PRACTICE EXAM 12

1. A prescription reads –4.00 +1.50 x 065. Transposed to minus-cylinder form, the resulting power is:

A. –4.00 –1.50 x 065

B. –2.50 +1.50 x 155

C. –2.50 –1.50 x 155

D. –5.50 –1.50 x 155

2. A patient views 7 mm below the OC of a –4.50 D lens. The induced prism is:

A. 31.5 prism diopters

B. 0.32 prism diopters

C. 4.5 prism diopters

D. 3.15 prism diopters

3. A spectacle lens of +12.00 D at a 14 mm vertex is refit closer to the eye. Using F/(1 – dF), moving it 14 mm closer makes the required power:

A. Lower, about +10.00 D

B. Unchanged at +12.00 D

C. Lower, about +11.00 D

D. Higher, about +14.50 D

4. A patient reads 9 mm below the OCs with vertical powers OD +4.00 and OS +1.50, both base down. The vertical imbalance is:

A. 5.0 prism diopters

B. 4.95 prism diopters

C. 2.25 prism diopters

D. 0.25 prism diopters

5. A +2.50 cylinder lies at axis 030. Using $F \times \sin^2\theta$, the cylinder power effective at the 075 meridian (45° from axis) is:

A. 1.25 D

B. 2.50 D

C. 0.00 D

D. 1.77 D

6. A frame marked 56 □ 14 is fitted to a 62 mm PD, but the patient also needs 2 mm of additional outward decentration per lens for a wrap adjustment. The base decentration per lens (before the wrap adjustment) is:

A. 8 mm inward

B. 4 mm inward

C. 6 mm outward

D. 2 mm inward

7. The spherical equivalent of +3.00 –5.00 x 090 is:

A. +3.00 D

B. –2.00 D

C. +0.50 D

D. –5.00 D

8. A –7.00 D spectacle lens at 12 mm vertex is refit as a contact lens. Using $F/(1 – dF)$ with the lens 12 mm closer, the contact power is approximately:

A. –6.45 D

B. –7.00 D

C. –7.65 D

D. –8.40 D

9. A lens has a focal length of 0.0625 m. Its power is:

A. +8.00 D

B. +16.0 D

C. +6.25 D

D. +1.60 D

10. A patient's Rx is +1.00 –3.00 x 180. By focal-line position, this is classified as:

A. Compound myopic astigmatism

B. Simple hyperopic astigmatism

C. Mixed astigmatism

D. Simple myopic astigmatism

11. All of the following increase as a minus lens's power increases EXCEPT:

A. The center thickness

B. The edge thickness

C. The minifying effect

D. The induced prism at a fixed off-center point

12. A patient with OD +5.00 and OS +2.00 reads 8 mm below the OCs. To eliminate the resulting vertical imbalance, the fabrication remedy is a:

