



LEA Grating Acuity Test

Part Number: 251300

Designed by Lea Hyvärinen, MD

The LEA Grating Acuity Test requires discrimination of the direction of long lines, which is a more demanding task than the detection acuity measured with LEA GRATINGS or the Teller Acuity Cards. The test gratings are presented to children and adults at different

distances to find out at which distance the direction of lines can be perceived. Knowing the distance and which grating was used, the grating acuity value can be read from a nomogram.

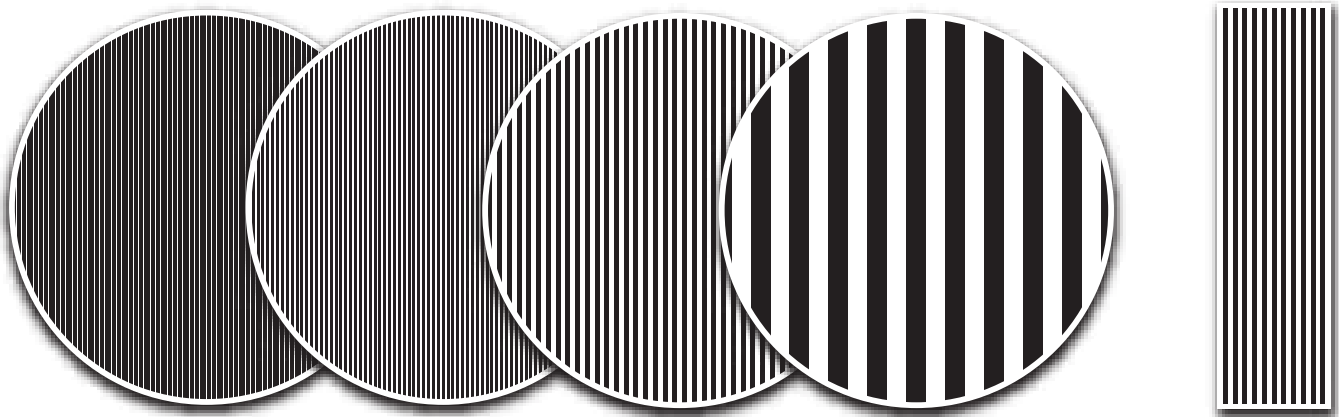


Figure 1. For the measurements of the grating acuity there are four gratings, 8 cpcm, 4 cpcm, 2 cpcm and 0.5 cpcm (cpcm = cycles per one centimeter of the surface). B. A keycard grating is made of the 2 cpcm grating.

Perception of grating

When assessing vision of a new person/child it is important to know that some persons/children perceive gratings not as straight lines but as irregular patterns and therefore cannot define the orientation of the lines. It is also possible that the person does not perceive the gratings at all, which is rare but will be found in persons with brain lesions, which may not affect the person's vision in any other way. Therefore it is wise to demonstrate the gratings by showing the 0.5 cpcm, 2 cpcm, 4 cpcm and 8 cpcm gratings at a close distance when starting the test situation and ask the person how he sees the gratings.

If the person answers that "the broad lines are regular straight lines in this direction but the other ones are not; the next narrower lines are visible only in a part of the surface, here, and the really fine lines wiggle and are not straight at all", then you have made an important observation already in the beginning of the test and know that the person has difficulties in processing many straight lines at once. This difficulty in visual perception can be detected with no other clinical tests but the gratings and asking how they are perceived.

You can use gratings to measure grating acuity as resolving/discrimination of gratings only when the gratings are seen as straight lines. The broad lines are perceived thinner and thinner the farther you go, so they become fine lines. If gratings are used as a detection test (Teller Acuity Cards, Keeler Acuity Card Test, LEA GRATINGS) we are not aware how the child perceives the gratings.

You might want to experience yourself the difficulties in perception of gratings by turning the grating in front of you. Even a perfectly normal visual system cannot code the fast turning gratings but you see all kinds of illusions.

