

Orbital Worksheet

Learning Objectives

Be able to:

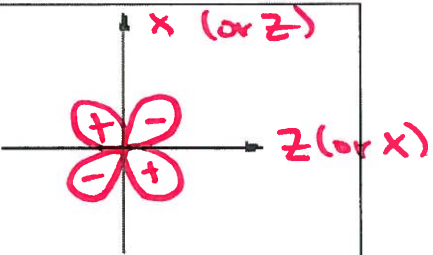
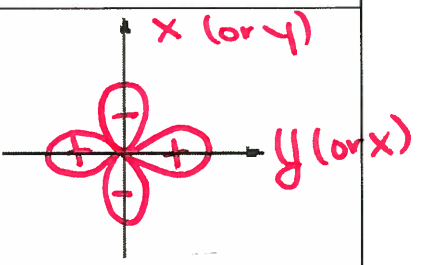
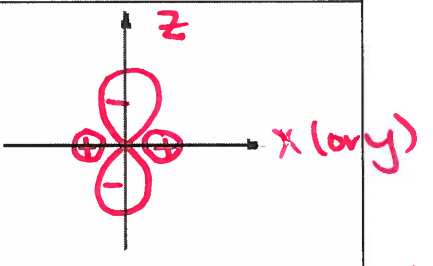
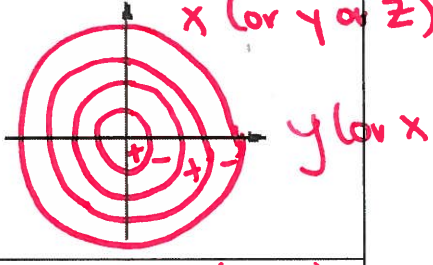
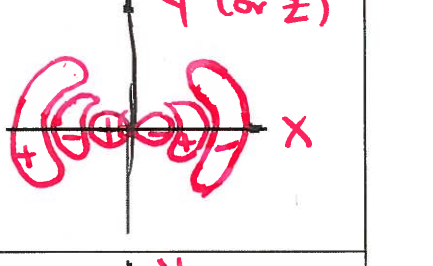
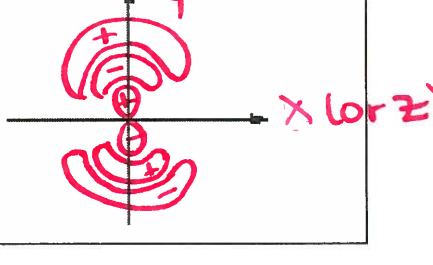
- Draw and label the cross sections of orbitals on a Cartesian coordinate system
- Match the orbital name with quantum numbers n , l , m_l
- Determine the number of radial nodes and angular nodes for every orbital
 - The number of angular nodes = l
 - The number of radial nodes = $n - l - 1$

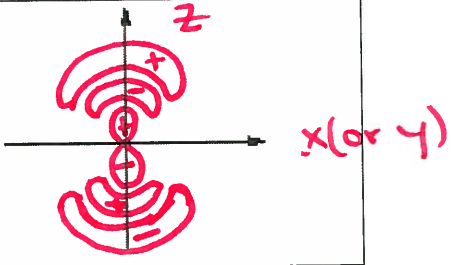
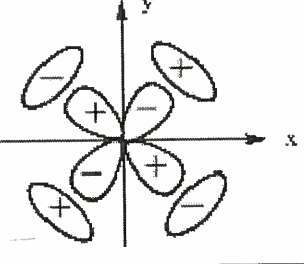
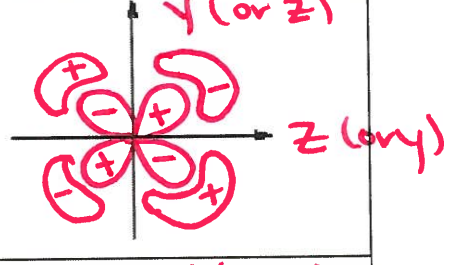
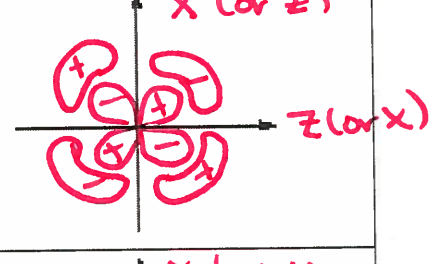
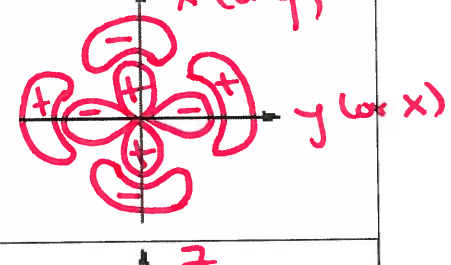
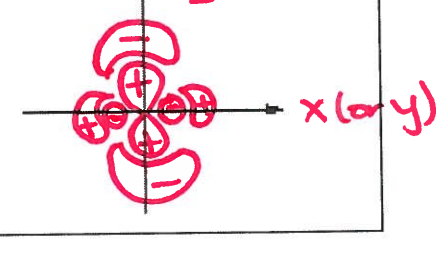
You may use the following web site to help you complete the table:

<http://winter.group.shef.ac.uk/orbitron/>

Orbital	Quantum numbers			Nodes		Cross sectional diagram (label the axes appropriately)
	n	l	m_l	# radial nodes	# angular nodes	
1s	1	0	0	0	0	
2s	2	0	0	1	0	
2p _x	2	1	-1, 0, 1	0	1	
2p _y	2	1	-1, 0, 1	0	1	
2p _z	2	1	-1, 0, 1	0	1	

3s	3	0	0	2	0	
3p _x	3	1	-1, 0, +1	1	1	
3p _y	3	1		1	1	
3p _z	3	1		1	1	
3d _{xy}	3	2	-2, -1, 0, +1, +2	0	2	
3d _{yz}	3	2		0	2	

$3d_{xz}$	3	2	see previous page	0	2	
$3d_{x^2-y^2}$	3	2		0	2	
$3d_{z^2}$	3	2		0	2	
$4s$	4	0	0	3	0	
$4p_x$	4	1	-1, 0, +1	2	1	
$4p_y$	4	1		2	1	

$4p_z$	4	1	see previous page	2	1	
$4d_{xy}$	4	2	-2, -1, 0, +1, +2	1	2	
$4d_{yz}$	4	2		1	2	
$4d_{xz}$	4	2		1	2	
$4d_{x^2-y^2}$	4	2		1	2	
$4d_z^2$	4	2		1	2	

You can keep going if you want to!