A. Larger frame

B. Heavier coating

C. Steeper base curve

D. Slab-off on one lens

13. A +6.00 D lens induces 3.0Δ at a point below its optical center. That point is located:

A. 18 mm below the OC

B. 2.0 mm below the OC

C. 5.0 mm below the OC

D. 0.5 mm below the OC

14. Which sequence correctly transposes a plus-cylinder Rx to minus-cylinder form?

A. Add sphere and cylinder, reverse cylinder sign, rotate axis 90°

B. Halve the cylinder, keep the axis, double the sphere

C. Reverse only the axis, leaving sphere and cylinder unchanged

D. Rotate the axis 45° and keep the cylinder sign

15. A patient's far point is 0.20 m uncorrected, with clear near vision. The refractive error is:

A. Hyperopia, +5.00 D

B. Hyperopia, +0.20 D

C. Myopia, –5.00 D

D. Myopia, –0.20 D

16. Which statement about Abbe value and index is correct?

A. Higher index generally raises the Abbe value

B. Higher index generally lowers the Abbe value

C. Abbe value and index are unrelated

D. Abbe value measures impact resistance

17. A +3.00 –1.00 x 180 lens has principal-meridian powers of:

A. +3.00 D at 180 and +2.00 D at 090

B. +2.00 D at 180 and +3.00 D at 090

C. +3.00 D in both meridians

D. +2.00 D in both meridians

18. A patient looks 5 mm below the OC of a +4.00 D lens. The induced prism, with base direction, is:

A. 20.0Δ base down

B. 2.0Δ base up

C. 0.2Δ base down

D. 2.0Δ base down

19. Which of the following is NOT a component listed on a written spectacle prescription?

A. The lens material's index of refraction

B. The cylinder power

C. The sphere power

D. The add power

20. A patient with anisometropia of OD +1.00 / OS +4.00 experiences strain only when reading. The underlying cause is:

A. A scratched coating

B. Vertical imbalance below the optical centers

C. An incorrect frame color

D. A defective tint

21. A patient's record shows OD –6.00 –2.00 x 180. The power in the 090 meridian is:

A. –6.00 D

B. –2.00 D

C. –4.00 D

D. –8.00 D

22. A lens material with an Abbe value of 30 compared with one of 58 will show, at the periphery:

A. Less chromatic aberration

B. Identical clarity

C. Better scratch resistance

D. More chromatic aberration

23. A patient needs the thinnest lens for a –9.00 Rx. The most effective combined approach is:

A. High-index material in a small, well-centered frame

B. Low-index material in a large frame

C. Crown glass in an oversized frame

D. Standard plastic with the widest bridge

24. Which structure provides about two-thirds of the eye's refracting power?

A. The crystalline lens

B. The vitreous humor

C. The cornea

D. The aqueous humor

25. A patient reports painless, gradual loss of peripheral vision with elevated intraocular pressure. The most likely condition is:

