parallelogram is divided into four regions. Two opposite regions have areas 18 and 30. What is the area of the parallelogram?

2. Point E lies inside rectangle $ABCD$ below such that the area of $\triangle ABE$ is 28 and the area of $\triangle BCE$ is 63. What is the area of $\triangle BED$?

3. In the diagram below, a large square is separated into a smaller square with area 25 and two rectangles. One of the rectangles has an area of 126. Find the area of the shaded rectangle.

Note: This theme was originally called "Brandon's Quadrilaterals", but Brandon contributed little to problem writing this year; hence, the name was changed. Also, notice that beautiful alliteration in the title.