Some answers

Chapter 2,

Q3: 16.8 dB

Canvas exercises:

2: I=95 mW/cm^2, u_0=36 mm/s, z(t)=0.6 nm

3: 7.5 mm

4: 134 μs

7: 6.3 kPa, 13.2 W/m^2

20a SONAR

Both instruments provide an image of the amplitude of the reflection from a certain surface on the seabed, the so-called reflectivity. This varies with angle, distance, etc., but this can be compensated to a certain extent. Remaining variations depend on e.g. the nature of the bottom material, slope, etc. and shadows in the image often provide information about objects and their shape.

A modern side-looking sonar uses a passive group oscillator which provides a 'fan-shaped' lobe typically 60° vertically and 0.5-1° horizontally. Reflections are obtained from the part of the bottom insonified by the lobe, and are separated by arrival times. The data thus consists of amplitude versus time.

20b

If we disregard the properties of the medium, there are two parameters: Partly equipment-related, e.g. resolution in time (range resolution) and lobe width in horizontal direction, partly the characteristics of the target ("cross section"). This means that a strong reflector can be relatively small and still be detected.

20c

With SAS, a synthetic receiver group is created that contains significantly more elements than the physical oscillator. This means that the lobe width in the horizontal direction decreases, and the resolution thereby increases.