A. Cataract

B. Macular degeneration

C. Amblyopia

D. Glaucoma

26. Presbyopia is best described as the age-related:

A. Loss of accommodation from a stiffening crystalline lens

B. Clouding of the crystalline lens

C. Unequal curvature of the cornea

D. Elevation of intraocular pressure

27. A phoria differs from a tropia in that a phoria is:

A. A constant manifest turn

B. A clouding of the lens

C. A loss of central vision

D. A latent deviation controlled by fusion

28. Which photoreceptors are responsible for color and fine detail in bright light?

A. Rods

B. Bipolar cells

C. Cones

D. Ganglion cells

29. Hyperopia, uncorrected, focuses parallel light:

A. Exactly on the retina

B. Behind the retina

C. In front of the retina

D. On the cornea

30. Which term means a difference in the size of the two eyes' retinal images?

A. Anisometropia

B. Antimetropia

C. Emmetropia

D. Aniseikonia

31. A patient with diabetes reports vision that shifts from week to week. The cause is:

A. A permanent corneal reshaping

B. A sudden cataract

C. Blood-sugar-related refractive shifts

D. Improved accommodation

32. Macular degeneration impairs which type of vision?

A. Dim-light peripheral vision

B. Side vision only

C. Central, detailed vision

D. Color in the far periphery

33. Accommodation is performed by which structure changing the lens shape?

A. The iris sphincter

B. The extraocular muscles

C. The lacrimal gland

D. The ciliary muscle

34. Exophthalmos, a forward protrusion of the eyes affecting frame fit, is most associated with:

A. Diabetes

B. Hypertension

C. Thyroid disease

D. Rheumatoid arthritis

35. Convergence is the eyes' movement that occurs when viewing:

A. A near object

B. A distant object

C. The far periphery

D. With the eyes closed

36. Which of the following is NOT a refractive error?

A. Myopia

B. Glaucoma

C. Hyperopia

D. Astigmatism

37. Rods, unlike cones, are primarily responsible for:

A. Sharp daylight color vision

B. Dim-light and peripheral vision

C. Aqueous humor production

D. Pupil constriction

38. A patient's "lazy eye" with reduced vision not fully correctable by lenses is termed:

A. Amblyopia

B. A cataract

C. Glaucoma

D. A localized scotoma

39. Which is the MOST appropriate material for a child's everyday eyewear?

A. Crown glass

B. Ultra-high index

C. Untempered glass

D. Polycarbonate

40. A semi-rimless nylon-cord frame requires the lens edge to be:

A. Beveled for full-rim mounting

B. Grooved to seat the cord

C. Drilled with mounting holes

D. Left flat and unfinished

41. A polarized lens reduces glare most effectively from:

A. A vertical wall

B. A flat horizontal surface like water

C. Overhead lighting

D. The wearer's lashes

42. A photochromic lens darkens primarily in response to:

A. Infrared heat

B. Visible blue light only

C. Ultraviolet radiation

D. Body temperature

43. Which is NOT a typical property of polycarbonate?

A. High impact resistance

B. The highest Abbe value among common materials

C. Inherent UV blocking

D. Light weight

44. A trifocal adds, compared with a bifocal, a zone for:

A. The smallest near print

B. Distant road signs

C. Intermediate distances like a monitor

D. Peripheral motion only

45. Which lens enhancement reduces surface reflections and increases light to the eye?

A. A solid tint

B. An anti-reflective coating

C. Edge polishing

D. A scratch coat alone

46. A rimless drill-mount frame is best fitted with which material?

A. Polycarbonate or Trivex

B. Crown glass

C. Standard CR-39

D. Untempered glass

47. Which describes a gradient tint?

A. Uniform in density throughout

B. Darker at the top, lighter at the bottom

C. Color-changing in sunlight

D. Blocking only horizontal glare

48. A patient with a nickel allergy should be fitted with:

A. A nickel-rich alloy

B. The same alloy with thin plating

C. Titanium or a hypoallergenic material

D. An untreated base metal

49. Which is the MOST appropriate recommendation for a patient needing the widest sustained near field for drafting?

A. A small round-segment bifocal

B. A progressive in a shallow frame

C. An executive-style bifocal

D. A pair of OTC readers

50. A dark sunglass lens without UV protection can be harmful because it:

A. Dilates the pupil while admitting UV

B. Reflects all light away

C. Permanently fixes the Rx

D. Increases impact resistance

51. Which is NOT true of OTC reading glasses?

A. They share the same power in both lenses

B. They reliably correct astigmatism

C. They have a fixed optical-center spacing

D. They suit simple presbyopic near use

52. A patient with macular degeneration who struggles to read is best helped by:

A. A routine scratch coat

B. A standard distance lens

C. A basic anti-reflective coating

D. An electronic video magnifier

53. Low vision aids primarily work through:

A. Magnification and contrast enhancement

B. Surgical retinal repair

C. Reversal of the disease

D. Restoration of 20/20 acuity

54. Which mounting requires a groove cut in the lens edge?

A. A full-rim frame

B. A rimless drill-mount frame

C. A semi-rimless nylon-cord frame

D. A frameless press-fit mount

55. A patient with a strong plus Rx dislikes magnified-looking eyes. The design that most reduces this is:

A. A steeper base curve

B. A larger lens blank

C. A thicker center

D. An aspheric lens

56. Which is NOT a property of titanium frames?

A. Light weight

B. Hypoallergenic composition

C. The lowest cost among all materials

D. Corrosion resistance

57. A patient needs lenses that darken outdoors and clear indoors automatically. The recommendation is:

A. A photochromic lens

B. A solid sunglass tint

C. A polarized lens

D. A clear lens with AR only

58. A patient sensitive to peripheral color fringing is better served by a material with:

A. A higher Abbe value

B. The highest possible index

C. The thinnest profile

D. The greatest reflection

59. Which is the MOST appropriate lens for full-time monitor and desk work?

A. A distance-only single vision lens

B. A polarized driving lens

C. A plano mirror-coated lens

D. An occupational/computer lens

60. A photochromic lens may underperform when the patient is:

A. Standing in direct sun

B. Driving behind a windshield

C. Walking outdoors on a clear day

D. At high altitude

61. Which is NOT a reason to recommend an anti-reflective coating?

A. To reduce night-driving glare

B. To make the lens scratch-proof

C. To recover transmission on high-index lenses

D. To reduce reflections for cosmetics

62. A frame offering the most adjustable bridge fit after dispensing is:

A. A fixed saddle-bridge plastic frame

B. A one-piece molded plastic frame

C. A fixed keyhole-bridge plastic frame

D. A metal frame with adjustable nose pads

63. A patient with a –10.00 Rx still has thick edges in a large frame despite high index. Beyond material, recommend:

A. The widest bridge

B. A smaller, well-centered frame

C. A steeper base curve

D. A larger eye size

64. A lensmeter (focimeter) primarily measures:

A. Lens surface curvature

B. The back vertex power of a lens

C. The patient's pupillary distance

D. The vertex distance to the cornea

65. A lens clock measures a lens's:

A. Back vertex power

B. Pupillary distance

C. Add power for near

D. Surface curvature in diopters

66. The distometer measures:

A. Pupillary distance

B. Lens surface curvature

C. Vertex distance to the cornea

D. Lens size or perimeter

67. A corneal reflex pupillometer measures the patient's:

A. Pupillary distance

B. Vertex distance

C. Lens base curve

D. Temple length

68. When verifying a lens, the back surface faces the lensmeter stop because the standard is:

A. Front vertex power

B. Back vertex power

C. Surface curvature power

D. Equivalent air power

69. Prism in a lens is indicated on the lensmeter by:

A. Displacement of the target from the reticle center

B. A blurred, unfocusable target

C. The axis wheel failing to turn

D. A change in eyepiece magnification

70. A lens clock used on a lens of a different index than its calibration will:

A. Be unable to read curvature

B. Read curvature faithfully but give an inexact power value

C. Read a PD value

D. Permanently lose calibration

71. The add power of a multifocal is verified on the lensmeter by:

A. Reading only the near zone

B. Subtracting the distance reading from the near reading

C. Reading only the distance zone

D. Multiplying the two readings

72. Which is NOT captured by a digital measurement system?

A. Pupillary distance

B. Pantoscopic tilt

C. Vertex distance

D. The material's Abbe value

73. A centered lensmeter target with no displacement indicates reading through the:

A. Thickest edge

B. Segment line

C. Bevel apex

D. Optical center

74. Calipers are most appropriately used to measure:

A. Pupillary distance

B. Lens thickness and small linear dimensions

C. Back vertex power

D. UV transmission

75. An automatic lensmeter differs from a manual one in that it:

A. Measures only front vertex power

B. Cannot read cylinder or axis

C. Requires no lens inserted

D. Displays the readings electronically

76. Plastic (zyl) frames must be prepared for bending by:

A. Warming them with a frame heater

B. Cooling them in cold water

C. Freezing them overnight

D. Bending them while fully cold

77. Which instrument measures a lens's surface curvature in diopters?

A. The distometer

B. The pupillometer

C. The lens clock

D. The circumference gauge

78. Which is NOT a true statement about a lens clock?

A. It measures surface curvature in diopters

B. It is the primary tool for checking base curve

C. It measures total back vertex power