During the measurement you may notice that lines in different orientations are perceived at slightly different distances. That usually means that the person has some uncorrected astigmatism. This does not mean that the spectacles had wrong values.



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Instructions

The measurement is easiest if you have a measure tape taped on the floor and you walk along it. Then you can check the distance every time when the person/child correctly reports the orientation of the lines.

Children may need to train to show the orientation of lines with their hand or using the keycard-grating by comparing it with the orientation of the test gratings. If a child's responses are irregular, it is possible that the lines are seen moving and thus their orientation is difficult to define.

- Based on your observations during the demonstration of the gratings, choose the first test grating so that it is seen at a distance longer than 120 cm (4') if the distance is within the visual and cognitive sphere of the person/child.
- The test grating is first moved to a distance where the person/child cannot discriminate the direction/orientation of the grating lines. When testing a child, say something like "Now I walk a bit farther until you no more see the lines; do you see them now; no, then we can start".
- Bring the grating slowly closer to the person/child until he can perceive the orientation of the grating.

- Use the 4 different orientations when defining the threshold distance. To turn the grating, turn the evenly grey surface toward the subject. Ask the person to respond by showing the orientation of the lines with his hand or with the keycard grating. Some children can use only horizontal and vertical orientations.
- The direction of the lines should be varied randomly. It is wise not to show the same direction a second time immediately after the first presentation or to show the lines in a direction that the person has just used in his (wrong) answer because people tend not to repeat an answer. Therefore the use of two presentations of the same orientation of the lines is likely to lead to a wrong answer to the second presentation.
- The threshold distance is defined when at least three out of five presentations lead to the correct response at that distance. Children may not tolerate five measurements, so we often have to be happy with 2-3 measurements, especially if they are at nearly the same distance.

The grating acuity value as cycles per degree (cpd) that corresponds the distance of the threshold measurement is read on the nomogram I corresponding the grating used (Diagram A, B, C or D). To view a video of instructions, go to www.good-lite.com and search "251300".

