



# P03

# For Your Eyes Only

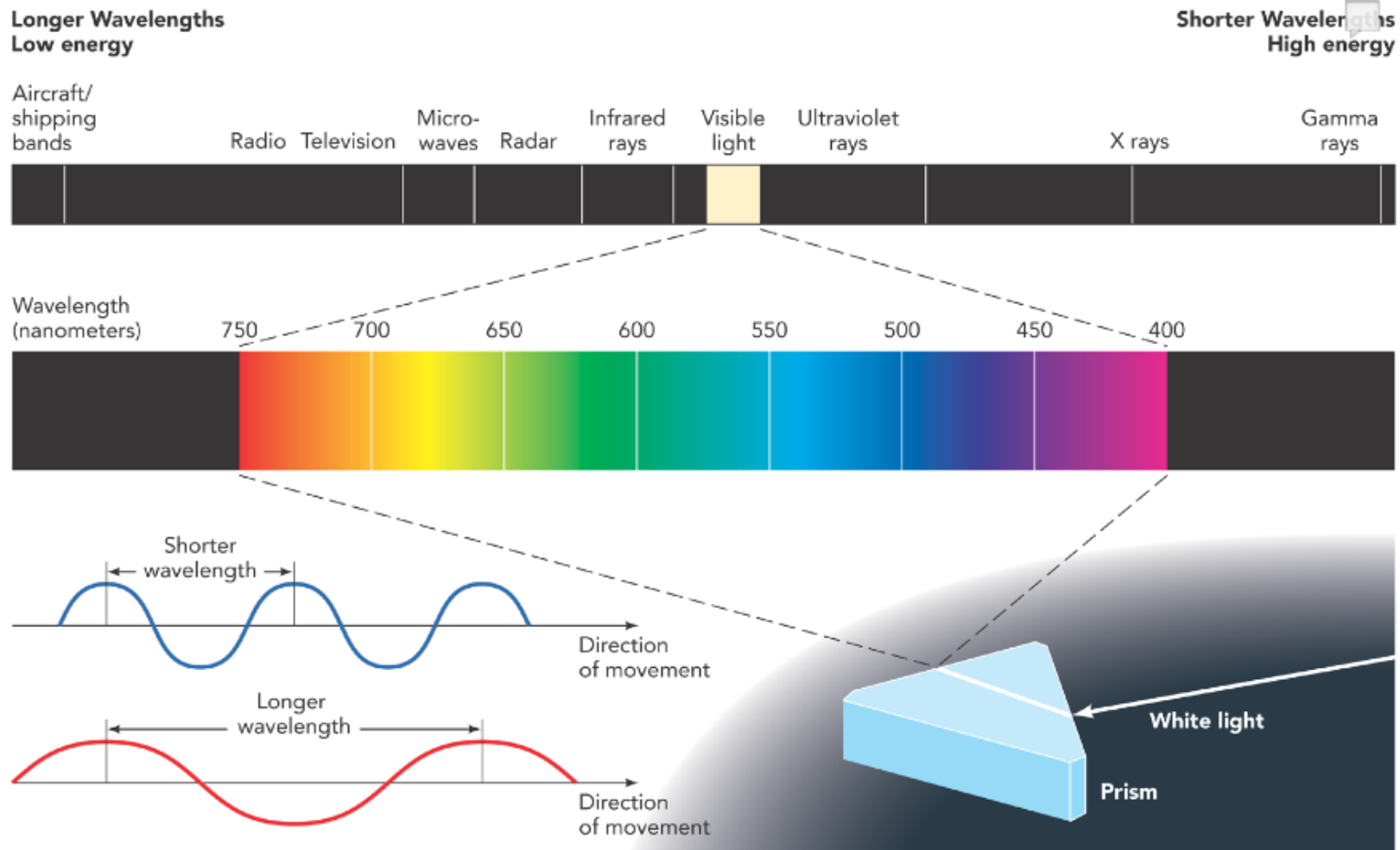
E365 – Aviation Human Factors

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