D. It reads one surface at a time

79. Pad-adjusting pliers are used to:

A. Angle and position the nose pads

B. Cut the temple core wire

C. Read the lens base curve

D. Measure the segment height

80. Metal frames, unlike plastic frames, are generally adjusted:

A. After warming with a heater

B. Cold at room temperature

C. Only when frozen

D. Only after solvent soaking

81. Padded nylon-jaw pliers are used during adjustment to:

A. Protect the frame finish from marring

B. Apply greater bending force

C. Heat the frame faster

D. Measure the frame dimensions

82. A circumference (lens) gauge measures a lens's:

A. Back vertex power

B. Surface curvature

C. Center thickness

D. Size or perimeter

83. A monocular PD is preferred over a binocular PD chiefly for patients with:

A. A very low prescription

B. A metal-frame preference

C. Facial asymmetry

D. No prior eyewear

84. Which is NOT a function of the lensmeter?

A. Reading sphere and cylinder power

B. Reading the cylinder axis

C. Measuring prism

D. Measuring the frame temple length

85. Round-nose pliers are most appropriately used to:

A. Cut the nylon retaining cord

B. Read the lens base curve

C. Measure the segment height

D. Form curves and bends in metal components

86. A millimeter ruler is most appropriately used to measure:

A. The total power of a lens

B. The base curve of a surface

C. The patient's pupillary distance

D. The material's dispersion

87. A lensmeter target that stays displaced even at the lens's thickest point indicates:

A. A scratch coating

B. An anti-reflective coating

C. A photochromic treatment

D. Prescribed prism

88. Which instrument-to-measurement pairing is correct?

A. Lens clock measures PD

B. Distometer measures lens thickness

C. Pupillometer measures base curve

D. Lensmeter measures back vertex power

89. A finished lens reading sphere power only, with no cylinder, is:

A. A spherocylindrical lens

B. A prism-only lens

C. A purely spherical lens

D. A bifocal lens

90. The instrument used to measure vertex distance for a high-powered Rx is the:

A. Lens clock

B. Distometer

C. Pupillometer

D. Circumference gauge

91. The fitting triangle's three points of support are the:

A. Two lenses and the bridge

B. Two temples and the chin

C. Forehead and both cheeks

D. Nose and the two ears

92. A patient's frame slides down the nose. The optician examines which support of the fitting triangle?

A. The lens anti-reflective coating

B. The bridge or nose-pad fit and temples

C. The lens base curve only

D. The lens material index

93. Pantoscopic tilt is the angle at which:

A. The frame curves horizontally around the face

B. The temples bend behind the ears

C. The lens rotates about its optical center

D. The lower edge of the lens sits closer to the face

94. As pantoscopic tilt increases, the optical center should generally be:

A. Raised toward the top

B. Lowered relative to the pupil

C. Moved temporally

D. Left unchanged

95. For most flat-top bifocal fits, the segment top is set at the:

A. Center of the pupil

B. Upper frame edge

C. Lower eyelid margin

D. Eyebrow line

96. A progressive lens's fitting cross is aligned with the:

A. Lower eyelid margin

B. Top frame edge

C. Temporal canthus

D. Center of the pupil in primary gaze

97. A patient reports headaches in new glasses whose power verifies correct. The first check is the:

A. Lens tint density

B. Coating brand

C. PD and optical-center placement

D. Frame color

98. A patient says the floor "swims" in new glasses with verified-correct power. The likely cause is a change in the:

A. Lens tint density

B. Frame temple length

C. Base curve from the previous pair

D. Anti-reflective coating type

99. A first-time progressive wearer's mild initial peripheral blur is best understood as:

A. Expected adaptation to the design

B. A definite power error

C. A coating defect

D. A frame-material error

100. Which is the MOST appropriate first step in troubleshooting a complaint about new eyewear?

A. Verify the lenses against the prescription

B. Immediately remake the lenses

C. Blame the prescriber's Rx

D. Replace the frame with a new style

101. A lifestyle assessment guides product choice mainly because:

A. Only frame color depends on it

B. The Rx alone dictates everything

C. Working distances and tasks drive selection

D. Activities have no bearing on lenses

102. A patient's bifocal segment intrudes on distance vision. It was set:

A. Too high relative to the lower lid

B. At the correct lower-lid level

C. Within tolerance properly

D. Too low on the lens

103. The fundamental purpose of correct centration is to:

A. Place the OC before the pupil and avoid induced prism

B. Increase scratch resistance

C. Darken the lens automatically

D. Raise the Abbe value

