



Perkins School for the Blind

**Getting to 1M: Understanding
Magnification and Print Size**

Darick Wright

**Clinic Coordinator, New England Eye Clinic at
Perkins**



Perkins School for the Blind

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Before we get started today I'd like to review a couple of things with you:

1. There will be time reserved at the end of the webinar for questions. Please feel free **to post your questions in the Q & A box during the webinar** and we will address them later on.
2. You may see a pop-up **screen** asking you about how you will choose to receive audio for this webinar – just **click** on the cancel button on the screen.
3. **If you are using your phone, you should mute your computer speakers** so that you don't experience feedback.
4. Thank you for joining us for this event. Please know that we will do our best to ensure that you have a good experience as you attend this webinar!



Getting To 1M

Darick Wright

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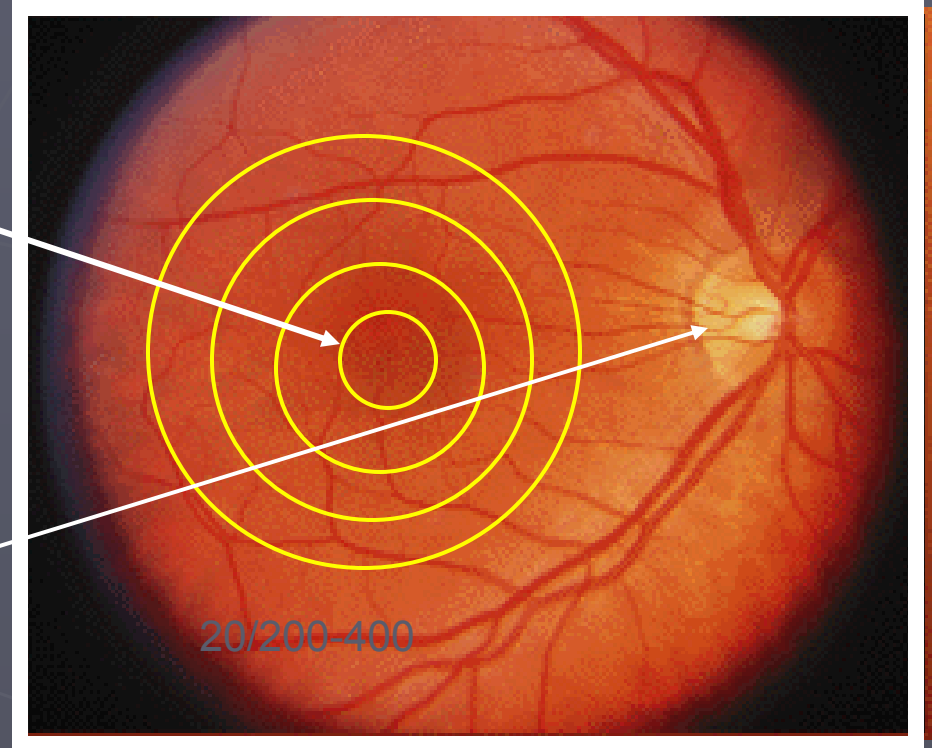
Goals

- Considerations when determining appropriate print/symbol size
- Using a near visual acuity chart as a tool to determine print size.
- Various optical and non-optical methods of magnification

Normal Fundus

Macula & Fovea
20/20 visual acuity

Optic Nerve
Transmits impulses



Clinical Measurement of Near Visual Acuity

- **Distance**
 - Standard 40 cm (16 inches)
 - Preferred
- **Smallest size identified** (Threshold Acuity)
- **Optimal conditions**
 - With correction
 - Contrast
 - illumination