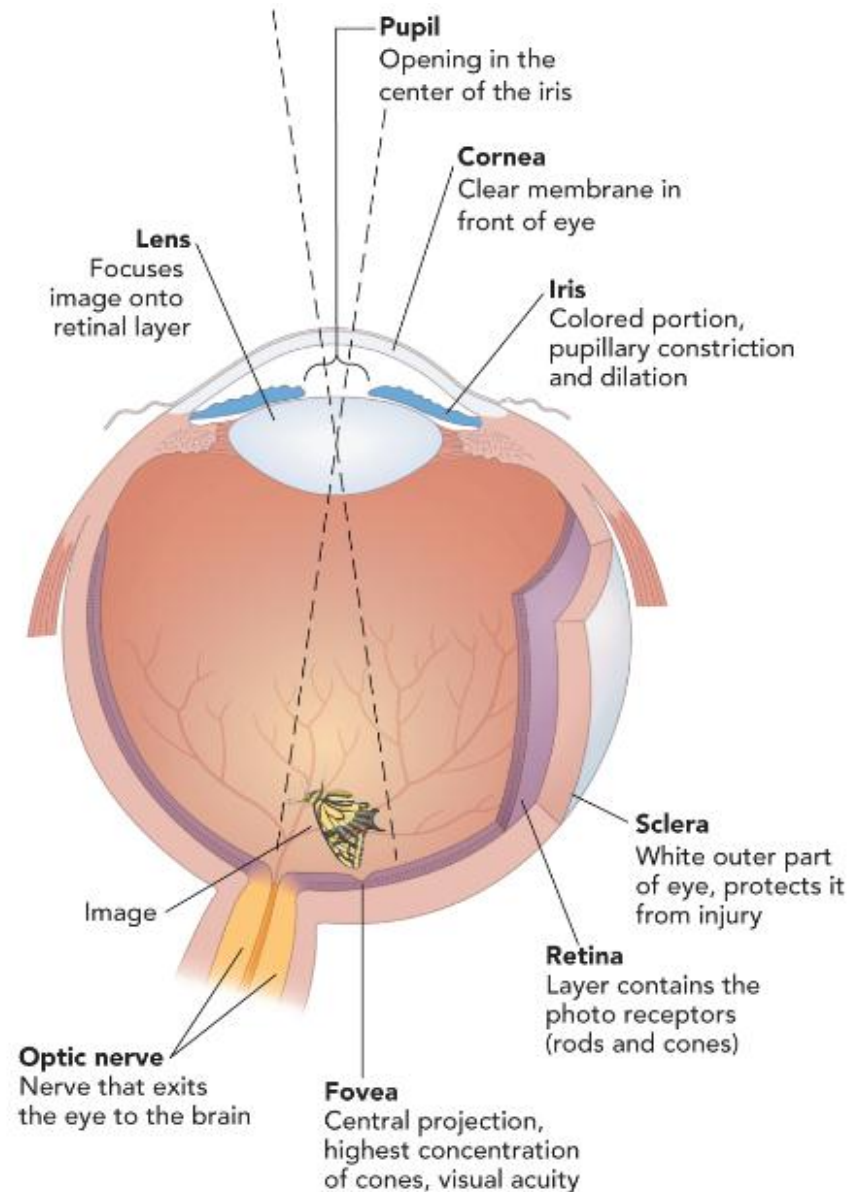
# Stimulus for the human eye



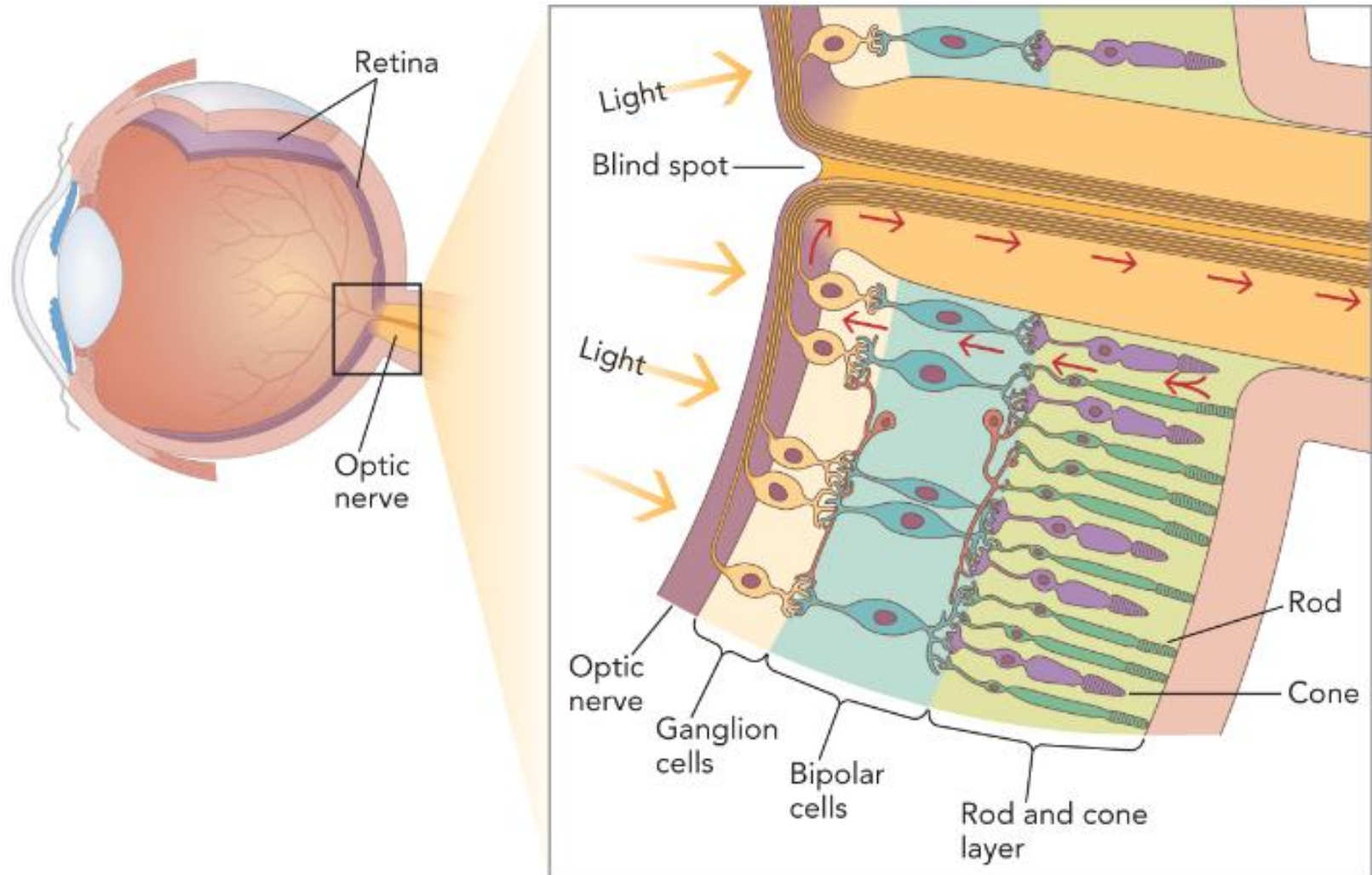
- Visible light wavelengths range: 400 – 700 nm.



