6.4

Why was Bohr's model ineffective?	Bits of matter, such as electrons behave as waves.
Who first proposed the wave model?	Louis de Broglie.
de Broglie's wave equation is $\lambda = h/mv,$; name the variables	$\lambda = h/mv$, λ = wavelength of matter, h = plank's constant, m = mass, v = velocity
Use de Broglie's wave equation to explain why large objects do not seem like waves	The huge m means a very small wavelength.
How can the wave properties of light be shown?	Through a diffraction experiment. (showing destructive and constructive interference) (as in fig. 6.16)
Give an example showing that matter has wave properties.	The existence of electron microscopy.

6.5

What name has been given to the current theory of electronic structure?	Wave or Quantum mechanics (because it is based on a wave model of matter that predicts quantized energy levels).
What two kinds of waves exist?	Standing and traveling.
Give an example of a standing wave.	Guitar string, electron.
What are the different parts of a wave?	The part that oscillates between crest and trough and nodes (fixed).
What is the restriction placed on the wavelength of standing waves?	The only waves that can occur are those for which a half wavelength can be repeated exactly a whole number of times.
> Express this restriction as an equation.	$L = n (\lambda/2)$
Define orbital	The waveform of an atom, with a characteristic energy.
How can energy changes within an atom be explained?	An electron changing its wave form/pattern.
Which two properties of orbitals are of interest?	Their energies and their shapes.
According to what are electron waves characterized?	By three integer quantum numbers, n, l, m_l
Give the names for the quantum number symbols.	n - principle quantum number, l - secondary quantum number, m_l - magnetic quantum number
What is another word for n	Shell
Summarize n, l, m_l with respect to equation, possible values, alternate names and resulting number of orbitals	See worksheet below.
What useful information does n give us?	It tells us the size of the electron wave (distance from nucleus) and the energy of the orbital (the higher n, the higher the energy).
Using the concept of n, why did Bohr's theory only work for hydrogen?	Only for hydrogen do all the orbitals that have the same value for n, have the same energies.
Within a shell what is the energy of subshells from low to high?	s, p, d, f, g, h, etc.
Figure 6.19 summarizes the information in section 6.5. What are the important ideas to take from this diagram …	
>With respect to how orbitals are represented?	With a circle.
>With respect to energy of orbitals with a subshell?	All orbitals in a subshell are of the same energy.
>With respect to energy levels of the subshells between shells?	As we go up the energy scale, the spacing between shells decreases, eventually leading to the overlap of some of shells.

	n (shell)	l	l (subshell name)	m_l	Number of values for m_l	# of orbitals	n^2	# of electrons
Equation	$n = 1$ to $n = $ inf.	$l = 0$ to $l = n$-1		$-l$ to l		$= m_l$	n^2	= # of orbitals x2
Possible values	1							
	2							
	3	0	3s	0	1	1		2
		1	3p	-1,0,1	3	3		6
		2	3d	-2,-1,0,1,2	5	5	9	10
	4							
	5							

	n	l	l (subshell name)	m_l	Number of values for m_l	# of orbitals	n^2	# of electrons
Equation	n = 1 to n = inf.	l = 0 to l = n-1		-l to l		= m_l	n^2	= # of orbitals x2
Possible values	1	0	1s	0 (same as -0)	1	1	1	2
	2	0	2s	0	1	1		2
		1	2p	-1,0,1	3	3	4	6
	3	0	3s	0	1	1		2
		1	3p	-1,0,1	3	3		6
		2	3d	-2,-1,0,1,2	5	5	9	10
	4	0	4s	0	1	1		2
		1	4p	-1,0,1	3	3		6
		2	4d	-2,-1,0,1,2	5	5		10
		3	4f	-3,-2,-1,0,1,2,3	7	7	16	14
	5	0	5s	0	1	1		2
		1	5p	-1,0,1	3	3		6
		2	5d	-2,-1,0,1,2	5	5		10
		3	5f	-3,-2,-1,0,1,2,3	7	7		14
		4	5g	-4,-2,-1,0,1,2,3,4	9	9	25	18