# Math Circle Explorations: Session 3

## Room A

Problem 1. Observe that for some small integers, if we attach some extra digits on the right hand side, we can “complete” them to a power of 2. For example, for the integer 1, we write 6 on the right to get 16 “ $2^4$. Similarly, we write 56 to the right of 2 to get 256 “ $2^8$. Some more examples:

3 32 “ $2^5$

4 4096 “ $2^{12}$

5 512 “ $2^9$

6 64 “ $2^6 \dots$

Seems easy enough... right? Next one is a bit harder.

7 70, 368, 744, 177, 664 “ $2^{46}$

That took some work!

8 8192 “ $2^{13}$

9 9007199254740992“ $2^{53}$

Almost gave up there!

10 1024 “ $2^{10}$

11 1125899906842624“ $2^{50}$

12 1208925819614629174706176“ $2^{80}$

Phew!

13 131072 “ $2^{17}$

... and so on.

Do you think that *any* integer can be “completed” to a power of two by writing some more digits to the right? Or is it impossible to do this for some integers?