

Basic Optician Training

Part I: Best-Spherical-Correction
Martin Aufmuth



Basic Optician Training

Part I: Best-Spherical-Correction
Martin Aufmuth

Copyright © 2017 by Martin Aufmuth
All rights reserved.

No part of this publication may be reproduced, distributed, or transmitted in any form or by any means, including photocopying, recording, or other electronic or mechanical methods, without the prior written permission of the publisher, except in the case of brief quotations embodied in critical reviews and certain other noncommercial uses permitted by copyright law. For permission requests, write to the publisher, at the address below.

Martin Aufmuth, OneDollarGlasses
Böhmlach 22, 91058 Erlangen, Germany

info@onedollarglasses.org

www.onedollarglasses.org

Photographs and illustrations

© Needle and thread: kkymek/Getty Images; Blue eye: © Vicu9/Getty Images; Two eyes: © lenanet/Getty Images; Retina: © Best_Shop/Getty Images; Clouds: © jat306/Getty Images; Raindrops: © jrubinart/Getty Images. All other photos and illustrations: © Martin Aufmuth

For all the people in the world who need a simple pair of eyeglasses
to change their lives.

Contents

Contents	6	The power of a lens	35
A global challenge	10	1.7 Experiments with the laser	36
Training in „Best-Spherical-Correction“	12	Eye model with light rays	37
The OneDollarGlasses Association	13	Measure the focus of a lens	38
Award-winning	13	1.8 Optical imaging	39
The system of GoodVisionGlasses	14	Life on the wall	39
The GoodVisionGlasses	14	Raindrop	39
Local production and value creation	14	1.9 Seeing	40
Fast and cost effective care	15	How we can see a candle	40
Sustainability through economic viability	15	1.10 Paper eye (Part I)	41
Information for trainers	16	What you need	41
Training material	19	1.11 Accommodation	44
		Distance vision	44
		Near vision	44
		The lens while seeing in different distances	45
1. Basic optics	20	1.12 Emmetropia	46
1.1 The eye	22	1.13 Ametropia: Myopia and Hyperopia	47
Orange Model	22	Myopia: short-sightedness (near-sightedness)	48
Important parts of the eye	22	Hyperopia: long-sightedness (far-sightedness)	49
Functions of the important parts	23	1.14 Paper eye (Part II)	50
The retina when looking through the pupil	24		
Important facts	25		
1.2 Lenses	26		
PLUS lenses	26		
MINUS lenses	27		
Lenses without optical power	27		
Shift of a line	28		
1.3 The optical center of a lens	29		
How to find the power of a lens?	29		
1.4 The power of a lens	30		
How to find the power of a lens?	30		
Calculating with lenses	31		
1.5 Light and lenses	32		
1.6 Refractive power	34		
		2. Best-Spherical-Correction (BSC)	52
		2.1 Eye Test - preparation	54
		The right location - Preparations	54
		Do the self-test	54
		The Vision chart	55
		We use the E chart with the letter „E“ in four kinds of rotation.	55
		The Visual Acuity (VA)	55
		The lens bar	56

Clients book	58	Shape behind the ear	83
2.2 Eye diseases	59	2.12 Binocular Balance	84
Characteristics of a healthy eye	59	2.13 Final Test!	85
2.3. Test without lens	60	2.14 Astigmatism	86
Test both eyes	60	Astigmatism test	87
Very low vision (high visual impairment)	61	The Best Spherical Lens (BSL)	88
If he cannot see anything	61	2.15 The pinhole	90
2.4 The Golden Rule of Refraction	62	2.16 Special cases	91
2.5 The Starting-Power	63	Big difference between the correction of	
2.6 The Refraction	64	the left eye	
Step 1: Check the right eye without lens	64	and the right eye	91
		Problems with high diopters	91
Step 2: Start with plus	64		
Step 3: Minus	66	3. The Glasses	92
People with very low VA	66	3.1 The different types of	
Plus-Minus Rule	67	GoodVisionGlasses	93
2.7 Reading glasses	70	3.2 The glasses - technical terms	94
Age and diopters	70	Measures of the lens	94
Finding the right reading glasses	72	The size of the bridge	95
The right reading distance	72	Inclination of the temples and the Panto-	
Position of the reading glasses	74	scopic Angle	95
Not only reading!	75	3.3 Quality criteria of GoodVisionGlasses	96
2.8 The Pupillary Distance (PD)	76	Frontal view	96
Typical pupillary distances	76	Side view	96
The right size of the frame	76	Closed	97
Measuring the PD	77	Top view	97
2.9 Producing PD test glasses	78	3.4 Repairing GoodVisionGlasses	98
2.10 Useful Tools	79	Repair oplique temples	98
2.11 Adjustment of the frame	80	Change the inclination of the temple	99
Closeness and distance	80	New shrink tubing for the temple	100
From the front to the back	80	How to remove a gap between wire and	
Shape of the glasses	81	lens	101
The front	82	4. Sales and Marketing	102
The side	82	4.1 The sales process	104
The top	82		
How to bend the temple?	83		

Some basic rules	104
The right position	104
Sandwich-Method	104
Clean table	105
Mirror	105
Box for rubbish	105
Cleaning Instructions	105
4.2 Campaigns	106
Preparation of the campaign	106
The day of the campaign	106
School classes	107
4.3 Material for campaigns	108
4.4 Your own business	109
4.5 Marketing	110
Why people need glasses?	110
Raising awareness	111
Customer service	111
Your Guarantee for GoodVisionGlasses	112
Celebrities	112
Finding the right price	112
Customer list and telephone marketing	113
Customer friends card	113
Corporate design	114
Examples for Corporate Design	115
Prescription card	115
4.6 Checklist	116



A global challenge

According to WHO, **more than 700 million people worldwide** need glasses but cannot afford them or do not have access to glasses. About 80% of these people (over 540 million) need reading glasses.

As a consequence, children cannot go to school and adults cannot work or provide for their families. The estimated **lost income for these people amounts to more than 200 billion US-Dollar every year**. Approximately 47,000 additional full-time functional clinical refractionists and 18,000 ophthalmic dispensers would be required to provide refractive care services for these individuals.

We want to change this.

Martin Aufmuth
Founder and President



Martin Aufmuth, CEO OneDollarGlasses



Children often fail at school because they would need eyeglasses

Training in „Best-Spherical-Correction“

The present training course in Best-Spherical-Correction (BSC) is designed as a one-year training course with the target to enable the trainees to find the right spherical correction for people suffering from URE (uncorrected refractive errors), to be able to adjust the eyeglasses to the faces of the people and to raise awareness for the need of eyeglasses and refractive care. The trainees also learn when they have to refer the patient to an ophthalmologist or an eye hospital.

The training course is part of the concept of OneDollarGlasses to supply people in developing countries with high quality, local produced and affordable eyeglasses. The goal is a basic optical eye care system which is affordable for everyone.

In cooperation with ophthalmologists and opticians, OneDollarGlasses (ODG) has developed the present, year-long training course. Best-Spherical-Correction (BSC) educates the student in finding the appropriate lenses during vision testing, selecting the correct frame size according to the pupillary distance and fitting the glasses in a professional manner. Approximately 80% of the patients will experience a significant improvement in their vision.

Patients with pathological eye diseases or in cases where the OneDollarGlasses cannot achieve significantly improved eye sight will be identified and referred to hospitals and ophthalmologists. A well thought out quality control system guarantees compliance with quality standards.

In an advanced training course (Part II of the Basic Optician Training) the trainees inter alia can learn how to correct astigmatism and how to cut lenses and fit them into any kind of frame.

Usually the young people chosen to be educated live in similar socio-economic circumstances as do their future patients. The thought behind the idea is that they will be satisfied with the modest salary the sale of inexpensive glasses will generate.

The BSC training course has a specific population segment in mind and targets the needs of first time or basic vision care. It is meant to be a necessary addition to the existing infrastructure.

The OneDollarGlasses Association

Martin Aufmuth, the inventor of OneDollarGlasses, founded the OneDollarGlasses Association (ODG) in 2012. ODG finances training and bending machines from donations. The wages for the opticians and material costs are financed through the sale of the glasses.

The goal is a financially independent local supply of affordable, robust, high quality eyeglasses.

OneDollarGlasses has different regional trade marks like GoodVisionGlasses or LentesAllInstante.

Award-winning

From more than 800 projects worldwide, OneDollarGlasses was awarded 1st prize by the Siemens Foundation.

In 2015 ODG won the prestigious Tech Award in the USA.

In 2016 ODG was awarded the Robert E. Hopkins leadership award of the Optical Society of America (OSA). So ODG was recognized by one of the world's most prestigious trade associations for the first time for ground-breaking research.



Martin Aufmuth, Founder and President of ODG



The Tech Award, USA



Siemens Foundation, Empowering people Award



Robert E. Hopkins leadership award, OSA

The system of GoodVisionGlasses

The GoodVisionGlasses

The extremely light-weight and flexible spring-steel wire frames, with added coloured beads are attractive and affordable. The materials cost around 1 US Dollar.

The selling price of the basic model is 2 to 3 times the typical local daily wage. Everyone can afford these glasses.



The frame: flexible and light

Local production and value creation

The bending machine fits into a wooden box measuring just 30x30x30 cm. The box contains all the tools needed to manufacture the frames.

With the machine, a team of 6 people can produce up to 30,000 glasses a year. The glasses can be made in various sizes: The yellow mark is for a small pupillary distance (PD), red is for medium PD and blue for people with a large PD.



Colourful marks for different sizes of eyeglasses



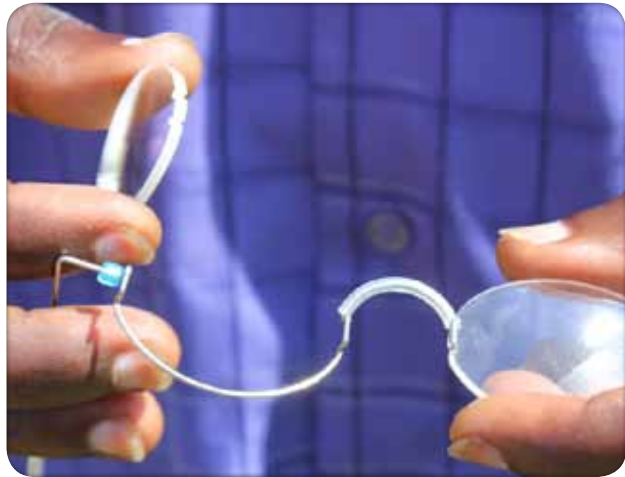
The ODGs get their unique design with two colourful glass beads

Fast and cost effective care

ODG's modular assembly system, consisting of prefabricated lenses ranging from -10 to + 8 diopters (in steps of 0.5 diopter increments in the standard system) and ready-made frames in different sizes and colours, allows for fast, individual and cost effective care, particularly in remote areas. Immediately after the vision test (always provided free of charge) the patient receives the glasses. No expensive grinding equipment is needed and a second consultation for fitting the glasses is not required.



Box with ready-made lenses



The lenses can be easily clipped into the frame

Sustainability through economic viability

The people trained by ODG in vision testing and the production of glasses are able to make their living from these activities. The goal is to offer permanent, self-sustaining basic vision care in developing nations.



Adjusting the eyeglasses



Eye testing

Information for trainers

The main goals of this training course

1. Always to find the right spherical lenses for the patient.
2. Knowing how to adjust the frame to the patient's face.
3. Knowing when we have to send the patient to the ophthalmologist or to the eye hospital.
4. In addition the trainees know how to become successful salesperson by learning marketing techniques and customer service.

Timetable and content

The training for GVG Opticians is designed as a 1-year training. During the first two months the trainees learn the content of this training manual and additionally get trained in the production and repair of GoodVisionGlasses. This helps the trainees to get manually skilled and to be able to adjust eyeglasses frames later. The two months training finishes with a first exam.

After the second month it follows a phase of practise under supervision of experts. After 6 months there is a second exam. Depending on the results of this second exam and the local need there is the possibility for some basic opticians to participate in a second training course and learn inter alia to test astigmatism, to cut lenses and to fit them into other types of frames. It follows a second period of 6 month practise with a third and final exam.

Let's think product orientated

To be successful, a manufacturer has to think product orientated: „How can I reach an optimum in quality and quantity in a minimum of time?“ For him what counts is the product coming out at the end. But what is the product of my training session as a trainer? The product is not if I talked a lot or if I made a nice lesson. No - the product is, if my trainees have learnt and understood the content and can use it!

Activity - don't talk too much

Studies show that concentration falls if the teacher is talking for more than 10 minutes (so 10 minutes of talking is already too much!). In addition, many of your trainees will have difficulty understanding you at all because of their educational background or a different mother tongue.

So, give a very short introduction, a compact information in the beginning, then let your trainees learn themselves and let them make a LOT of exercises. Be a tutor and a coach, NOT a teacher! Time efficiency: If you are talking in front of your class, only one out of all - you - is active. But: We learn best, when we are in action. So let the trainees talk, explain, draw, making experiments themselves. Think always: What exercise, what activity could they do next? How can I make them become active themselves? If 20 students work themselves, the efficiency will be about 20 times higher than if you talk alone. Let them make as many eye tests as possible!

Writing an own manual



Hand out one manual and an exercise book to every trainee. The trainees should **write their own manual in their own language** into their exercise book! They can write, draw and paint, also during the evening. Things you have created yourself you will not forget.

Train the trainers

Take students out of the group to explain to the group. They can also explain in their local language. The less you stand in front of the group and the more active the group is itself, the better it is. Once a trainee has successfully explained a content to the group, you can be sure he has understood and he won't forget. You can give new content to a small group one day before in order to present it the next day. Train the trainers.

Love mistakes

Let your pupils make mistakes - every mistake is a chance because we can learn from it. It helps to avoid mistakes later, after the training. When training the adjustment of glasses to a patient, don't start demonstrating yourself. Let somebody from the group start. Look at what he is doing and then ask your team how to improve the result.

Repetition

Repeat every day those contents which are most important. **Let them do a couple of eye tests every day!** After repeating 4 to 8 weeks the same contents the students will never forget.

Check the results

Do you remember this question from your former teachers: „Pupils, is this understood by everybody?“ Then one out of 30 conformed by nodding - this indicated to the teacher that he could continue. But looking close to it: He does only know that **ONE out of 30** has (probably) understood and maybe this student has known the content already before. This question is stupid and misleading! Let's transform the question into „**Who has understood this?**“ Now you can exactly see how many

students will raise their hands. And then: Ask those who understood to help those who didn't so far!

Even better than asking is a test. Make as much tests as possible! You can make such tests whenever you want. After 10 minutes. Every day. If the answers are right you know that you were successful and your students know they succeeded as well. The time during a test is used most efficient: Everybody gives his best. (A good moment for a test is e.g. in the afternoon, when concentration goes down.)

Speed learning

We can learn extremely fast if necessary. Example: The eye. You can explain every term - some trainees will listen, others won't. A loss of time. Much more efficient is to give them 10 minutes to learn every term and function (they can help each other). Then immediately make a test: everybody draws an eye himself, writes down the terms and explanations. Afterwards you can correct the answers together with your students. Do this with other content too.

Transparency

If you are doing something, explain why you do it. Tell your students in the morning what will be your and their goal for the day. For example „Until this evening I want you to know to refract a patient and to find the right lenses.“

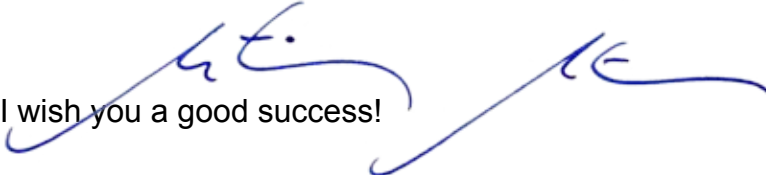
Don't be abstract

If you go through a content, make sure that everybody can understand it. Example: Light rays passing lenses. This is very abstract for somebody who maybe never had physics. But that is no problem: Make experiments, let your trainees experiment with the lenses, draw pictures, give them time to really understand. Don't be abstract - be practical.

You are a team

Always remember, you and your students sharing the same vision: Helping as many people as possible with the best service as possible.

I wish you a good success!



Training material

The following checklist helps you to prepare the right material for your training.

- Vision charts, far distance (4m): 1 for 2 trainees
- Nails or „blue tack“ for vision charts: 1 for 2 trainees
- Pointing sticks: 1 for 2 trainees
- Pinhole glasses: 1 for 4 trainees
- Exercise books (checked, A4): 1 per trainee
- Triangle (rectangle ruler): 1 per trainee
- Pens: 1 per trainee
- Pencils: 1 per trainee
- Eye-test-card: 1 for 2 trainees
- Water soluble marker: 1 for 2 trainees
- Sets of wooden colour pencils for each trainee (plastic pencils get dry fast)
- Pencil sharpeners and rubbers: 1 per 2 trainees
- Name stickers: 1 per trainee
- Needles: 1 for 2 trainees (for pupillary distance testing glasses)
- Lens bars: 1 for 2 trainees
- Boxes with lenses: 1 for 4 trainees
- Frames in different sizes (1 small, 1 medium, one large per trainee)
- Sunglass lenses: 4 per trainee
- Pocket rulers (1 m or longer): 1 per 2 trainees
- Client's books for training: 1 for 4 trainees
- Long nose pliers (for adjusting and repairing frames): 1 per trainee
- Mirrors: 1 for 4 trainees
- Plastic boxes for water with soap and for clean water
- Toilet paper (for drying lenses)
- Table cloth (for nice selling table): 1 for 4 trainees
- Light torch (if you don't have torches, a bright candle does it as well): for paper eye-experiment
- About 10 piece of very strong white paper (about 350 g/m²)
- Paperclips (staples)
- Spring steel wire: some pieces
- Experiment set - laser with lens profiles
- 1-2 pairs of cylindric eyeglasses
- needle and thread: 1 per 2 trainees
- rice with little stones
- Certificates (for every trainee, special ones for the successful trainees)

Material for the training for the production of the eyeglasses

- Bending units (with bending machine, tools and devices) per 4 trainees
- Spring steel wire: 200 piece per trainee
- Shrink tubing: 1 box per 4 trainees
- Beads: 1 box per 4 trainees

1. Basic optics



1.1 The eye

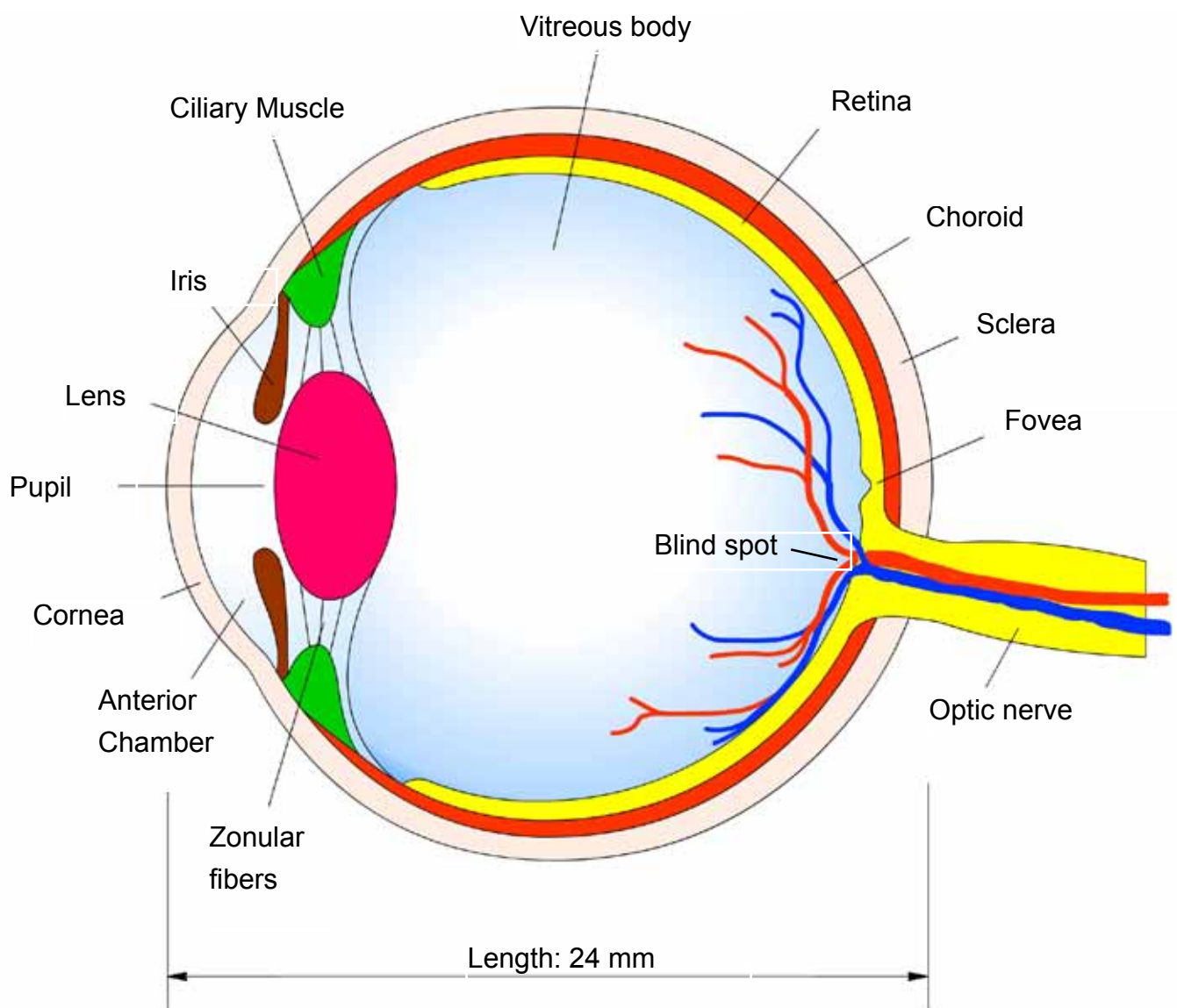
Orange Model

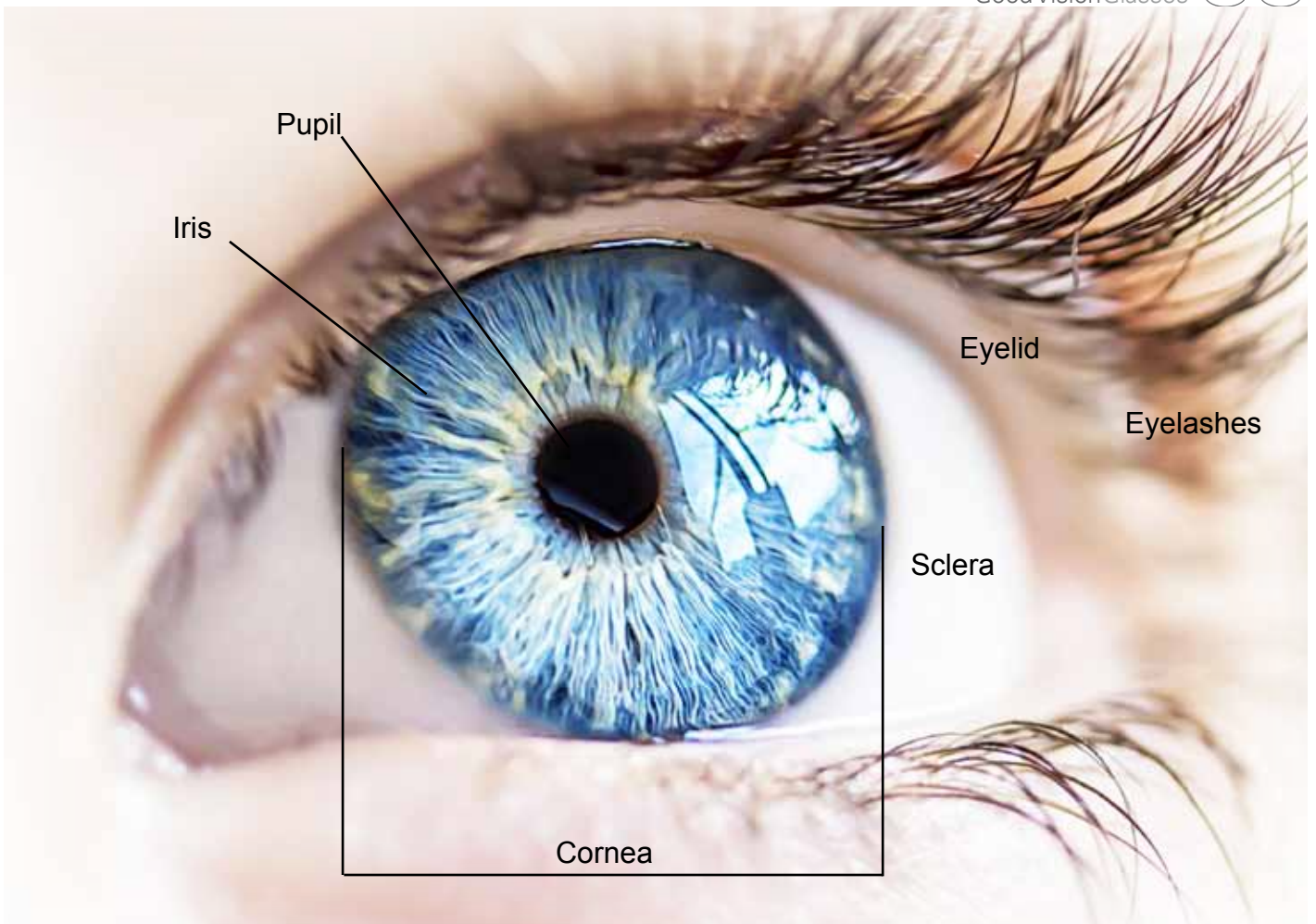


If you cut an orange in the middle, you can see what is inside...

... and if you cut an eye in the middle, you can also see what is inside.

Important parts of the eye



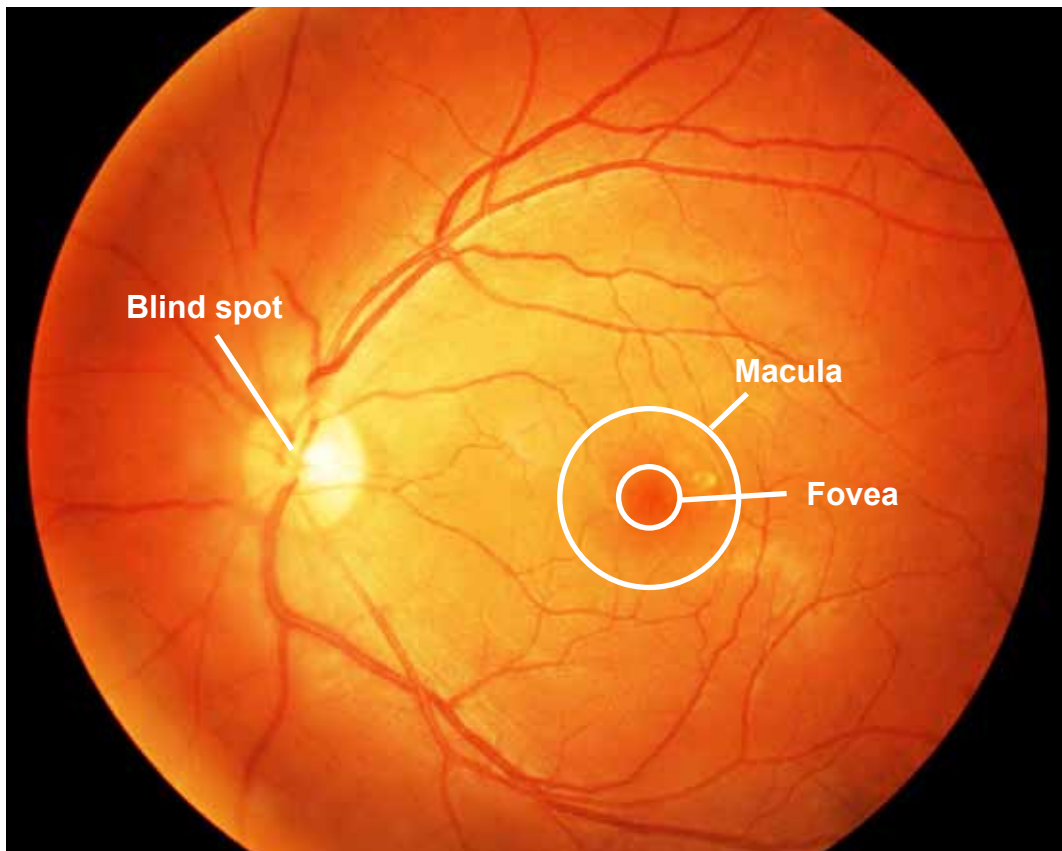


Functions of the important parts

1. **Cornea:** Clear part over the coloured part of the eye. The cornea helps to protect the eye. The cornea helps to focus light that enters the eye. It provides 2/3 of the eye's refractive power.
2. **Iris:** The nice round coloured part of the eye (brown, blue, green). Muscles in the iris can make the pupil wide when it is dark and small when it is bright.
3. **Pupil:** Round hole in the middle of the iris. It normally looks black because it is dark in the eye.
4. **Lens:** brings, together with the cornea, the image of an object on the retina. Can change the focus of the eye so that we can see things at different distances. The refractive power: app. 20 D.
5. **Ciliary muscle:** fixed to the lens with zonular fibers. It can contract and relax so that the lens gets thinner or thicker and so change the power of the lens. This is called accommodation.
6. **Sclera:** The sclera is very strong. It protects the inside of the eye and gives the eye its shape.
7. **Retina:** catches the light that comes into the eye and transforms it into nerv-impulses that are sent to the brain via the optic nerve.
8. **Fovea:** the place of best visual acuity (the area around is called macula)

For trainer: Everybody has 10 minutes to learn all parts of the eye and their functions. Then the manual has to get closed and the eye and all terms and functions have to be written down. Then everybody compares with the manual if he forgot something.

