Instructions

Print this out, grab scissors and glue. Then give all of that to your (or someone else's) kids*. After a couple of iterations, fancy SRE flash cards should magically appear on your desk.

*Danger! Make sure kids RTFM on scissors.

Power of Two 1 KB?	**1 KB = 2^10 bytes**
Power of Two 64 KB?	**64 KB = 2^16 bytes**
Power of Two 1 MB?	**1 MB = 2^20 bytes**
Power of Two 1 GB?	**1 GB = 2^30 bytes**
Power of Two 4 GB?	**4 GB = 2^32 bytes**

Power of Two 1 TB?	**1 TB = 2^40 bytes**
Time L1 Cache Reference	**0.5 ns**
Time Branch Mispredict	**5 ns**
Time L2 Cache Reference	**7 ns (14x L1)**
Time Mutex lock/unlock	**100 ns**

Time **Main Memory Reference**	**100 ns** **(20x L2, 200x L1)**
Time **Compress 1 KB with Zippy**	**10,000 ns** **10 us**
Time **Send 1 KB over Gbit network**	**10,000 ns** **10 us**
Time **Read 4 KB randomly from SSD**	**150,000 ns** **150 us**

Time Read 1 MB sequentially from memory	**250,000 ns 250 us**
Time Round trip within same datacenter	**500,000 ns 500 us**
Time Read 1 MB sequentially from SSD	**1 ms (4x memory)**
Time Disk seek	**10 ms (20x data center roundtrip)**
Time Read 1 MB sequentially from Gbit network	**10 ms (40x memory, 10x SSD)**

Time **Read 1 MB sequentially from disk**	**30 ms** **(120x memory, 30x SSD)**
Time **Round trip CA-AMS-CA**	**150 ms**
Power of ten? **ns / us / ms**	**ns = 10^-9 s** **us = 10^-6 s** **ms = 10^-3 s**
Speed **Read sequentially from disk**	**30 MB/s**
Speed **Read sequentially from Gbit network**	**100 MB/s**

Speed **Read sequentially** **from SSD**	**1 GB/s**
Speed **Read sequentially** **from memory**	**4 GB/s**
Speed **World-wide round trips** **per second?**	**6-7 world-wide round trips** **per second**
Speed **Round trips within** **same data center** **per second?**	**2,000 round trips within** **same data center** **per second**