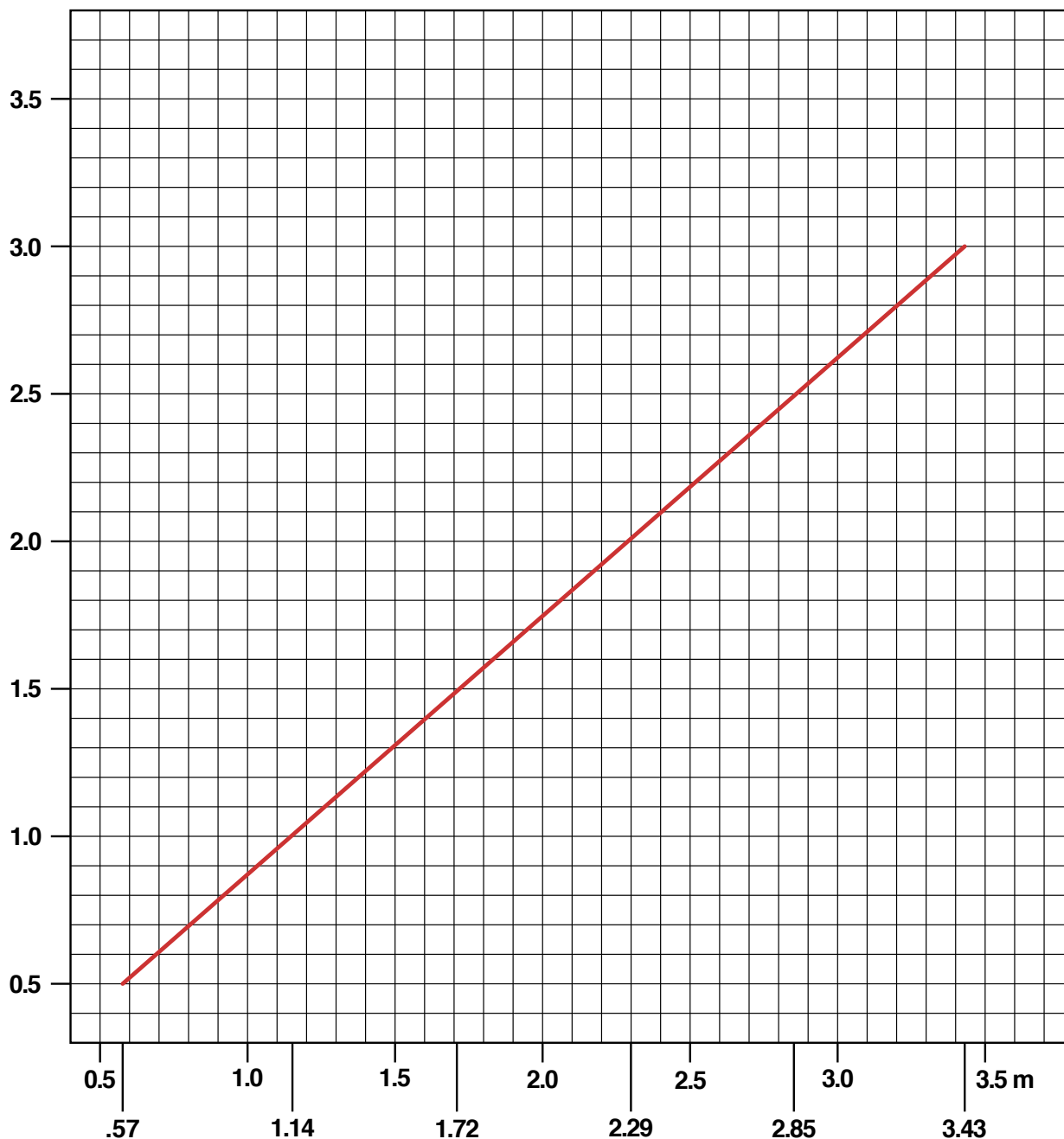


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Nomogram I. Grating acuity (cpd) at different distances.

