Band	Center Wavelength (nm)	Bandwidth (nm)
1	482	450-515
2	565	525-605
3	660	630-690
4	825	750-900
5	1,650	1550-1750
6	11,450	10400-12500
7	2,220	2090-2350
Pan	710	520-900

Band 6 resolution = 60 meters
Panchromatic Band = 15 meters.

The Landsat satellite is in an orbit that parallels lines of longitude so that its imaging system scans Earth's surface at a resolution of 30-meters per pixel. Each spot on the ground is also imaged in seven different filters or 'spectral bands' shown in the table to the left. This way, when the images are created from the data, the seven separate images can be combined to thematically classify every pixel in terms of its spectral composition: rock, soil, water, forest, grass, etc. Each of these substances has a distinct spectral fingerprint determined by the amount of light that it reflects in each of the seven bands.

Creating a small atlas of standard substance spectra:

Problem 1 – A pixel covers a spot in the middle of San Francisco Bay and an on-the-spot study confirms that it coincided with pure ocean water. The pixel intensities in Bands 1-7 are given by the ordered set (86,62,47,15, 14,113,15). On a linear scale, graph the spectrum of this 'water' calibration over the band domain and data range X:[1,7] on the X-axis and Y:[0,255] on the Y-axis.

Problem 2 – A pixel covers a spot in the middle of downtown Oakland and an on-the-spot study confirms that it coincided with modern office buildings. The pixel intensities in Bands 1-7 are given by the ordered set (155,140,150,74,123,140,115). On a linear scale, graph the spectrum of this 'building' calibration over the band domain and data range X:[1,7] and Y:[0,255].

Problem 3 – A pixel covers a spot in the middle of Redwood Forest and an on-the-spot study confirms that it coincided with conifer trees. The pixel intensities in Bands 1-7 are given by the ordered set (75,63,45,100,83,130,40). On a linear scale, graph the spectrum of this 'tree' calibration over the band domain and data range X:[1,7] and Y:[0,255].

Problem 4 – A pixel covers a spot on Alcatraz Island and an on-the-spot study confirms that it coincided with pure rock. The pixel intensities in Bands 1-7 are given by the ordered set (175,150,155,110,140,120,120). On a linear scale, graph the spectrum of this 'rock' calibration over the band domain and data range X:[1,7] and Y:[0,255].

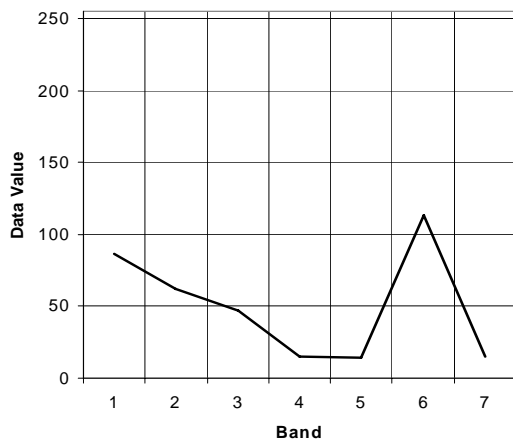**Problem 1** – water: (86,62,47,15, 14,113,15).

Problem 2 – buildings: (155,140,150,74,123,140,115).

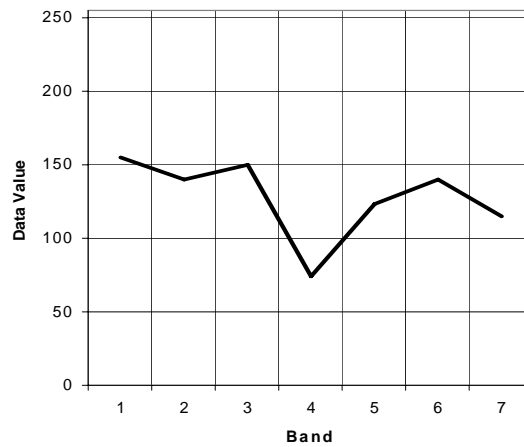**Problem 3** – trees: (75,63,45,100,83,130,40).

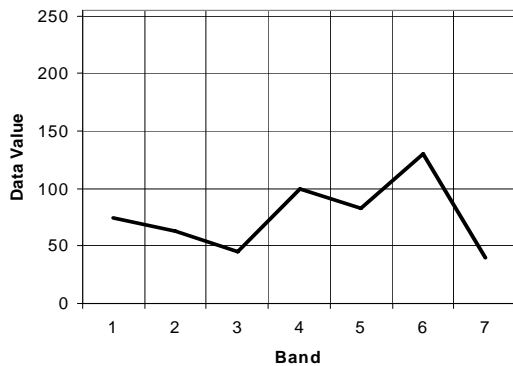**Problem 4** – rock: (175,150,155,110,140,120,120).

Graphs:

Water

Building

Trees

Rock