Mental Ray

Global Illumination

takes one lightsource and bounces photons all over scene (more physically accurate)
select a light, check off 'emit photons' (under mental ray tab)
set exponent to 1 (decay rate of photons: lower value = brighter image)
render globals>mental ray tab>global illumination checkbox
color bleeds onto other surfaces because photons are bouncing off them
global illum radius: increasing this acts like a blurring effect for final result (set in render globals)
diffuse: higher value will emit brighter photons (set on material)

Final Gather

calculates illumination in scene with scene's irradience (total brightness)
dont need lights to light scene (objects emit light)
create a light and set its intensity to zero (turns off maya's default light if you insert one)
give objects you want to emit lots of light incandesence and irradiance
turn on final gather checkbox in renderglobals
adjust camera's background color to brighten image:
    view>select camera (make sure attribute editor is open), environment tab, background color
render globals
    final gather rays: higher number = smoother image but higher render time
    min radius: 10% of max radius
    max radius: 10% of scene dimensions
one technique: create a dome above scene and give it a material with irradiance
to get colors to bleed:
    create a light, uncheck: illuminate by default, check: emit photons
    shine light on surface to bounce its color around

HDRI Rendering

high dynamic range images (.hdr extension)
get files from HDRShop website
create a dome above scene (create a polygon sphere and delete faces on bottom half)
plug in hdr image into ambient color charactertic on dome's material
give an object a blinn shader
render globals
    check: final gather
    adjust rays/min/max for speed and quality
to brighten image: raise 'value' ("V" in color selector pop-up) on color gain attribute (set on dome's material)
can turn off visability of dome in render if you dont want it in background
blurring reflections: select material, open mental ray tab, raise reflection blur setting
    may need to incread min/max sample levels in render globals and set filter to gaussian

Contour Shading

create new ramp shader
- give it multiple colors
- change color input to: brightness
- reflectivity tab: set 'selected value' to zero

select material, click 'show output connections' button, contours tab"
- check: enable contour rendering
- set color and thickness (width) of contour here

render globals
- contours tab, check: enable contour rendering
- play with check boxes in 'by property difference' tab
- 'by sample contrast' tab
  - enable normal contrast: will draw contour lines whenever normals change
  - enable uv contours: bump op values for more contours
- to smooth out contour lines: quality tab
  - filter type: box filter is the fastest
  - over sample: set to 3 to smooth lines
- to get just the wireframe: general tab, check: hide source

Caustics

glass material
- blinn, high transparency, low eccentricity, high specular roll off, dark specular color
- raytrace options tab>check refractions
  - refractive index: 1.3
- photon attributes tab
  - uncheck: derive from maya, click 'take settings: from maya" button, diffuse=0
- raytracing tab (render globals): bump up reflections/refractions/max trace depth/shadow trace depth

liquid
- blinn, half transparency, low eccentricity, high specular roll off, dark specular color
- turn on refractions
- photon attributes tab,uncheck: derive from maya,click 'take settings: from maya" button
  - set diffuse to zero, uncheck: absorbs

light
- must emit photons and turn on caustics in render globals
- if you want shadows: go to shadows tab, turn on use raytrace shadows

Mental Ray Custom Shaders

dielectric materials

select material, click 'show output connections' button, custom shaders tab
- material shader: plug in 'dielectric_material', choose color (col), index of refraction (ior) = 1.3
- photon shader: plug in 'dielectric_material_photon', choose color that you want to bleed, ior = 1.3

add materials to glass and liquid

bump up caustic photons settings in light

render globals: set quality to production, bump up caustic radius and caustic accuracy

Subsurface Scattering

scatters light throughout a material (skin, wax)
custom node on a light
create a light, custom shaders tab, plug in physical_light to 'light shader' attribute
physical_light: set cone to 1, drop down V in color attribute (very high by default)
for scattering, the light must emit photons: check 'emit photons' on light (caustics and global illumination tab)
play with exponent for brightness
turn on caustics in render globals
object's material:
increase transparency to around 90% (almost clear), turn on refractions
click 'show output connections' button on material
volume shader: plug in parti_volume
pick scatter color, extinction=1, min_step_len=.02, max_step_len=.2
phot volume shader: plug in parti_volume_photon
lighten scatter a bit, extinction=1, min_step_len=.02, max_step_len=.2
crank up refraction blur (set on material, mental ray tab)

Baking

time saver when rendering lots of frames
only use for non-animated objects
lighting/shading>batch bake (mental ray)
only bake selected (baking everything would take too long)
color mode: texture
check: bake shadows
check: use face normals
normal direction: surface front
check: use bake set override (if textures are not high quality enough)
x resolution: 1024
y resolution: 1024
file format: jpg
will create a texture that renders much quicker successively (can be rendered in maya software now too)
if texture is not placed correctly, create a new place2dtexture node and attatch it