A. 0.5 cpcm Nomogram

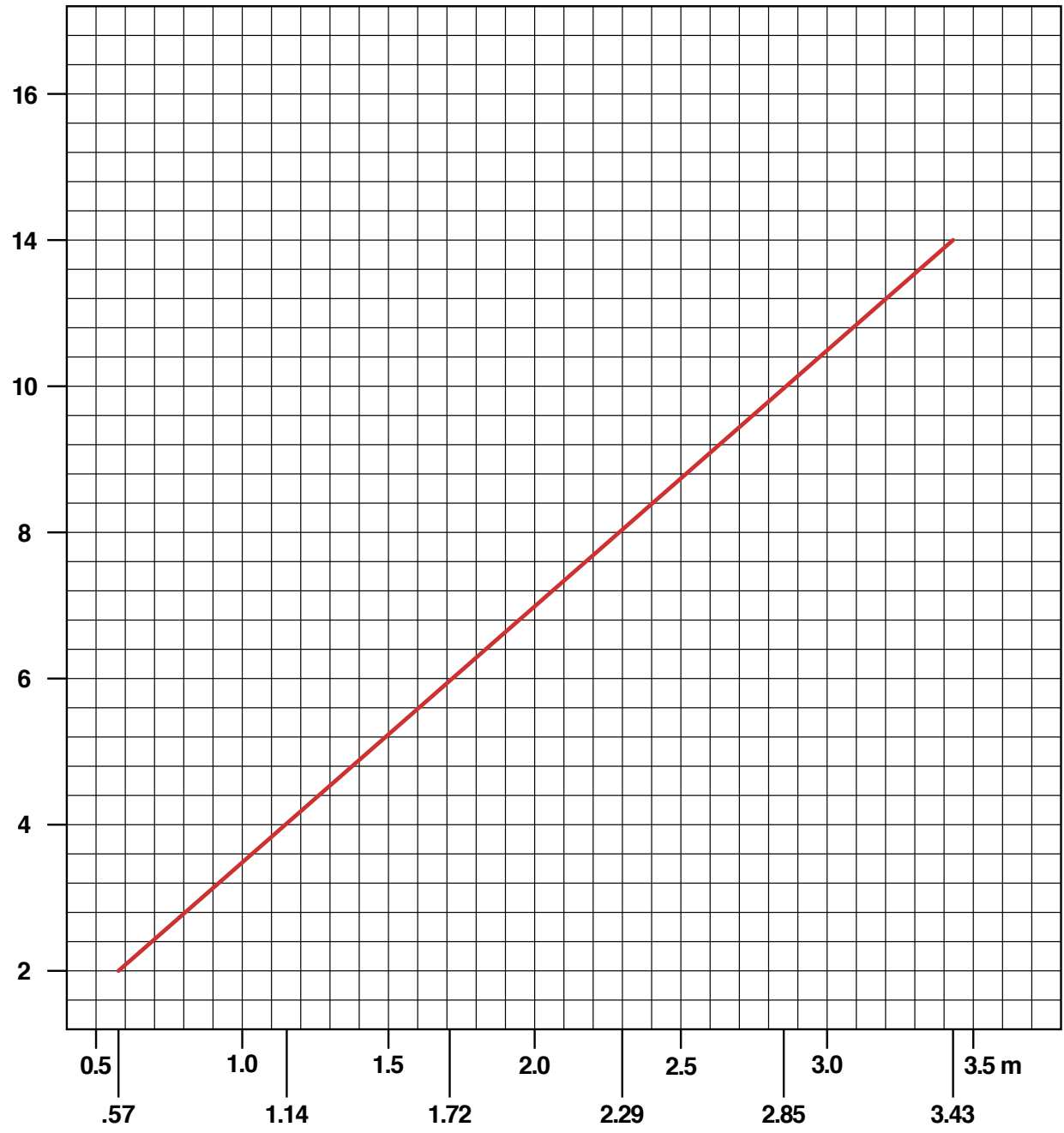




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B. 2 cpcm Nomogram

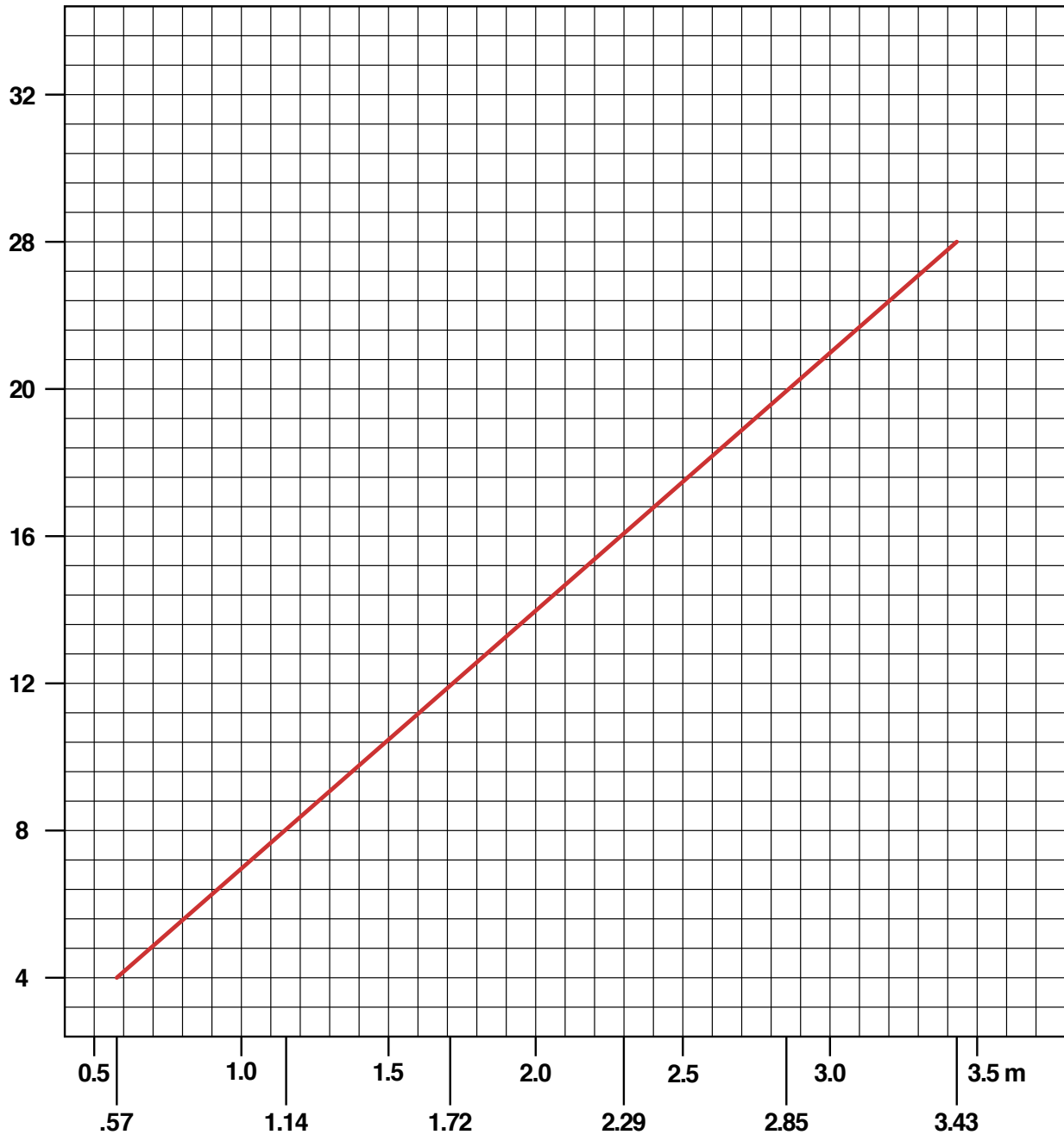




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C. 4 cpcm Nomogram