Clinical Visual Acuity Notation

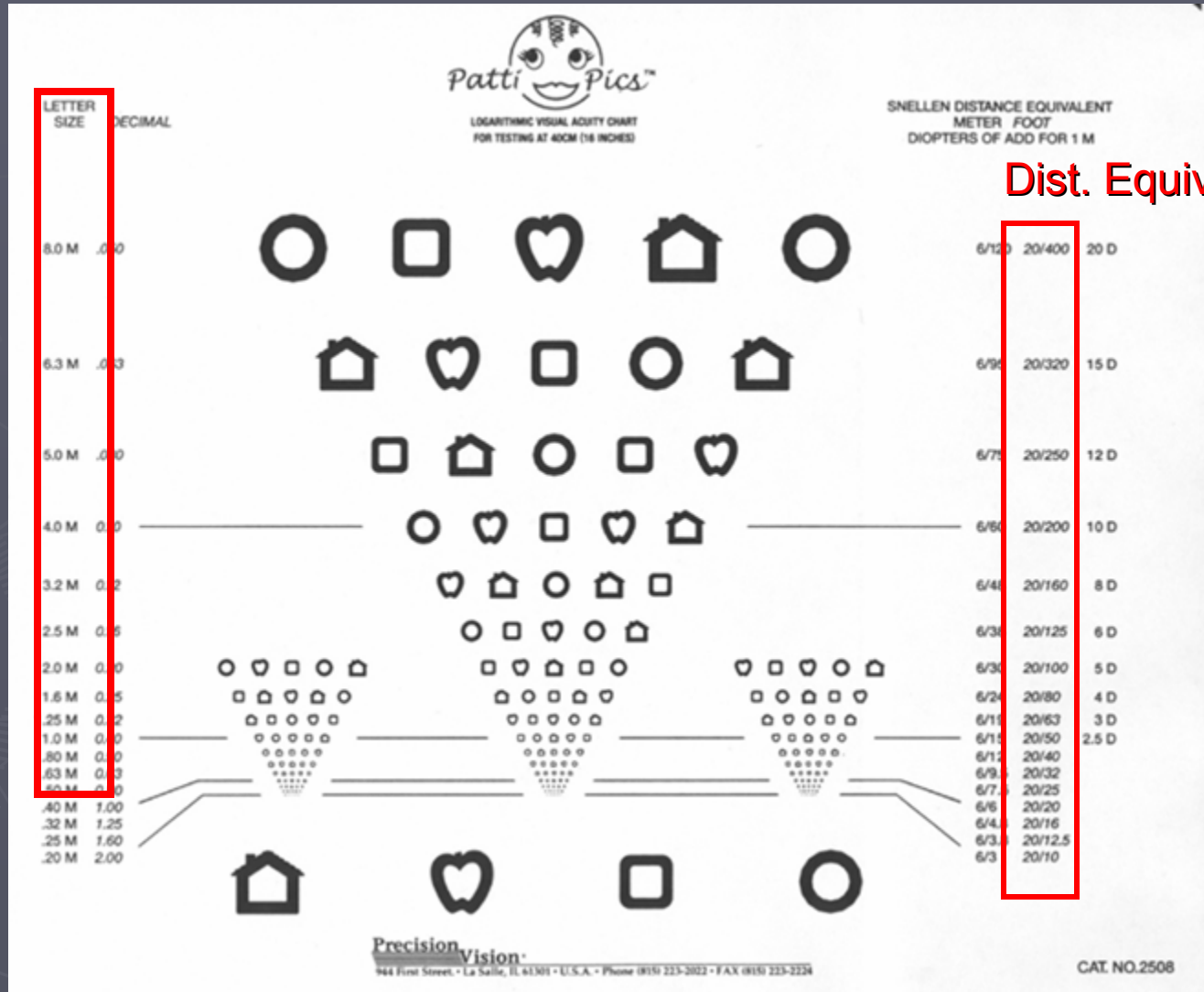
Optotype size + testing distance

2.5M @ 40 cm

1M = regular print = 1.45mm

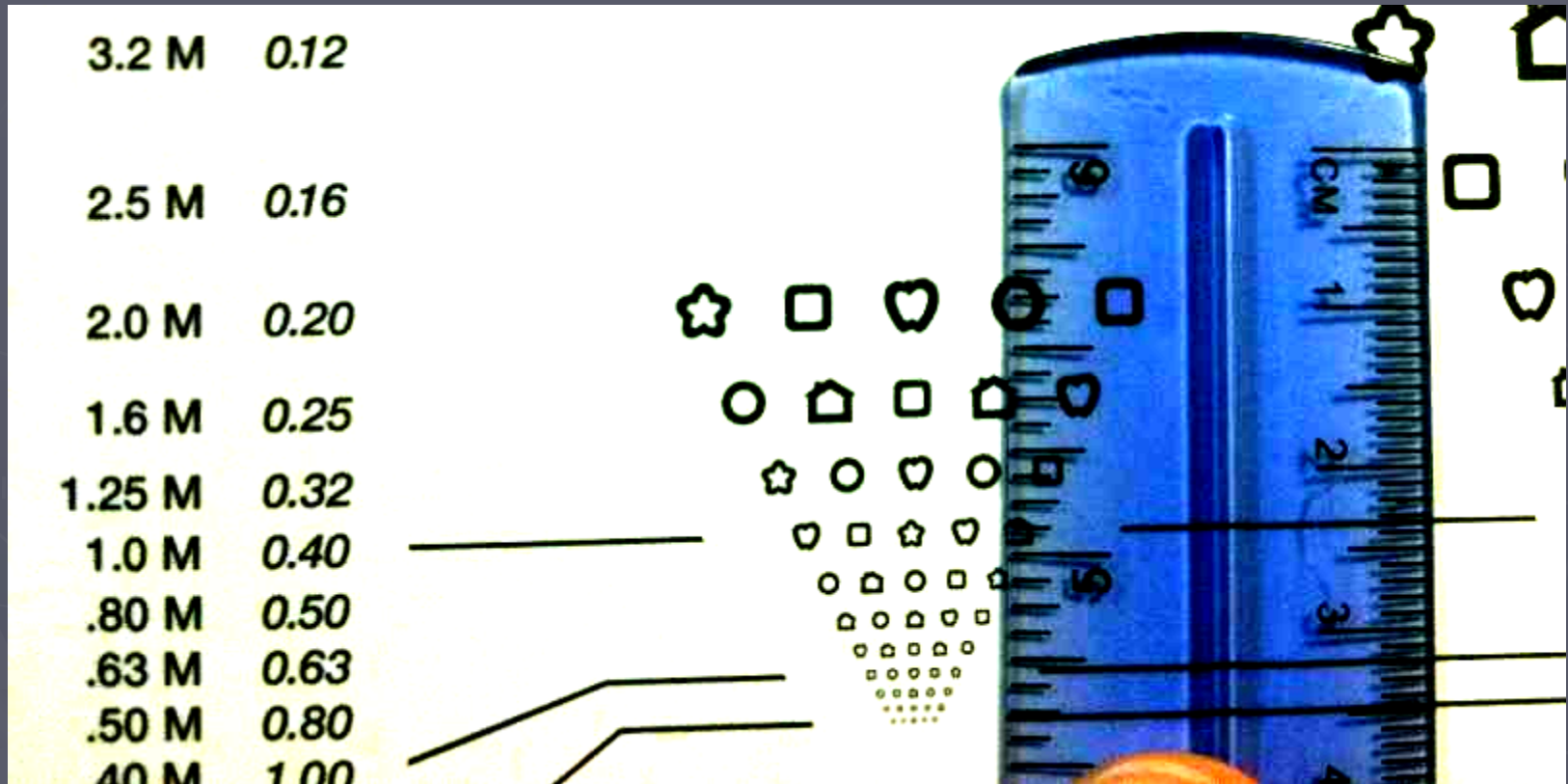
Notation

M-size



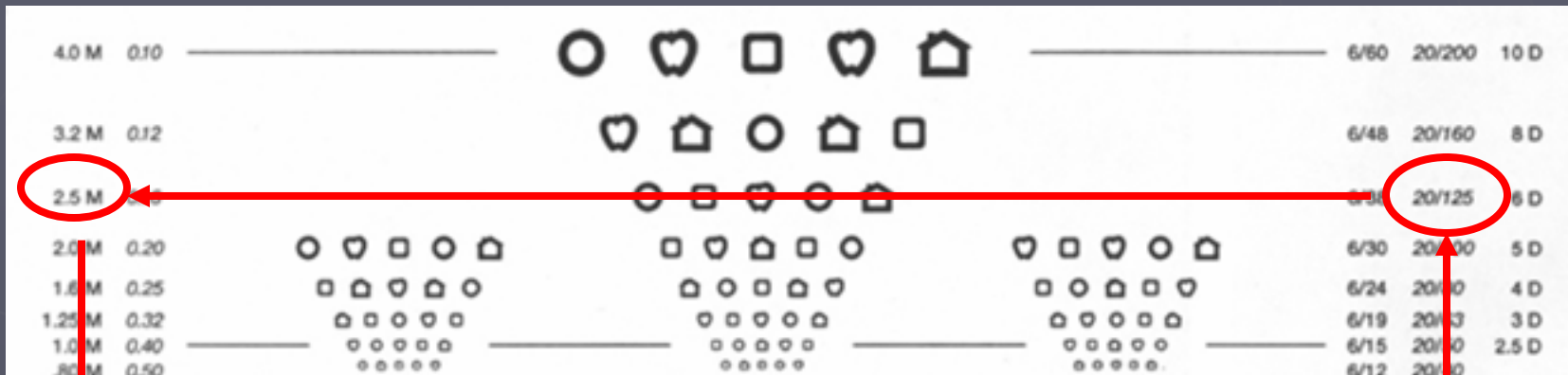
Dist. Equivalent

2.5M @ 40 cm



~ 3 mm @ 40cm

20/125 @ 40 cm



2.5M

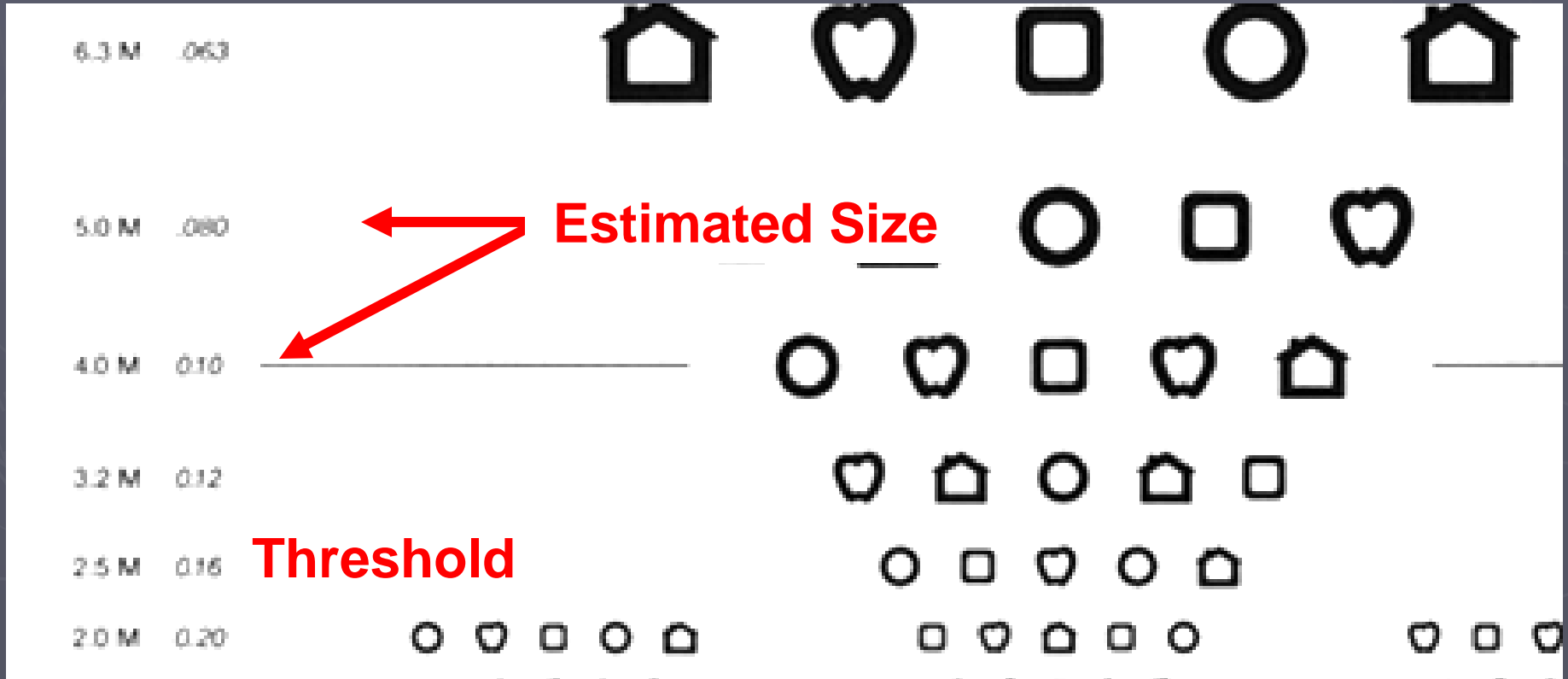
20/125 line

~ 3 mm @ 40cm

Estimation of Functional Print Size

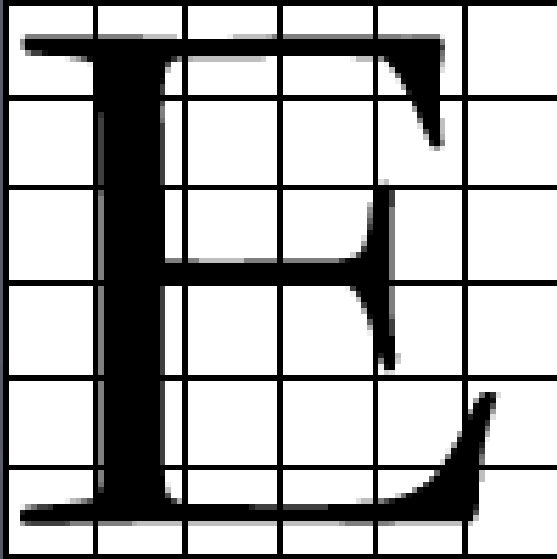
- Preferred Distance
- Size of Print
 - Note smallest line read (threshold)
 - Note size of required print size (target)

Visual Reserve



Estimation of Functional Print Size

- **Combine with additional information**
 - Speed & Comprehension (Reading Efficiency)
 - Learning Media Assessment