The retina when looking through the pupil



Picture of the retina with blind spot, macula and fovea.

Experiment - blind spot

Close your left eye and stare at the cross with your right eye with approximately 40 cm reading distance. Now slowly move the paper towards your face. Suddenly the black circle will disappear! This is when the area of the black circle is projected on the blind spot of your eye.



Important facts

Refractive power of the eye: about 60 diopters (cornea about 40 diopters, lens: about 20 diopters)

On the retina of an eye there are more than **100 million sensory cells** sending the image information to the brain (a camera has probably 10 million pixels).

The retina contains two types of photoreceptors, rods and cones. **The rods** are with some 120 million more numerous. They are responsible for seeing at night.

The 6 to 7 million **cones** provide the eye's colour sensitivity for seeing at daylight. They are concentrated in the 0.3 mm diameter fovea.

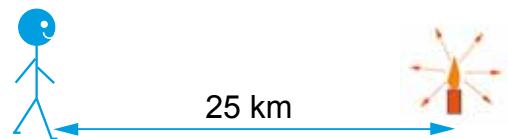
The eye can be very strong: In a dark night, you can see the light of a candle in up to 25 km distance!



Digital camera:
more than 10 million
pixels



Human eye:
more than 100 million
Pixels



Experiment - rods and cones

Look straight forward. Bring a colour pencil from the side of your face into your view. Try to guess its colour.

You will see: Before you see the colour of the pencil with the cones in the center of your eye, your rods see that there is a pencil.



Experiment - pupil

Wait until darkness. Now shine with a torch into the eye of your partner.

=> The pupil will get smaller immediately! If you don't have a torch, cover the eye with your hand and remove it quickly (same effect).

1.2 Lenses

If you cut an optical lens in the middle, from the side it looks e.g. like this:



PLUS lenses

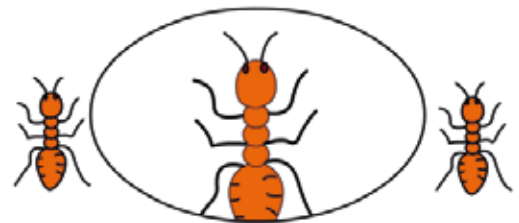
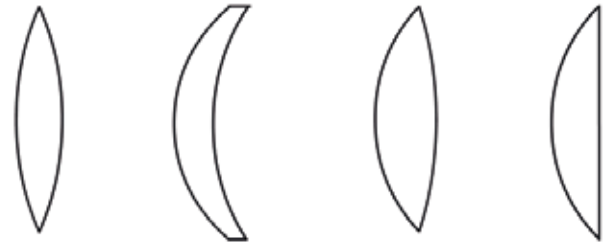
PLUS lenses are THICK in the center and thin outside.

Mnemonic: If you eat more (PLUS) you get a big belly.

PLUS lenses let things look **larger**.

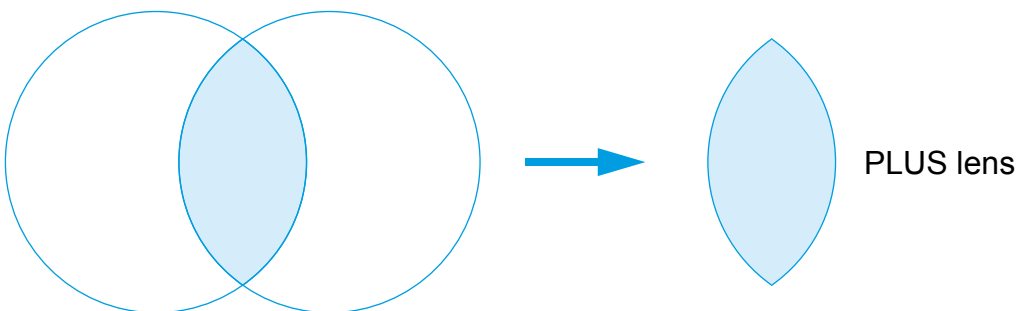
Power: +0.5; +1.0; +1.5; ... +6.0 D

The power P of a lens is measured in diopter D .



This is how you can imagine a PLUS lens:

Space inside 2 overlapping lenses



Experiment

Take different lenses and decide if they are positive or negative. Check if they are thicker in the center or thinner. Look through the lenses and see if they make things larger or smaller.

MINUS lenses

MINUS lenses are THIN in the center and thick outside.

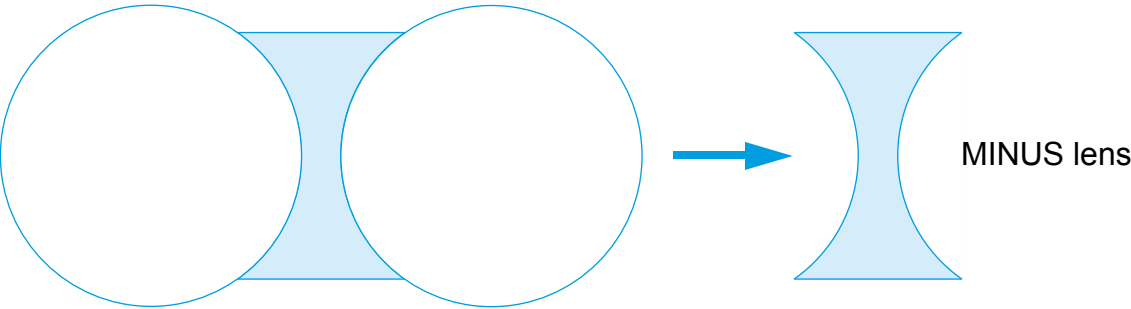


MINUS lenses make things look smaller

Power: -0.5; -1.0; -1.5; ... - 6.0 D

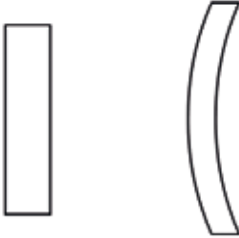


This is how you can imagine a MINUS lens:
Space between 2 spheres next to each other



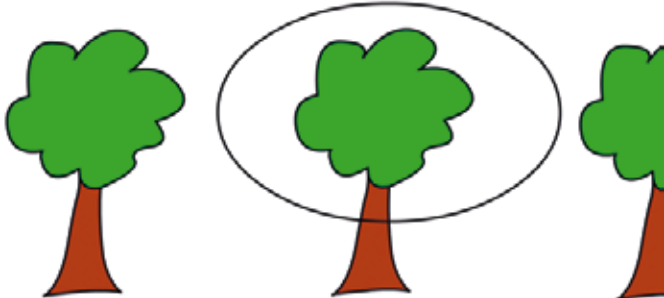
Lenses without optical power

They have the same thickness everywhere.



Lenses without power change nothing.

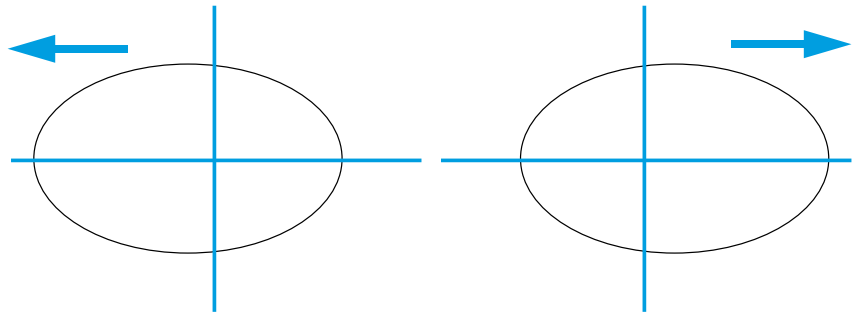
Optical power: 0 D



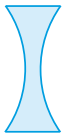
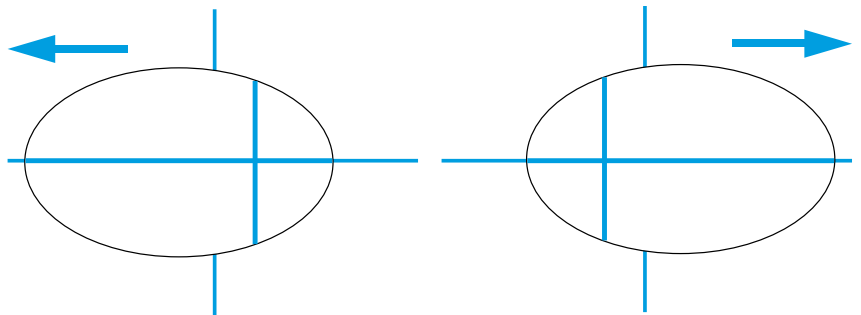
Shift of a line



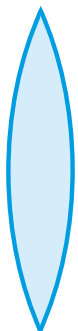
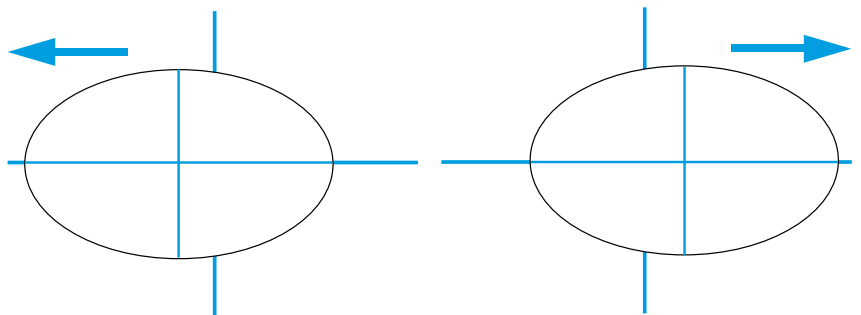
If you look through a **lens without power** at two vertical lines and move it left and right, nothing happens.



PLUS lens: the image **moves contrary** the movement of the lens.

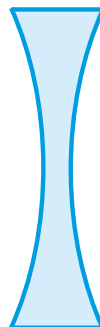


MINUS lens: the image **moves with** to the movement of the lens.



PLUS lenses

- are thick in the middle
- make things look larger
- shift the image contrary to the movement of the lens



MINUS lenses

- are thin in the middle
- make things look smaller
- shift the image with to the movement of the lens



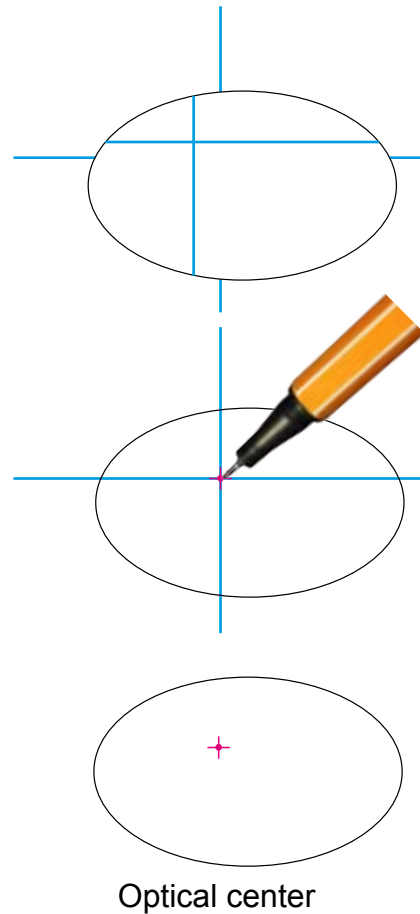
1.3 The optical center of a lens

How to find the power of a lens?

The optical center is the point of a lens where light rays passing through remain unrefracted.

How you can find the optical center without measuring instrument:

1. Look from above and hold the lens 10-20 cm in front of two rectangle lines.
2. Bring the images of the lines together with the lines by moving the lens.
3. Then mark the point where the lines meet. This is the optical center of the lens!



Task

Take different lenses and mark their optical centers.

Experiment

Take two lenses of very different power, e.g. +6 and -6 and hold both in front of your eyes. Now look to your partner...

Hold 2 lenses of +6 in front of one eye. That is how somebody feels who needs strong glasses for distance vision.

1.4 The power of a lens

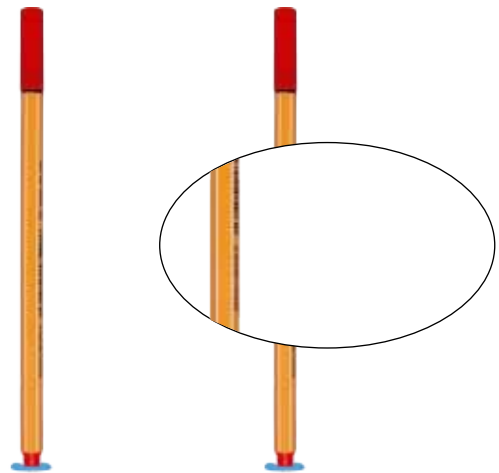
How to find the power of a lens?



Put a pen upright in about 1m distance on the table in front of you (fix it with a piece of blue tack)

Now hold the unknown lens 40 cm in front of your eye and move it left and right.

The pen is larger and it moves against the movement of the lens. It must be a PLUS lens.

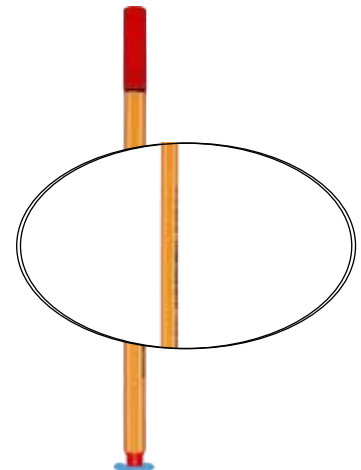


You guess: The lens could have +4.0 D

You take a **-4.0** lens and hold both lenses together.

Now the pen is smaller and it moves with the movement of the lens.

=> The MINUS lens is stronger than the PLUS lens



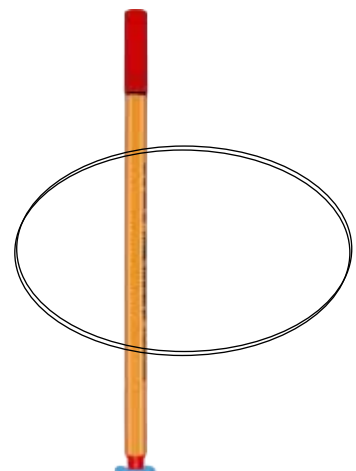
Now you try **-3.0** and hold it together with your PLUS lens.

Now nothing changes!

Both lenses together have 0 D

Calculation: $-3.0 + 3.0 = 0$

=> The power of the unknown lens is +3.0 D



Calculating with lenses

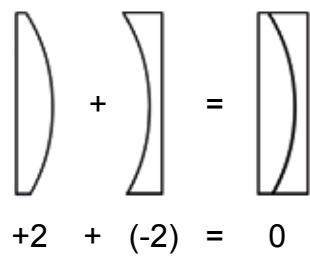
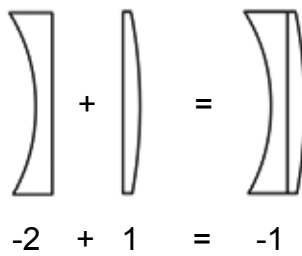
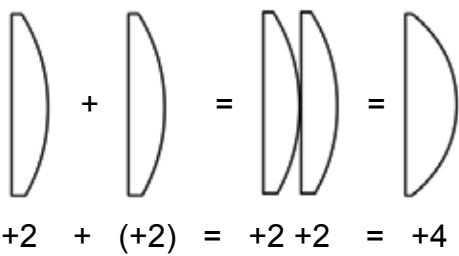
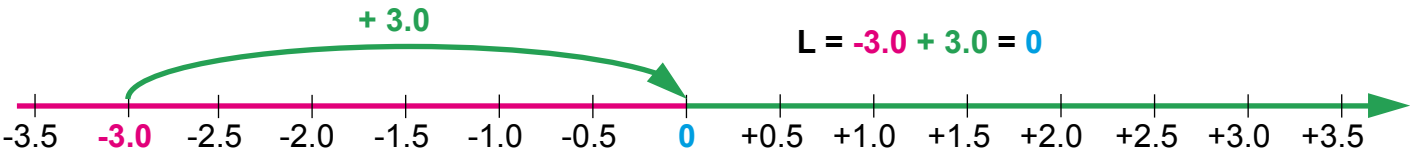
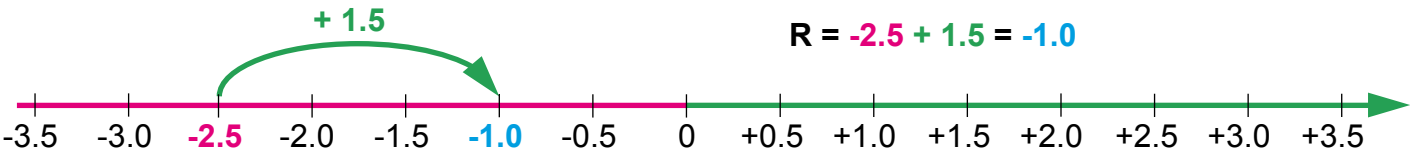
Little mathematics

- $+3 + (+1) = +4$
- $+3 + (-1) = +2$
- $+3 + (-3) = 0$
- $+1 + (-3) = -2$
- $-2 + (-3) = -5$

Exercises

- $+5 + (-4) = \underline{\hspace{2cm}}$
- $+3.5 + (-3.5) = \underline{\hspace{2cm}}$
- $+2 + (-3) = \underline{\hspace{2cm}}$
- $+2 + (-3.5) = \underline{\hspace{2cm}}$
- $-0.5 + (-1.5) = \underline{\hspace{2cm}}$

For calculations the **number line** can help:



Task

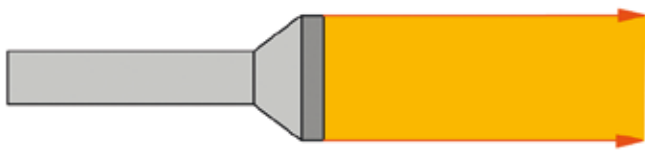
Take different unknown lenses out of the box. First decide if they are positive or negative. Then find out the diopter by addition. Write down your results.

For Trainer: Scratch numbers on about 20 different lenses with a needle. Write the numbers and their diopters on a paper. Then you only have to compare the results of the trainees with your list.

1.5 Light and lenses



Normally the light spreads out straight ...



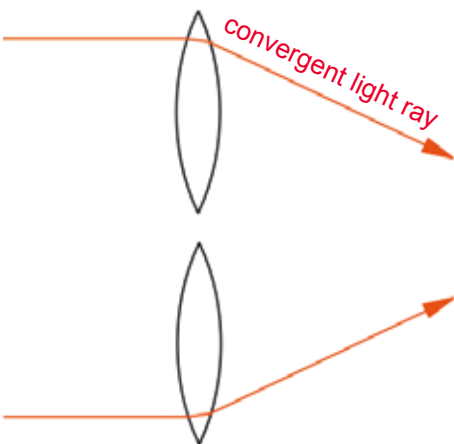
... and into all directions



But when a **single light ray** passes through a lens, it changes its direction. We say it gets **refracted** (like a broken stick)

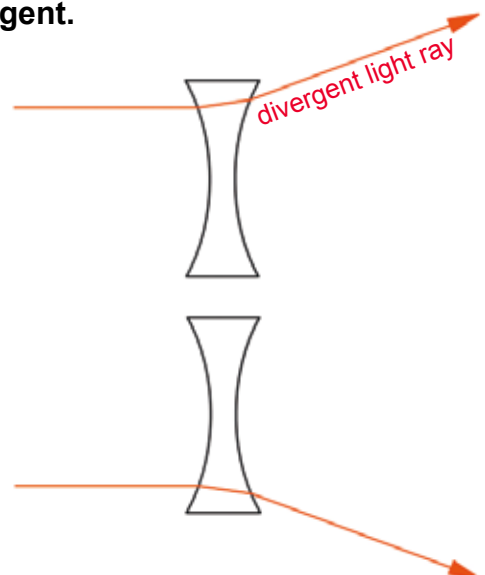
PLUS lens

The light ray is refracted to the center.
It is **convergent**.

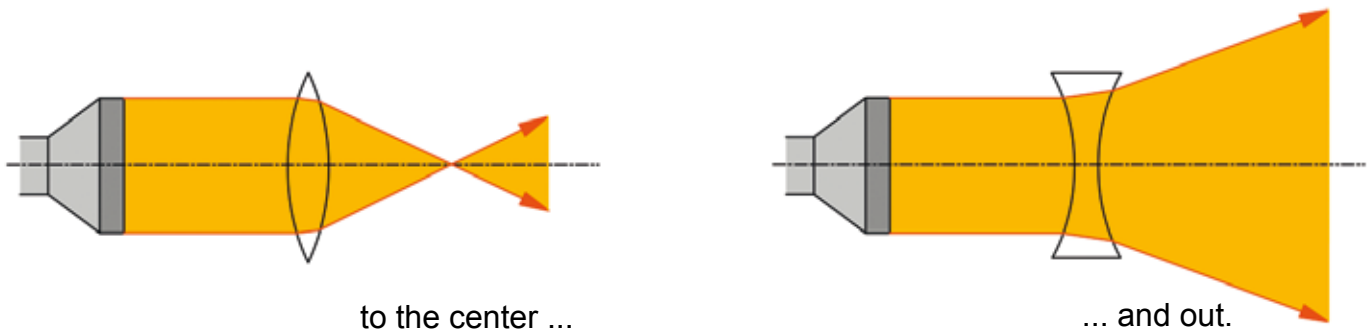


MINUS lens:

The light ray is refracted out.
It is **divergent**.

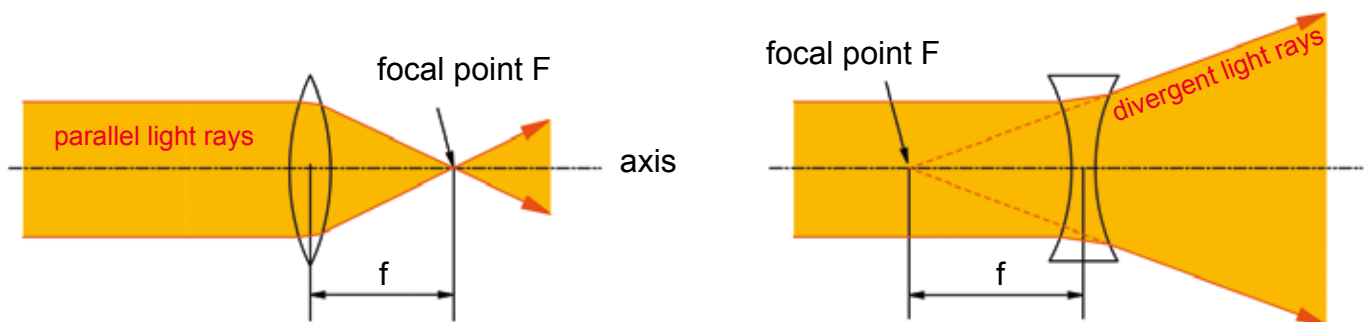


When many (millions) of light rays passing through the lens as a parallel light beam, all of them get refracted ...



Parallel light rays passing through a positive lens, meet all in one point, the **focal point F**. They are convergent (they converge).

Parallel light rays passing through a negative lens are divergent (they diverge).



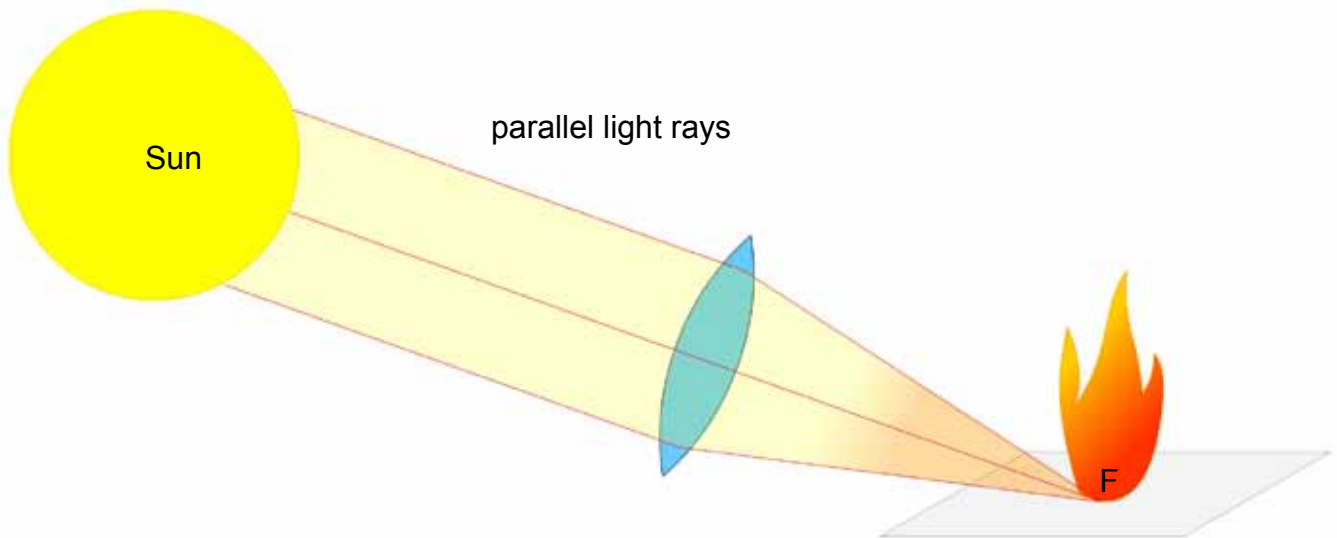
Experiment - Attention: Put on your sunglasses!

Take the lens bar, go outside and let the sun shine through the lenses. On the ground you will see light spots or shadows depending on the lens power and the distance of the lensbar to the floor. Vary the distance. What happens?

Put one +6 lens in front of one of the MINUS lenses what happens? Change the +6 lens to another MINUS lens...