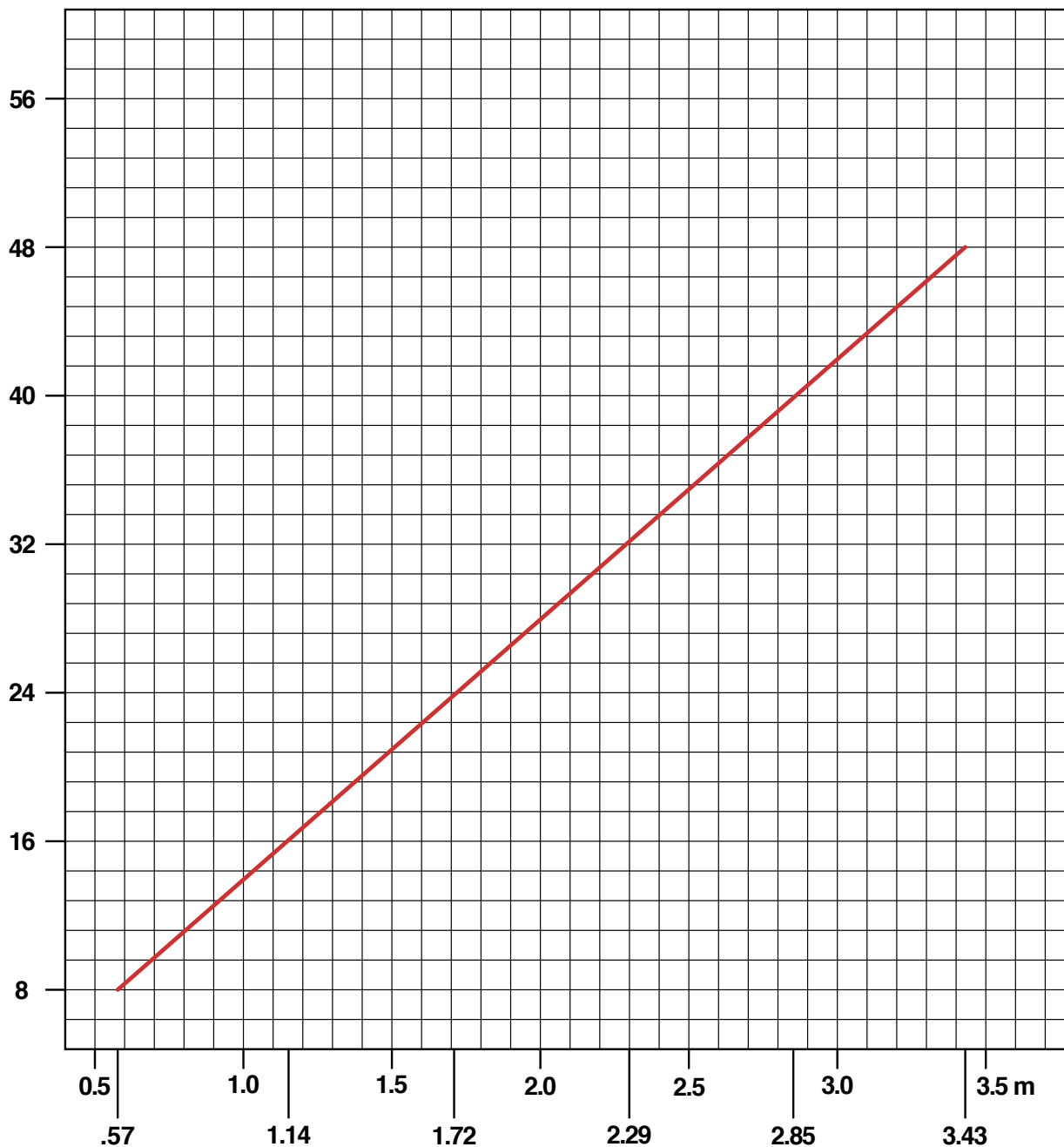




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D. 8 cpcm Nomogram



The size of the stimulus

For example, if a person saw the 8 cpcm grating at 1.15 m distance, grating acuity is 16 cpd with a 10 degree stimulus: 8 cpcm corresponds to 8 cpd at 57.2 cm and 16 cpd at 11.5 cm (2x57 cm). Since the grating is 20 cm in diameter, it is 20 degrees at 57 cm distance and 10 degrees at 11.5 cm distance.