 - Functional Vision Assessment



Typography

(taɪˈpɒɡrəfi) — *n* 1. the art, craft, or process of composing type and printing from it 2. the selection and planning of type for printed publications

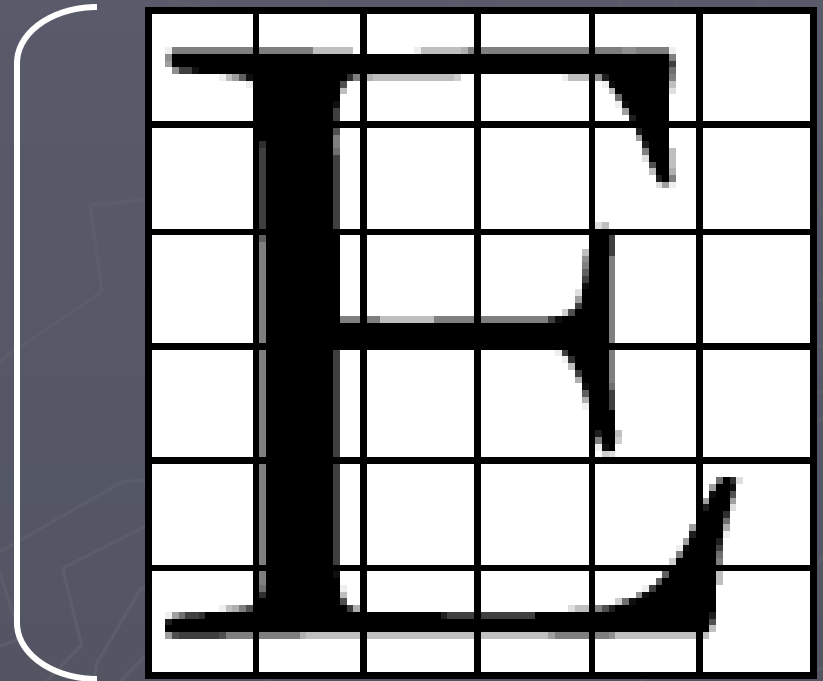
- Units of Measurement
- Serif vs Sans-Serif
- Leading & Kerning

A 1-inch high letter has 6 Picas

1 Pica = 12 points
12 points = 1/16 inch

2 Picas = 24 points
24 points = 1/8 inch

6 Picas = 72 points
72 points = 1 inch



Serif Typeface

Typeface that have tiny “strokes” or “feet” attached to the edges of letters. They help guide the eye from one letter to the other.

Examples:

Times

Script

Bookman

Sans Serif Typeface

Sans literally means the absence of (without) serifs. Often used in headlines and for visual impact.