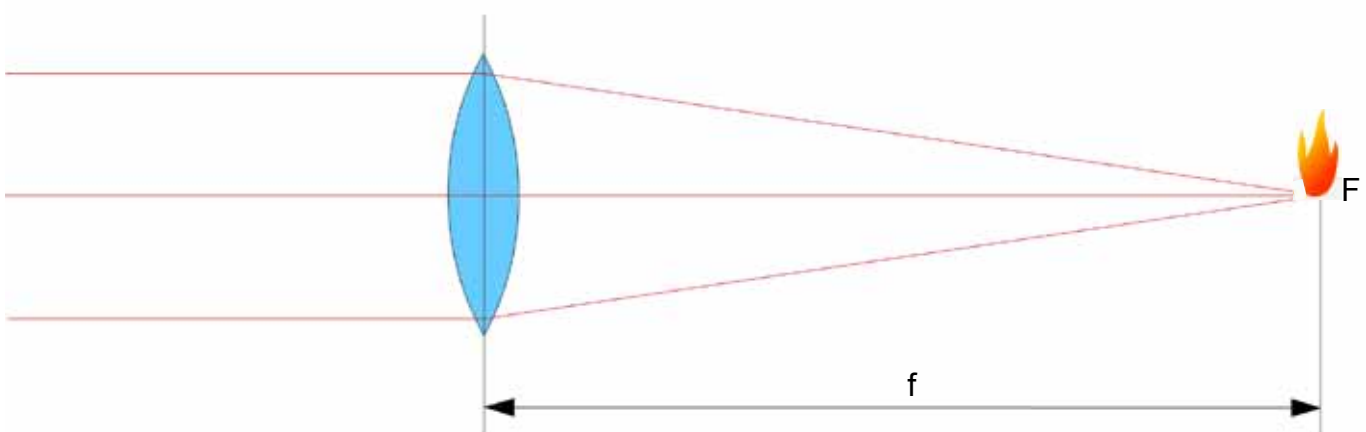
1.6 Refractive power

DANGER: For Experiments with sunlight put on your sun glasses!



If parallel light rays fall through a positive lens, they get focused in one point, the **focal point F** (or focus). In this point a piece of paper starts to burn.

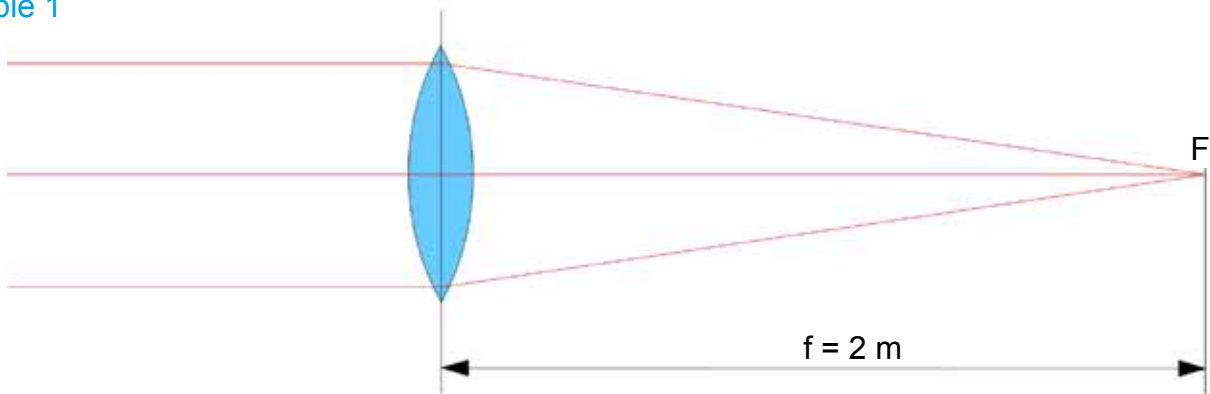
Tip: Before this experiment paint a black point on the paper: ●
Dark and black coloured surfaces absorb the light rays best.



The **focal length f** is the distance between the lens and the focal point F.

The power of a lens

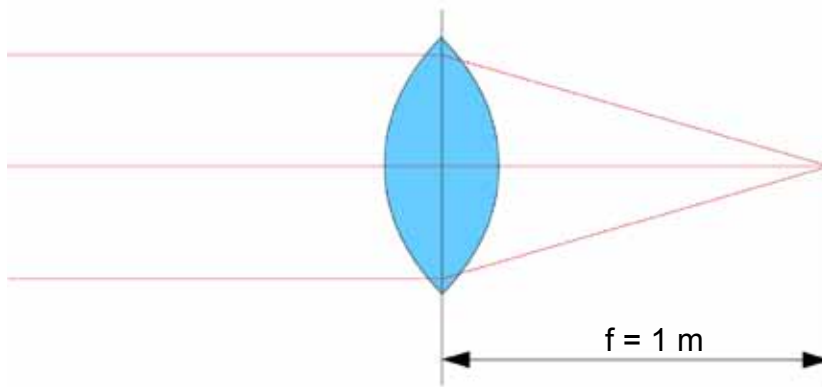
Example 1



This lens has a focal length of $f = 2 \text{ m}$

The power of the lens is $D = \frac{1}{f} = \frac{1}{2 \text{ m}} = 0.5 \text{ D (diopter)}$

Example 2



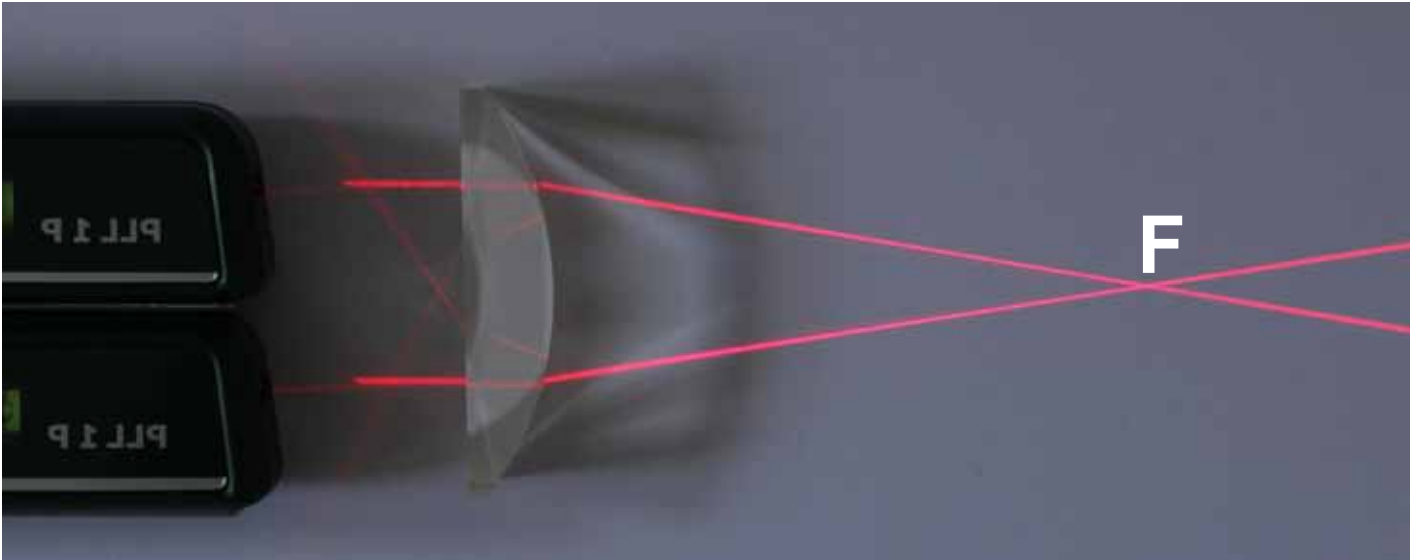
This lens has a focal length of $f = 1 \text{ m}$

The power of the lens is $D = \frac{1}{1 \text{ m}} = 1.0 \text{ D}$

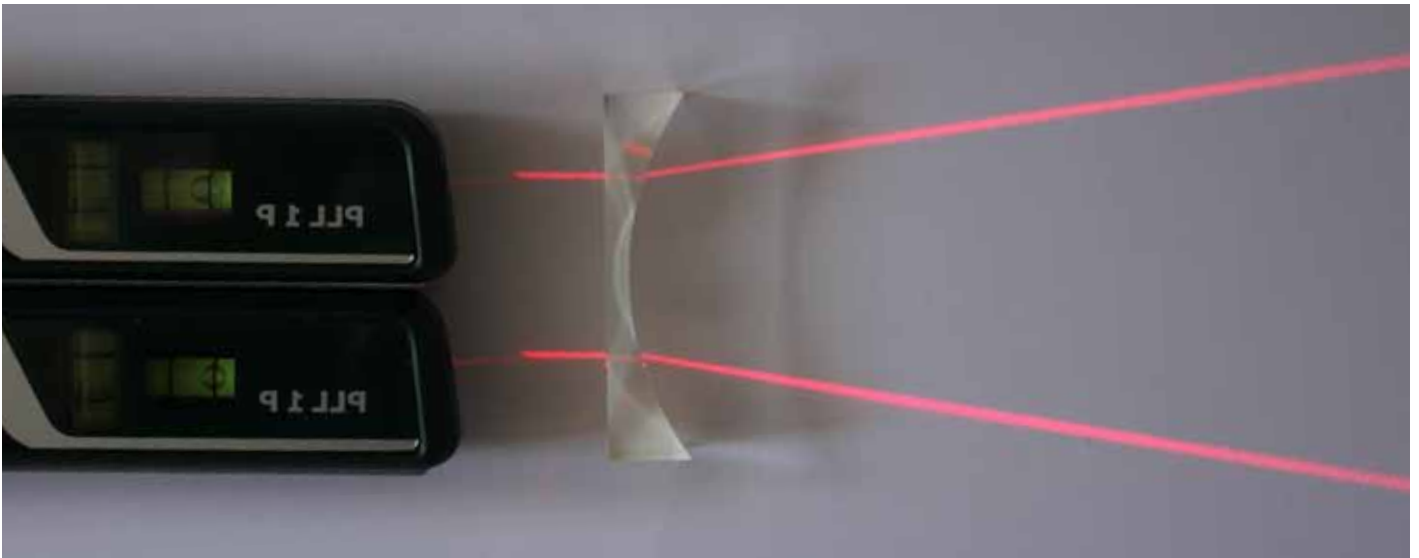
Task

- What is the power of a lens with $f = 3.0 \text{ m}$ ($f = 4.0 \text{ m}$, $f = 10 \text{ cm}$, $f = 0.20 \text{ m}$)
- Find out the focal length of a lens with the optical power of 20 D (2.5 D, 3 D, 4 D)
- Hold your lens bar into the sun and test the different focal lengths.

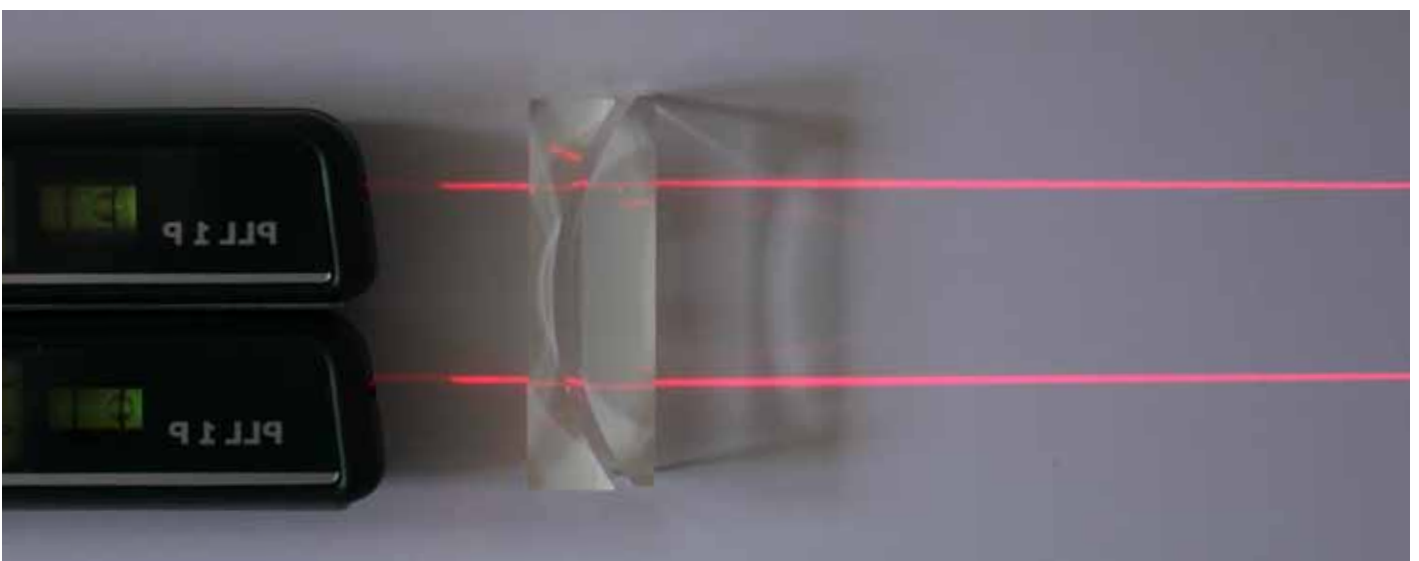
1.7 Experiments with the laser



Positive lens - focuses the light rays in the focal point F

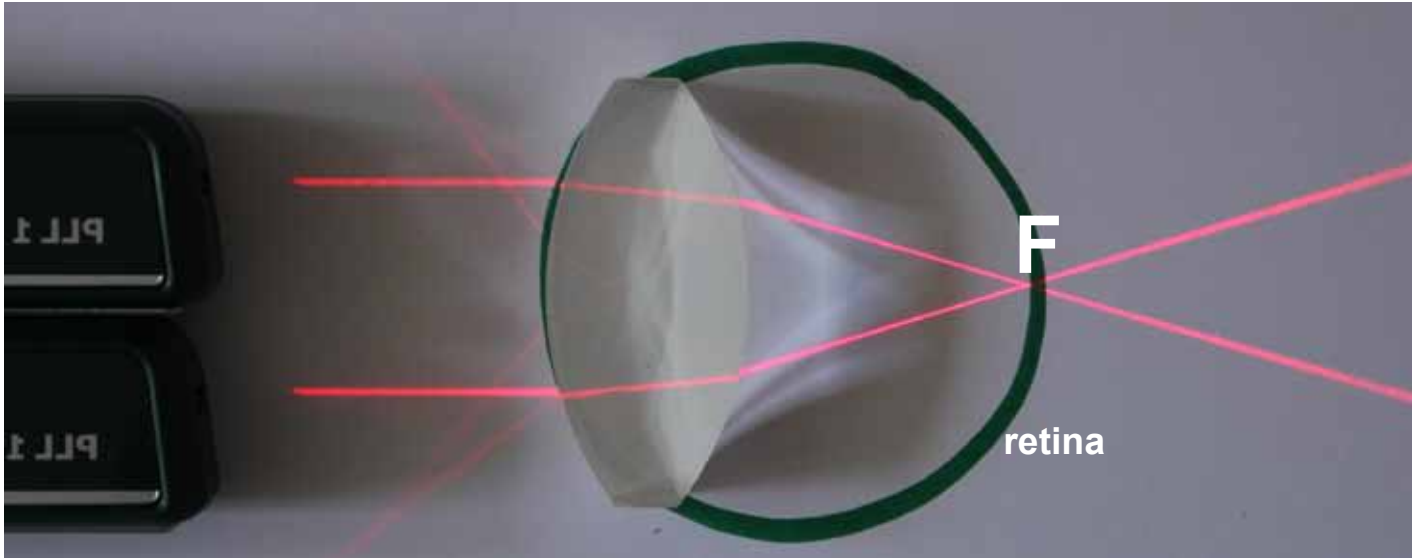


Negative lens: disperses the light

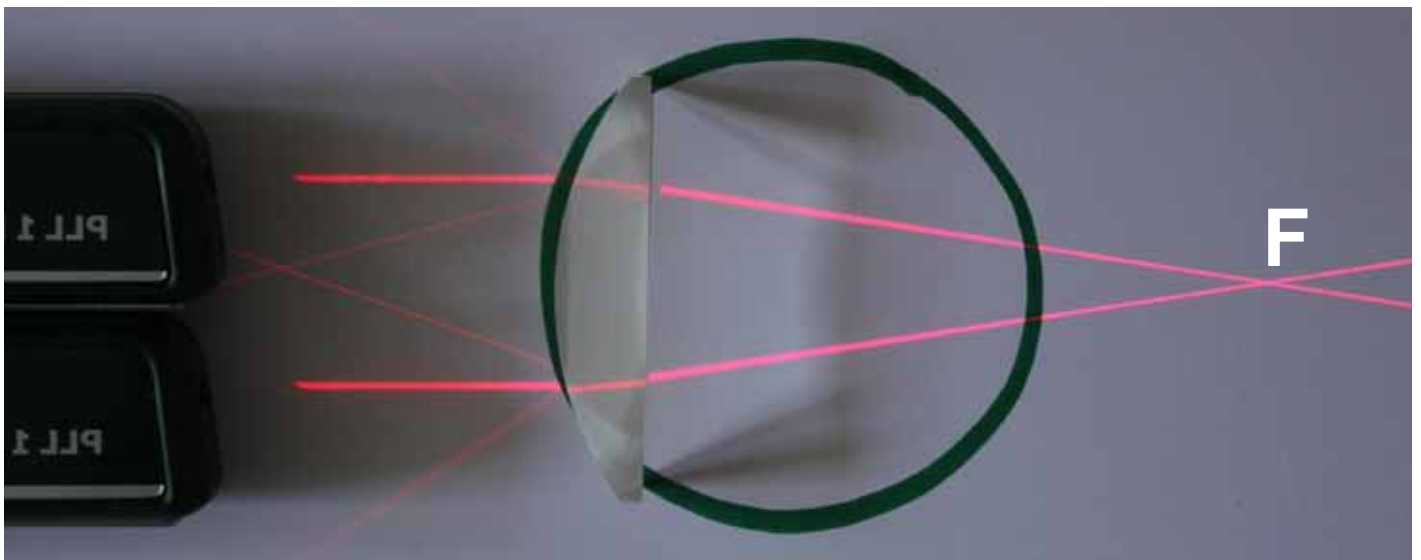


Addition: A positive and a negative lens compensate each other

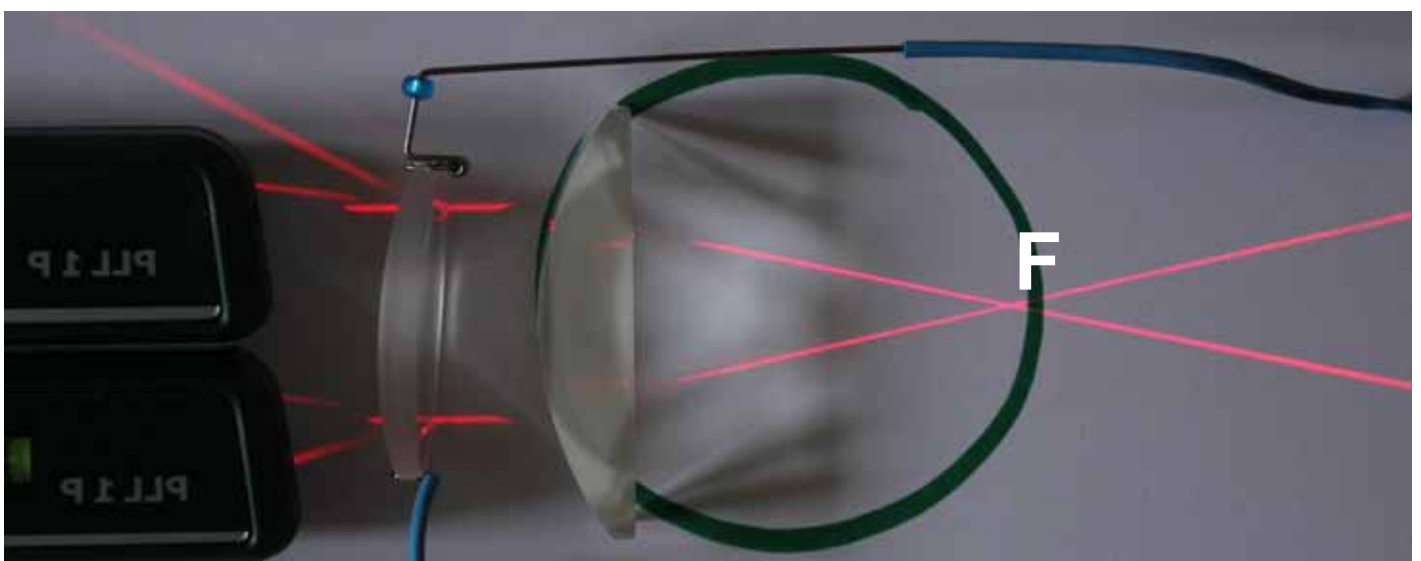
Eye model with light rays



Here the lens of the eye focuses the light exactly on the retina. This eye sees sharp.



The lens is not strong enough - F is behind the retina. This eye cannot see sharp.



Give the eye a pair of (positive) glasses to bring the focal point on to the retina!

Measure the focus of a lens

DANGER: For Experiments with sunlight put on your sun glasses!



Which power has the lens?

The focal point has a distance of 16 cm (0,16 m) from the lens.

So the power D of the lens is
 $D = 1 / 0,16 \text{ m} = 6.25 \text{ D}$

Now do the experiment yourself and calculate the power of different lenses!

1.8 Optical imaging

Life on the wall

Hold a lens with high positive power in front of a white wall opposite the window. Find out the distance where the image on the wall gets sharp. This is the focal length. How does the image look?

You see: The image is

- smaller
- upside down
- reversed



Raindrop

A raindrop is like a PLUS lens: Also here, the image you see is smaller, upside down and reversed.



Experiment

Close one eye and hold a +6.0 lens about 30 cm in front of your open eye. Look through the lens around and outside. You will see everything small, upside down and reversed.



1.9 Seeing

How we can see a candle

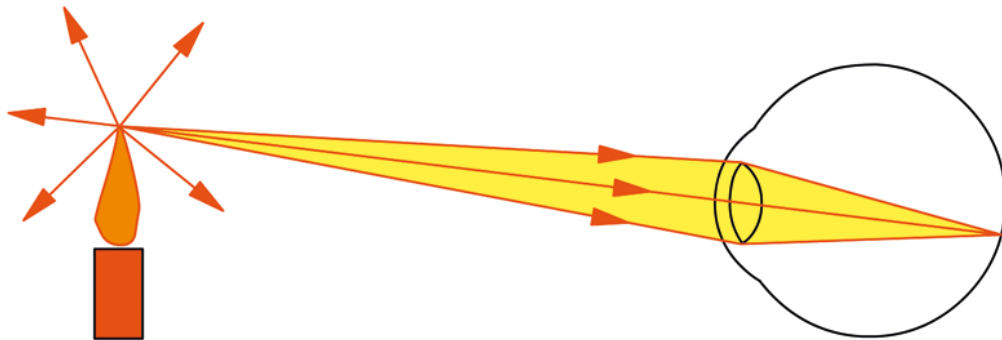
From the top of the flame the light rays go straight in all directions.

Some of the light rays fall into the eye (through the pupil).

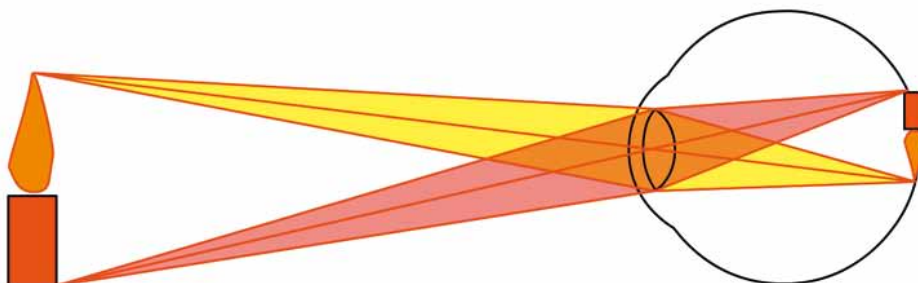
They get refracted by the lens and

then meet again in one image point on the retina.

From there the optic nerve sends the information to the brain.



The same thing happens to all other points of the candle. The image of the candle occurs on the retina.



The image is

- smaller
- upside down
- reversed!

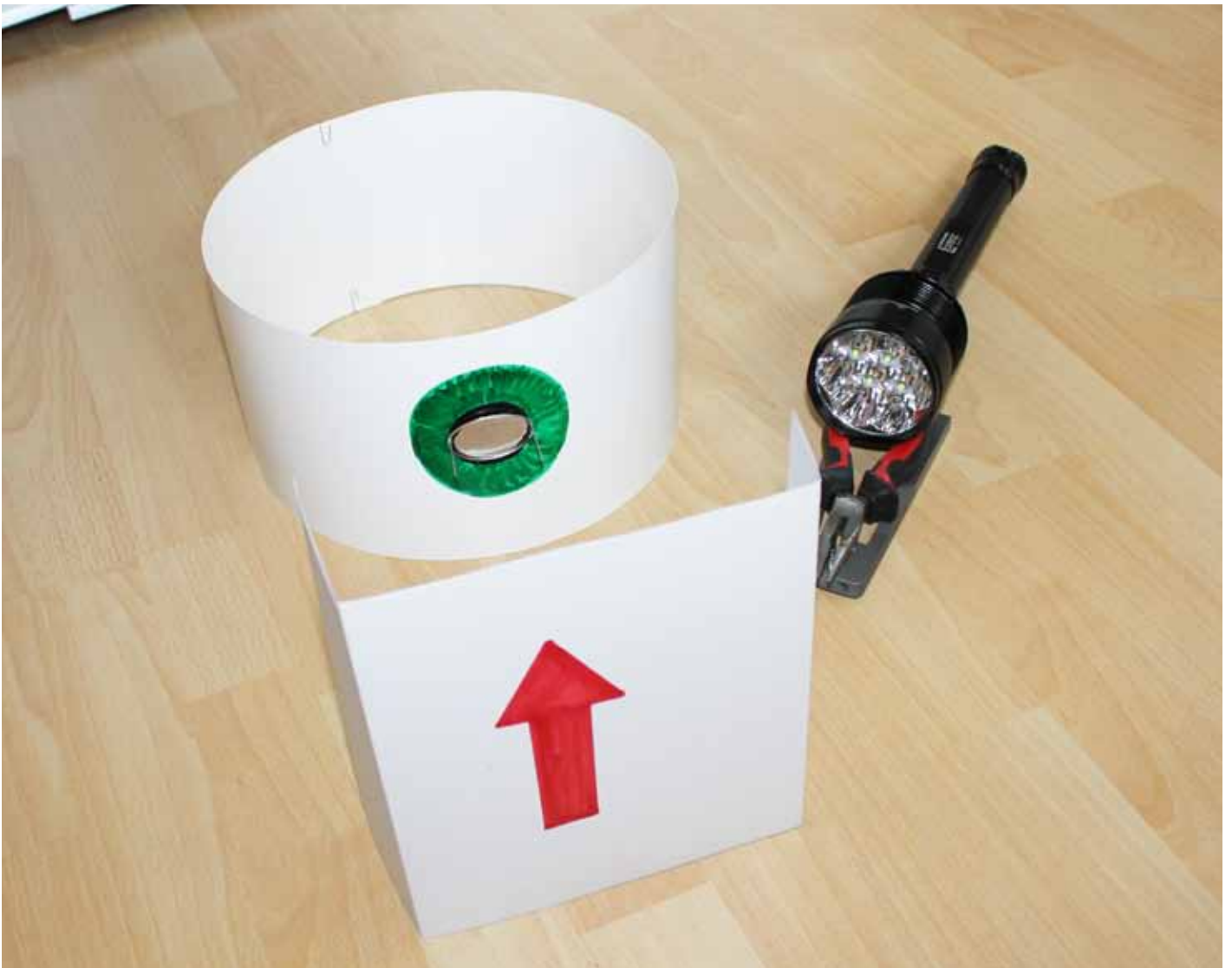


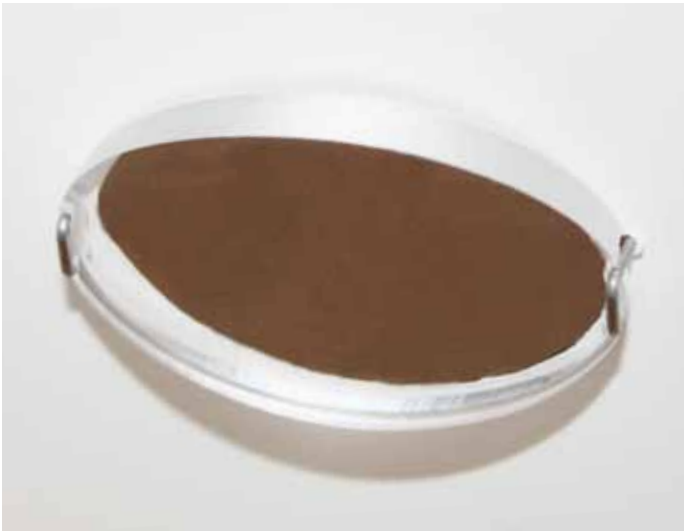
Image of the F

1.10 Paper eye (Part I)

What you need

- A very light torch (if you don't have the torch, a candle can do it as well)
 - About 10 piece of very strong white Paper (about 350 g/m²)
 - Lenses (+6.0; +1.0; -1.0)
 - Glue
 - Paperclips
 - Spring steel wire
1. Make a long strip of the paper (about 100x15 cm)
 2. Form a ring and fix the ends with two paperclips (staples)
 3. Cut an elliptic hole in one side (a bit smaller than the lens)
 4. Draw a nice red arrow on another
 5. Piece of paper (about 10 cm height)