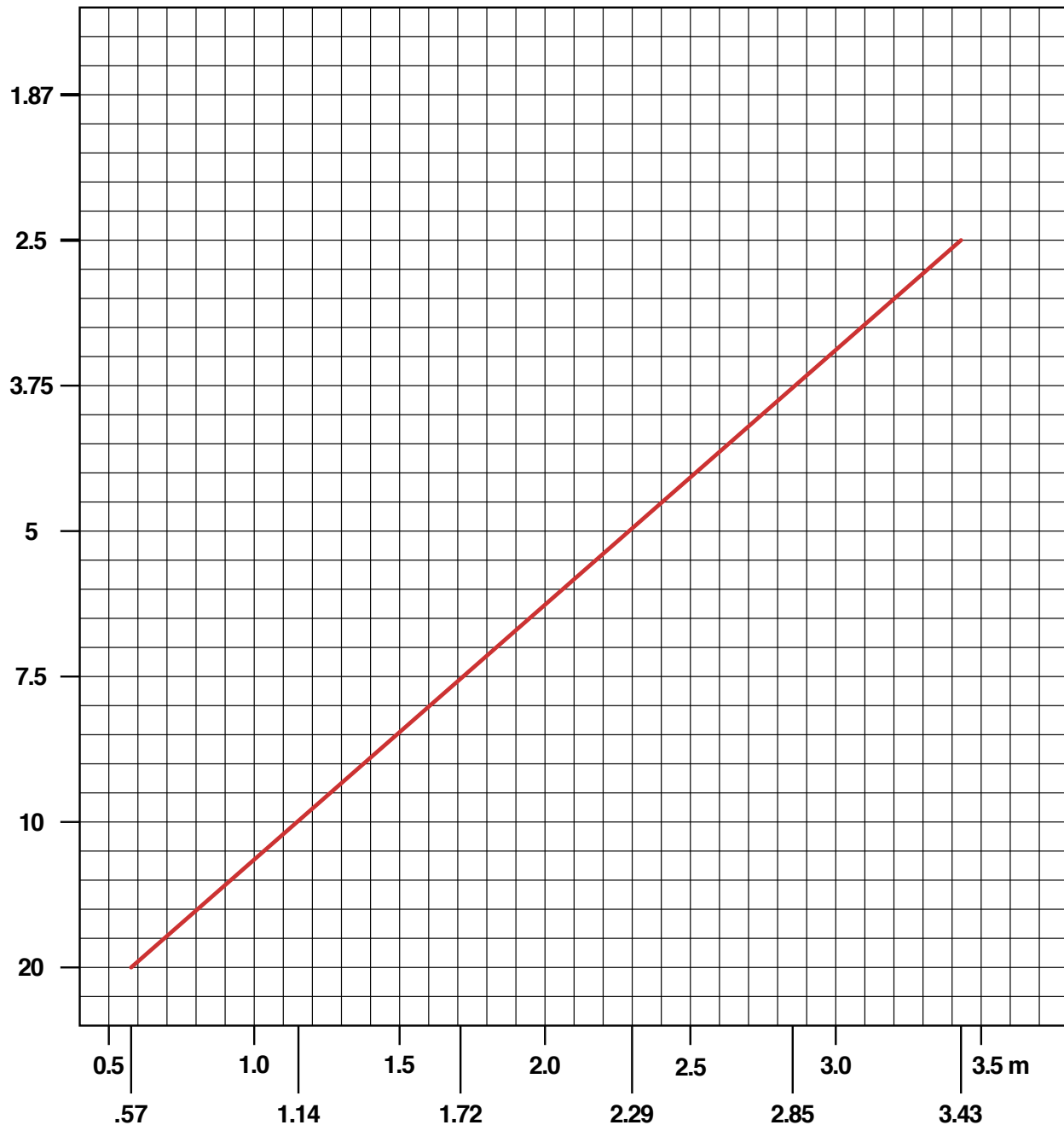
The results may vary as a function of the size of the grating, i.e. grating acuity value drops when at longer distances the grating is perceived smaller. This happens if there are patchy losses of the central visual field or a dense central scotoma. Both of them “eat” the area of the visual field that is available for collecting the information. An example, a person with relative central scotoma was tested with three gratings:

- The 8 cpcm grating at 120 cm is equal to 16.8 cpd (stimulus size 10.3 deg),
- The 4 cpcm grating at 190 cm is equal to 13.5 cpd (stimulus size 6.7 deg),
- The 2 cpcm grating at 300 cm is equal to 10.5 cpd (stimulus size 3.6 deg).

The measurements with stimuli of different size depict the quality of the central visual field.

The size of the stimulus is given in the nomogram II.

Nomogram II. The size of the stimulus; i.e., the diameter of the stimulus in degrees at different distances.



Recording the results

When the result of the grating acuity measurement is marked on the Recording Form with the recognition acuity value of the testee, you see the difference between the results of these two measurements of different types. You can also mark the values measured with gratings with perceived different size (measurements at different distances).

They are the points where the slopes of contrast sensitivity curves hit the X-axis.

