Thank you for sending a copy of flight-crew created gravity for space station. You have raised a number of fundamental questions, some of which will require additional study. You raised one question which does not require further study for the ~~data~~ knowledge exists and should be well known to workers in this field, however this question is frequently raised.

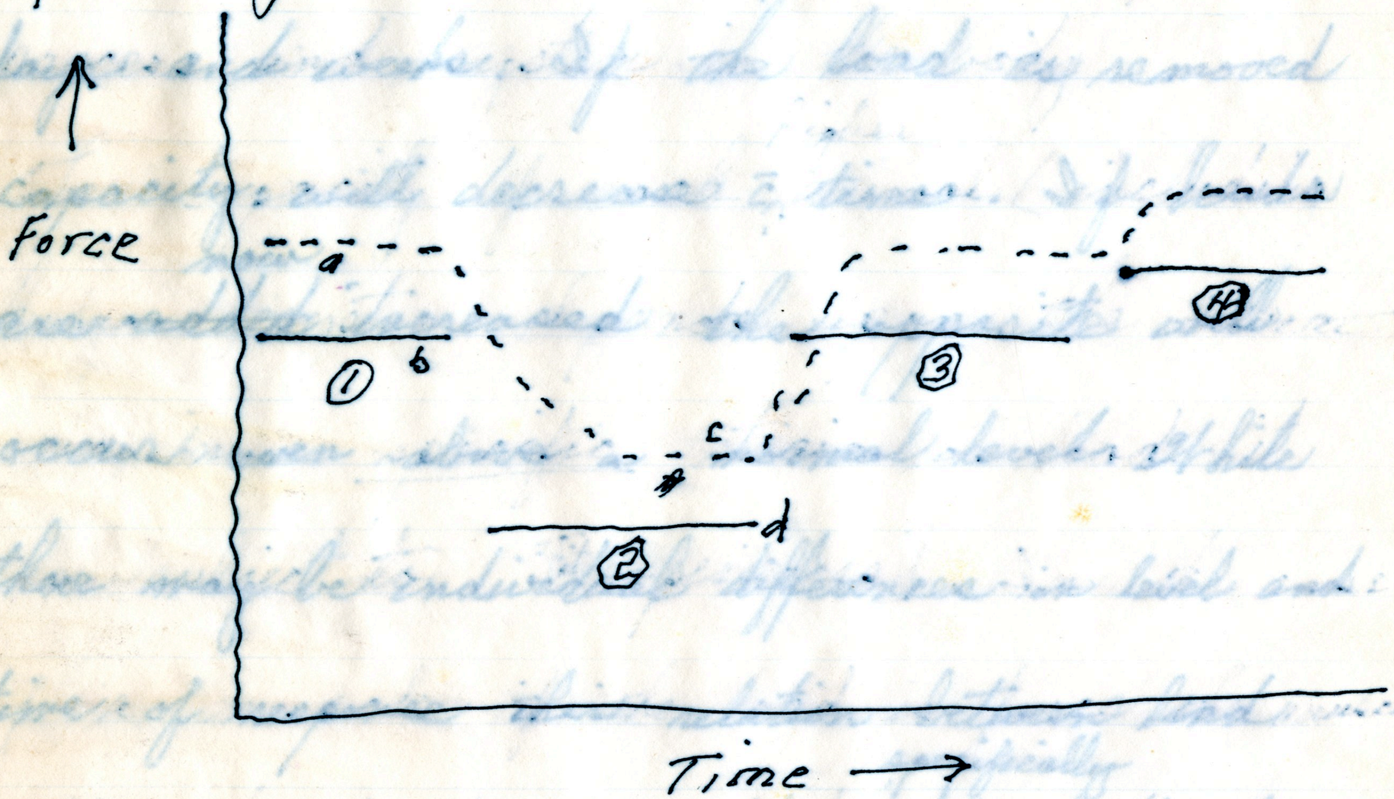
What level of gravity is required to maintain condition for safe return to 1 g?

A. This can be answered by an understanding of the basic adaptation process

which appears to be the same for every process and system in the body.

The capacity of each higher ?animal (including human) system depends upon the ~~exact~~ maximum specific strain or load it is subject to [? experiences]. In the case of a muscle if the load is force the muscle fibres change ~~to~~ appropriately to meet the load whether it be increase or decrease. One of the changes is an increase in fibre size such that the strength (force capacity) of a muscle is proportional to muscle size. This change does not occur in some hap-hazard fashion but is very reproducible and can be shown

graphically in Fig. 1.



If an individual ~~can~~ usually works or exercises a given muscle at some force level①, say a biceps which regularly does ~~②~~ curls against ~~③~~ weight level b, then the muscle has a somewhat larger capacity, ~~to~~ ⓐ a safety factor if you will, ~~to generate~~ to lift weights. If now the usual maximum weight load is decreased ② d the muscle's force capacity (strength)

is decreased ~~as~~ as an exponential function of time in days and weeks. If the load is removed capacity will decrease ~~a~~ time. If loads are ~~added~~ now increased the opposite will occur even above a normal level. While there may be individual differences in level and time of response this relation between load and capacity is universal. It specifically extends to the ~~majority~~ virtually all of the body's systems & organs; bone, heart, whatever.

The first and crucial point is that the body's ~~system~~ given time will adapt to the various capacities force level it experiences. If one expects ~~full function of~~ normal 1 g. capacity on return to Earth after a long flight,

~~then~~ the individual will have to do equivalent work and exercise under 1 g. loads in space. If one exercises under 1/6 G at usual loads the body will be adapted for the moon. Conversely in 1/6 G is available than weights could be added to make 1 g. equivalent loads).

~~Since the next is that~~ This ~~simp~~ fundamental relation between load and capacity was nicely demonstrated on the Skylab missions. Fig 2. Skylab II had only a cycle ergometer for exercise.

Values shown are means values of crewmen with percent loss of flexor and extensor strength also average.