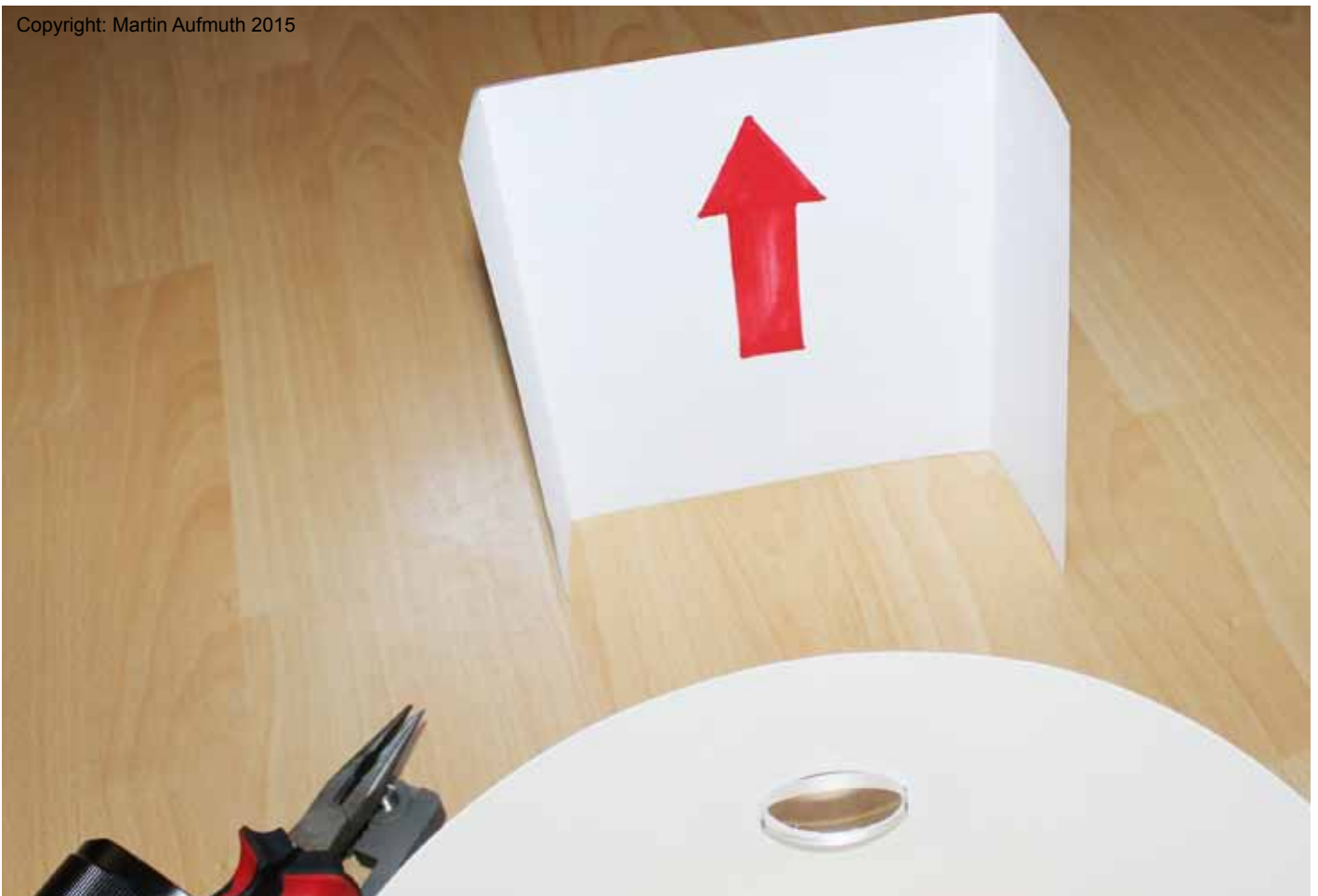


5. Fix the +6.0 D lens by means of a half frame from INSIDE the paper ring.



6. From outside you can put other lenses as „eyeglasses“ on the ends of the wire

7. Wait until evening, lit the torch and shine on the red arrow.





Copyright: Martin Aufmuth 2015

Like a real eye, the light from the red arrow is falling through the lens into the eye.

Like a real eye, there is an image of the red arrow at the back of the eye on the retina.

Alternatively you can also draw a nice „F“. The „F“ has the additional advantage that you can see not only the image is upside-down but also inversed.



Iris

You can also simulate the function of the iris. Cut one iris from paper with a big opening and one with a small one.

=> The image will change its brightness.

Wide and closed Iris

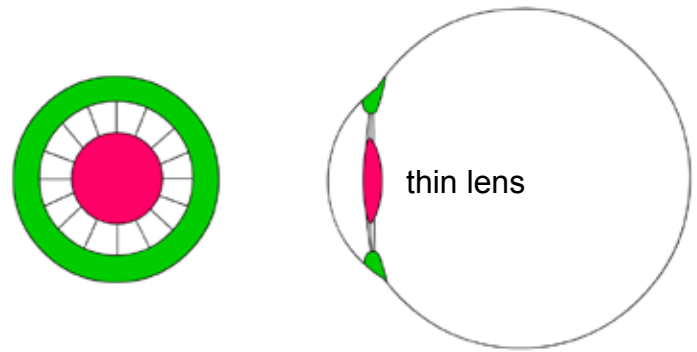


1.11 Accommodation

Distance vision

If you see something distant, your **lens is thin and long**.

The ciliary muscle is relaxed, the zonula fibers are tight.

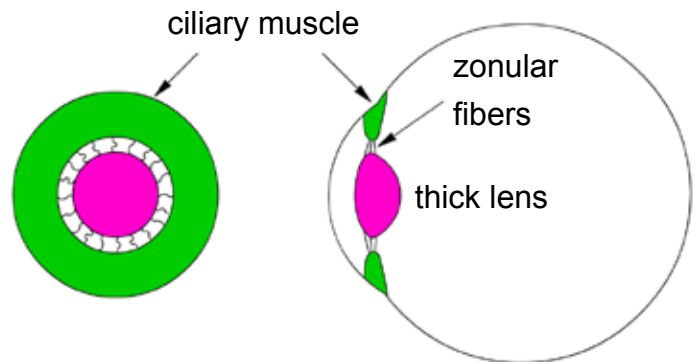


For distance vision the lens is thin and long.

Near vision

If you want to read and see near objects, the ciliary muscle is contracted, the zonula fibers are loose.

The lens is thick.



For near vision the lens is thick and round.

The refractive power of the lens changes according to the distance of the object you are looking at. This is called **accommodation**.



Group experiment

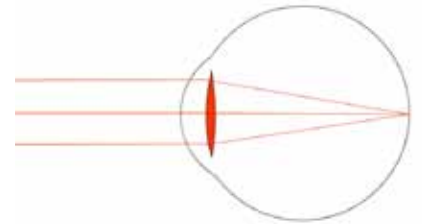
All of you standing in a circle (at least 12 persons). In the front two persons are the pupil (they can open and close).

Two persons are the ciliary muscle holding the lens (a third person) in the middle and let it get thicker and thinner. In the back there is the retina getting the information from outside from the pupil...

The lens while seeing in different distances

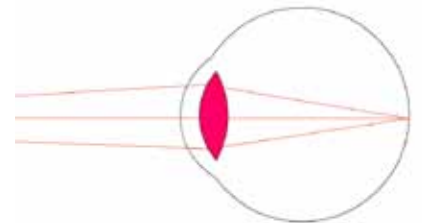
Far distance

- Thin lens
- No accommodation
- Ciliary muscle relaxed



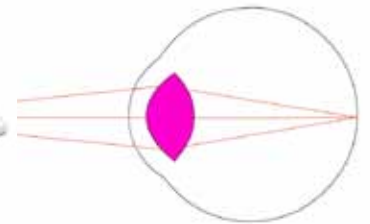
Middle distance

- Medium lens
- Medium accommodation



Near distance

- Thick lens
- Strong accommodation
- Ciliary muscle contracted



Experiment: Feel your eye muscle

Look at your finger. Now bring your finger close to your eye (but don't touch it) and focus on it. How do your eyes feel now?

You feel it is hard for your eye (your ciliary muscle has to contract very strong).

Now look outside to a very distant point (a remote tree, house, mountain). How do your eyes feel now?

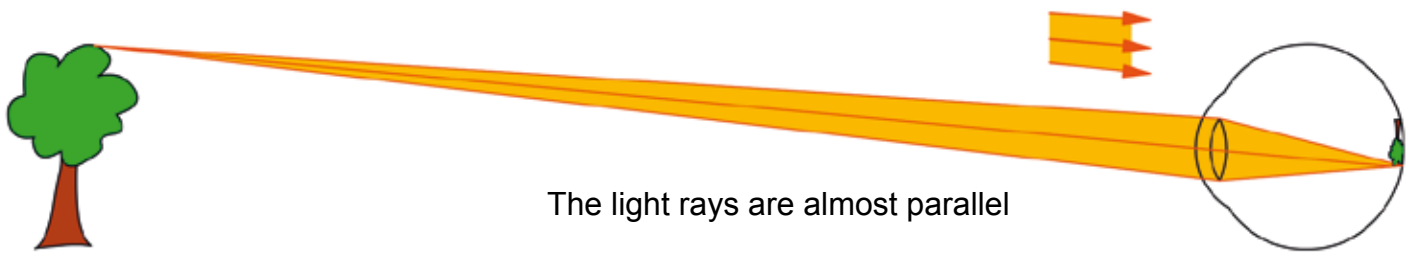
Yes: your eyes feel very easy - your ciliary muscle is relaxed now (thin lens).

1.12 Emmetropia

The good, perfect functioning eye.

Normally, the eyeball has a length of about 24 mm. The refractive power is about 60 D.

Looking at **far distant objects**, the almost parallel light rays fall through the lens, get refracted and focused on the retina in the back of the eye.



=> The image is **sharp on the retina**

=> Far things can be seen sharply without accommodation (eye relaxed)

=> everything is OK

Experiment

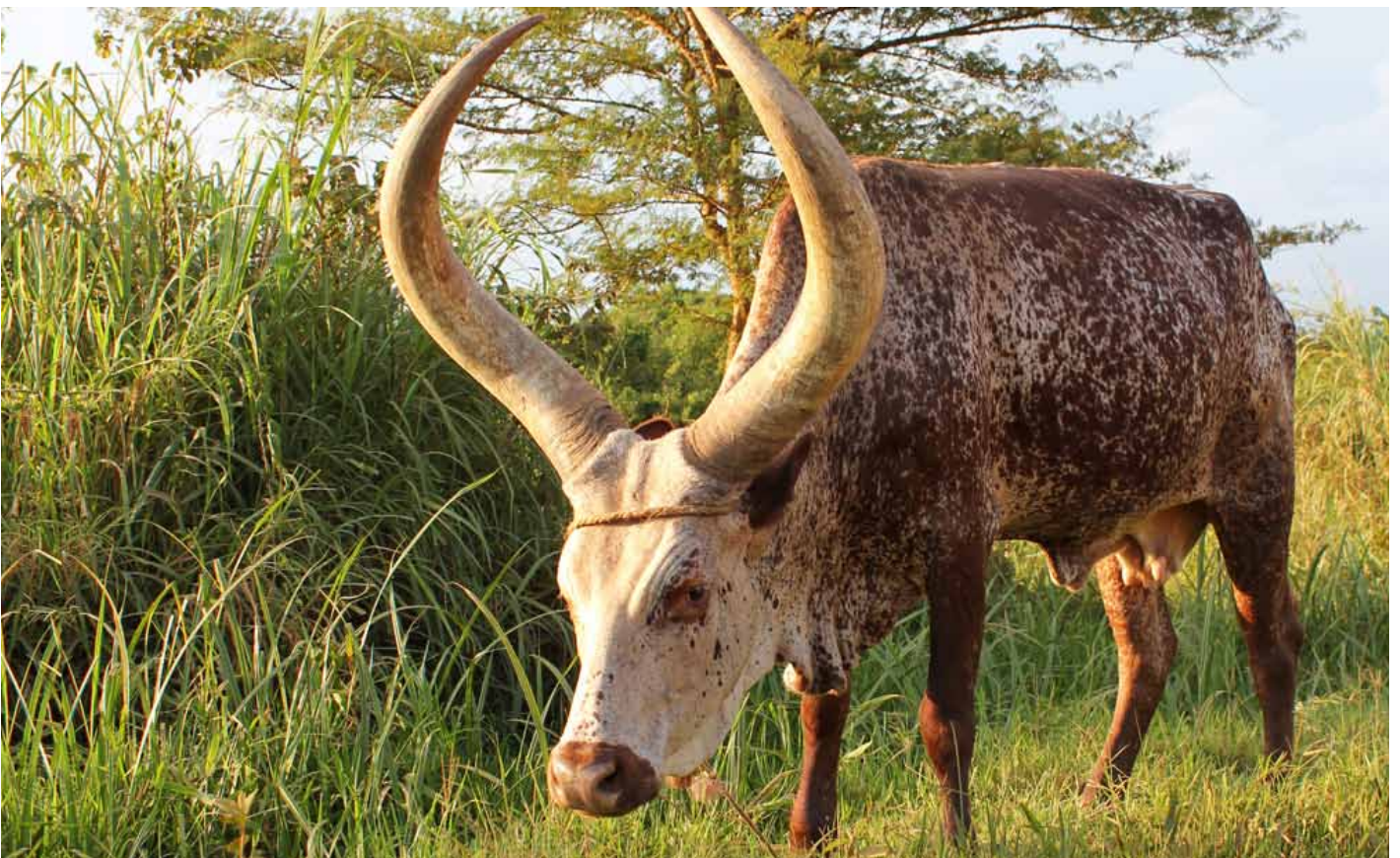
Do the cow experiment on the right side on your own: Put on a pair of glasses with strong PLUS lenses and look around.

1.13 Ametropia: Myopia and Hyperopia

The opposite of emmetropia is ametropia: The eye has a refractive error when viewing distant objects.



This is how a cow looks like with a defect vision of 6 diopters ...

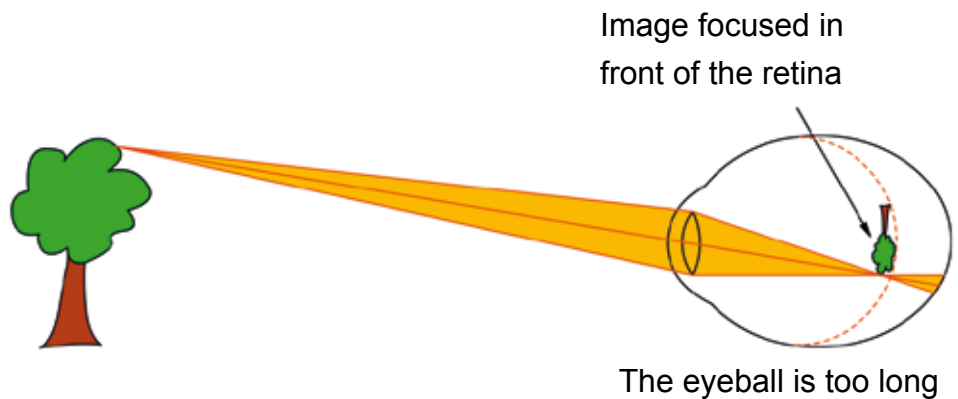


... And the same cow with the right pair of eyeglasses.

Myopia: short-sightedness (near-sightedness)

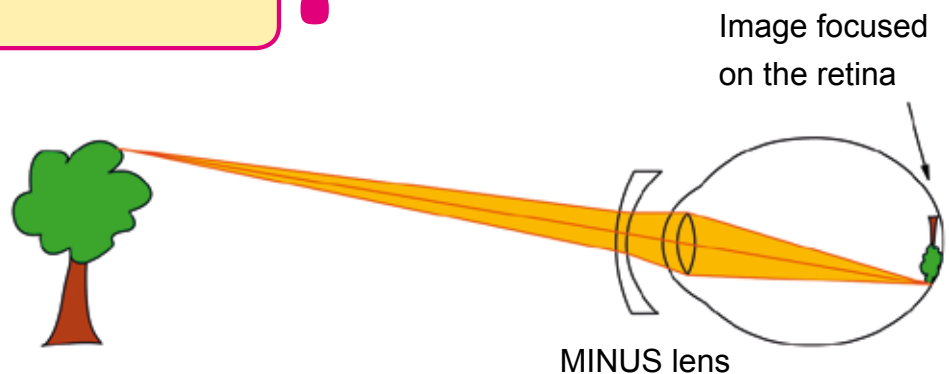
The eyeball is too **LONG** (or the refractive power is **too positive!**)

- The image is **focused in front of the retina**
- Only close **things at a short distance are sharp**
Distant things are blurred (you are myopic = short-sighted)



How can we correct hyperopia?

People with myopia need **negative lenses!**
The negative lens brings the image back to the retina.



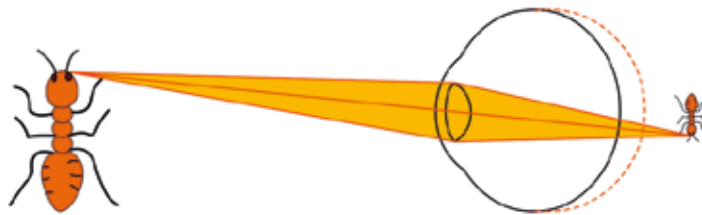
Experiment

Put on a pair of glasses with positive lenses (e.g. +5.0 on both eyes)
Now you feel exactly like somebody short-sighted with myopia!
Try to correct your „problem“ with a negative lens...

Hyperopia: long-sightedness (far-sightedness)

The eyeball is too **SHORT** (or the refractive power is **too negative!**)

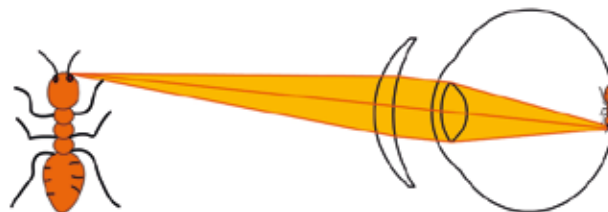
- The image is focused **behind the retina**
- Especially **near objects are blurred** (you are hyperopic = long-sighted = far-sighted)
- The eye lens is not strong enough to focus the object on the retina.



The eyeball is too short

How can we correct hyperopia?

People with hyperopia need **positive lenses!** The positive lens brings the image to the retina.



PLUS lens

Young hyperopic people can accommodate very strong (make their lens thick) and get a sharp picture, but it is hard for their eyes.

Experiment

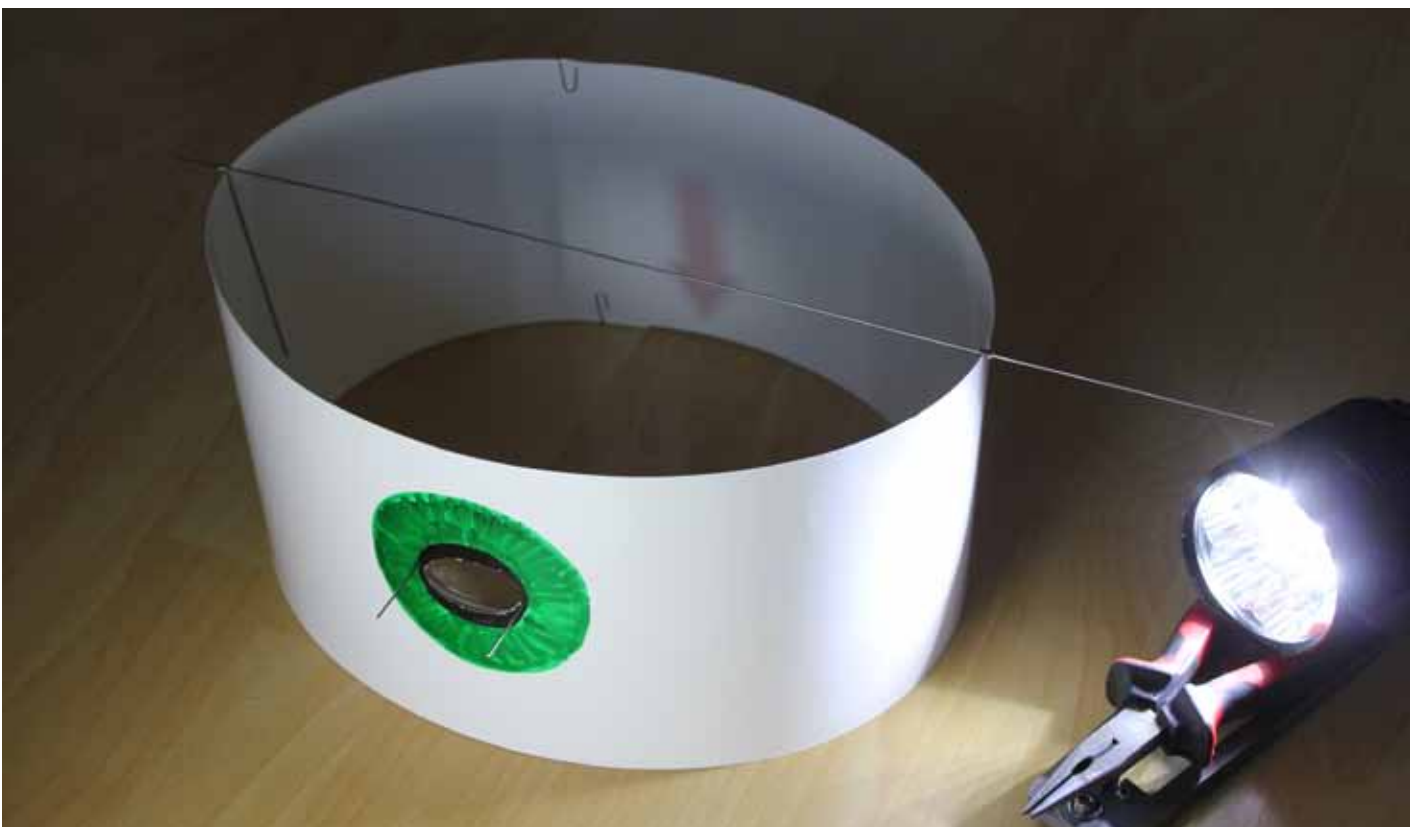
Put on a pair of glasses with -6.0 on both eyes.

Now you feel like somebody long-sighted with hyperopia! Distance vision will be not easy but maybe possible. Reading at very near distance will be difficult. Test it!

1.14 Paper eye (Part II)



The myopic eye: The eye ball is too long. The image of the arrow is not clear first. If you take a -1.0 lens and put it before the eye as eye glass, the image becomes sharp.



A hyperopic eye which is too short can be corrected with e.g. a $+1.0$ lens.

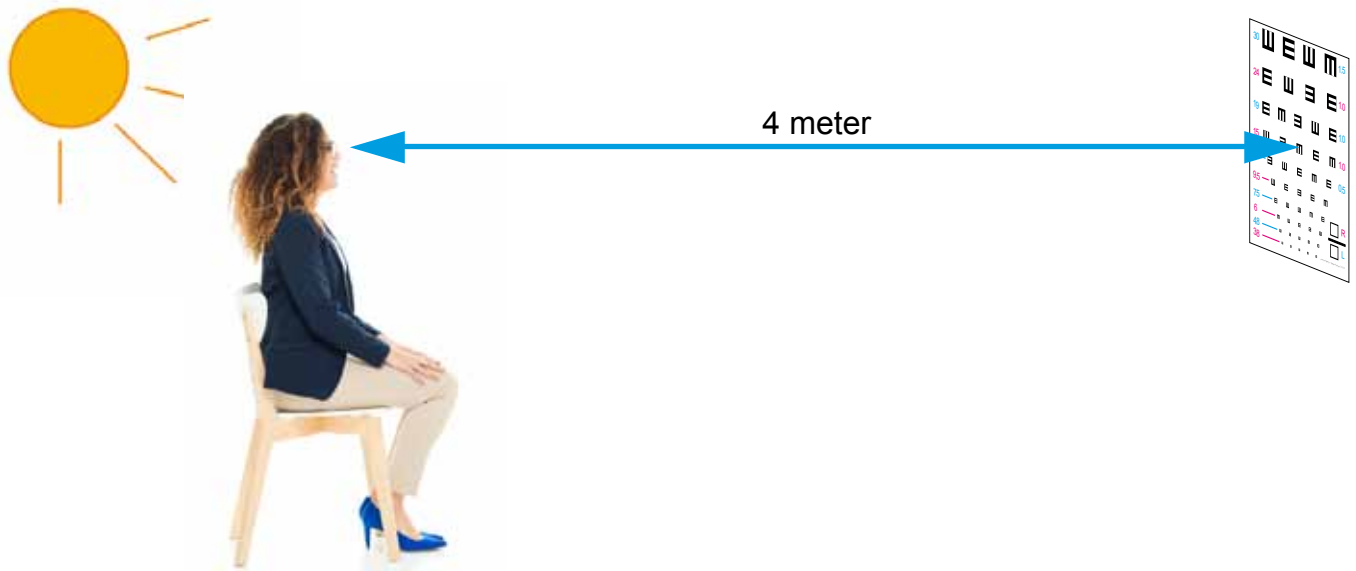
2. Best-Spherical-Correction (BSC)



2.1 Eye Test - preparation

The right location - Preparations

Put the vision chart on a wall or on a tree. Measure **4 meters** from the chart and put the chair there. Make sure, the light comes from behind.



Do the self-test

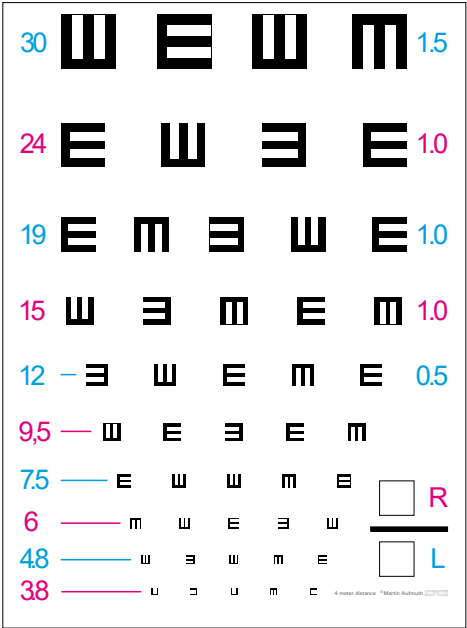
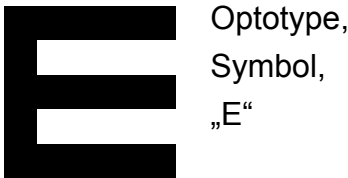
Sit down on the patient's chair yourself and look at the chart

- Can you see the last line clear yourself?
- Doesn't the chart reflect the sun?
- Doesn't the sunlight or shadow disturb you?
- Is the vision chart at the same height as your eyes?
- Is there enough light in the room?

=> If not: Change the position of the chair or the vision chart!

The Vision chart

We use the E chart with the letter „E“ in four kinds of rotation.



E chart

The Visual Acuity (VA)

VA_{sc} means how good somebody can see **WITHOUT** glasses.

sc: sine correctione (Lat.) = no correction

VA_{cc} means how good somebody can see **WITH** glasses.

cc: cum correctione (Lat.) = with correction

$\frac{6}{12}$ means somebody with good eyes can see this E out of 12 meter distance, while the patient sees the E only from 6 meter distance.