Examples:

Ariel Century Gothic Helvetica

14 Point Times New Roman

Print size that may be adequate for sighted persons may be far too small for individuals with low vision. Low vision clinicians, teachers of students with visual impairments, and other rehabilitation professionals are often responsible for ensuring that the print size is appropriate for an individual, given the prevailing constraints on the viewing conditions. Practical decisions, such as the following, need to be made: Should the print size be enlarged? Should the observation distance be changed? Should optical or electronic magnification systems be used? Should lighting conditions be modified? Should alternatives, such as braille or speech-output systems, be used? Compromises and trade-offs are often involved. Making

14 Point Affont

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Leading

14 Point Ariel Normal Leading

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14 Point Ariel Expanded Leading

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Kearning

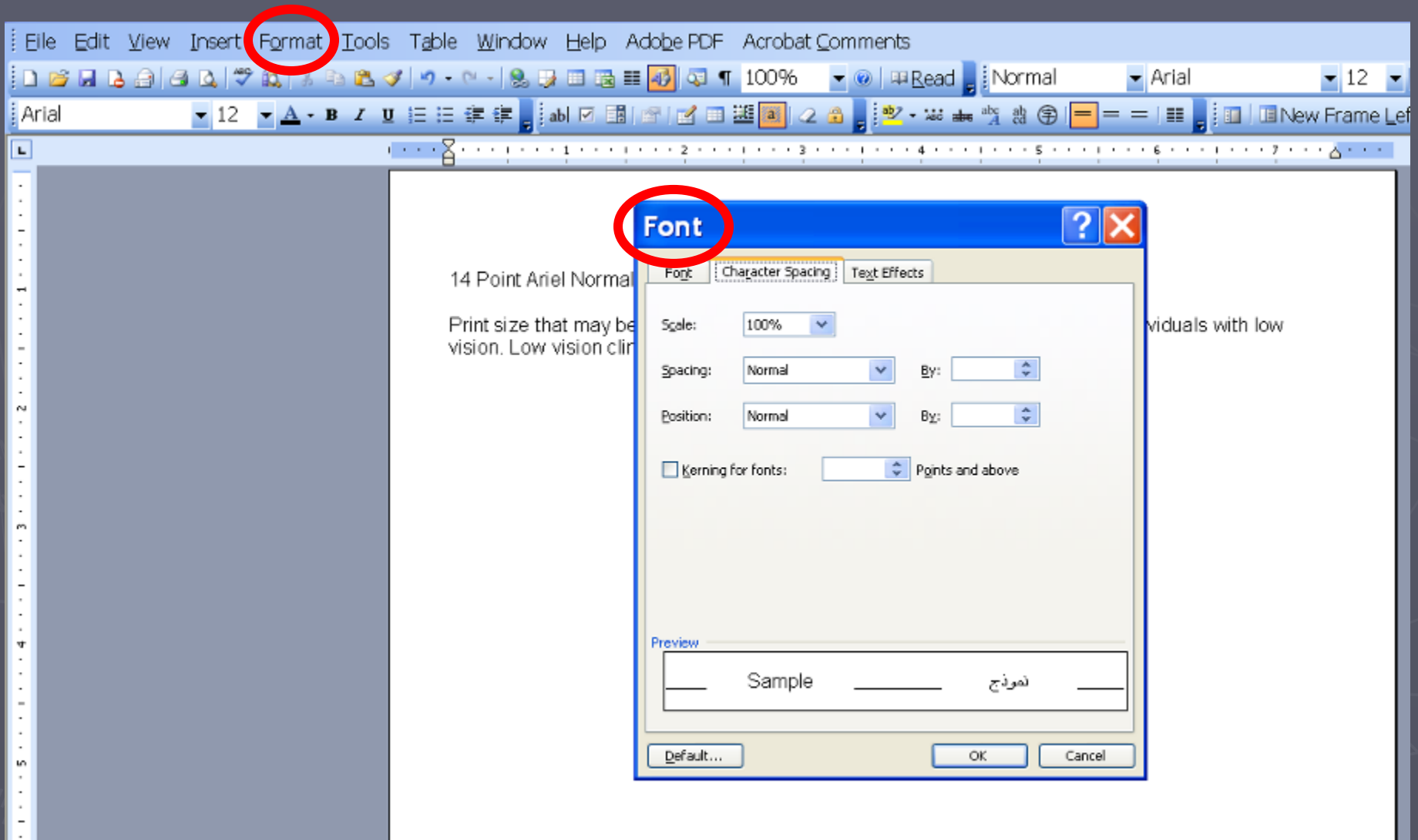
14 Point Ariel normal kearning

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14 Point Ariel expanded kearning

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Leading & Kerning





www.APH.org

- No serifs
- Even spacing between letters
- Wider/heavier letters
- “underslung” j and q
- Higher crossbars
- Larger punctuation marks ! . , ; ?

To Serif or Not To Serif!

- Sans Serif is better when reading close to threshold acuity.
- Letters too close or too far apart (kerning) may be difficult to read.
- The smaller the space between lines (leading) of print, the “darker” or “visually complex” the page appears.

Selecting the Print Size

- Identify threshold (clinical/functional)
- Identify current print size & reading duration required (target)
- Identify current environmental conditions
 - Color contrast
 - Illumination
- Combine with other data
 - Reading efficiency
 - LMA or FVA

Case #1 - 7 y/o, 1st grade

Near Visual Acuity: (threshold) 2.5M at 40 cm

Current Required Print Size: 5mm

Reading Duration: average

Environmental Conditions:

- High contrast
- Normal illumination (no task lighting)

Case #1 Compare

- Compare actual size (height)
 - Clinical acuity (2.5M/3mm)
 - Required print size (5mm)
- Which is larger? Required Print Size (5mm)
- Can they access Required Print? Yes
- Is Required Print Size Functional? ?

If Required Print is 2 – 3 times larger than threshold acuity, magnification may not be required with equal reading distance.