The Recording form can be used for results at all contrast levels and gives us an overview of the visual functioning in the fixation area of the visual field.



xx=OD oo=OS

patient: _____ date _____

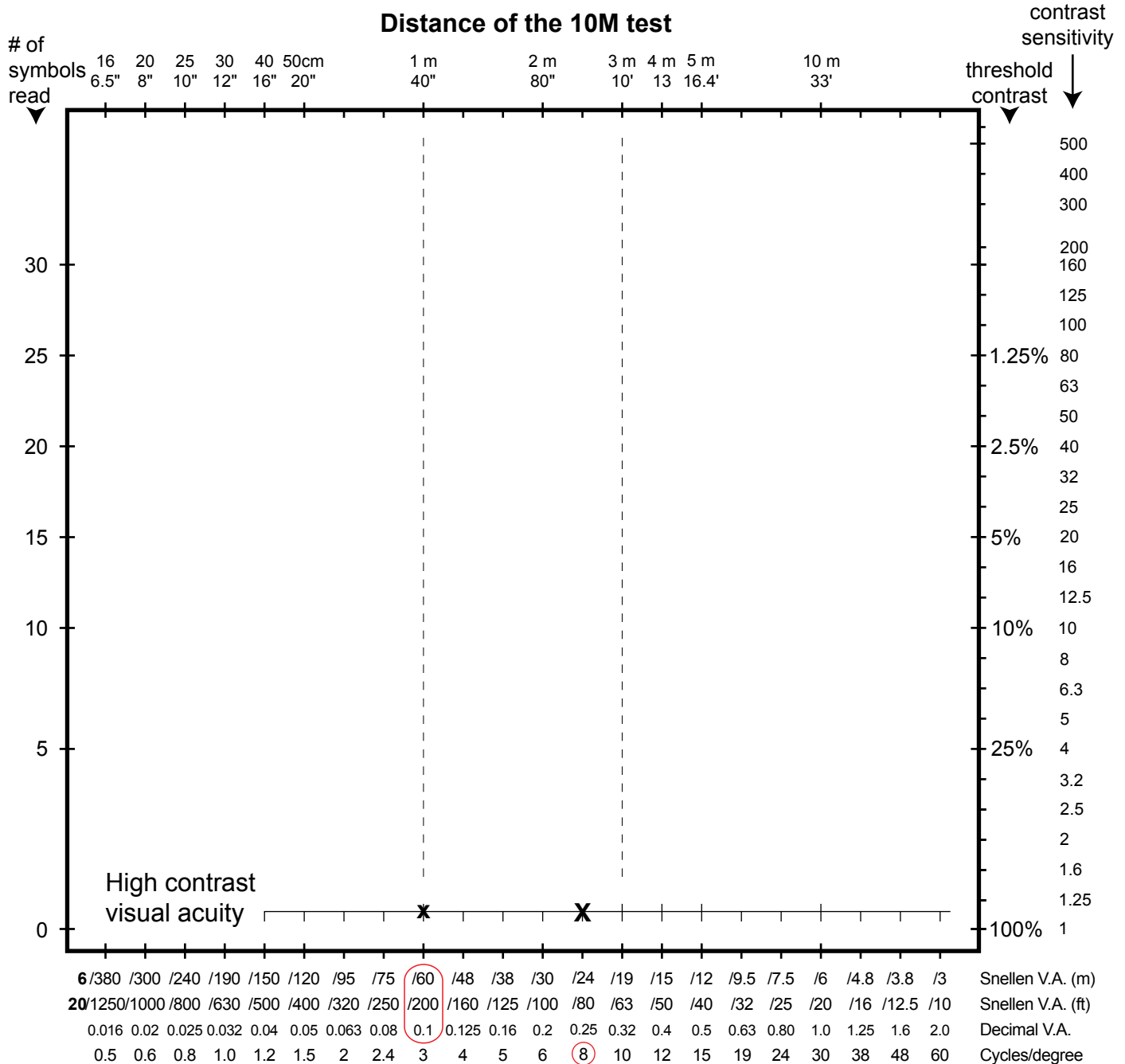


Figure 2. The results of a patient with a grating acuity 8 cpd (X) and a recognition acuity value 0.1 (6/60, 20/200) (x) are marked on the recording form.