Line No.
12 $\frac{6}{12}$

Grades of visual impairment
 6/18 moderate visual impairment
 6/60 severe visual impairment
 6/200 or less: somebody is said to be blind.

Experiment
 Make the test: Which PLUS lens makes you moderate, which one severely visually impaired and which makes you blind?



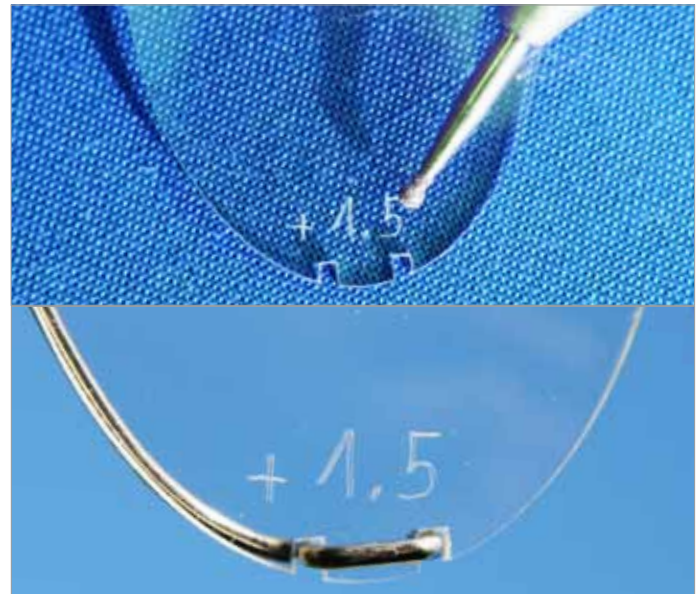
The lens bar

The lens bar has lenses of the different diopters. Make sure that the lenses are always clean. If they are scratched then replace them.



Lens bar

Engrave the diopters into the lenses. In case they drop out you cannot mix them up.

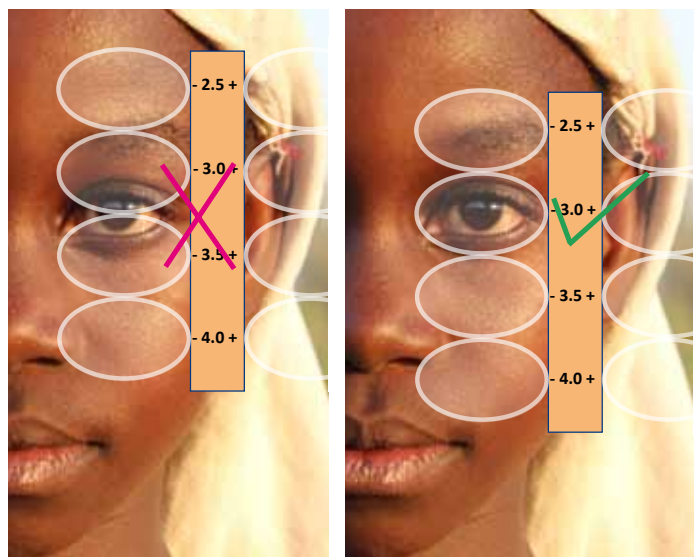


Lens with engraved power

Make sure, the patient looks through the middle of the lens!

Maybe the patient can hold the lens bar himself, then he holds it the right way.

If your hand is shivering - put it on the patient's head (ask him before if this is OK for him).

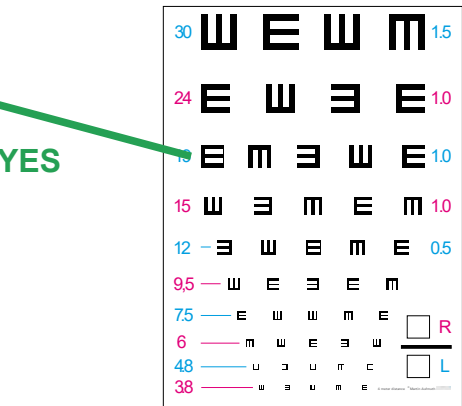
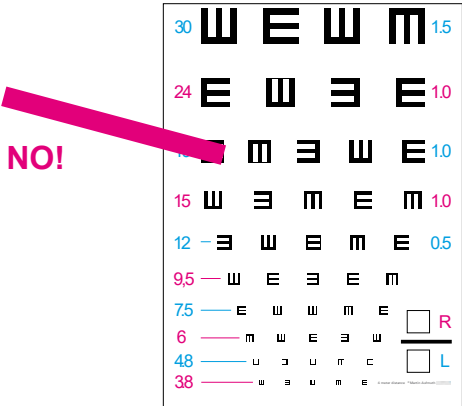




Don't cover the symbols with your finger or your stick! Take a thin stick!

Make sure, the patient can see the „E“ **COMPLETE!**

Experiments with the vision chart
 Make experiments with the vision chart. Try to read from different distances - who in your group has the best eyes?
 Double/triple the distance - which lines you can read now?
 Try it in shadow/sun/in the evening. How your vision acuity changes?



Clients book

Welcome the patient, say hello, tell him your name.

Be friendly and polite - the patient might be afraid because he never met an optician before.

Don't hurry - the patient needs time to see and to understand.

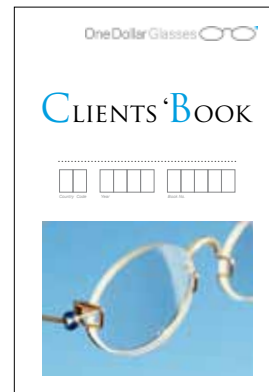
Ask his personal data:

- name
- age
- address
- phone number (if he has no phone, ask him for the number of a family member or neighbour)
- profession

Ask him about his problem:

- reading
- seeing at short distance
- seeing at far distance
- problem with light
- aching eyes
- cataract, or any other eye disease
- eye injury

Write everything in the client's book!



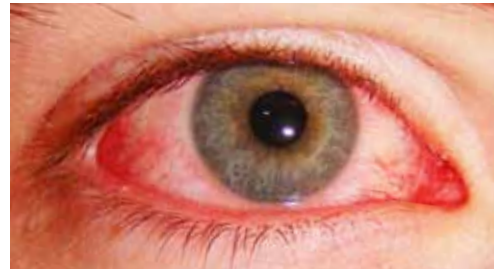
Ask him how long he already has the problem

Date: <input type="text" value="2"/> <input type="text" value="0"/> <input type="text" value=""/> <input type="text" value=""/> - <input type="text" value=""/> <input type="text" value=""/> - <input type="text" value=""/> <input type="text" value=""/>		Prescription by: _____	
First name: _____		Age: _____	
Surname: _____		Male <input type="checkbox"/> Fem. <input type="checkbox"/>	
Address: _____			
Phone No.: _____		Profession: _____	
Problem: _____		Had glasses before: Yes <input type="checkbox"/> No <input type="checkbox"/>	
Eye test:	VA _{sc} R: <input type="text"/> L: <input type="text"/>	VA _{cc} R: <input type="text"/> L: <input type="text"/>	R: <input type="text"/> L: <input type="text"/>
Glasses for:	reading <input type="checkbox"/> seeing far <input type="checkbox"/> Sun <input type="checkbox"/>	PD: _____ (S/M/L)	
Selling prize: _____		Signature: _____	
I should go to hospital: Yes <input type="checkbox"/> No <input type="checkbox"/>			
With my signature I declare that the abovementioned data is true. I agree that my personal data may be stored and published.			

2.2 Eye diseases

Look at the patient's eyes

1. Is the white of the eye red?

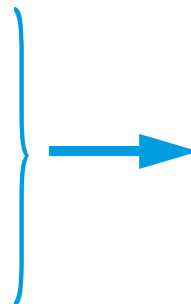


2. Is the pupil grey or white?



Has the patient

- 3. Painful eyes
- 4. Swollen eyes
- 5. Watery eyes
- 6. Abnormal eye movement
- 7. anything which does not look normal



=> Send the patient to the hospital!

Important: You are not allowed to treat any eye diseases by giving drops or so.



Characteristics of a healthy eye

- Eyelids opening and closing normally
- White conjunctiva
- Clear cornea
- Round, black pupils of the same size
- Eyeball can move in all directions



2.3. Test without lens

Test both eyes

The patient sits 4 m from the vision chart.

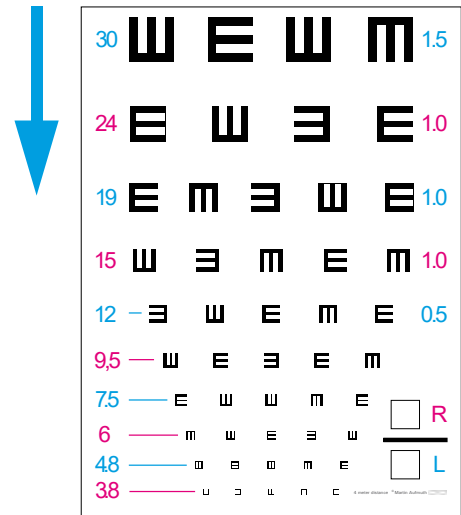
Ask which line he can see well.

=> Start with this line

Go down to the next line.

Ask the directions of all symbols.

If he can see at least **3 out of 5 symbols** (60%) in one line this is OK. If he is not sure, let him guess.

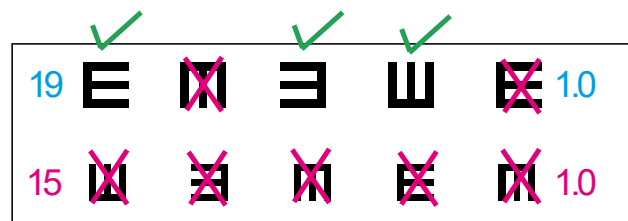


Example

The patient can see 3 out of 5 symbols in line 19. In line 15 he cannot see.

=> He has **VAsc** = $\frac{6}{19}$

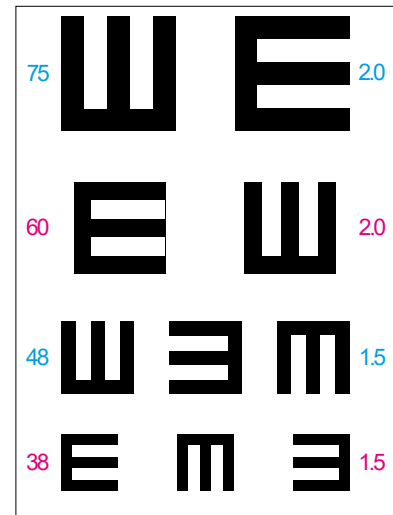
(Somebody with perfect vision acuity would see this line from 19 meter distance)



Very low vision (high visual impairment)

If somebody cannot see any line, turn the vision chart to see the side with the large symbols.

Then ask again.



If he cannot see anything

Bring the vision chart 40 cm near to his eyes and test again:

If he can see nothing again:

If he can see **NOTHING** again:

=> If now he can see line 30, this is like line 300 (at 15 => 150, always ten times as much)

=> Try finger counting very near to his eyes.

=> **Send him to the eye doctor / hospital!**

2.4 The Golden Rule of Refraction

The Golden Rule

Per 0.50 D the visual acuity (VA) goes down 50% (by half)!

Experiment 1

If you see the line 6 ($6/6 = 1$) and you take a +0.5 lens, you will see only line 12 ($6/12 = 0.50 = \text{half}$) => You see half as good as somebody with normal eyes.



Experiment 2

If you see the line 6 ($6/6 = 1$) and you take a +1.0 lens, you will see only line 24 ($6/24 = 0.25 = \text{half of half} = \text{a quarter}$)



Experiment 3

If you see the line 6 ($6/6 = 1$) and you take a +1.5 lens, you will see only line 48 ($6/48 = 0.125 = \text{half of a quarter}$)



Visual acuity in %

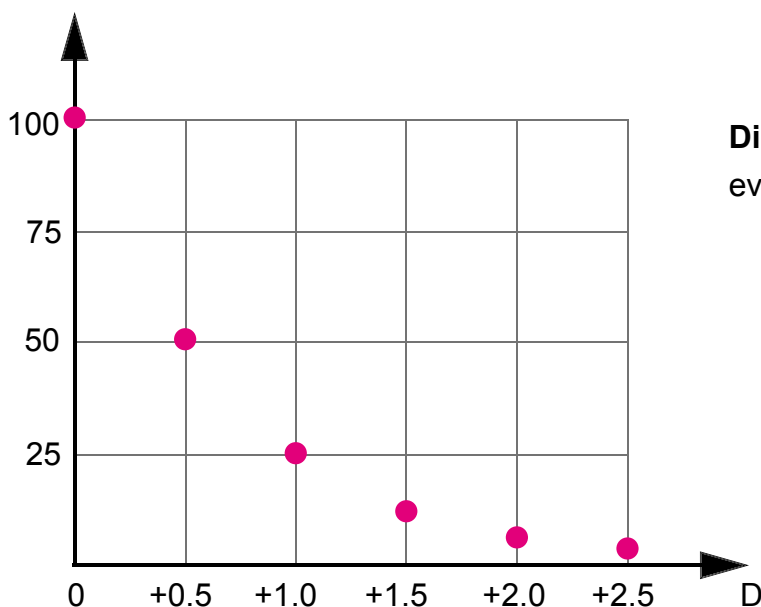


Diagram: If you look through a PLUS lens, for every 0.5 D the VA goes down by half.

2.5 The Starting-Power

If the patient can only see line 12 you start with the **Starting-Power** of +0.5

If this is worse you go to -0.5

With -0.5, his visual acuity (VA) now should double and he should see line 6

=> The **Starting-Power** for line 12 is ± 0.5

With ± 1.0 the VA should double twice and he should see line 6

=> The **Starting-Power** for line 24 is ± 1.0

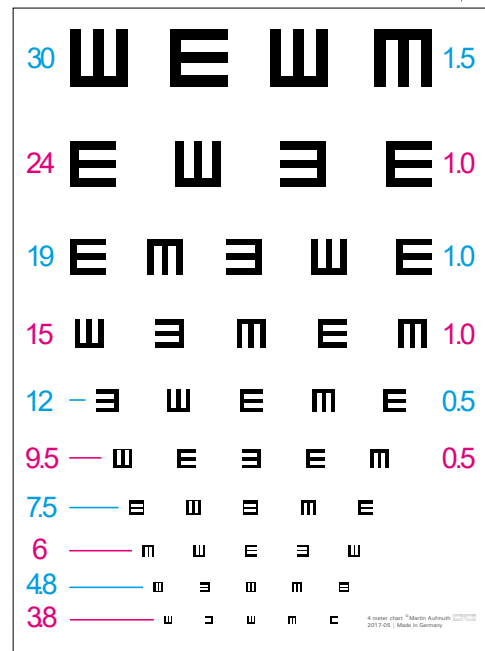
With ± 1.5 the VA should double three times and he should see line 6

=> The **Starting-Power** for line 48 is ± 1.5

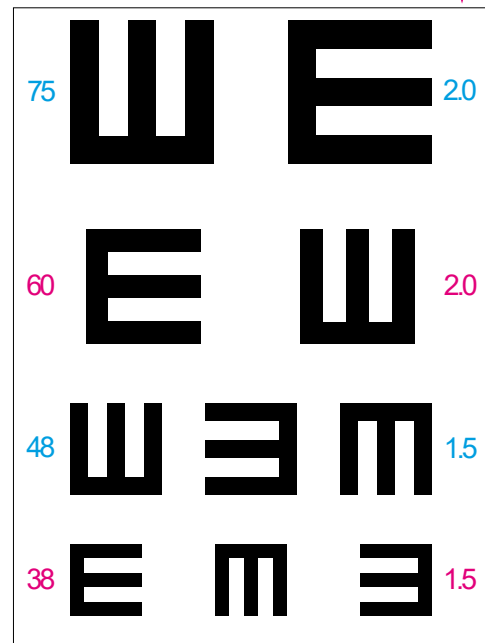
If he cannot even see the large symbols,

=> Take as **Starting-Power** ± 2.0

Starting-Power ↓



Starting-Power ↓



Each line has its own Starting-Power! ¹⁾ !

1) Exceptions: If the patient has a strong astigmatism, the starting power might be too strong. If the patient is accustomed to his bad vision, the starting power might be not strong enough. Also when he is strongly hyperopic there will be more plus needed.

2.6 The Refraction

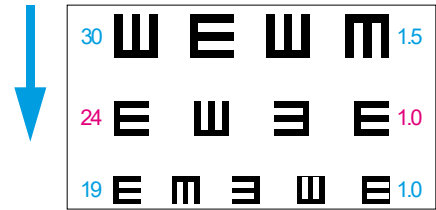
Step 1: Check the right eye without lens


The patient covers his LEFT eye with his PALM (not with his fingers!).

Ask which line he can see well with his RIGHT eye => Start with this line. Then go down and find the line he can see at least 3 out of 5 symbols.

The Eye-Test-Card

Laminated card you can write on with a water-soluble marker. At the end of the refraction the data is transferred into the clients book.



Name:	_____	
Optician:	_____	
	R	L
VA _{sc}	<u>6</u> 19	<u>6</u>
VA _{cc} <i>temporary</i>	<u>6</u>	<u>6</u>
Far		
Near		
VA _{cc} <i>Final test!</i>	<u>6</u>	<u>6</u>

Write down the VAsc of the line he can see at least 3 out of 5 symbols. !

Step 2: Start with plus

Start with PLUS Starting-Power

Wait 3-5 seconds! (the eye can adapt)

Then Ask: „**Is this worse?**“

Find the line he can see (3 out of 5)

Take next higher plus (continue...)

Stop when he says „**it is worse!**“

Take 0.5 D less and test again

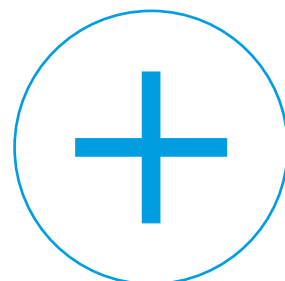
Take highest PLUS lens which is still OK

Write in Eye-Test-Card VAcc

Write prescription in Eye-Test-Card

If Plus is NOT good => go to Minus

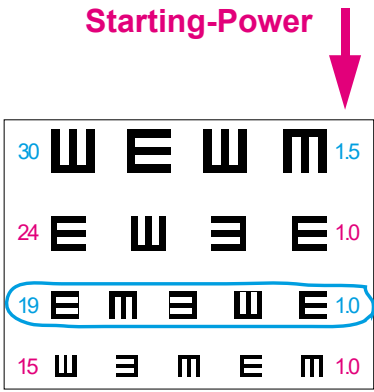
Start with PLUS



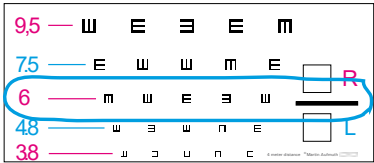
Example 1

Without lens, the patient can see 3 out of 5 (or more) in line 19
 => VAsc 6/19

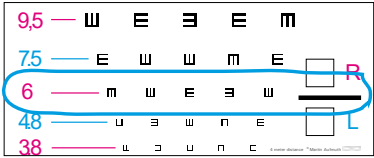
=> Starting-Power = +1.0
 Wait 3 seconds (count „21, 22, 23“)
 Ask: „Is it worse?“




He says „NO“ and he can see 3 out of 5 in line 6 now
 Take +1.5
 Ask: „Is it worse?“



He says „NO“ and he can still see 3 out of 5 in line 6
 Take +2.0
 Ask: „Is it worse?“



Now he says „YES“ (it is worse) => STOP
 Go back to + 1.5 and test again line 6
 => he can see line 6

	R	L
VAsc	$\frac{6}{19}$	$\frac{6}{6}$
VAcc temporary	$\frac{6}{6}$	$\frac{6}{6}$
Far	+1.5	

Write VAcc 6/12
Write prescription R +1.5



Not OK: covering the eye with fingers.



OK: He covers his eye with his palm.

Step 3: Minus

Start with MINUS Starting-Power

Ask: „**Is it better?**“

Find the line he can see (3 out of 5)

Go on with next higher Minus ...

Stop when he says „it is not better!“

Stop also when the line does not improve

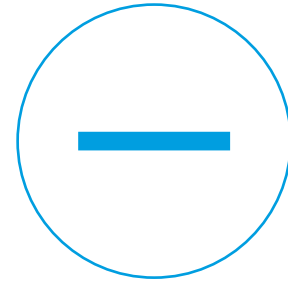
Take 0.5 D less and test again

Take the lowest MINUS lens which is good

Write VAcc in Eye-Test-Card

Write prescription in Eye-Test-Card

MINUS



People with very low VA


A patient can't see the largest symbols

VAsc: Write < **6/75** (smaller than 6/75)

Starting-Power: Take 2.0

Increase the power (first PLUS, then MINUS) step by step.

Stop only if none of your lenses can help (including the lenses higher than 6.0). Take time!

	R	L
		
VAsc	< $\frac{6}{75}$	$\frac{6}{6}$
VAcc	$\frac{6}{6}$	$\frac{6}{6}$

If you cannot help

=> **Send him to the eye doctor/hospital**

If somebody cannot reach line 12 (VAcc less 50%) with any of your lenses => send him to the hospital. (If he wants he can buy your glasses nevertheless.)

24	E	W	3	E	1.0		
19	E	m	3	W	E	1.0	
15	W	3	m	E	m	1.0	
12	-	3	W	E	m	E	0.5

↑
**line 15
or worse**

Example 2

Without lens, the patient can see line 15 with his left eye

=> VAsc 6/15

=> Starting-Power = +1.0

Check +1.0

„Is it worse?“ => YES (it is worse)

Check -1.0

„Is it better?“ => YES (it is better)

With this he should reach 6/6 or better

Check -1.0

=> line 15 OK

=> line 12 OK

=> line 9.5 OK

=> line 7.5 OK

=> line 6 NOT OK

=> **The lens is probably too strong!**

Check -0.5

=> line 7.5 OK

=> line 6 NOT OK¹⁾

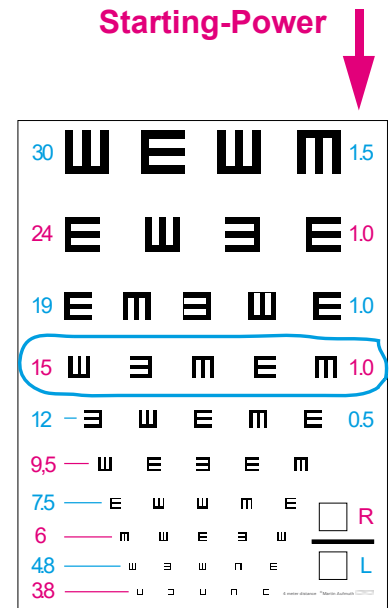
Both lenses are the same


=> give the **smaller MINUS lens!**

=> Give -0.5

Write down the VAcc 6/7.5

Write prescription R -0.5



	R	L
VAsc	$\frac{6}{19}$	$\frac{6}{6}$
VAcc temporary	$\frac{6}{7.5}$	$\frac{6}{6}$
Far	+0.5	

Plus-Minus Rule

Plus Refraction: Find the highest PLUS lens BEFORE it gets worse!

(If 2 lenses are the same, take the **higher PLUS**)

Minus Refraction: Find the smallest MINUS lens he can read the best line.

(If 2 lenses are the same, take the **smaller MINUS**)

1) The reason that the patient cannot reach line 6 can be an astigmatism.

Example 3

Without lens, the patient can see line 24 with his right eye

=> VAsc 6/24

=> Starting-Power = +1.0

Check +1.0

„Is it worse?“ => NO (it is not worse)

=> Line 19 is OK

Check +1.5

„Is it worse?“ => NO

=> Line 12 is OK

Check +2.0

„Is it worse?“ => YES (it is worse)

=> STOP

Take 0.5 D less (+1.5) and test again

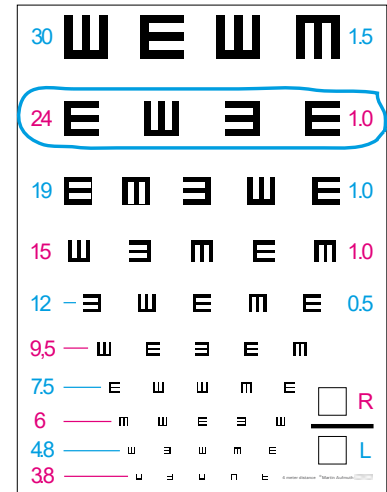
=> Line 12 is OK

The best line was 6/12

Give +1.5

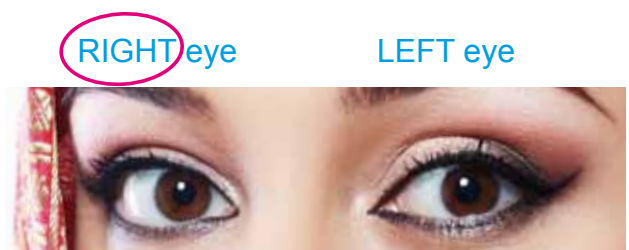
Write down the VAcc 6/12

Write prescription R +1.5



	R	L
VA _{sc}	$\frac{6}{24}$	$\frac{6}{6}$
VA _{cc} temporary	$\frac{6}{12}$	$\frac{6}{6}$
Far	+1.5	

Don't mix the RIGHT and LEFT eye of the patient! (For you right is left and left is right)



Example 4

Without lens, the patient can see line 30 with his left eye

=> VAsc 6/30

=> Starting-Power = +1.5

Check +1.5

„Is it worse?“ => YES (it is worse)

Check -1.5

„Is it better?“ => YES

With this he should reach 6/6 or better

Check -1.5

=> line 24 OK

=> line 19 OK

=> line 15 OK

=> line 12 OK

=> line 9.5 OK

=> line 7.5 OK

=> line 6 NOT OK

=> The lens is probably too strong!

Check -1.0

=> line 7.5 OK¹⁾

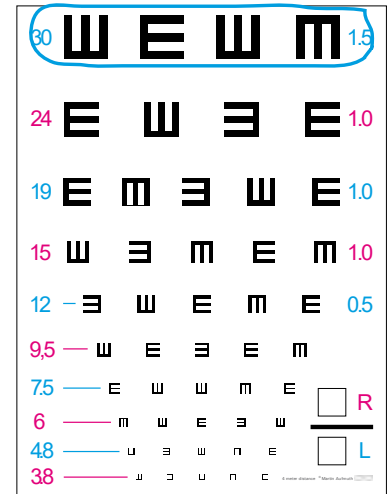
Both lenses are the same


=> give the smaller Minus!

=> Give -1.0

Write down the VAcc 6/7.5

Write prescription L -1.0



	R	L
VAsc	6	$\frac{6}{30}$
VAcc temporary	6	$\frac{6}{7.5}$
Far		-1.5

1) The reason that the patient cannot reach line 6 can be an astigmatism.

2.7 Reading glasses

When people get 40 years or older, their lens loses its elasticity and the ciliary muscle gets weak. They lose their accommodation!

This is called **Presbyopia**.

These people cannot read any longer. They need **reading glasses**.

Presbyopia without reading glasses...

Hyperopia

... and with reading glasses.

Hyperopia

Age and diopters

Here is a table which shows the average power of reading glasses at a certain age (individually it can be different).

Reading Table

age 40	+1.0 D
age 45	+1.5 D
age 50	+2.0 D
age 55 (or older)	+2.5 D

Experiment - Reading glasses

Bring this text very close to your eye. Now you cannot read it because your ciliary muscle is not strong enough.

Now take a strong PLUS lens (+6.0) close to your eye. Can you read again?

Research

Babies and young children can accommodate very good. They have a very strong ciliary muscle and they can see things very close to their eye. (A baby can focus at 5 cm in front of his eye)

Ask a child how close it can see his finger...



This girl child can accommodate more than 10 D. She doesn't need reading glasses.



This young woman can accommodate more than 6 D. She doesn't need reading glasses.



This old man can accommodate less than 4 D. **He needs reading glasses!**

Info:

Little babies can focus at 5 cm in front of their eyes (this equals 20 diopters). A 25 year old adult can still focus at 10 cm (or 10 diopters). A person at age 60 or older can only see clearly at a minimum distance of about 1 meter (this equals 1 diopter).

Finding the right reading glasses

First do the normal refraction for distance vision.
Write down the prescription for R and L.

