Aortic Valve Leaflets
With the onset of ventricular ejection, the aortic leaflets snap open with the right coronary cusp moving anteriorly and the non-coronary cusp moving posteriorly. Both leaflets remain separated throughout the ejection period and lie parallel to the anterior and posterior aortic walls. Fine systolic fluttering of the aortic leaflets may be seen in the normal individual. With the onset of diastole, the leaflets close abruptly and coapt in the centre of the aortic root producing a single linear echo. Throughout the remainder of diastole the leaflets remain closed together following the posterior motion of the aortic root. This diastolic and systolic motion of the aortic leaflets forms a characteristic “box-shape” within the aortic root; importantly this ‘box’ is not always seen on every trace. From the Q wave of the electrocardiogram (ECG) to the onset of ventricular ejection (opening of the aortic “box”) is a period known as the pre-ejection period or the isovolumic contraction time.

Left Atrium
The LA lies directly posterior to the aorta. Although the anterior LA wall and the posterior wall of the aortic root are anatomically separate structures, their close proximity and spatial resolution limitations of the ultrasound machine result in the production a single echo. Therefore, the anterior LA wall follows the same phasic motion as that of the posterior aortic wall throughout the cardiac cycle. The posterior LA wall displays minimal motion and so remains relatively “flat” during the cardiac cycle. The specific phases of LA emptying may be appreciated by close observation of the anterior LA wall/posterior aortic root motion.

M-Mode Examination of the Mitral Valve
The M-mode examination of the mitral valve with respect to the cursor position, structures interrogated and the normal motion of these structures is displayed in Figure 4.2. Table 4.3 at the end of this chapter lists the abnormalities that may be detected from this M-mode examination.

Imaging Plane and Position of M-mode Cursor
The mitral valve can be examined from the PLAX view of the LV and from the PSAX view at the level of the mitral valve. From these views, the cursor is directed through the tips of the mitral valve leaflets.

Structures transected by the M-mode Cursor
From anterior to posterior, the ultrasound beam passes through the anterior chest wall, the anterior wall of the RV, the RVOT, the interventricular septum (IVS), the anterior and posterior leaflets of the mitral valve, and the posterior wall of the LV.

Normal Motion of the Mitral Valve during the Cardiac Cycle
As previously mentioned, motion of the mitral valve throughout the cardiac cycle is not as simple as that of the aortic valve (recall Fig. 2.7 in Chapter 2). During diastole, the mitral leaflets separate widely with the anterior leaflet approaching the IVS and the posterior leaflet moving toward the posterior wall of the LV. When the patient is in normal sinus rhythm, both leaflets separate widely with the anterior leaflet approaching the IVS and the posterior leaflet moving toward the posterior wall of the LV. When the patient is in normal sinus rhythm, both leaflets separate widely with the anterior leaflet approaching the IVS and the posterior leaflet moving toward the posterior wall of the LV.

M-Mode Examination of the Left Ventricle
The M-mode examination of the LV with respect to the cursor position, structures interrogated and the normal motion of these structures is displayed in Figures 4.3. Table 4.3 at the end of this chapter lists the abnormalities that may be detected.

Imaging Plane and Position of M-mode Cursor
From anterior to posterior, the ultrasound beam transects the anterior IVS, the LV cavity, the basal posterior (inferolateral) wall of the LV, the basal anterior wall, the anterior chest wall, the anterior wall of the RV, the RVOT, the basal IVS, the LV cavity, the basal posterior (inferolateral) wall of the LV, and the pericardium. The posterior epicardio-visceral pericardial interface is identified by its much brighter echo appearance. Recognition of this interface is particularly important when measuring the posterior LV wall thickness.