1. Why are visual fields performed?
   (a) It is the only clinical test that measures peripheral visual function.
   (b) Visual fields improve detection of disease (many ocular and neurologic deficits affect peripheral vision before the fovea or macula is involved.
   (c) Visual fields provide useful differential diagnostic information – the pattern and location of visual loss is specific to damage at particular locations along the visual pathways, unlike visual acuity loss, which is not very specific.
   (d) Many people are unaware of peripheral vision loss, particularly if it is gradual, and even if it affects their ability to perform daily tasks such as navigation, etc.

2. A cookbook for visual field evaluation
   (a) Place the left eye visual field on the left and the right eye visual field on the right.
   (b) For each eye, is the visual field normal or abnormal? (If normal in both eyes, you’re done)
   (c) If abnormal, is it one eye or both eyes?
   (d) If in one eye, it’s retina or optic nerve.
   (e) Where is the defect? (sup, inf, nasal, temporal)
      (1) Nasal or binasal – glaucoma, optic nerve or retina
      (2) Bi temporal – chiasm
      (3) Nasal in one eye, temporal in the other – postchiasm
   (f) What is the shape (features) of the defect?
      (1) Respect the vertical, respect the horizontal, point to the blind spot, point to fixation, etc.
   (g) How do the two eyes compare? (homonymous, congruous)
   (h) Where is the most likely location of the deficit?

3. Key features to remember
   (a) Respect the horizontal - Glaucoma, optic nerve, retina
   (b) Respect the vertical - Chiasm, post-chiasm
   (c) Point to the blind spot - Optic nerve, glaucoma
   (d) Point to fixation - Chiasm, post-chiasm
   (e) Bitemporal – Chiasm
   (f) Homonymous - Post-chiasm - The greater the congruity between eyes, the farther back in the optic radiations.
   (g) Central - Retina, optic nerve
4. Types of visual field testing

(a) Kinetic Perimetry
   (1) Tangent Screen
   (2) Goldmann Perimetry
   (3) Octopus 900 Perimeter (semi-automated kinetic perimetry)
   (4) Advantages and disadvantages of kinetic perimetry

(b) Static Perimetry
   (1) Goldmann Perimeter (manual)
   (2) Humphrey Field Analyzer (automated)
   (3) Octopus 900 (automated)
   (4) Other automated perimeters
   (5) Advantages and disadvantages of static perimetry

(c) Suprathreshold Static Perimetry
   (1) Mainly used for rapid screening
   (2) There are many different procedures (some take as long as threshold testing)
   (3) Little formal research has been conducted in this area
   (4) Advantages and disadvantages of suprathreshold static perimetry

5. Test strategies

(a) Ascending method of limits
(b) Full Threshold (staircase)
(c) SITA (Swedish Interactive Threshold Algorithm) – Bayesian strategy
(d) Armany-Drance procedure (suprathreshold static perimetry)

6. Stimulus presentation pattern and target size are important (examples)

(a) Comparison of Full Threshold and SITA
(b) Size III, Size V and Full visual field evaluation in an RP patient
(c)

7. The printout for static perimetry

(a) Demographic information
(b) Patient information (age, pupil size, visual acuity etc.)
(c) Reliability indices (fixation losses, false positives, false negatives)
(d) Numerical sensitivity values
(e) Gray scale graphical presentation
(f) Summary Statistics (Mean Deviation [MD], Pattern Standard Deviation [PSD], Glaucoma Hemifield Test [GHT])
(h) Total Deviation Plot
(i) Pattern Deviation Plot
(j) Gaze Tracking

8. Artifactual Test results
9. Types of deficits associated with pathology to various portions of the visual pathways (refer to the cookbook and key features)

(a) Optical factors (cataract, corneal abnormalities)
   (1) Usually diffuse or widespread losses

(b) Retinal Disease
   (1) Ring Scotomas (retinitis pigmentosa), arcuate defects (branch artery occlusion), central and centrocecal (between the blind spot and fixation – candle flame shaped) irregular (scalloped) edges to deficits.

(c) Glaucoma
   (1) Nasal steps, paracentral defects, arcuate scotomas, temporal wedges, fan-shaped defect that points to the blind spot.

(d) Other optic neuropathies (AION, optic neuritis, optic atrophy, idiopathic intracranial hypertension, etc)
   (1) Central scotomas, centrocecal scotomas, altitudinal defects, nasal depression, enlarged blind spot.

(e) Chiasmal lesions (pituitary adenoma, pituitary apoplexy) – Bitemporal defects.
    Defects point to fixation and vertical meridian is respected.

(f) Lateral geniculter lesions – Are very rare. Deficits appear as a tongue shape along the horizontal meridian or the tongue is the only remaining visual field.

(g) Post-chiasmal defects (temporal lobe, parietal lobe, occipital lobe deficits) The vertical meridian is respected
   (1) Temporal Lobe – Defects are “pie in the sky” deficits and are incongruous between eyes and point to fixation.
   (2) Parietal lobe - Defects are “pie on the floor” are more congruous between eyes and point to fixation.
   (3) Occipital lobe - Cookie cutter punched out lesions that are highly congruous between eyes and point to fixation.

10. Remember the key features and the cookbook when making an evaluation. Don’t skip steps.

11. Visual Field Progression
    (a) Use all of the visual field information (don’t just compare the current results with the previous one – you will make many incorrect judgments.
    (b) When in doubt do a repeat test (to confirm a suspected change) or assess with other clinical information (history, other medical conditions, optic disc and retina appearance, etc).
Method of determining visual field progression

(1) Clinical judgment – Highly variable among practitioners, and there is a tendency to overcall change
(2) Classification system - AGIS, CIGTS, etc. – Simple methods that use a 20 point scale. Does a difference from 8 to 10 mean the same thing as one from 4 to 6?
(3) Event analysis - Change from baseline (Glaucoma Progression Analysis). Can detect change quite rapidly, but ignores data between baseline exam and current test.
(4) Trend Analysis - Usually linear regression (Progressor). Requires about 6-7 visual fields and can estimate rate of progression. Uses all of the data.
(5) In general event analysis usually can detect change earlier than trend analysis, but trend analysis can provide rate whereas event cannot provide a good estimate.
(6) Every multicenter trial has used a different procedure for determining visual field progression, and they only agree with each other 50-60% of the time.

New visual field test procedures

(a) Short Wavelength Automated Perimetry (SWAP) – Uses a high luminance yellow background and a large blue spot to isolate and measure the short wavelength pathways.
(b) Frequency Doubling Technology (FDT) Perimetry – Uses a low spatial frequency sinusoidal grating undergoing high frequency counterphase flicker. The Matrix perimeter is the second generation FDT device that can provide more stimulus presentation patterns, analysis and storage capabilities.
(c) Pulsar perimetry – Similar to FDT, except that it uses a 2 dimensional sine wave pattern and varies the spatial and temporal frequency of the target.
(d) Flicker Perimetry – Can occur in many forms (critical flicker frequency, flicker modulation perimetry, luminance pedestal flicker perimetry).
(e) Motion Perimetry – Also in many forms (displacement of a single stimulus, coherent motion of random dots or motion of a subset of dots).
(f) Rarebit perimetry – A suprathreshold test that performs fine detail mapping of the visual field.
(g) Microperimetry – A fine detail mapping technique that compensates for eye movements during testing.
(h) Multifocal Visual Evoked Potentials (mfVEP). – An electrophysiological procedure that determines local visual evoked cortical potentials from the visual area (area 17 or occipital lobe) of the brain.
(i) Pupil perimetry – Measures the pupil dynamics of the visual field to stimuli presented at different visual field locations.