Ask the age of the patient
Look at the reading table

Then calculate for each eye
distance vision power + reading power



age 40	+1.0 D
age 45	+1.5 D
age 50	+2.0 D
age 55 (or older)	+2.5 D



Comment: with +3.0 the reading distance will be $1/3 \text{ m} = 33 \text{ cm}$.
The problem with high diopters is the smaller depth of focus. So don't go too near to read if not necessary.

The right reading distance

The typical reading distance is 40 cm (reading with rectangle arms)

Let the patient hold the reading test himself
=> so he can find his best distance

The individual distance depends on what somebody is doing: reading, sewing, etc.

=> Ask the people what they want to do with their glasses and which distance they need.

If he holds reading test **too far**
=> Take more PLUS, check again

If he holds reading test **too near**
=> Take less PLUS, check again



If people cannot read: Give them a needle and a thread, or a box with rice mixed with little stones or let them type on a mobile phone.



Example 1

A 70-year-old man needs for far distance
R +1.5 and L 0.0

Look into the table:
 70 years => +2.5 D

R = +1.5 + 2.5 = +4.0

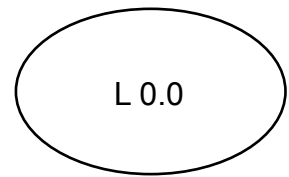
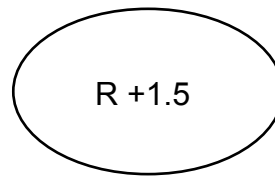
L = 0 + 2.5 = +2.5

If he can read => **it is OK.**

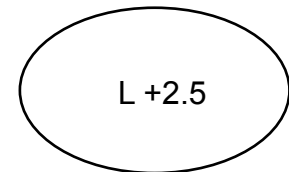
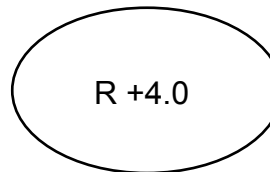
If he holds reading test **too far**
 => Take more PLUS, check again

If he holds reading test **too near**
 => Take less PLUS, check again

Glasses for far distance




Reading glasses

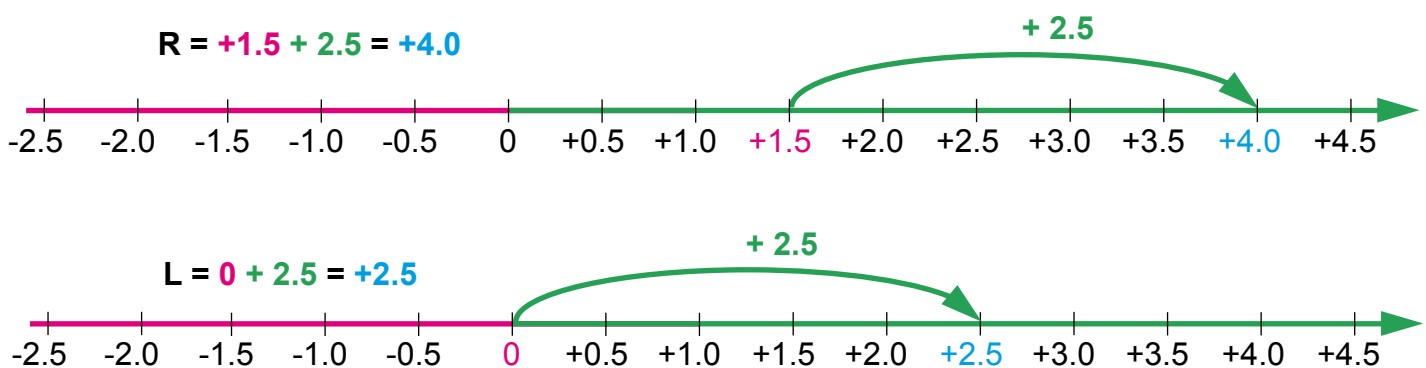


ATTENTION!

If you look at the client, his LEFT eye is on your RIGHT side!



For calculations the number line can help:



Task

What problems people beyond 40 years are faced with, when they do not have reading glasses?
 Write at least 10 examples. Think about your family, your neighbours, different professions ...

Example 2

A 49-year-old woman needs for far distance
R -3.0 and L -2.0

Look into the table: 49 years for reading glasses normally is about +2.0 D

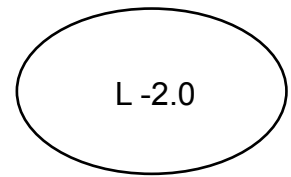
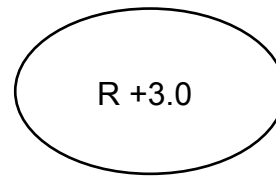
$$R = -3.0 + 2.0 = -1.0$$

$$L = -2.0 + 2.0 = 0.0$$

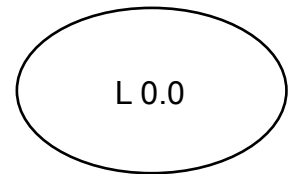
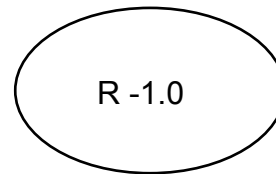
Theoretically this is her reading glasses prescription.

But practically nobody with a moderate myopia will take reading glasses. Let her decide if she wants to buy these reading glasses or not.

Glasses for far distance



Reading glasses



Position of the reading glasses

Before bending the temple, ask the patient if he wants to have his reading glasses in the front of his nose or not.



Task

A 55-year-old woman needs for far distance R -5.5 and L -6.0

A 40-year-old man needs for far distance R +0.5 and L +2.0

=> Find the right reading glasses!

=> Find other examples and make the calculations!

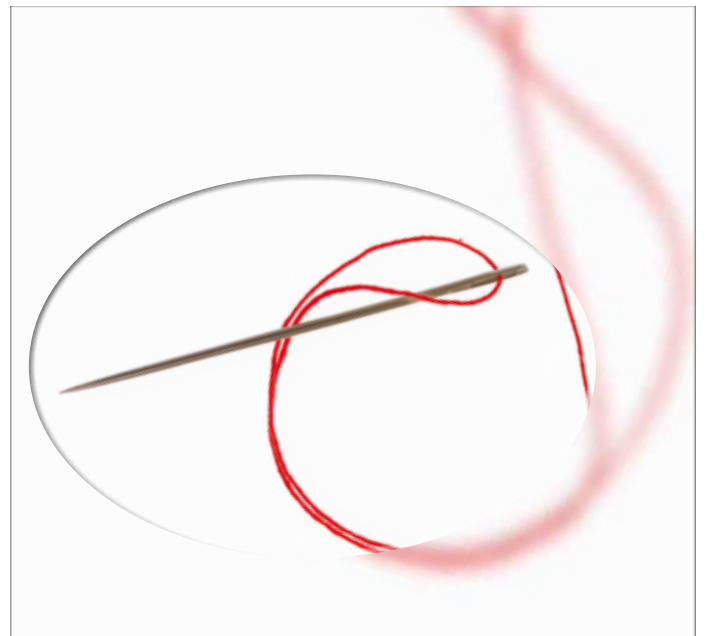
Not only reading!

Reading test: Many people can no longer read the bible, the Koran or the song book in the church. Have such books with you so that people can see the difference immediately.

Some people probably cannot read, but they need reading glasses for other important things.



Needle and thread: Many people cannot sew because they are presbyopic. Always have a needle and a thread with you, so they can feel the difference with glasses.



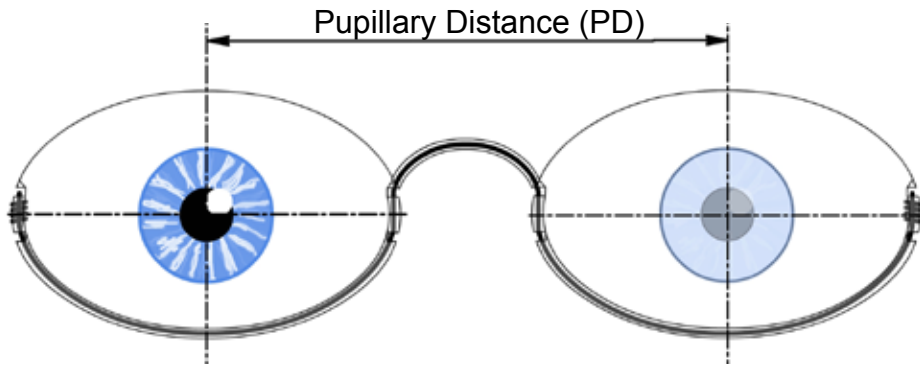
Rice and stones: Women have to check if the food is good for cooking. Always have a little box with rice (or beans) mixed with little stones with you.



Task

Put on a pair of strong negative glasses (e.g. -5.0). Now try to put the thread into the needle. Try to find the stones in the rice. That is how you will feel like when you are old and presbyopic.

2.8 The Pupillary Distance (PD)



Typical pupillary distances

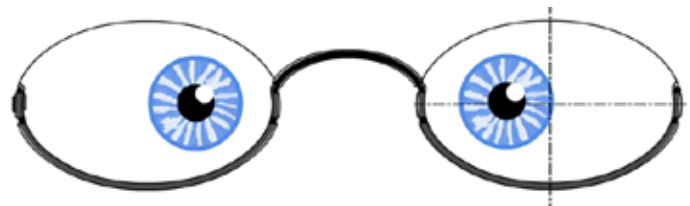
Children: ● 54 mm (yellow point frame)
Adults average: ● 63 mm (red point frame)
Adults large: ● 69 mm (blue point frame)

The right size of the frame

Both eyes must look through the CENTER of the GoodVisionGlasses!



The frame is **too small!**
=> Take a larger one.

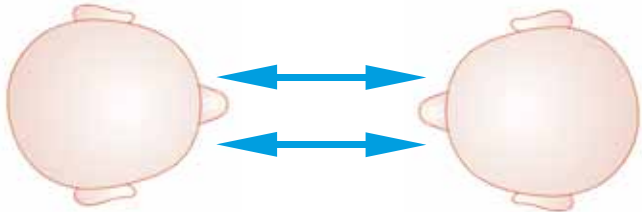


The frame is **too large!**
=> Take a smaller one.

If the glasses are too small or too big, the eyes are forced to look angular. The patient gets a headache.

Measuring the PD

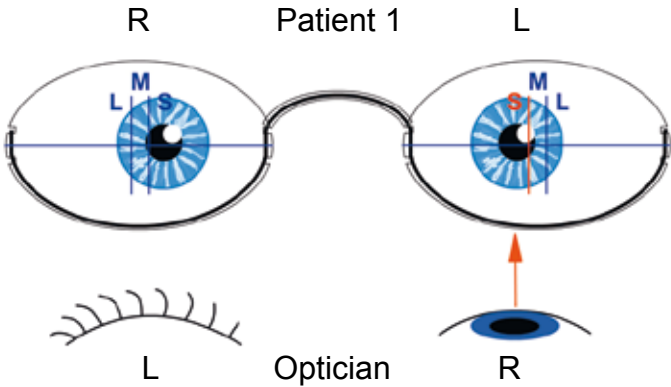
You stand face to face to the patient.
Don't move your heads now!



Patient 1:

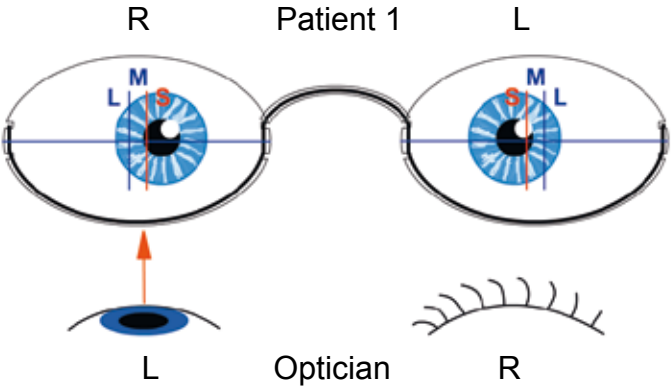
You close your left eye. The patient looks with both eyes to your right eye. With your right eye you look to the left eye of the patient.

The left eye is in the small area (S).



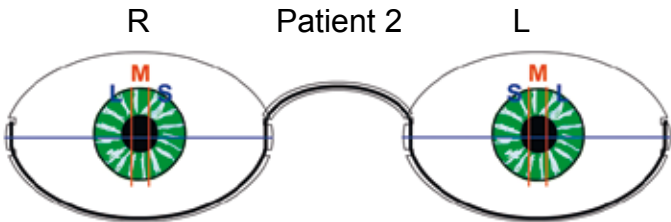
Now the patient looks to your left eye. In this example the right eye is in the small area (S) too.

This patient needs a small (yellow point) frame.



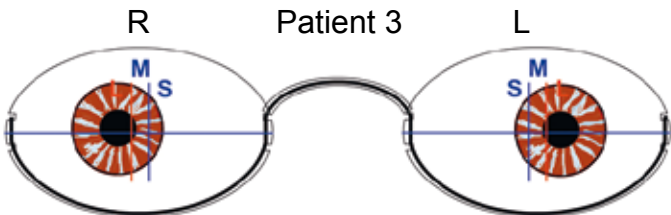
Patient 2:

Here, the pupils are in the medium (M) area.
 This patient needs a medium (red point) frame.



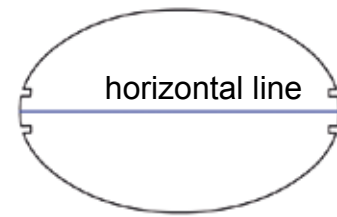
Patient 3:

Here, the pupils are in the large (L) area.
 This patient needs a large (blue point) frame.

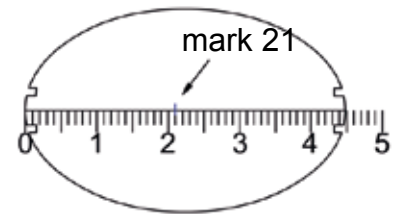


2.9 Producing PD test glasses

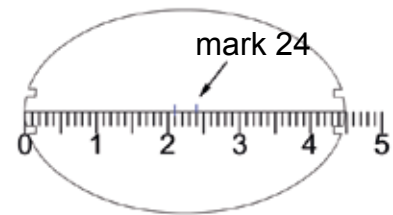
You need: 2 lenses of 0 D, a needle and a ruler. First scratch a horizontal line through the middle of the lens.



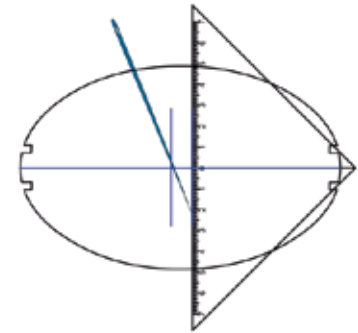
Now scratch a mark 21 mm from the left side into the lens.



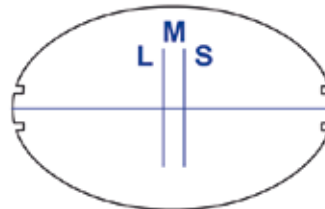
Now scratch a second mark 24 mm from the left side into the lens.



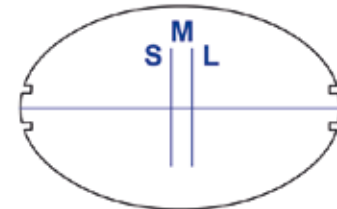
Now scratch two vertical lines into the lens.



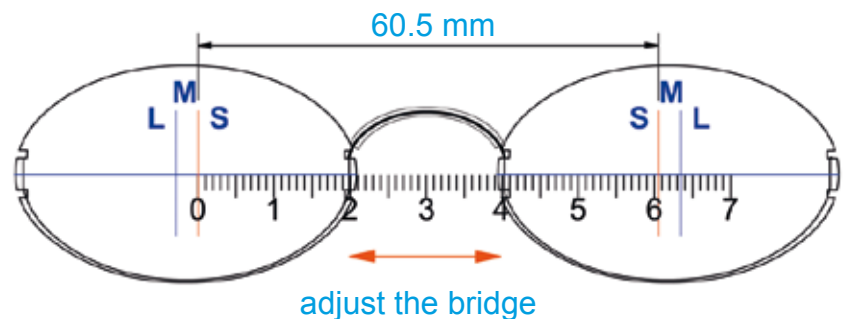
Scratch S, M and L in the lens.



Do the same with the second lens.



Now take a medium frame and adjust the size of the bridge so that the distance between **S left** and **S right** amounts to exactly **60.5 mm**.



Task

Produce your own test glasses. Test the pupillary distance of at least 5 colleagues and write down the results in his book. At the end you can compare your results with the others.

2.10 Useful Tools

To adjust and repair the frames, these tools are helpful:



Loop forming pliers



Two pairs of long nose pliers



Nail scissors



Front cutter



Diamond file



Cutter

2.11 Adjustment of the frame

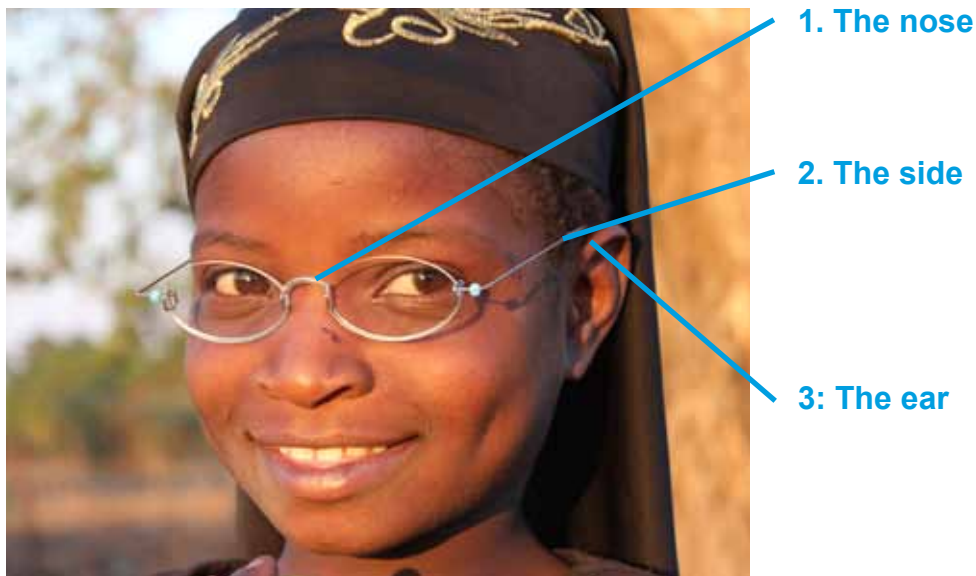
Closeness and distance

Normally strangers don't come too close to each other and in particular don't touch each other. There is a private sphere only family members or good friends may enter. So, before adjusting the frame, always ask: „May I adjust these eyeglasses?“

From the front to the back

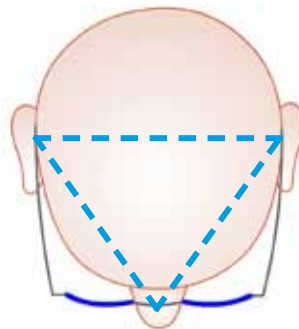
Always adjust the frame from the front to the back!

Start at the nose (bridge), then come to the side, then to the ears.



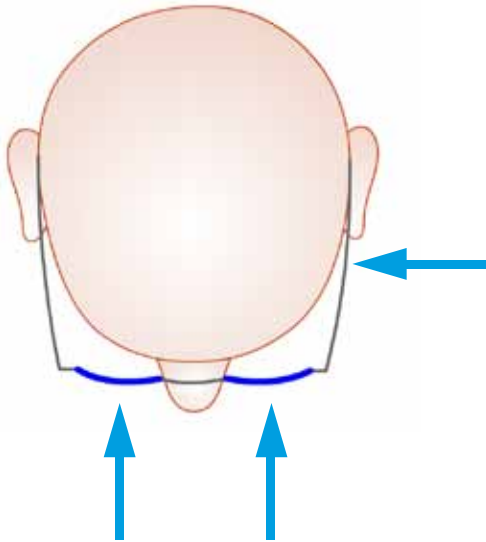
The well-adjusted frame will touch the person's head at **3 points only**:

1. The bridge on the nose
2. The sides of the person's head above and behind the ear
3. The top of the ear



Shape of the glasses

The shape of the frame, looked from above, should follow the shape of the face.



The temple of the glasses is round bent. So it does not touch the side of the head.

Make sure, the temple of the glasses does not press against the **trigemius nerve**, which is at the side of the head.

Both lenses should have the same distance from each eye.



The temples of the GoodVisionGlasses therefore are already round shaped.

Check the Quality of the frame!

Before adjusting a frame, check if the frame is perfect. (No propeller at the front, symmetric front, side pieces in one line etc.)



The front

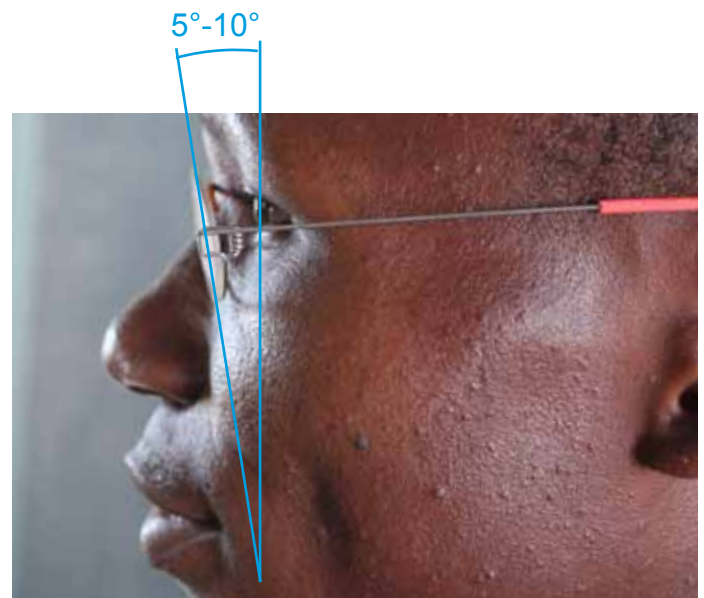
The glasses must be at the same height at both eyes.



The side

The inclination of the lenses should have between 5° and 10° .

This inclination is called **pantoscopic angle**.



The top

If the eyelashes touch the lens take a frame with longer side parts at the bridge!



How to bend the temple?

The bending of the temple should start approximately 2 mm behind the base of the ear.

The temple is bent correctly!



The temple is bent too short!

If the temples are bent too short this is not comfortable AND it is not enough space between the lens and the eye.



Shape behind the ear

The bending of the temple should start approximately 2 mm behind the base of the ear.

Behind the ear the temple should follow the shape of the ear and the shape of the head.

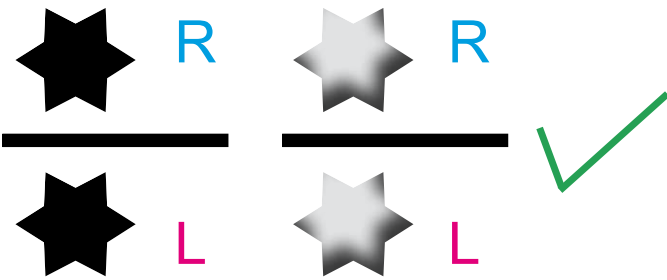


2.12 Binocular Balance

The **Binocular Balance** ensures that accommodation is balanced in both eyes.

(Testing is not necessary if the patient can see with one eye only.)

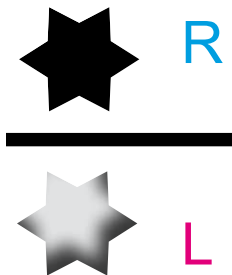
Put on the test glasses. If right (at the top) and left (at the bottom) are the same (black or gray) it is OK.



Both symbols have the same colour
=> No correction necessary.



Test glasses with polarisation foil.



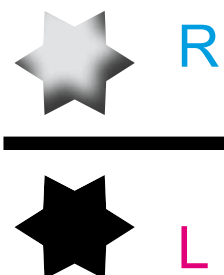
Right (top) is black

=> **Add +0.5 for the right eye**

Example: Right $-1.5 + 0.5 = -1.0$

Correct on Eye-Test-Card

VA _{sc}	30	24
VA _{cc} temporary	$\frac{6}{7.5}$	$\frac{6}{6}$
Far	-1.5 -1.0	-1.0



Left (bottom) is black

=> **Add +0.5 for the left eye**

Example: Left $-1.0 + 0.5 = -0.5$

Correct on Eye-Test-Card

VA _{sc}	30	24
VA _{cc} temporary	$\frac{6}{7.5}$	$\frac{6}{6}$
Far	-1.5	-1.0 -0.5

2.13 Final Test!


Before the patient leaves with his glasses, make the final test with his ready adjusted eyeglasses.

1. He closes his left eye. With his right eye he must reach the VAcc of the test before.
2. He closes his right eye. With his left eye he must reach the VAcc of the test before.

Fill the VAcc (Final test!) on the Eye-Test-Card.

Name: _____

Optician: _____



	R	L
VA _{sc}	$\frac{6}{30}$	$\frac{6}{24}$
VA _{cc} <i>temporary</i>	$\frac{6}{7.5}$	$\frac{6}{6}$
Far	-1.5	-0.5
Near		
VA _{cc} <i>Final test!</i>	$\frac{6}{7.5}$	$\frac{6}{6}$

Fill in the missing Information in the patient's book. **Every field must be filled!**

Date: - - Prescription by: _____

First name: _____ Age: _____

Surname: _____ Male Fem.

Address: _____

Phone No.: _____ Profession: _____

Problem: _____ Had glasses before: Yes No

Eye test: VA_{sc} R: L: VA_{cc} R: L: R L

Glasses for: reading seeing far Sun PD: _____ (S/M/L)

Selling prize: _____ Signature: _____

I should go to hospital: Yes No

With my signature I declare that the abovementioned data is true. I agree that my personal data may be stored and published.

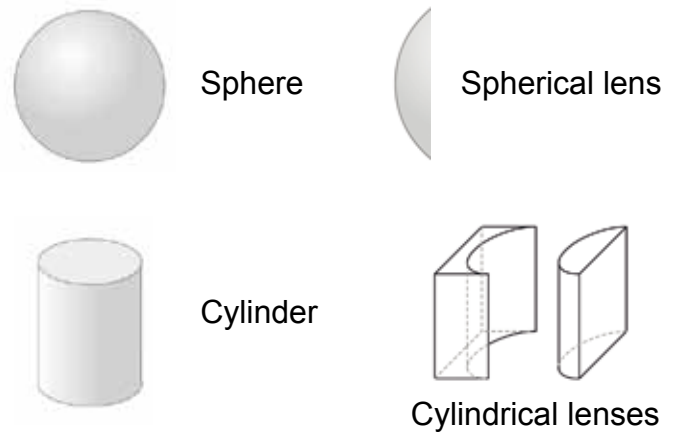
2.14 Astigmatism

Besides Myopia, Hyperopia and Presbyopia, there can be another common refractive error too:

Astigmatism

People suffering from myopia, hyperopia and presbyopia can be helped with „normal“ spheric glasses. Spheric means, the lenses are shaped like a part of a sphere/ball.

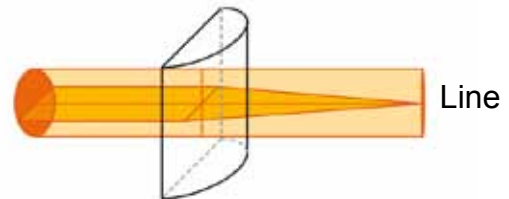
People suffering from astigmatism have a cornea which is deformed cylindrically.



Normally, light coming from a round circle falling through a positive spheric lens, is focussed in a single point.



The same light falling through a cylindric lens is focussed on a line.



This is how a normal eye sees the ball.



This is how somebody with astigmatism sees the ball.



At night, people with astigmatism don't see the stars like points but like little ellipses (or sticks).

