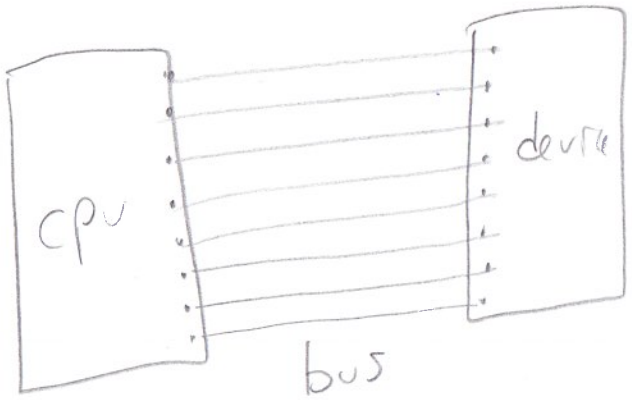
2721

Pins: a contact point/connector for I/O which connects via a bus to another, corresponding, pin on another device.



Pinout: what the signals on the pins mean.

Devices talk to one another using only their pins.
ie pins are the interface.

Types of pins: ctrl
address
data

eg cpu wants to read some data from some memory cell.

---

m address pins means we can address 2^m cells. (memory locations)

n data pins means we can work with n-bit words per operation.

cpu control pins: - bus-control pins
- interrupt-control pins: From device to cpu
  eg finished/ready/error
- coprocessor signals.

bus master: actively initiates bus transfers

slave: responds to requests eg MM

Addressing: CPU, Cache, main memory

- Every main-memory cell has an address
- Each cell is the same size
- eg One byte inside each cell
- A word is usually 32 bits (4 Bytes) or 64 bits (8 B)

b = bit
B = byte

Consider 32-bit MM address ← address space is 32 bits

Q | How much MM is there?

A | e.g. 1-Byte cell size ← Memory space is 2^{32} B

$= 4$ GB

Q) 1 GB total main memory
8 Bytes/cell. (each cell contains 8 B)
How many bits make up the address?

A) $2^{30}\frac{B}{mem} \div 2^{3}\frac{B}{cell} = 2^{27}\frac{cell}{mem}$ ∴ 2^{27} addresses

logarithm = exponent

$\log_2 2^{27} = 27$

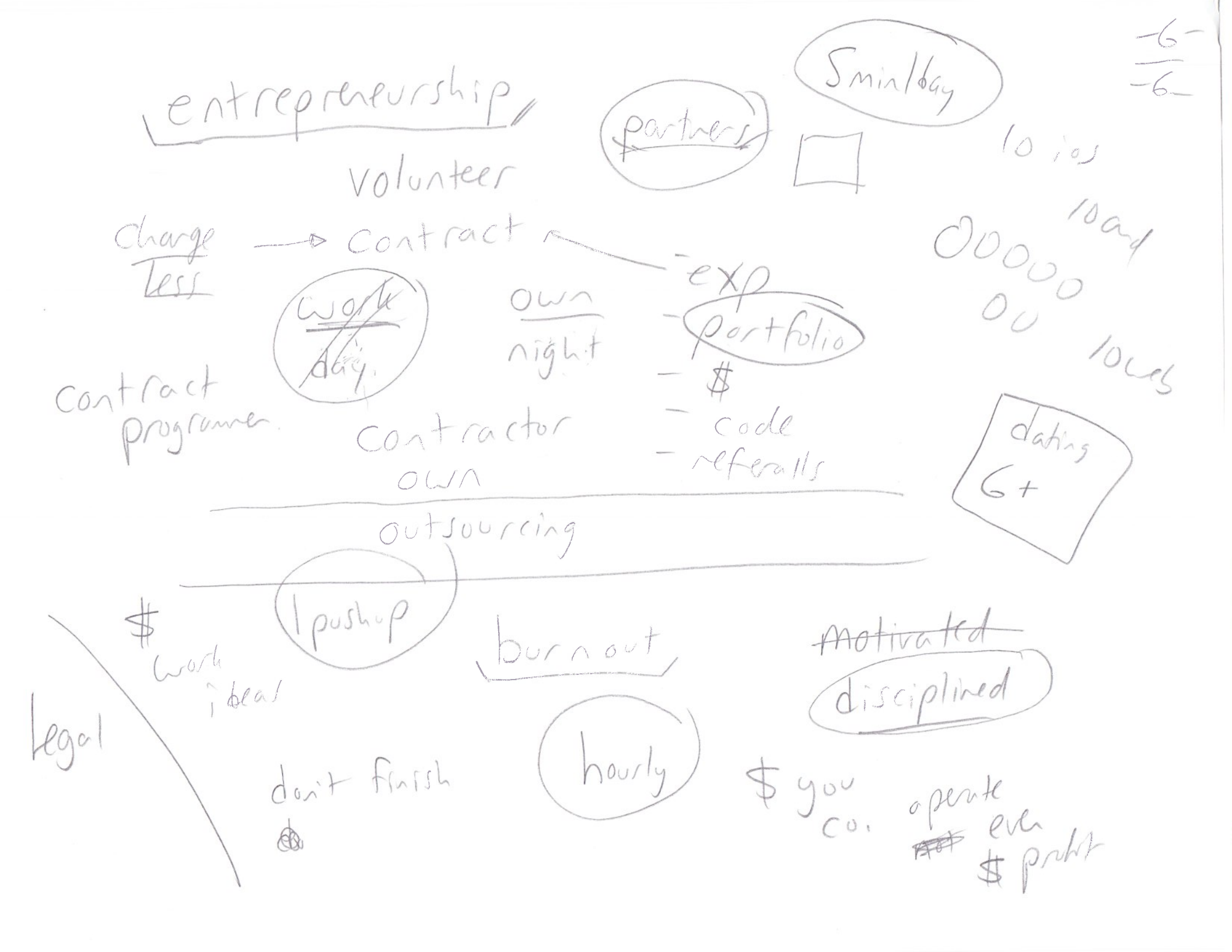
27-bit address

Typical quiz scores:

25 students = 25 different answers ①

= 10 different ②

= 1 answer


entrepreneurship
volunteer
partners
5min/day
charge less
contract
exp
portfolio
- $
- code
- referalls
own night
work day
contract programmer
contractor
own
outsourcing
dating
6+
pushup
burnout
motivated
disciplined
$
work
ideal
legal
don't finish
hourly
$ you
co.
operate
even
$ profit