Case #2 - 7 y/o, 1st grade

Near Visual Acuity: (threshold) 3.2M at 40 cm

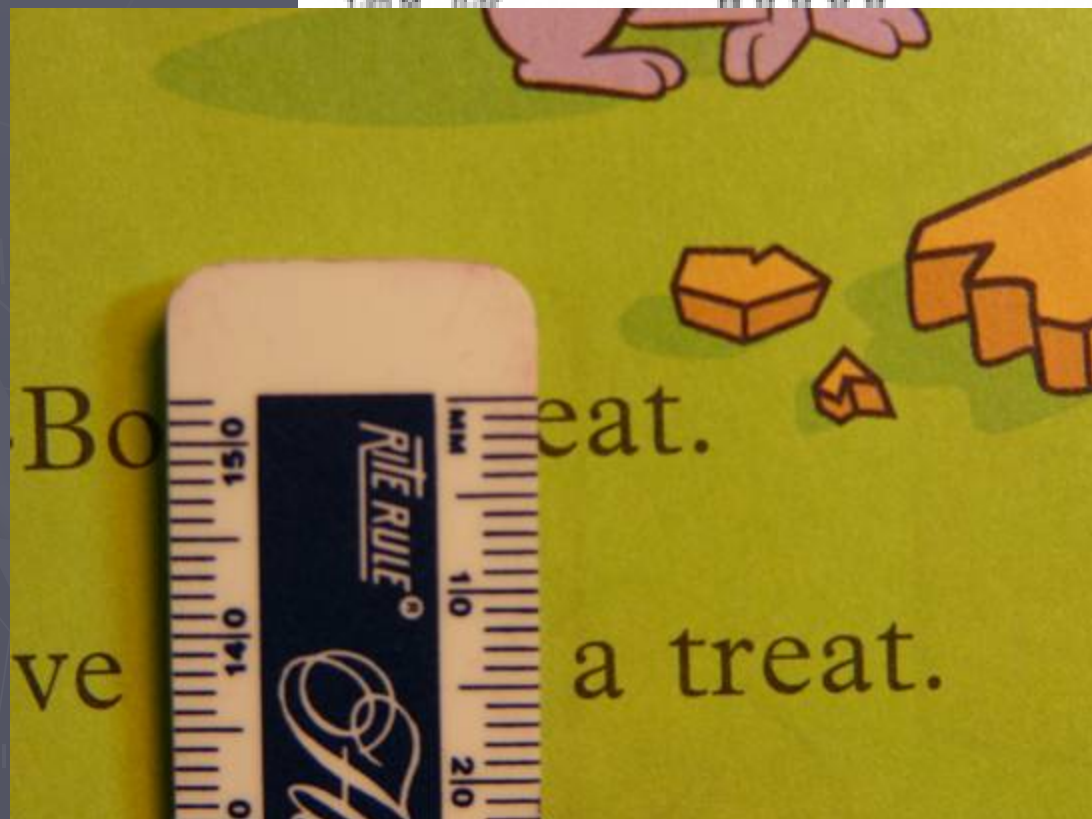
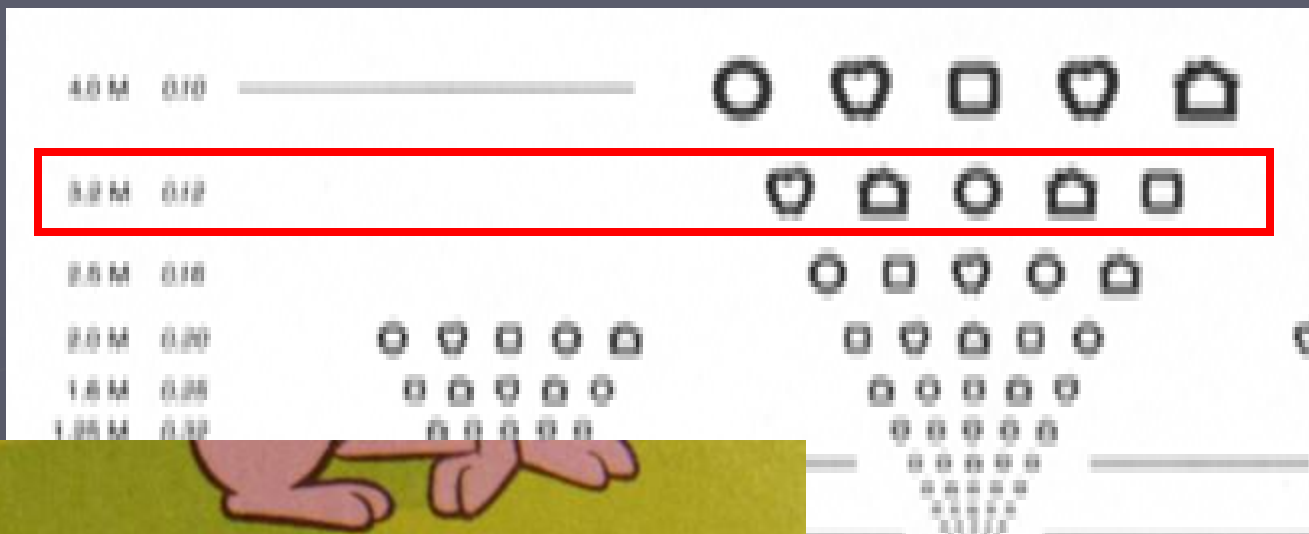
Current Required Print Size: 3 mm height

Reading Duration: average

Environmental Conditions:

- Low/medium contrast
- Normal illumination (no task lighting)

3.2M
~ 5mm



3 mm

Case #2 Compare

- Compare actual size (height)
 - Clinical/Threshold acuity (**3.2M/5mm @ 40cm**)
 - Required print size (**3 mm**)
- Which is larger? **Clinical/Formal Acuity**
- Required print size accessible? **No**
- Estimated functional print size (at 40cm)?

Estimated Functional Print Size?

6.3M
Possible Functional Size
(9mm)



3.2M
Threshold (clinical VA)



Case #3 - 16 y/o, 11 grade

Near Visual Acuity: (threshold) 4M at 40 cm

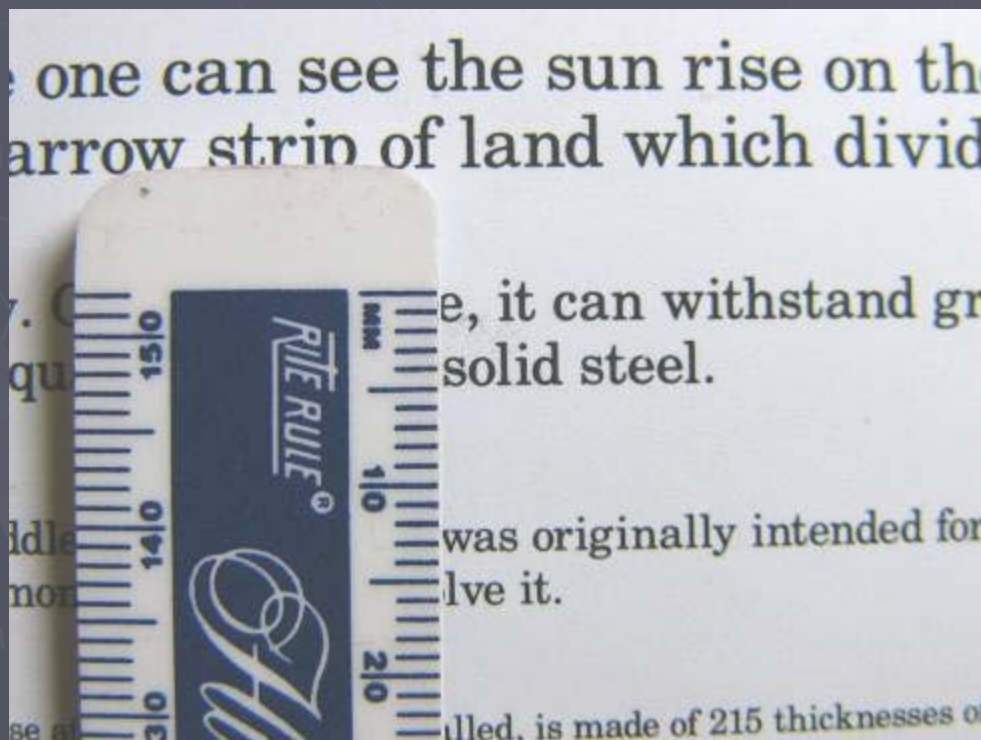
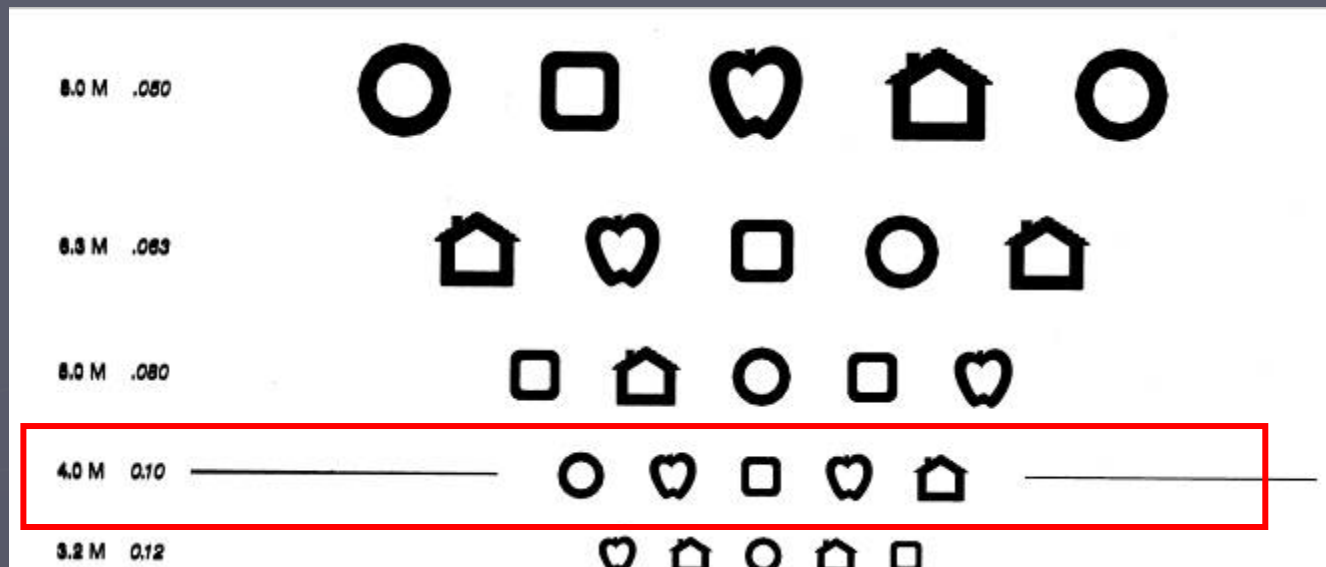
Current Required Print Size: 1.45mm