# Anatomy of the human eye



# How the human eye works



# Visual Acuity

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- Visual acuity is the ability of the eye to discriminate sharp detail at varying distances
  - Snellen eye chart and fractions
- Visual problems
  - Myopia
  - Hyperopia
  - Presbyopia
  - Cataracts
  - Astigmatism
  - Glaucoma
  - Migraine-induced
  - Colour-defective vision

# Visual perceptions

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- Shapes
  - Figure-ground relationship
  - Gestalt principles
    - Closure
    - Proximity
    - Similarity
- Depth
  - Binocular cues
  - Monocular cues
    - Familiar size
    - Height in the field of view
    - Linear perspective and relative size
    - Overlap
    - Shading
    - Texture gradient

# Criteria for text displays

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- Visibility
  - The quality of a character or symbol that makes it separately visible from its surroundings
- Legibility
  - The attribute of alphanumeric characters that makes it possible for each one to be identifiable from others
    - Stroke width, form of characters, contrast, and illumination
- Readability
  - A quality that makes possible the recognition of the information content of material when it is represented by alphanumeric characters in meaningful groupings, such as words, sentences, or continuous text.
    - Spacing of characters and groups of characters
    - Combination into sentences or other forms
    - Spacing between lines and margins

# Characteristics of text displays

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- Typography
  - Stroke width: Stroke thickness to letter height
    - Good illumination
    - Increase width as illumination decrease
  - Width-to-Height Ratio
    - 3:5 satisfactory for most purpose
  - Style of Type/ Fonts
    - Roman types for conventional text material
    - Italics for emphasis, titles and special uses
    - Bold for headings and labels
- Size
  - Increase character size as viewing distance increases to maintain legibility and readability

# Characteristics of text displays

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- Case
  - Lowercase is easier to read than all uppercase
    - Distinct shape of envelope
  - Labels are often printed in uppercase
    - Maximize overall height of letters within space allocated
- Layout
  - Interletter Spacing
    - Close-set type is read more rapidly than regular-spaced letter
  - Interline Spacing
    - Induce visual effect, may provoke eye strain and headache
    - Increase spacing to improve clarity

# Characteristics of text displays

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- Reading Ease
  - Type of Sentence
    - Active vs Passive
  - Order of Words
    - Order of word should match order of action
    - The above instruction is likely to result in many green buttons being pushed with the gas on.
  - Ensure proper grammar, use simple words, use short sentences to make reading easier.

# Characteristics of text displays

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- Density
  - Search time and errors increase with increasing density
- Grouping
  - Extent to which information form well-defined perceptual groups
  - Search time and errors increase with number and size of groups
- Complexity
  - Arrange text in columns rather than horizontal list
- Highlight
  - Avoid blinking highlights

# Characteristics of text displays

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- Color
  - Use as few colors as possible
  - Avoid extreme of color spectrum (reds and blues)
  - Avoid using color pairs of saturated red and blue, red and green, or blue and green on a dark background
  - Maximize color contrast

# Graphic Representation

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- Graphic representation of text
  - Use pictures for speed and text for accuracy
  - E.g., Airline passenger safety instruction
- Graphic representation of data
  - Graphs may distort perceptions, resulting in inaccurate interpretation

# Learning Objectives

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- How the human eye works
- Visual acuity and problems
- Visual perceptions
- Designs of text and graphic displays