Stars seen with normal eye

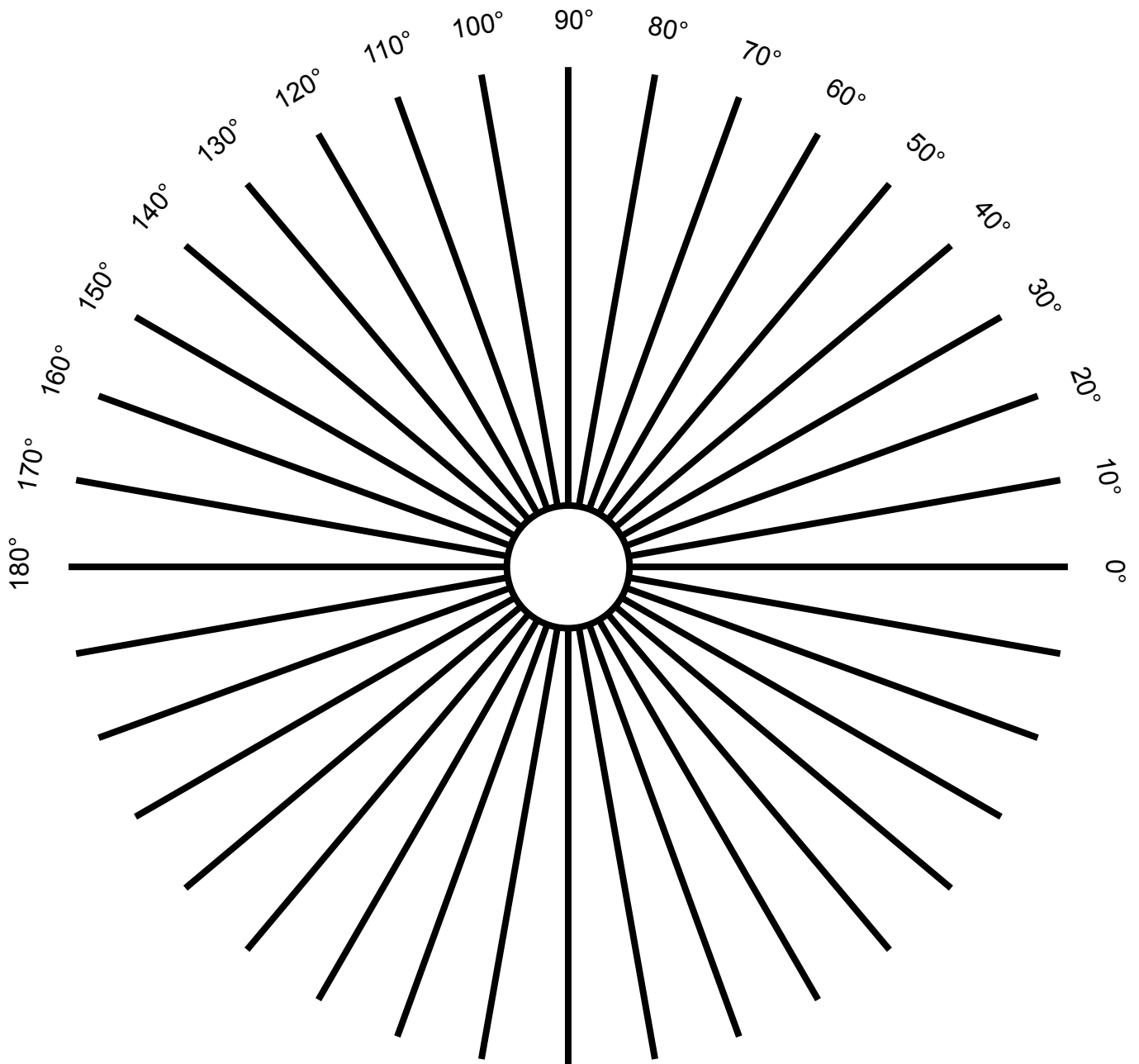


Stars seen with astigmatism



Astigmatism test

With this test you can check, if somebody has an astigmatism. Looking to the lines, somebody without astigmatism should see all lines similar. Somebody with astigmatism sees only lines in a certain direction black, the others are blurred.



Experiment

1. Do you see all lines similar?
2. Close your left eye and hold a lens with -2.0 D oblique in front of your left eye, looking to the concentric lines. Now you should see some of the lines blurred.

The Best Spherical Lens (BSL)

Astigmatism normally must be corrected with a cylindrical lens. But people with a small astigmatism (small cylindrical deformation of cornea) can be helped with a „normal“ spheric lens to some extent. We call this lens „**Best Spherical Lens (BSL)**“.

People with a strong astigmatism must be sent to an optometrist. If the patient reaches less than line 12 on the vision chart with your lenses, sent him to the optometrist.

A cylinder can be positive or negative. Every cylinder has an axis (A) which describes the direction of the cylindrical deformation.

Example

Prescription

L: sph. +3.00 cyl +2.00 A 180° (cylinder positive +)
 R: sph. +2.50 cyl -1.00 A 180° (cylinder negative -)

Formula for the Best Spherical Lens

BSL = spherical correct. + cylinder / 2

BSL = sph + cyl / 2

Little mathematics

$$(+2) / 2 = +1$$

$$(-2) / 2 = -1$$

$$(+0.50) / 2 = +0.25$$

$$(-3.50) / 2 = -1.75$$

$$(+4.50) / 2 = \underline{\hspace{2cm}}$$

$$(-3.0) / 2 = \underline{\hspace{2cm}}$$

$$(+2.5) / 2 = \underline{\hspace{2cm}}$$

Example: Which spherical lens (BSL) is needed?

Prescription

L: sph. +3.00 cyl +2.00 A 180°
 R: sph. +2.50 cyl -1.00 A 180°

$$\begin{aligned} & +3.00 + (+2.00 / 2) \\ \text{Left eye:} & = +3.00 + 1.00 = +4.00 \\ & \Rightarrow \text{BSL left: } +4.00 \text{ D} \end{aligned}$$

$$\begin{aligned} & +2.50 + (-1.00 / 2) \\ \text{Right eye:} & = +2.50 - 0.50 = +2.00 \\ & \Rightarrow \text{BSL right: } +2.00 \text{ D} \end{aligned}$$

If you have glasses in 0.5 steps (-6.0; -5.5; -5.0; ... +5.5; +6.0) you sometimes have to round.

Little mathematics

round +3.75 into +4.00
 round +1.25 into +1.50
 round -1.25 into -1.00
 round -3.75 into -3.50

Round towards the **SMALLER** Minus and towards the **HIGHER** Plus!

round +4.25 into _____
 round -0.75 into _____
 round +5.75 into _____

Example: Which spherical lens (BSL) is needed?

Prescription

L: sph. -3.00 cyl +0.50 A 160°
 R: sph. -2.75 cyl +0.75 A 50°

Left eye:
 $-3.00 + (+0.50 / 2)$
 $= -3.00 + 0.25 = -2.75$
 \Rightarrow BSL left = -2.75 D
 \Rightarrow The smaller minus is: **-2.50 D**

Right eye:
 $+2.50 + (-1.00 / 2)$
 $= +2.50 - 0.50 = +2.00$
 \Rightarrow BSL right: **+2.00 D**

By the way: 2 cylindric diopters are as disturbing as 1 „normal“ spheric diopter.

If you calculate the BSL, **ALWAYS** verify the result by your own refraction.

For trainer: Make sure everybody knows how to add and subtract fractions like $+1.25 - 0.50$. (This can take a whole day!)

2.15 The pinhole

Imagine this situation: You have tested the eyes of a patient for some time without any improvement of his vision. Now you want to know if glasses can help him at all.

Here the pinhole glasses or a pinhole occluder can be used.

Let the patient look through the hole(s) at the vision chart.

If the patient can see better, go on with the refraction. If you are not successful, he might have a strong astigmatism. In this case send him to the optometrist.

If the patient cannot see better with the pinhole, he has an eye disease. **Send him to the eye doctor / hospital.**

Pinhole glasses



Pinhole occluder



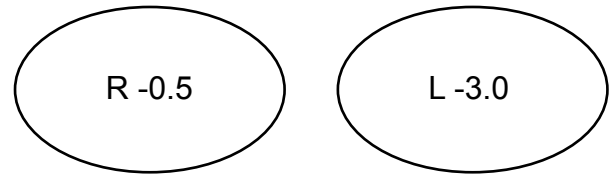
2.16 Special cases

Big difference between the correction of the left eye and the right eye

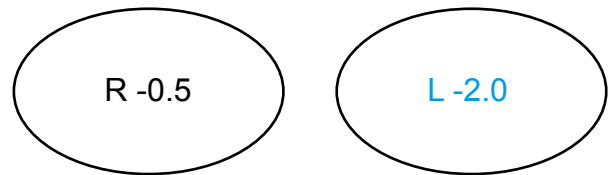
If the difference between the left lens and the right lens is 2 diopters or more, the patient can get problems like headache.

In such cases, let the patient test his new glasses for some hours.

If he gets problems, reduce the power of the stronger lens (e.g. take -2.0 instead of -3.0). Some weeks later he can try the stronger lens again.



Big difference between left and right eye



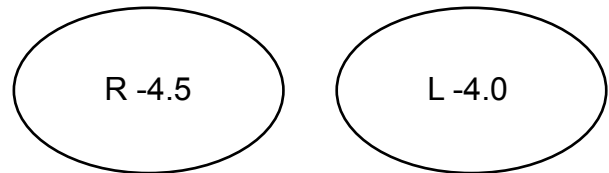
Stronger power reduced

Problems with high diopters

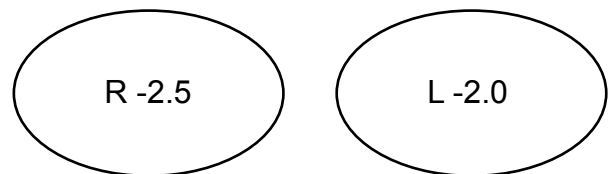
If a patient has glasses with high diopters for the first time in his life (e.g. L -4.5 and R -4.0) it might happen that he has problems with it.

In such cases, reduce the lens power of both lenses equally.

Some weeks later you can try to give him the stronger lenses again.



Problems with high diopters



Reduced lens power

3. The Glasses

3.1 The different types of GoodVisionGlasses

1. GoodVisionGlasses Basic (round)

The classic elliptic lenses fit everybody. All frames exist in different colours.



2. GoodVisionGlasses Sun

They exist as normal sun glasses without optical power and also with optical power. They fit into the elliptic standard frame.

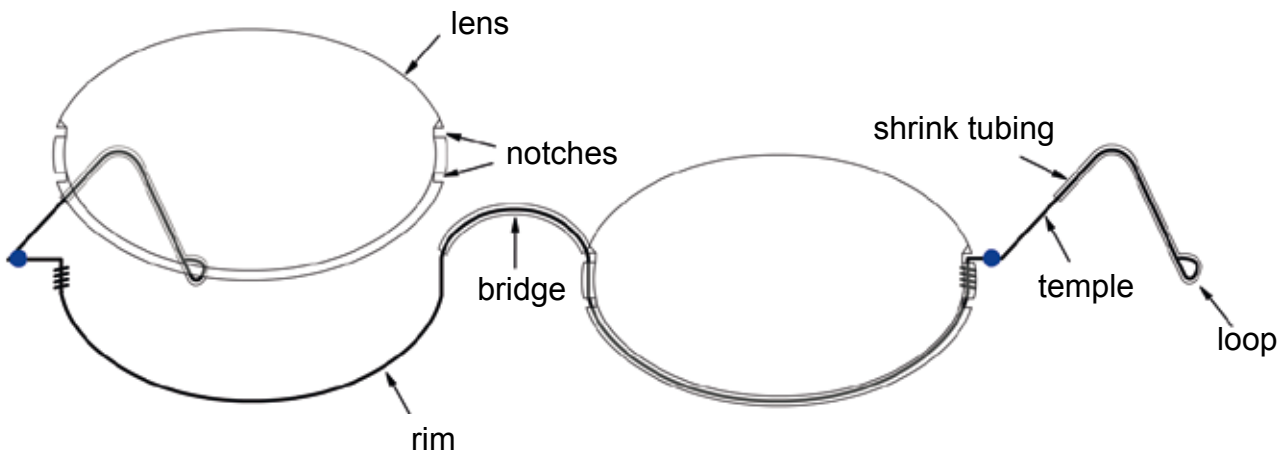


3. GoodVisionGlasses Corners

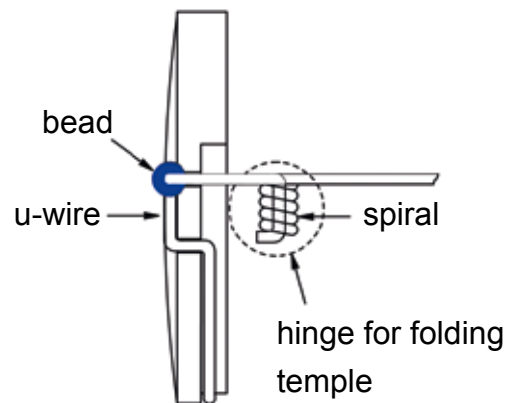
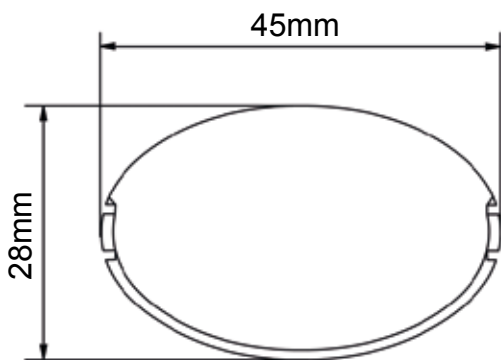
Here with stylish double frame.



3.2 The glasses - technical terms



Measures of the lens

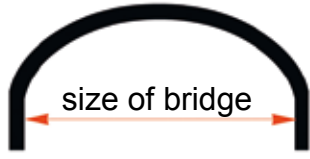
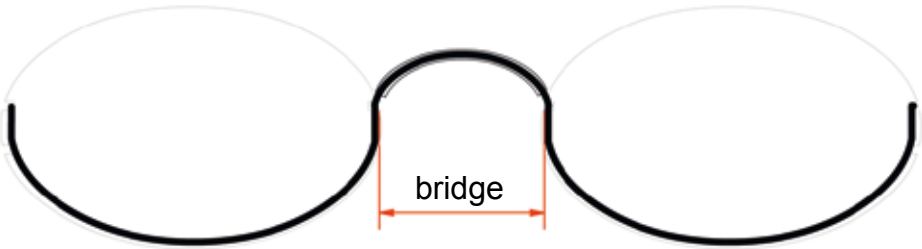


Task

Learn all the parts of the glasses (5 minutes).

Close your book and write them down. Which ones did you forget?

The size of the bridge

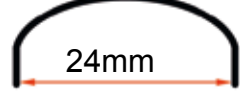
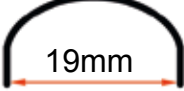


Measure the size of the bridge inside between the wire!

● Small

● Medium

● large



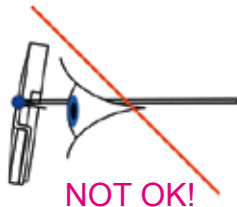
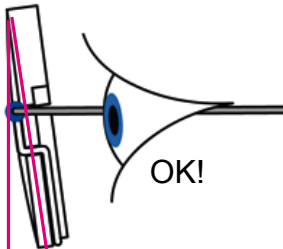
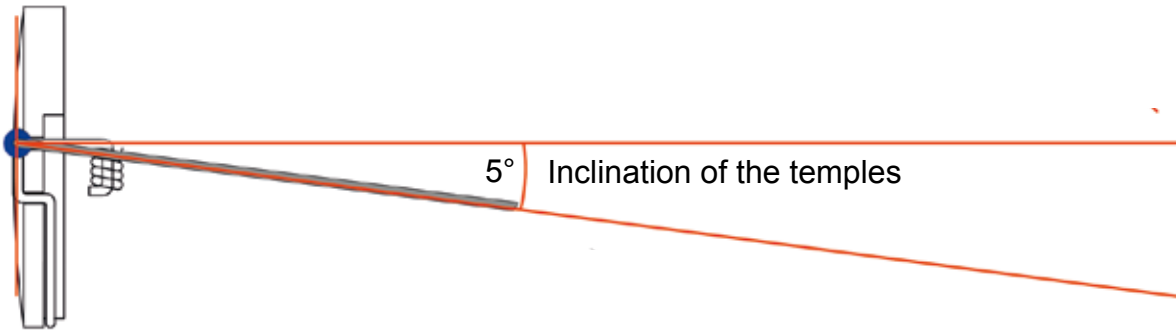
54 < PD < 60.5

60.5 < PD < 66

66 < PD < 71

(PD: Pupillary Distance)

Inclination of the temples and the Pantoscopic Angle



5-10° Pantoscopic Angle: 5-10°

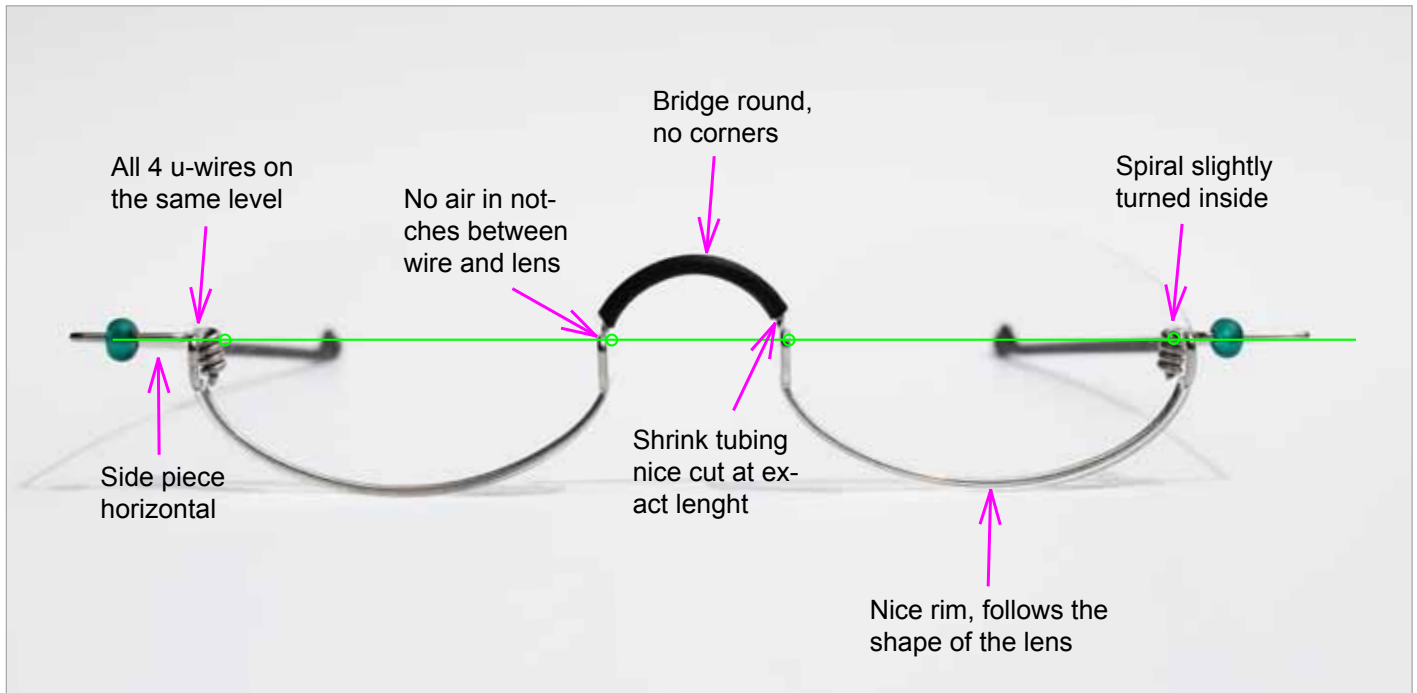
The Pantoscopic Angle
The Pantoscopic Angle is the angle between the lens and the vertical position when wearing the glasses.

The Pantoscopic Angle should have 5-10°. You can adjust it by changing the inclination of the temples.

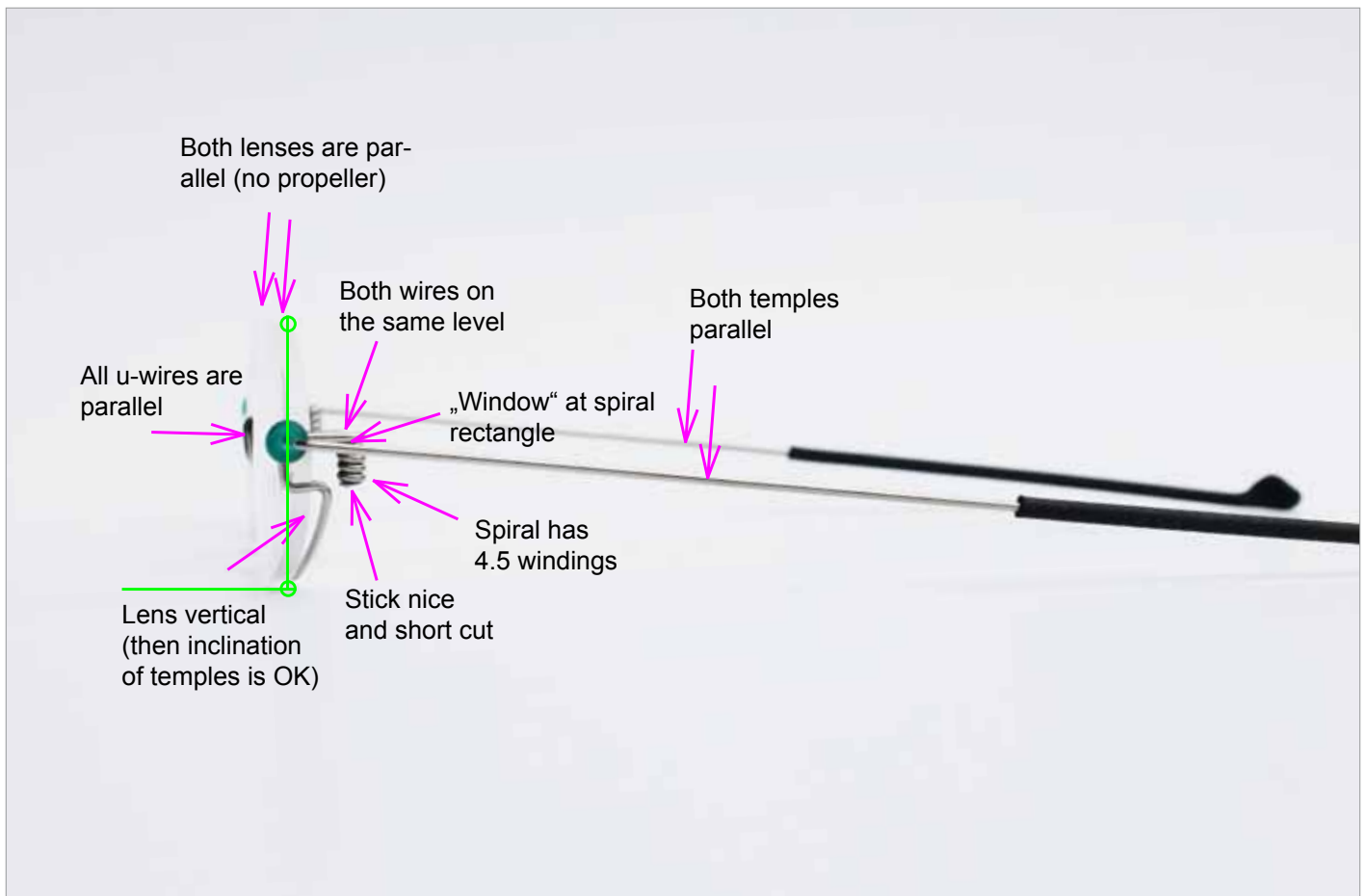
3.3 Quality criteria of GoodVisionGlasses

When using or repairing GoodVisionGlasses, take care that these quality criteria are met. Otherwise repair the glasses or replace them.

