

- 1.) If a cathedral is 1000 ft. long, 100 ft wide and 175 ft. high in terms of enclosed internal volume, what is the reverberation time? (Make an assumption about the absorptivity of stone.)

Assume stone is equal to rough concrete, or 0.05 sabins.

$$T = 0.05 V / A = 0.05 (1000 \times 100 \times 175) / [2(1000 \times 100 + 175 \times 100 + 175 \times 1000) 0.05] =$$

$$0.05 (17,500,000) / [2(100,000 + 17,500 + 175,000) 0.05] =$$

$$875000 / [2 (292,500) 0.05] = 875,000 / 29,250 = 29.9 \text{ seconds}$$

- 2.) Is that like a room, or is it so large that it is like an open field?

It is still like a room, because it is so reflective.

- 3.) In an office with an eight foot high ceiling and an open office plan (nothing separating work stations except 5' high partitions) what would be the difference between using an acoustical tile ceiling and a plaster ceiling? For example, would private conversations be encouraged?

With a plaster ceiling, you could hear everyone else's conversations. Even with acoustic tile, you might add white noise (or similar) if privacy were important.

- 4.) Given a room with a reverberation time of 3 seconds, would lectures be appropriate? Would singing be encouraged? What kind of singing would work best? Would it make much difference what language was sung? Would a large musical instrument sound good? What kind of instrument, one suited to short sharp notes or one suited to long imposing ones?

The reverberation time is too long for lectures, and most appropriate for slow singing. Language would make only small differences. A large musical instrument would sound good only if played slowly.

- 5.) What are the arenas in the modern world like in comparison? What are the absorptivities of the seats and rear walls like? Is that good or bad?

Some modern arenas tend to use absorptive seating, which is good. Arenas with plastic seating are not so good. They are very reverberant.

- 6.) What are cars like in comparison? What is the background noise like? What is the absorptivity like? Given electronic amplification, what kind of music would sound best in a moving car, music with a lot of bass or music with a lot of high frequency sound?

Would loud or soft music be best? Would music with a strongly discernable beat or subtle music be easiest to follow?

Cars interiors are fairly absorptive because of the seats and the carpet and even the people's clothing. Electronic amplification could boost bass and add reverberation. The absorption would also reduce high frequency sounds, although they would be distinct. Music with a strong beat and a lot of bass would probably work best in overcoming background noise.

- 7.) Given that a room will rely heavily on electronic amplification, what should be the strategy for the design of the space?

Make it a highly absorptive space, and add the bass and the reverberation back in artificially, when needed.