Reading Duration: average

Environmental Conditions:

- Low/medium contrast
- Normal illumination (no task lighting)

6mm
(4M)



1.45 mm
(1M)

Case #3 Compare

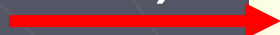
- Compare actual size (height)
 - Clinical/Threshold acuity (4M/6mm @ 40cm)
 - Required print size (1M = 1.45mm)
- Which is larger? Clinical Acuity
- Required print size accessible? No
- Estimated functional print size (at 40cm)?

Possible Functional Print Size?

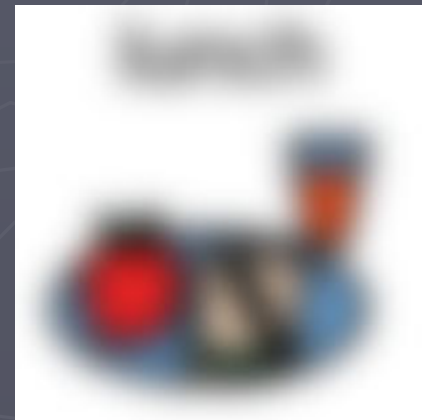
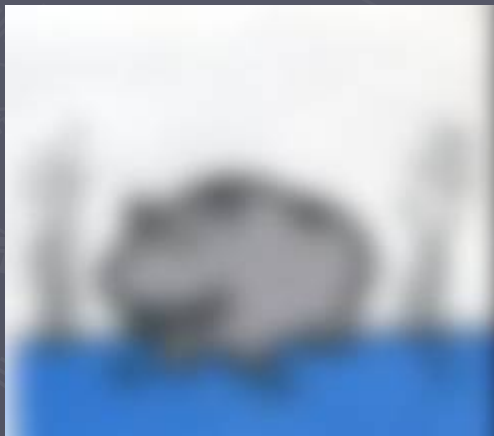
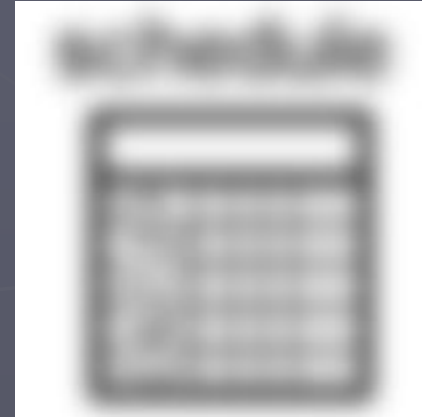
8.0 M
Possible Functional Size



4.0M
Threshold (clinical VA)



How Big? Critical Components?



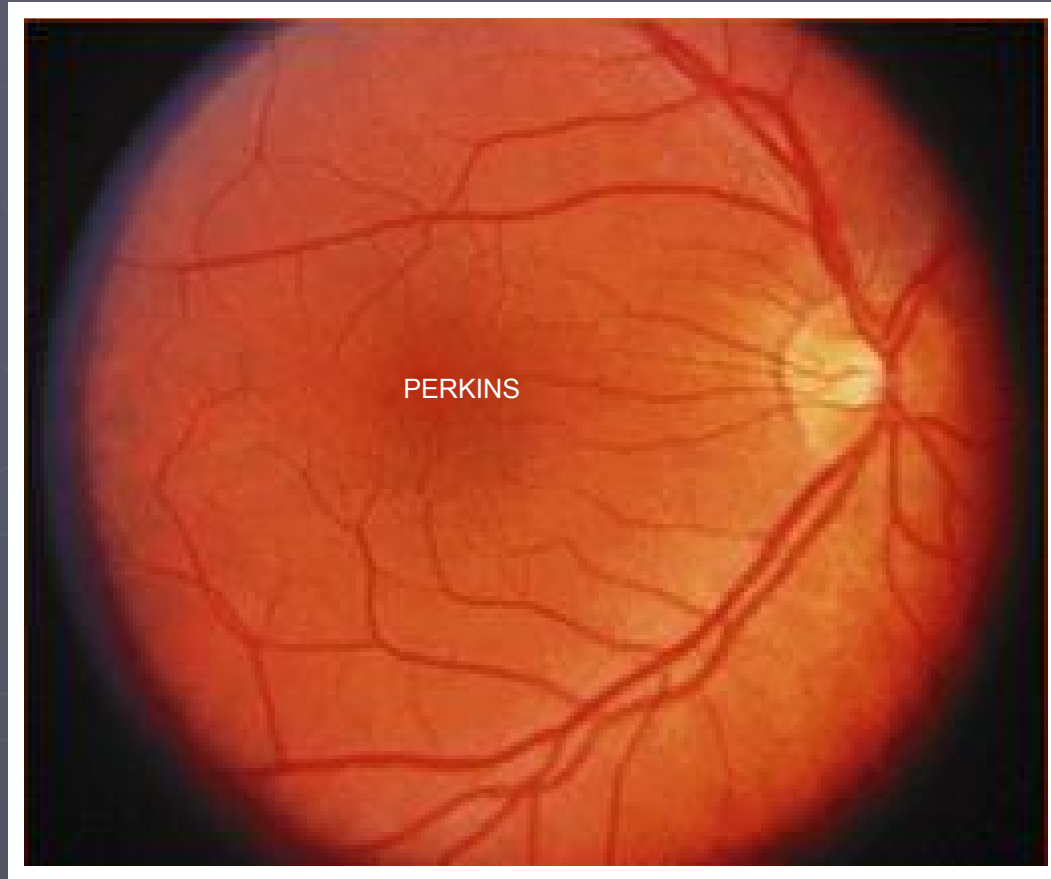
Critical Components

- Threshold vs Functional/Preferred Size
- Viewing Distance
- Typeface & Layout (complexity)
- Combine with additional assessment data (LMA, FVA)

Magnification



Magnification = retinal image size



Relative Distance

- As objects are brought closer (or the person moves closer to the object) the retinal image size is enlarged proportionally.

123

- It is still necessary to focus the image with lenses or accommodation.