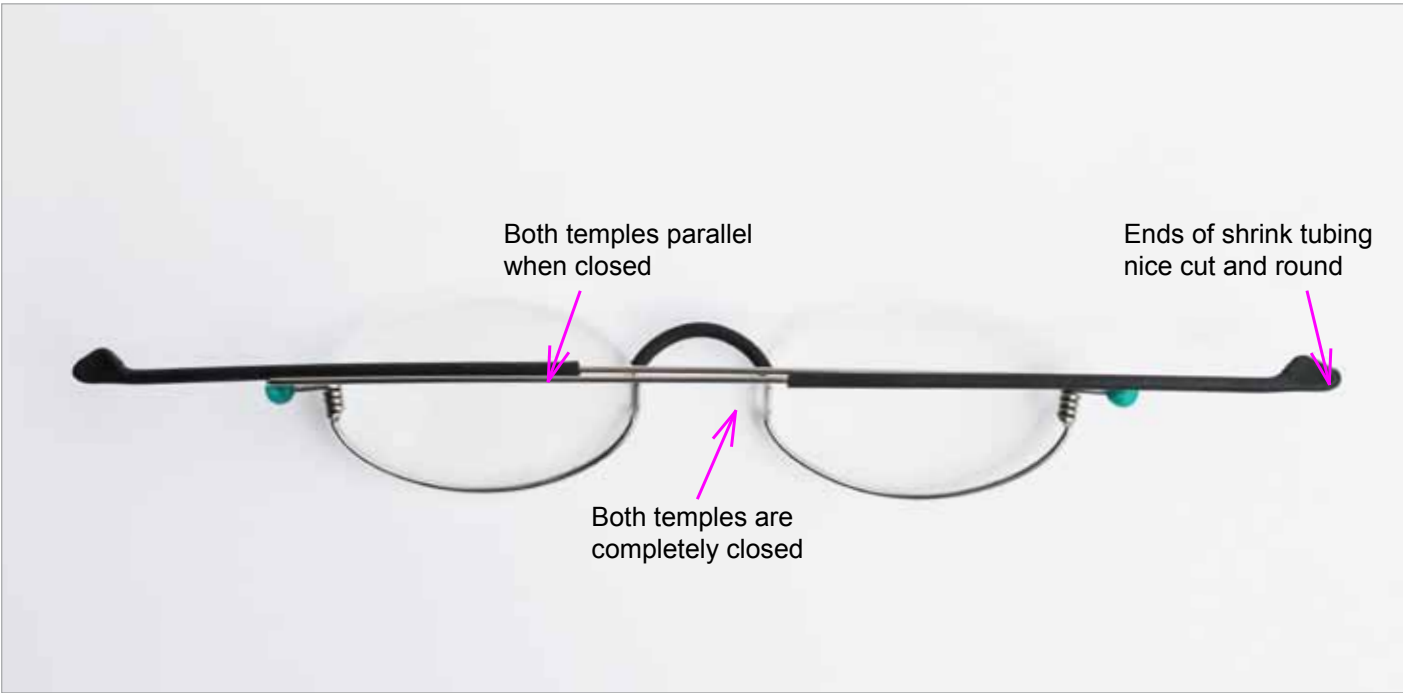
Frontal view



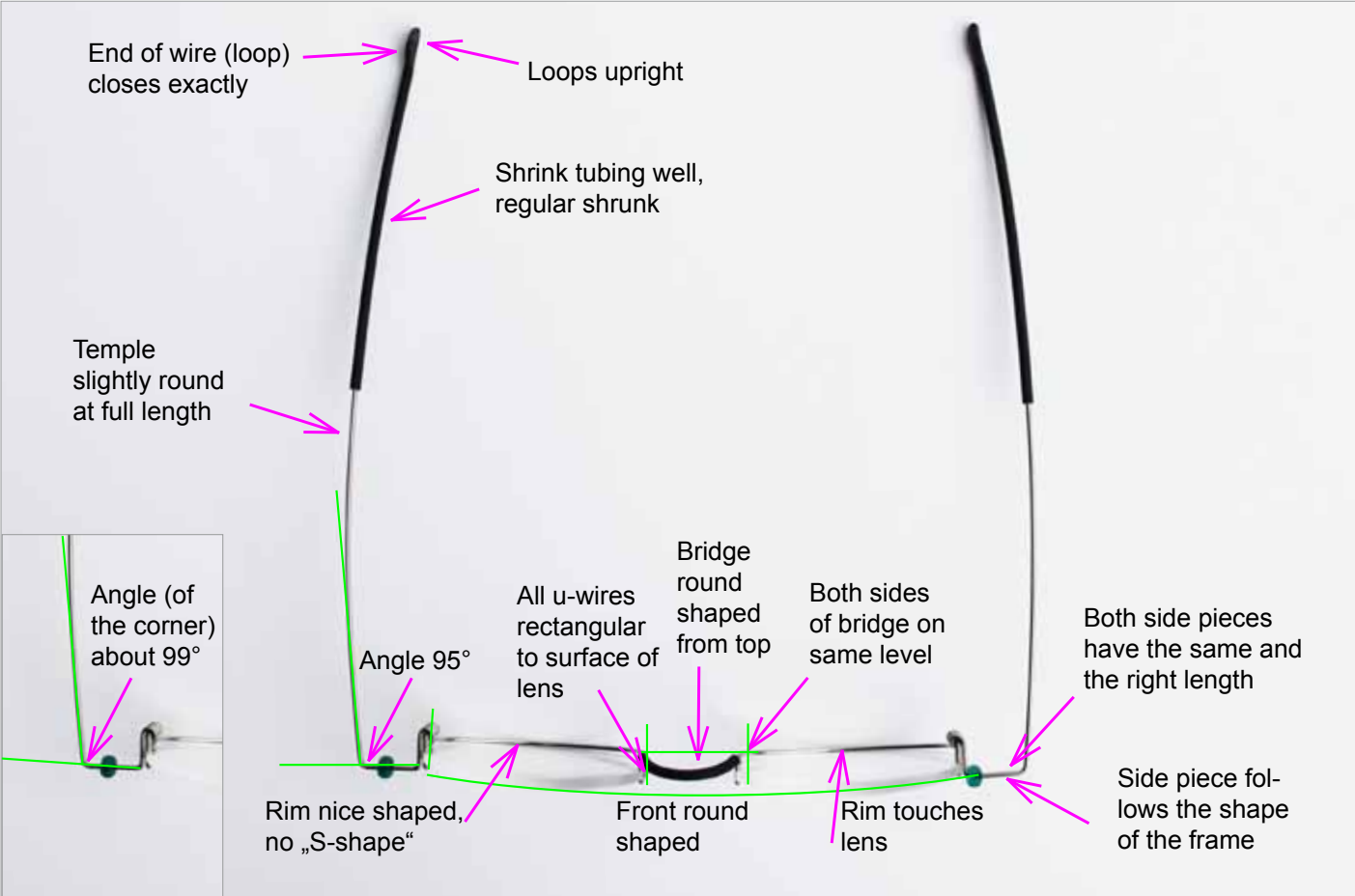
Side view



Closed



Top view



3.4 Repairing GoodVisionGlasses

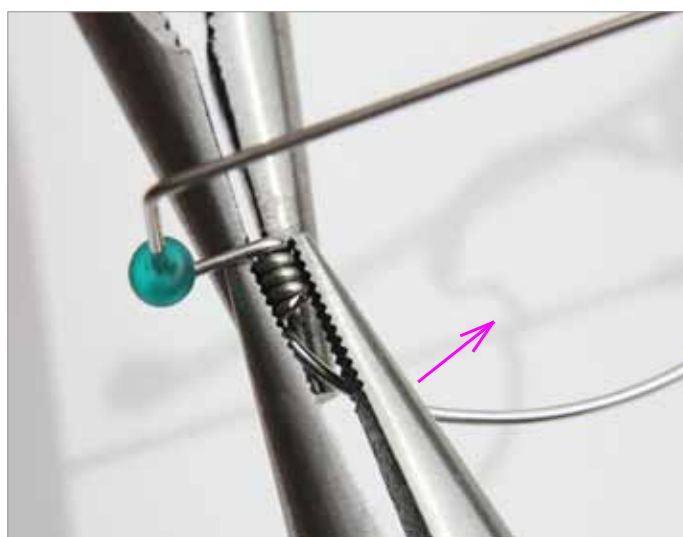
Repair optique temples



These temples are not well adjusted



Hold the u-wire with the first plier



Bend the spiral in (or out) with the second plier



Well adjusted temples

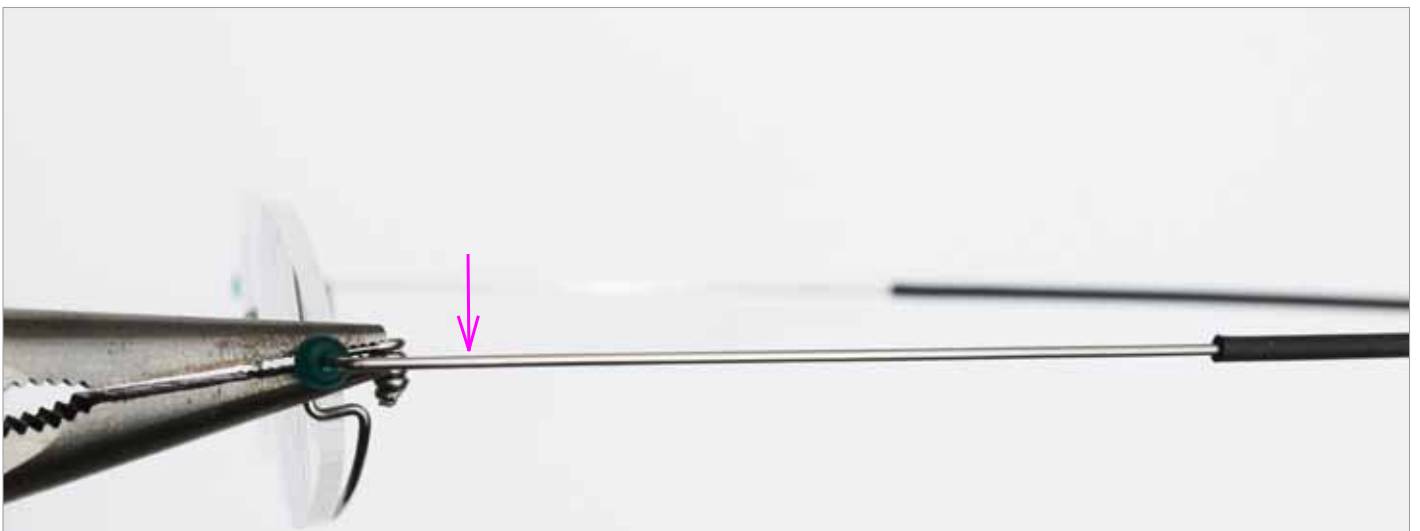
Change the inclination of the temple



If the temples are not parallel...



Hold the temple with the plier at the small piece of wire besides the spiral



Now bend the temple down (or up) near the hinge

New shrink tubing for the temple

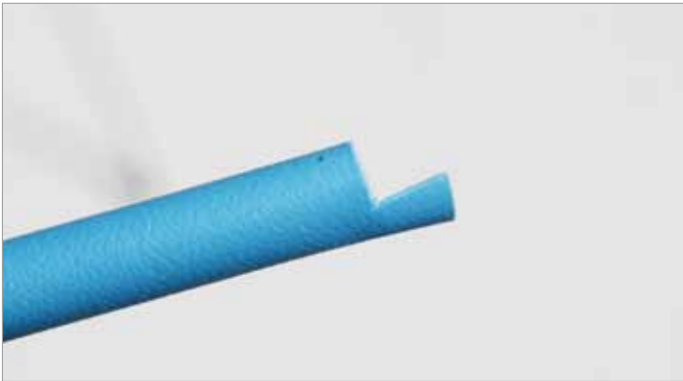
The spring steel wire of the GoodVisionGlasses is unbreakable. But the shrink tubing, after some time, can break. Here you see how to put new shrink tubing on the temples.



1. Cutting



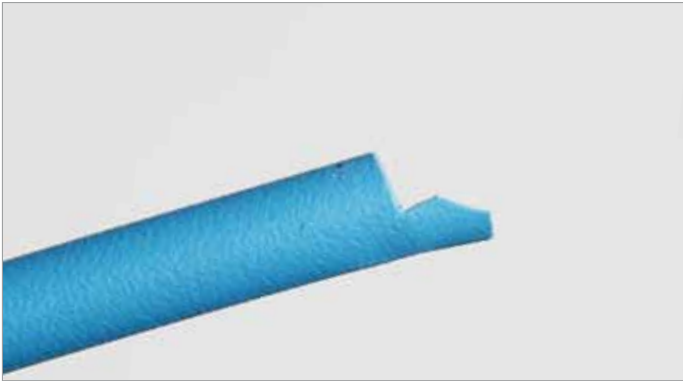
5. Put the shrink tubing on the temple



2. The cut



6. Heat shrinking



3. Cut again



7. Filing on sandpaper (grade 400-600)



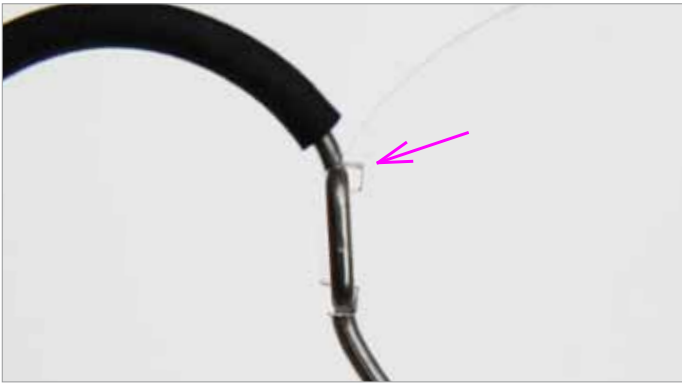
4. Putting the end into the tube



8. Temple with nice new shrink tubing

How to remove a gap between wire and lens

If there is a gap between wire and lens, the lens can drop out.



Gap between wire and lens



Take u-wire into the plier and bend with finger



Now the gap has disappeared

4. Sales and Marketing

Free Eye Test Here

Good Vision Glasses 



 See-Far-Glasses from **MWK 3000** only

 Reading/ Sun Glasses

See better immediately!

Opening Hours:
Mon - Fri: 8 am - 12 pm; 1 pm - 5 pm
Saturday: 8 am - 12 pm

goodvisionglasses_malawi
www.goodvisionglasses.org | 01 116 454 72   

Partners:
ELSE KRÖNER-FRESENIUS-STIFTUNG
Flensburg/Itzehoe, Deutschland



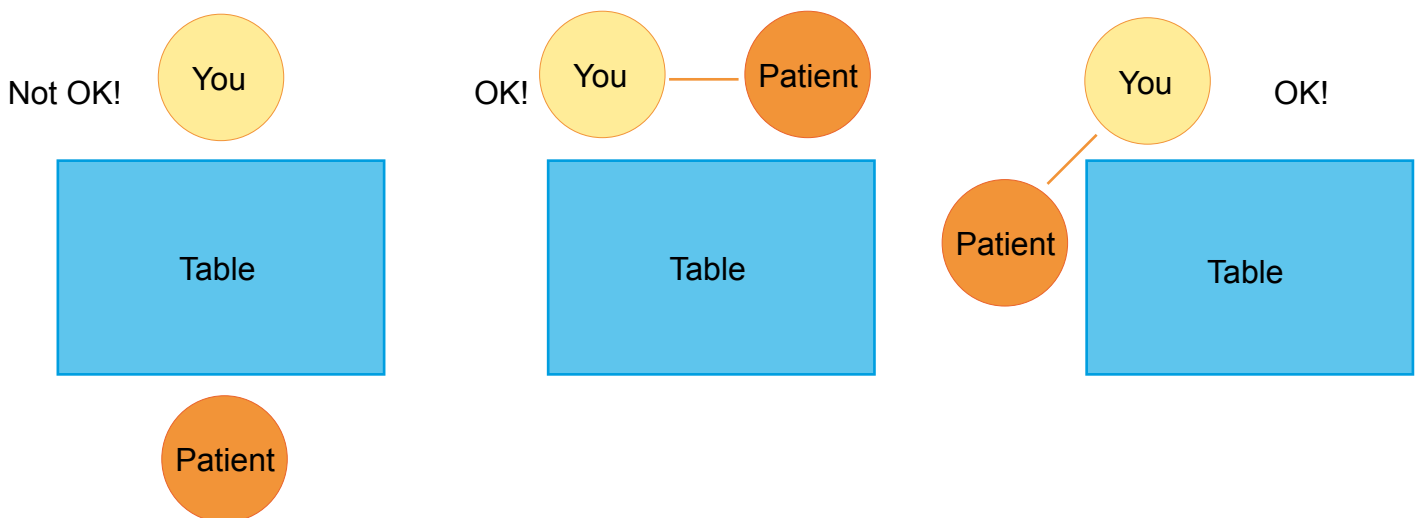
4.1 The sales process

Some basic rules

- Heartily welcome your customer. The first impression is crucial.
- Stand up when a customer comes into your shop.
- If you meet somebody the first time, tell him your name, this is more personal.
- Wear professional clothing with your logo.
- Offer your customer some water or tea so that he feels at home in your shop.
- At the end, bring the customer to the door. He will remember you very positively.

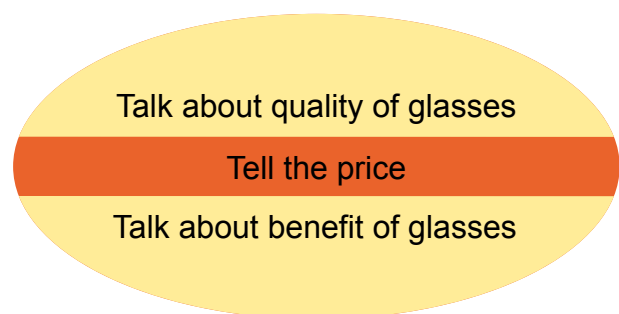
The right position

Don't sit behind your table when you fit the glasses. The distance is too large.



Sandwich-Method

Information is given at the beginning and at the end is remembered better. If the price is told in between it is easier accepted.



Task

Discuss in your team: How does a friendly welcome looks like? Play in your team the whole selling process.

Clean table

Always have a clean table with nice table cloth on it. Check if the glasses are nicely presented. Are there all different colours and types of glasses visible?



Mirror

Always have a mirror on the table.



Box for rubbish

Always have a box with a hole for rubbish with you.



Cleaning Instructions

Tell the patient how to clean his eyeglasses:
Clean the glasses under clear water with some soap. Then dry them with a piece of new **toilet paper!**



4.2 Campaigns

Preparation of the campaign

If you want to make a campaign in a village or community, first talk to the authorities and explain the project to them.

- Ask them who among them has problems with his vision (near or far) and who among them knows somebody who has a vision problem but no eyeglasses.
- Tell them about the glasses frame: German quality, locally produced. Tell them that the wire of the frame is as robust as the spokes of a bicycle wheel. Demonstrate them by deforming the glasses frame and throwing it on the ground.
- Tell them about the lenses: They are from plastic and so strong that you can beat them with a hammer. They have a hardened surface and protect against dangerous UV radiation.
- Scratched lenses can get replaced very easy and cheap.
- The eye test is free of charge.



Talking to the authorities



Registration of patients



Explaining the eye test

The day of the campaign

If there are many people, give them small papers with a number on it so everybody knows when it is his turn.

Talk to all people in a group and explain to them the project and the glasses (like above). Explain the eye test to them. Everybody closes one eye with his palm. Then everybody shows the direction of the „E“. Continue until everybody has understood.



Training the eye test together

School classes

Talk to the whole school class. Do the training with pupils together (like above). Then take small groups of pupils to screen them. With those who have a problem do the refraction.

Cheating: Sometimes children only pretend they need eyeglasses. Make the test with plano lenses - if they pretend to see better with them they are cheating.



Task

Play with your group of trainees the situation with the authorities. One of you is the optician who is explaining the project to the others. Then do the same with you as customers. What are the most important marketing arguments like „The glasses are as robust as...“, „You can read the display of your mobile phone...“

4.3 Material for campaigns

The following checklist helps you to prepare the right material for your campaign

- Vision charts, far distance (4m)
- Nails or „blue tack“ for vision charts
- Lens bars
- Pointing sticks
- Your own eyeglasses for marketing
- Boxes with lenses (round, corner, sun)
- Frames in different sizes and colours
- Glasses boxes
- Client's book or client's app
- Pen
- Eye-test-card
- Water soluble marker
- Long nose pliers, 2 pieces
- Mirror
- Table cloth for selling table
- Are there tables, chairs available?
- Plastic box for waste
- Water and soap for cleaning the glasses
- Toilet paper (for drying lenses)
- PD test glasses
- Customer friends card
- Small papers for numbers for each patient
- Box for money

4.4 Your own business

If you want to start your own business, you have to think about your shop (position, shop fitting) and about some legal requirements (business registration, taxes etc.)



Task

Visit optician shops and look at them. How does a nice display, shop window look like? What are your ideas? Make drafts and discuss in your team.

Task

Investigate which formalities you have to consider when you open a small business, for example:

- Business registration
- Writing invoices (how must they look like)
- Paying taxes (which taxes do you have to pay, how does this work)

4.5 Marketing

Why people need glasses?

There are different reasons for people why they need glasses. If you know why people need eyeglasses you can make much better marketing.



Make a market research

Talk to your family, friends and neighbours. Ask them who among them has problems with their vision (far or near). Ask those who have a problem, what are the main problems and challenges in their daily life because of their vision problems.

1. Make a list and write these problems down. Example:

Person	vision problem	main challenges
Father:	problem with snear vision	cannot read, has problems at field work
Sister:	problem with distance vision	cannot read the blackboard at school
...		

2. Make a statistic: What are the most common problems for the people? Example:

Problem	How many concerned
cannot read	5
problems at field work	3
...	

Raising awareness

Often people don't know how bad their vision is and that eyeglasses could help them. Others think that eyeglasses can be dangerous for their eyes. This is why you need to inform people and raise awareness for eyeglasses.

When you have tested their eyes and finished their glasses, let them look outside to see the difference (for myopic glasses).



Customer service

Surprise your customer with a service which is better than he could even have dreamed of!

Examples:

- Be extremely friendly and attentive
- Serve your customer a cup of tea
- Give your client a small gift e.g. a glasses case or a cleaning cloth
- Repair the frame of your clients free of charge
- Within the first weeks after the purchase replace a broken lens for free

Task

What else can you do to surprise your customers and make them happy? Write your ideas down and discuss in your team.

Your Guarantee for GoodVisionGlasses

A guarantee strengthens the customers confidence in you and your product. This is what you as an optician can guarantee to your customers:

- I guarantee high quality and long-lasting eyeglasses
- I guarantee that we will be in reach when the patient needs a new pair of glasses
- I guarantee a professional eye test free of charge for everybody
- I guarantee to repair the frame of GoodVisionGlasses free of charge at any time
- I guarantee affordable replacement lenses

Celebrities

Sell or even donate eyeglasses to village/city authorities and celebrities first. They will be the best advertising media.

Finding the right price

The right price is crucial for your business. If your glasses are too expensive, you loose customers. Offer types of glasses at different prices.

Broken prices: People feel a price of 198 much cheaper than a price of 200.

Task

Make some market research: Ask people how much they would like to pay for your glasses, what price would be OK for them.

Customer list and telephone marketing

Make a list of all your customers sorted by their Name:

Name, prescription, phone number, date of purchase, date of last call

Call your customers from time to time (e.g. after ½ year). Ask them:

- If they are happy with their glasses
- If they can still see well with their glasses or if they need a new test
- If they probably need a second pair (for reading, or as spare part)
- If the lenses are still good (not scratched) or if they need new ones
- If they have family members, friends, neighbors who need glasses too (then ask them to invite them to come to the shop to get a free eye test!)

Customer friends card

The best marketing media is your happy customer. Before he leaves, ask him who in his family and among his friends needs glasses too.

For every person give him one customer friends card and write the name of this person on it. On the card is the address of your shop and your telephone number.



Corporate design

The corporate design (CD) is the official graphical design of the logo and the name of an NGO or an company on all its printed and digital media like posters, brochures, on shops etc. CD is important that people remember and recognize an enterprise.

The logo of GVG consists of the name GoodVisionGlasses and the logo of the glasses:



The logo can also be used white on GVG blue:



The colours



GVG blue
100% Cyan



GVG Yellow
20%M, 100%Y



GVG Orange
60%M, 100%Y



GVG dark grey
75% black



GVG light grey
45% black

Task

How does a nice opticians shop look? Look at the colours, at the wording.
How does good advertisement from other shops and companies look?

Examples for Corporate Design




Glasses display



Shop

Prescription card

After selling the glasses, give your customer a prescription card with his prescription and the date he should come again to get his eyes checked.

Good Vision Glasses 
Prescription Card

Name

F/L F/R Date / /

N/L N/R ID

Good Vision Glasses 

  See-Far-Glasses from **MWK 3,000** only!

 Reading/ Sun Glasses

Your next free eye test: / / !

 goodvisionglasses_malawi | www.GoodVisionGlasses.org | 01 116 454 72

Outreach - Checklist

Version 2017-05-10

=====

Place, Date: _____
 Patient's Name: _____
 Refractionist: _____
 Adjusting Person: _____
 Controller: _____
 Team Members: _____

1. For Trainers / Coordinators

Follow one patient, check ✓ the point if done properly
 make a cross ✗ if not

2. For Opticians: Learn this list by heart!

Basis of the refraction process is the Optic Manual

one class, take 10 pupils with you to the test room. When 8 out of 10 are tested, bring the next 10	
Vision chart	
Is the distance 4 Meter?	
Sit down on the chair YOURSELF and check if you can read the last line!	
No Shadow on the signs? (from Optician or from stick)	
No reflection from light?	
No sun behind the vision chart? (sit down and check yourself if you can see the symbols)	
Signs are not covered by the pointer of optician?	
Is there enough light in the room to see properly?	
Check eye disease	
Is the white of the eye red?	
Is the pupil grey?	
Has the patient painful eyes, watery eyes, anything not looking normal?	
=> In these cases send him to the hospital (tell him and write in the patients book)	
Lens bar	
Can patient see through the middle of the lens? (Look from front)	
Lay your hand or fingers on the head of the patient for not shivering	
Are the lenses of the lens bar clean?	
Eye Test	
Both eyes: Which is the last line the patient can see at least 3 out of 5 symbols	
If he can see no line, turn the vision chart around for the large symbols	
Right eye (then left eye)	
Left eye is covered with palm (not with fingers)	
Which line he can see at least 3 out of 5 symbols? => you get the Starting-Power	
Write VAsc in Eye-Test-Card	
Special Case: He can't see the largest symbols	
VAsc: Write < 6/75 (smaller than 6/75)	
Starting-Power: Take 2.0	
Increase the power (first Plus, then MINUS) step by step. Stop only if no one of your lenses can help (also the lenses higher than 6.0). Take time! If you cannot help => Send him to hospital	
Start with PLUS Starting-Power	
Wait 3 seconds (count 21, 22, 23)	
Ask: "Is this worse?"	
If it is not worse, find the line he can see 3 out of 5	
Take next higher PLUS (continue)	
Stop when he says "It is worse"	
Take 0.5 dpt less and test again	
Take highest PLUS-lens which is still OK	
Write VAcc in Eye-Test-Card	
Write prescription in Eye-Test-Card	
If Starting-Power PLUS is worse => go to MINUS	

4.6 Checklist

Arrival of the patients	
If many patients waiting: Give everybody a small paper (3x2 cm) and write the number on it.	
Make sure people are waiting feel comfortable (shadow, benches to sit etc.)	
Is every optician wearing our glasses himself?	
Preparation of patients	
Take groups of 10 to 30 people (or a whole school-class) together and prepare them for the eye test	
Stay in front of them and explain the project	
Ask them who has problems to see properly (awareness)	
Ask them what they cannot do because they cannot see (awareness)	
Ask them who has problems in for example handling their mobile phone, working on the field, seeing the numbers of the minibus, putting the thread into the needle etc.	
Ask them if they know friends/family/neighbors who need glasses – and to tell them to come too	
Show them the glasses	
Tell them about the glasses (high quality, affordable, as robust like the spokes of the wheel of a bike, produced locally, German design)	
Tell them the price	
Tell them what to do if they have no money today (where they can buy later, when you come back)	
Explain the vision chart	
Show the direction of different E's	
Show me your hands (everybody shows his hand)	
Show me your palms (everybody shows his palm)	
Close your left eye with your palm (not with fingers!)	
Show me the direction of the E's.	
Now the same test with the other eye	
Only school class: After explaining to all pupils of	

Starting-Power	
Ask: "Is this better"	←
Find the smallest line he can see 3 out of 5	↖
Take next higher MINUS (continue ...)	↗
Stop when the line does not improve any more	
Take 0.5 dpt less and test again	
Take the lowest MINUS-lens which is good	
Write VAcc in Eye-Test-Card	
Write prescription in Eye-Test-Card (Then continue with left eye ...)	
If somebody cannot reach line 12 (VAcc less 50%) with any of your lenses => send him to the hospital. (If he wants he can buy your glasses nevertheless)	
Reading glasses	
For reading glasses take the prescription you found for distance and add reading value: 40 => +1.0 45 => +1.5 50 => +2.0 55 and older => +2.5	
Let the patient hold the reading test himself => so he can find his best distance	
If he cannot read, take thread and needle, or rice with stones etc. Ask him why he needs the glasses.	
Test if reading / working distance of 40 cm is OK (reading with rectangle arms)	
If he holds reading test too far => Take more PLUS If he holds reading test too near => Take less PLUS	
Sales Process	
Let the patient look into the mirror!	
The optician and the client sitting at the corner of the table (optician not behind table) for better contact and easy adaption of glasses.	
Let the patient choose his favorite color of glasses case	
Let the patient choose his favorite color of eye glasses	
Instruct to the patient how to clean the glasses (water, soap, toilet paper)	
Specially for donated glasses for school kids: prepare plastic boxes for every class. The pupils give their glasses to their teacher when school ends. The teacher keeps the glasses in the director's office until the next morning.	
The Table	
Is there any waste on the selling table? (clean it!)	
Is there a plastic box for the waste? (Box with hole in cover)	
Is there a nice blanket on the table? (dark blue blanket available in stock)	
Is there a mirror standing (not lying) on the table	
Are there two pairs of pliers on the table?	
Are there glasses cases nice presented on the table (4-5 pieces)	
Are there different types of eye glasses available? (round, rectangle, sun)	
Are there different colors of eye glasses available?	
Reality eye-test	

Far vision: let the patient look outside with his new glasses (to people, nature, trees etc.)	
Near vision: ask him what he needs the glasses for: let him read / give him needle and thread / box of beans with stones etc.	
Adapting the glasses	
Front: Are the glasses horizontal?	
Is the pupil distance (PD) being tested? Do the glasses have the right size?	
Side: Are the lenses inclined 5-10°?	
Do the temples fit behind the ears?	
Do the temples of the glasses NOT press against the head of the patient? (=> round temples)	
From Top: Do the eyelashes NOT touch the lens?	
Are the lenses clean?	
Patient-book	
Fill the book completely (every line)	
Phone No.: If patient has no phone no. => Ask him for the number of his Brother/Child/Neighbor etc.	
Address: if he has no address, write the name of his village	
Final eye-test – Most important!!!	
After adapting the glasses do the final eye-test!!!	
Which line can he read with his LEFT eye with HIS glasses?	
Which line can he read with his RIGHT eye with HIS glasses?	
Write VAcc on eye-test-card and in the patients book.	
Check once again: Are the glasses fitting well? (from front / from side / from top)	
Stamp in the health book	
Put the stamp into the health book	
If the patient does not have such a book, then give him his prescription on a card	
Marketing	
Ask the patient, who of his family/friends/neighbors cannot see properly.	
Give him a card for every family member/ friend who needs glasses, write their names on it (Mother, Brother, Friend1, Friend2 etc.)	
Tell him to give these cards to his family members	
Ask him if he works in a company, get the phone number of his boss and make an outreach	
Is he a priest => Ask him if you can make an outreach in his church.	
Is he a chief => Ask him for an village outreach etc.	
Ask the patient if he wants to buy sunglasses or reading glasses too or a second pair of glasses	
End of Outreach	
Is everything cleared and no waste left behind?	

Notes

A large empty rectangular box with a thin blue border, intended for taking notes.



Notes





OneDollarGlasses 