from data TO DECISION

Critical Thinking: Designing aircraft seats

When designing seats for aircraft, we want to have sufficient room so that passengers are comfortable and safe, but we don't want too much room, because fewer seats could be installed and profits would drop. It has been estimated that removing one row of seats would cost around $8 million over the life of an aircraft.

Figure 6-22(a) shows an important human consideration: The buttock-to-knee length. The accompanying table includes relevant buttock-to-knee length parameters obtained from studies of large numbers of people. Figure 6-22(b) shows a traditional aircraft seat, and Figure 6-22(c) shows the new SkyRider seat design by the Italian company Aviointeriors. The SkyRider seat is dramatically different from traditional aircraft seats. The seats are like saddles, and they are higher so that passenger legs slant downward with weight on the legs. The most dramatic difference is that SkyRider seats have much less legroom. The distance of 23 in. shown in Figure 6-22(c) is a distance of 30 in. to 32 in. for most current economy seats. As of this writing, the SkyRider seats have not yet been approved by the Federal Aviation Administration, but approval would allow a new class of seating with very low fares.

When designing aircraft seats, we must make some hard choices. If we are to accommodate *everyone* in the population, we will have a sitting distance that is so costly in terms of reduced seating that it might not be economically feasible. Some questions we must address are: (1) What percentage of the population are we willing to exclude? (2) How much extra room do we want to provide for passenger comfort and safety?

1. A common design criterion is to accommodate people falling between the 5th percentile and the 95th percentile. Find those values for the buttock-to-knee lengths of men and women.

2. Of the four values found in Exercise 1, which single value is most important? Explain.

3. Why do the values found in Exercise 1 not apply to the SkyRider seat?

4. Apart from the drastically reduced leg room, identify at least one other disadvantage of the SkyRider seat.

5. Seat pitch is defined to be the distance between the same point on two successive seats. In addition to buttock-to-knee length, what other important factor affects the choice of seat pitch?

6. Based on the preceding results, what would you tell an engineer who is designing and configuring seats for an aircraft?

Buttock-to-Knee Length (inches)

	Mean	St. Dev.	Distribution
Males	23.5 in.	1.1 in.	Normal
Females	22.7 in.	1.0 in.	Normal

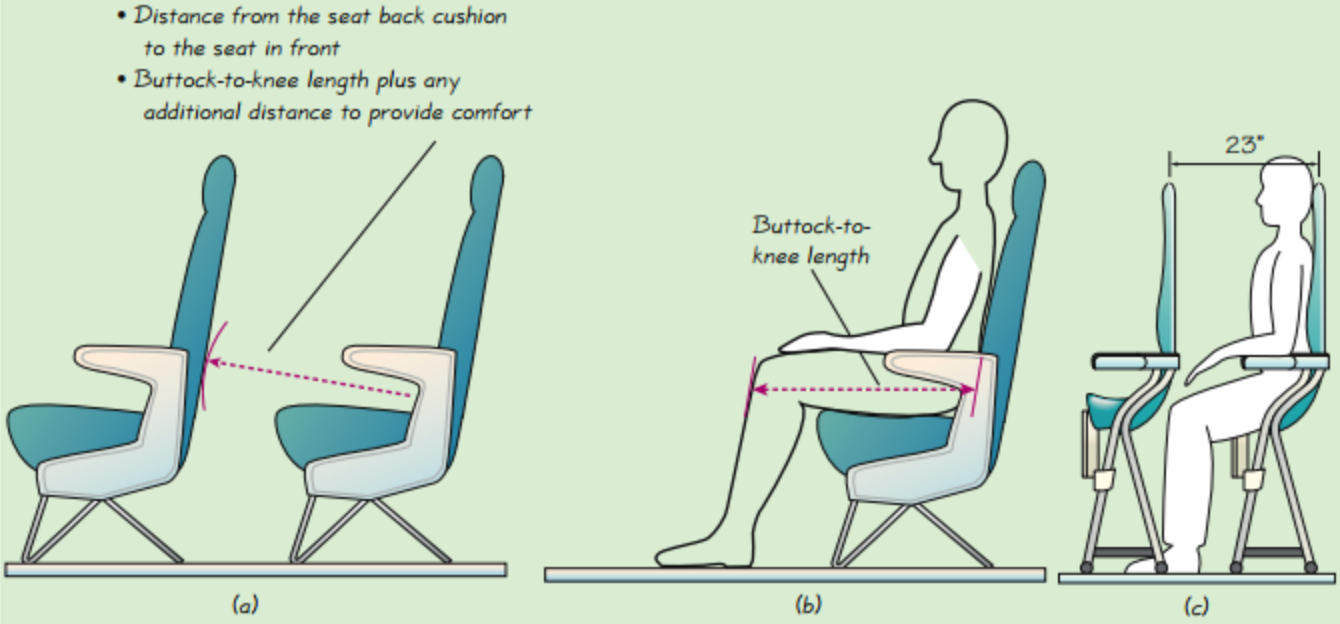

Figure 6-22 **Distances Used in the Design of Aircraft Seats**