Advantages

- Commonly accepted/understood
- Low cost 😊
- Can be used in combination with other forms of magnification

Disadvantages

- Student may feel self-conscious
- Does not work in all situations
 - Can't be close enough
 - Disturbs others
 - May conflict with other eye conditions
- Can discourage pursuing other methods of magnification

Using Relative Distance

If a person could read a book with 2M print at 16 inches (40cm). How close would they hold the book to read 1M size print?

8 inches (20cm)

Using RELATIVE DISTANCE

If a person could identify a 1-inch sized object at 16 inches. How close would they need to be to identify a $\frac{1}{4}$ -inch sized object?

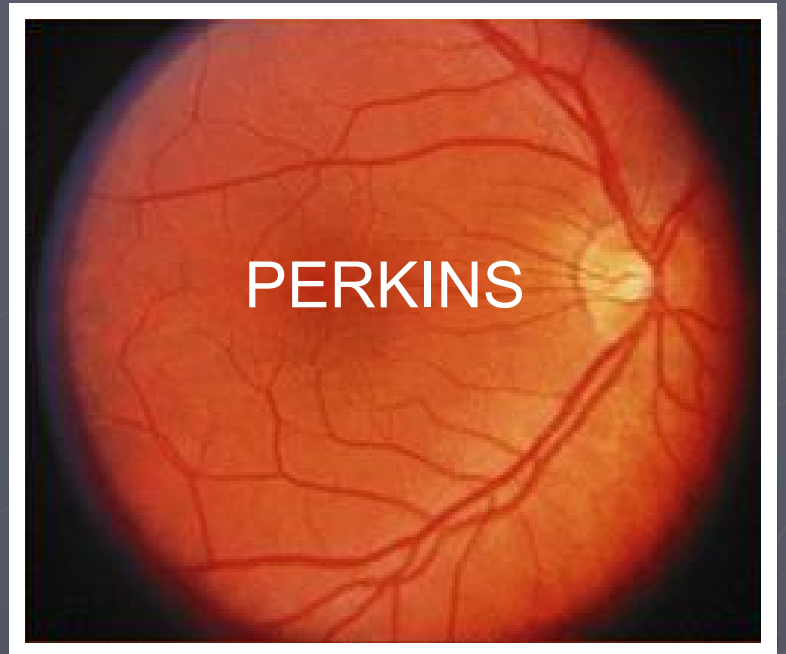
**4 inches, or
4-times (4x) as close**

Relative Size

- **The object itself is made larger.**
 - Examples: large print books, writing larger, enlarged buttons on a telephone/sign, bold line paper, bold line pens.
 - Examples: large print books, writing larger, enlarged buttons on a telephone/sign, bold line paper, bold line pens.
 - Examples: large print books, writing larger, enlarged buttons on a telephone/sign, bold line paper, bold line pens.

How does it work?

PERKINS



Advantages

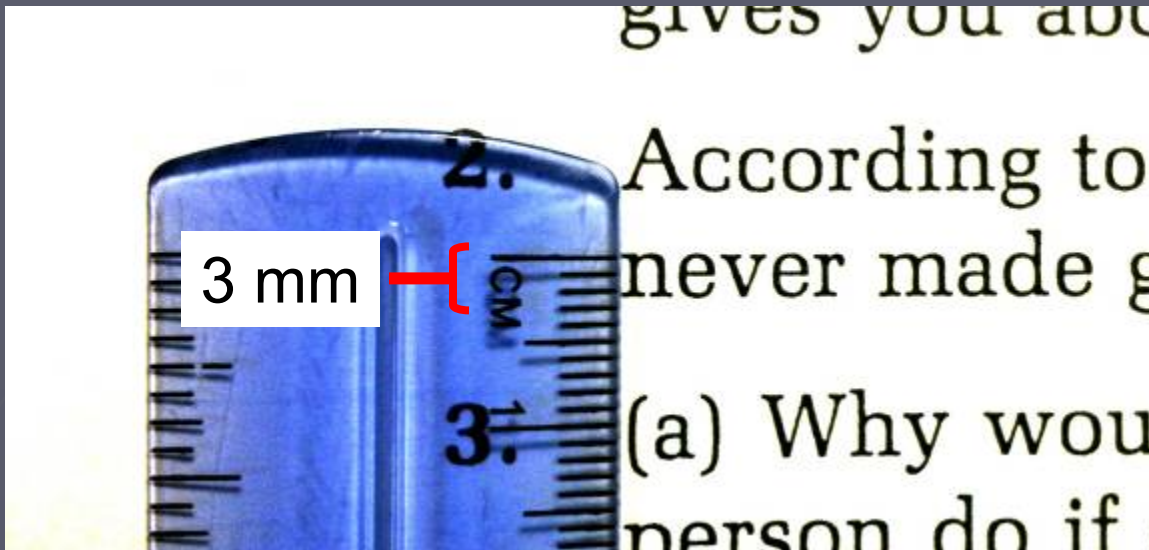
- Commonly accepted/understood
- Can be created using a copy machine
- Easily used with a computer (Zoomtext, accessibility features built-in)
- Can be used in combination with other forms of magnification

Disadvantages

- Size does not always equal size needed
- Size not always consistent
- Rarely able to include color
- Large print = large books
- Can discourage pursuing other methods of magnification
- Cost?

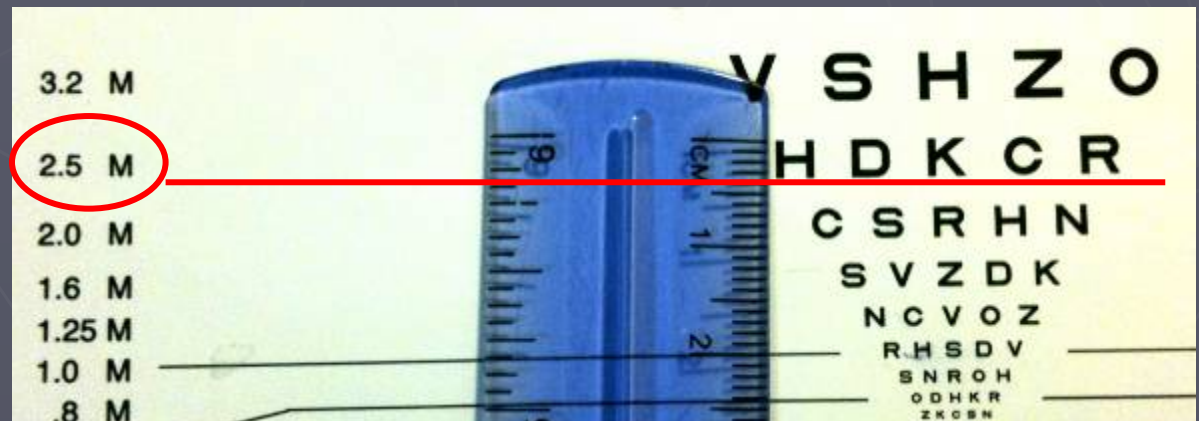
How Big is Large Print?