104. Double vision in correctly powered glasses most likely indicates:

A. A defective scratch coat

B. An incorrect tint density

C. A centration error inducing prism

D. An expired frame warranty

105. A patient with good distance and near vision but blurry arm's-length vision needs:

A. A darker near tint

B. An intermediate zone (trifocal or progressive)

C. A stronger distance lens

D. A larger frame only

106. A patient moving to a high-wrap frame with a strong Rx needs lenses that are:

A. Made thicker only

B. Optically compensated for the wrap

C. Left uncoated

D. Cut to a smaller blank

107. Vertex distance most affects effective power when the prescription is:

A. High (around 4.00 D or more)

B. Below 1.00 D

C. Plano in both meridians

D. Purely low-power cylindrical

108. A patient with high anisometropia and reading-level vertical imbalance is commonly helped by a:

A. Slab-off applied to one lens

B. Larger frame eye size

C. Heavier anti-reflective coating

D. Steeper base curve on both lenses

109. A patient's frame sits too far from the eyes on a high-plus Rx, increasing vertex distance. The lens delivers:

A. Exactly the prescribed power

B. More minus than prescribed

C. No change, since vertex never matters

D. Less effective plus power than intended

110. Which patient measurement determines optical-center placement?

A. The pupillary distance

B. The vertex distance

C. The temple length

D. The base curve

111. A patient needs a frame deep enough for a progressive's three zones. The optician ensures adequate:

A. Temple length

B. Bridge width only

C. Effective-diameter reduction

D. Vertical (B) measurement depth

112. Which is NOT a position-of-wear factor affecting the optics a patient receives?

A. Pantoscopic tilt

B. Face-form (wrap) angle

C. Vertex distance

D. The lens material's Abbe value

113. A patient with a strong minus Rx wanting thin edges should, beyond high index, choose:

A. The largest fashionable frame

B. A smaller, well-centered frame

C. The widest bridge

D. A steeper base curve

114. A patient's lenses make objects appear tilted, though power verifies correct. After verification, the optician checks whether the:

A. Lens index is too high

B. Frame is sitting level and aligned

C. Tint is too dark indoors

D. Coating brand is wrong

115. Under ANSI Z80, a finished lens is acceptable when each parameter is:

A. Exactly equal to every prescribed number

B. Within any deviation the optician prefers

C. Within the allowed tolerance for that value

D. Matched on sphere power only

116. Which federal agency requires that dress eyeglass lenses be impact resistant?

A. OSHA

B. FDA

C. EPA

D. HIPAA

117. ANSI Z87 governs which category of eyewear?

A. Occupational and educational safety eyewear

B. Dress prescription lenses

C. Contact lens solutions

D. Patient privacy records

118. A patient using fashion sunglasses for a hazardous task must be warned that the eyewear:

A. Is not rated as occupational safety eyewear

B. Meets every occupational standard

C. Permanently corrects the Rx

D. Increases impact protection automatically

119. Which is NOT protected health information under HIPAA?

A. A patient's prescription

B. A patient's identifying details

C. The frame manufacturer's public catalog

D. A patient's stored exam records

120. Which agency most directly governs disposal of chemical waste from an optical lab?

A. HIPAA

B. The FDA drop-ball rule

C. ANSI Z80

D. EPA

121. The professional duty to warn most directly serves to:

A. Inform patients of product limitations and proper use

B. Increase the lens Abbe value

C. Reduce the lens edge thickness

D. Eliminate the need for safety standards

122. Under ANSI Z80, axis tolerance becomes tighter as the:

A. Lens index decreases

B. Frame eye size increases

C. Cylinder power increases

D. Vertex distance decreases

123. ASTM standards, distinct from ANSI Z87, most directly govern:

A. Dress prescription lens tolerances

B. Sports and recreational protective eyewear

C. Patient privacy records

D. Environmental waste disposal

124. A patient requests a copy of their own eyeglass prescription. Under applicable rules, the patient is generally:

A. Entitled to a copy of their own prescription

B. Denied access to their own records

C. Limited to a verbal summary

D. Required to use a third-party intermediary

125. An electronic medical record holding a patient's prescription must comply with:

A. The ANSI Z80 tolerance standard

B. The FDA drop-ball test

C. HIPAA privacy and security rules

D. The EPA waste rule

Answer Key & Full Explanations

1. C — –2.50 –1.50 x 155. Combine sphere and cylinder (–4.00 + 1.50 = –2.50), reverse the cylinder sign (+1.50 → –1.50), and rotate the axis 90° (065 + 90 = 155). The result is the identical lens in minus-cylinder form.