Height of LP
lower-case letter

Corresponding
size (3mm) on
Near VA chart



Large Print = 3mm = 2.5M

Using Relative Size

Case #1

- 2.5M at 40cm (threshold)

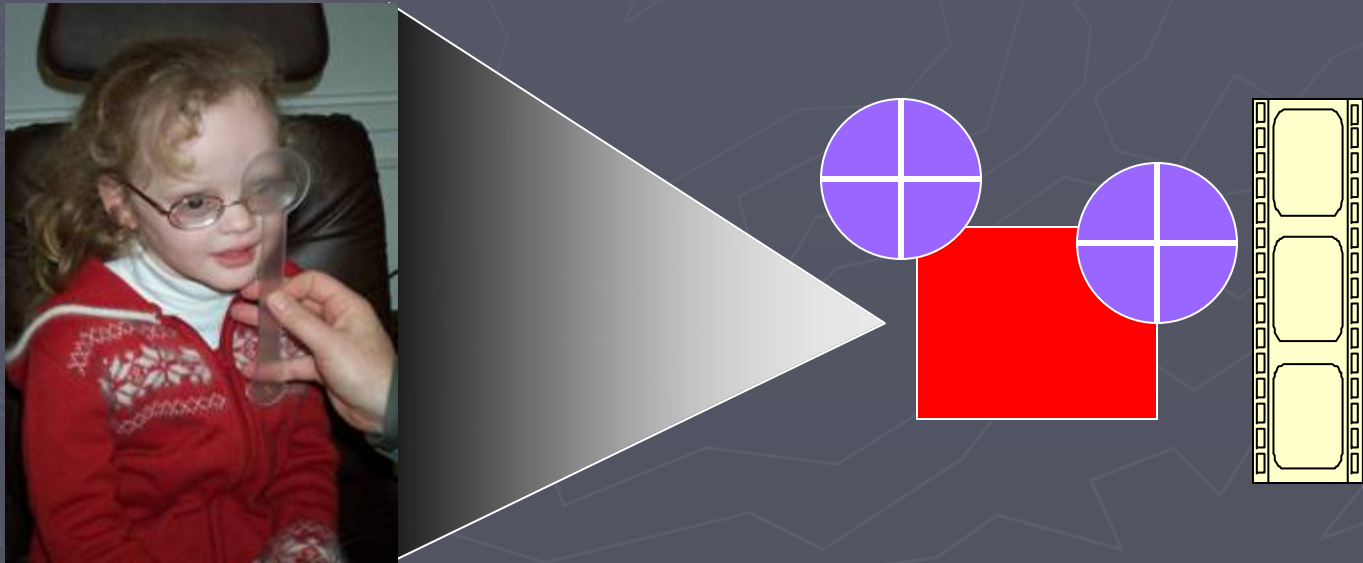
Estimated functional print size? ~5M

What is height of functional size? ~7mm

Is standard large print accessible? ?

Projection Magnification

- Images are enlarged by projecting them against a distant surface.



Advantages

- Commonly accepted/understood
- Low cost 😊
- Can be used in combination with other forms of magnification
- Can vary image size

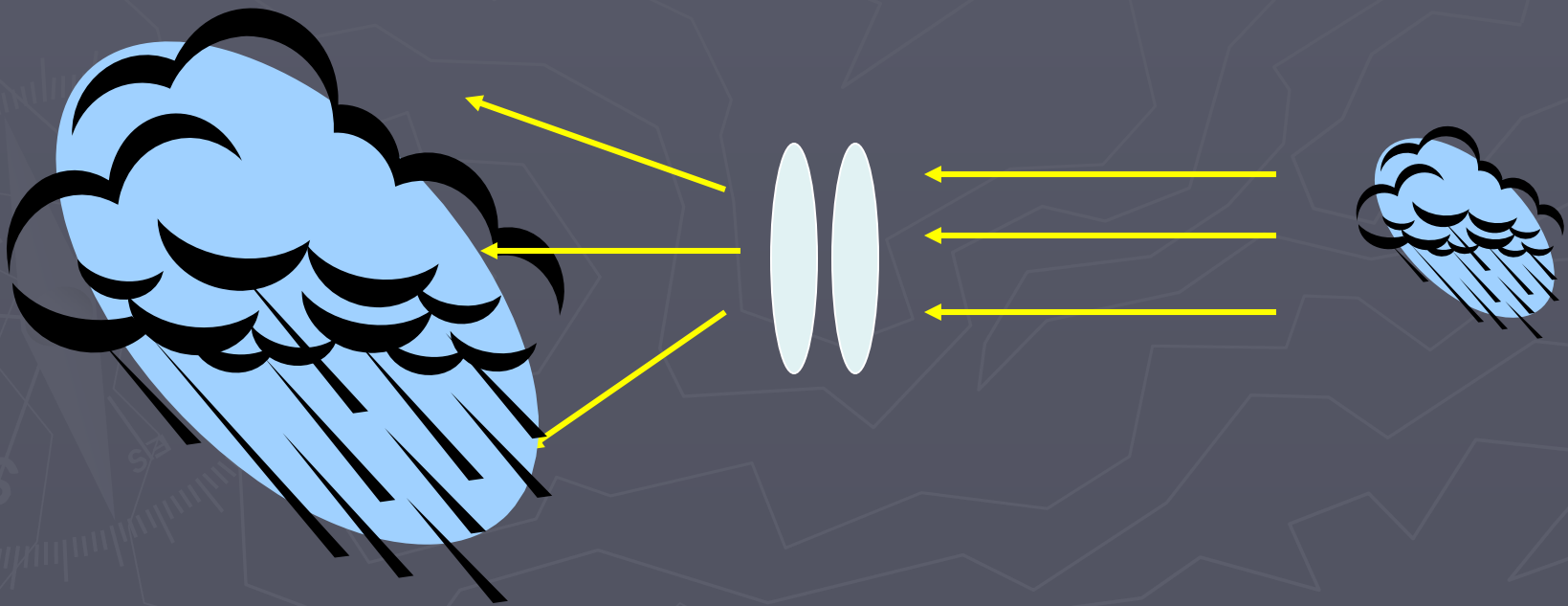
Disadvantages

- May not enlarge enough
- Can cause glare/fatigue
- Can discourage pursuing other methods of magnification

Angle (optical) Magnification

Magnification occurs using a series of lenses

- Examples: hand held/stand magnifiers, telescopes



Characteristics

When you **INCREASE** lens power you,

 Increase magnification

 Decrease Focal Distance

 Decrease Field of View

  Decrease Reading Speed

Characteristics

When you **DECREASE** lens power you,

↓ Decrease magnification

↑ Increase Focal Distance

↑ Increase Field of View

↑ ↓ Increase Reading Speed

Using Optical (Angle) Magnification

- **Level of Magnification needed**
 - Determined by Optometrist/Ophthalmologist
- **Actual size of material**
 - Current
 - Future
- **Characteristics of Material/Task**
 - Letter/Symbols
 - Photographs/illustrations
 - Combination
 - Reading + Writing

Using Optical (Angle) Magnification

- **Physical Ability**
 - Grasp, maintain focal distance, use of other devices
- **Age**
 - Introduce early to develop skills
- **Cosmesis**
- **Portability Needs**
- **Combining with other devices**
 - Optical magnifier + reading stand

Review

- Magnification = creating larger retinal image
- Combine magnification methods
 - Relative distance + Relative Size
 - Relative Size + Angle/Optical
- **Team Effort!**
 - Identify & prioritize tasks
 - Low Vision Specialist prescribes optical devices
 - Educational Team provides device training & follow-up

Remember...

- Clinical acuity = threshold (smallest)
- Critically analyze print characteristics
- Determine best size & style for maximum efficiency
- Magnification = larger retinal image
- Consider using combination of magnification methods



Getting To 1M

Thank You!