2. D — 3.15 prism diopters. Convert 7 mm to 0.7 cm and apply Prentice's rule: $\Delta = 0.7 \times 4.50 = 3.15\Delta$. The millimeter-to-centimeter conversion prevents a tenfold error.

3. D — Higher, about +14.50 D. Moving a plus lens closer to the eye makes it effectively stronger, so more plus is needed; using $F/(1 - dF)$ with d = 0.014 m: $12.00 / (1 - 0.168) = 12.00 / 0.832 \approx +14.42$, about +14.50 D. Vertex compensation is significant at this power.

4. C — 2.25 prism diopters. Apply Prentice's rule at 0.9 cm: OD = $0.9 \times 4.00 = 3.6\Delta$ and OS = $0.9 \times 1.50 = 1.35\Delta$, both base down; subtract: $3.6 – 1.35 = 2.25\Delta$. The imbalance is the difference between the two eyes' induced prism.

5. A — 1.25 D. Using $F \times \sin^2\theta$ with $\theta = 45°$: $\sin 45° \approx 0.707$, squared = 0.5, so $2.50 \times 0.5 = 1.25$ D. Cylinder effect is 50% at 45° from the axis.

6. B — 4 mm inward. Frame PD = 56 + 14 = 70 mm; total base decentration = 70 – 62 = 8 mm; per lens = 8 ÷ 2 = 4 mm inward, before the separate wrap adjustment. The centers move nasally because the PD is narrower than the frame PD.

7. C — +0.50 D. Spherical equivalent equals sphere plus half the cylinder: +3.00 + (½ × –5.00) = +3.00 + (–2.50) = +0.50 D. Carrying the cylinder's sign through is essential.

8. A — –6.45 D. Moving a minus lens closer to the eye makes it effectively weaker, so less minus is needed; using F/(1 – dF) with d = –0.012 m: –7.00 / (1 – (–0.012 × –7.00)) = –7.00 / 1.084 ≈ –6.46, about –6.45 D. Vertex compensation matters at this power.

9. B — +16.0 D. Power is the reciprocal of focal length in meters: 1 ÷ 0.0625 = 16.0 D. Very short focal lengths give very strong powers.

10. C — Mixed astigmatism. A +1.00 sphere with a –3.00 cylinder places one focal line in front of the retina and the other behind it, defining mixed astigmatism. The opposing focal-line positions are its signature.

11. A — The center thickness. A minus lens is thin at the center, and its center thickness does not increase with stronger power; edge thickness, minification, and induced prism all do. Center thickness is the exception.

12. D — Slab-off on one lens. Significant vertical imbalance from unequal powers is commonly corrected with a slab-off, which adds prism in the reading portion of one lens. This neutralizes the imbalance in down-gaze.

13. C — 5.0 mm below the OC. From Prentice's rule, c = Δ ÷ F = 3.0 ÷ 6.00 = 0.5 cm = 5 mm. Solving for the distance inverts the standard prism calculation.

14. A — Add sphere and cylinder, reverse cylinder sign, rotate axis 90°. Transposition combines the sphere with the cylinder, reverses the cylinder sign, and rotates the axis 90°. Performing these in sequence yields the equivalent minus-cylinder form.

15. C — Myopia, –5.00 D. A far point at 0.20 m with clear near vision indicates myopia, with power the reciprocal of the far point: 1 ÷ 0.20 = 5.00, so –5.00 D. Clear near and blurred distance confirm myopia.

16. B — Higher index generally lowers the Abbe value. Abbe value runs inversely to index of refraction, so a higher index generally lowers the Abbe value and increases chromatic aberration. This inverse relationship is the key material trade-off.

17. A — +3.00 D at 180 and +2.00 D at 090. The axis is 180, so the cylinder has zero power there (only the +3.00 sphere), while the full cylinder acts 90° away: +3.00 + (–1.00) = +2.00 D at 090. This is the two-meridian behavior.

18. D — 2.0Δ base down. Convert 5 mm to 0.5 cm: Δ = 0.5 × 4.00 = 2.0Δ; a plus lens has its base toward the optical center, so viewing below the OC gives base down. Both magnitude and base direction must be correct.

19. A — The lens material's index of refraction. A written Rx specifies sphere, cylinder, axis, add, and prism — but not the index of refraction, a material property chosen during dispensing. Index is therefore the exception.

20. B — Vertical imbalance below the optical centers. Unequal refractive error between the eyes induces unequal vertical prism when the eyes drop below the optical centers to read, causing the reading-specific strain. In primary gaze through the OCs no imbalance occurs.

21. D — –8.00 D. The axis is 180, so the cylinder has zero power there and full power 90° away: –6.00 + (–2.00) = –8.00 D in the 090 meridian. This is the two-meridian behavior of a spherocylindrical lens.

22. D — More chromatic aberration. A lower Abbe value (30) means more dispersion than a high-Abbe material (58), producing more chromatic aberration, most noticeable at the periphery. This is the index–Abbe trade-off.

23. A — High-index material in a small, well-centered frame. The thinnest result for a –9.00 Rx combines high-index material with a small, well-centered frame to limit edge thickness. Low-index materials and oversized frames work against thinness.

24. C — The cornea. The cornea provides about two-thirds of the eye's refracting power, more than the crystalline lens. Its clarity and curvature are critical to vision.

25. D — Glaucoma. Painless, gradual peripheral vision loss with elevated intraocular pressure is characteristic of glaucoma. Its symptom-free progression is why IOP screening matters.

26. A — Loss of accommodation from a stiffening crystalline lens. Presbyopia is the age-related stiffening of the crystalline lens that reduces accommodation and impairs near focus. It is corrected with a plus add.

27. D — A latent deviation controlled by fusion. A phoria is a latent misalignment held in check by the brain's fusion, while a tropia is a constant, manifest turn. This latent-versus-manifest distinction is the key difference.

28. C — Cones. Cones, concentrated at the macula, provide color and fine detail in bright (photopic) light. Rods, by contrast, handle dim-light and peripheral vision without color.

29. B — Behind the retina. In hyperopia the eye is too weak or short, so relaxed-eye light focuses behind the retina. A plus lens converges the light forward onto the retina.

30. D — Aniseikonia. Aniseikonia is a difference in the size of the two eyes' retinal images, which interferes with fusion. It can result from anisometropia but is a distinct concept.

31. C — Blood-sugar-related refractive shifts. Diabetes can cause blood-sugar-related refractive shifts and fluctuating vision, as well as diabetic retinopathy. Recognizing this pattern is a reason to encourage medical follow-up.

32. C — Central, detailed vision. Macular degeneration damages the central retina, impairing detailed central vision while peripheral vision is preserved. This is the mirror image of glaucoma.

33. D — The ciliary muscle. The ciliary muscle changes the crystalline lens's shape to focus on near objects, the process of accommodation. Its age-related decline produces presbyopia.

34. C — Thyroid disease. Exophthalmos, the forward protrusion of the eyes, is most strongly associated with thyroid disease such as Graves'. It can affect frame fit and lid closure.

35. A — A near object. Convergence is the inward rotation of the eyes to maintain single vision on a near target. Divergence is the opposite movement toward distance.

36. B — Glaucoma. Myopia, hyperopia, and astigmatism are refractive errors; glaucoma is an optic-nerve disease, not a refractive error. It is therefore the exception.

37. B — Dim-light and peripheral vision. Rods are highly light-sensitive and responsible for dim-light and peripheral vision without color. Cones, by contrast, handle color and detail in bright light.

38. A — Amblyopia. Amblyopia ("lazy eye") is reduced vision in an eye that did not develop normally and cannot be fully corrected by lens power alone. It differs from a clouded lens or a localized scotoma.

39. D — Polycarbonate. A child's everyday eyewear should use impact-resistant polycarbonate for safety. Glass and brittle materials are inappropriate for children.

40. B — Grooved to seat the cord. A semi-rimless nylon-cord mounting requires a groove cut in the lens edge to seat the cord. Each mounting type dictates its own edge treatment.

41. B — A flat horizontal surface like water. Polarized lenses block horizontally oriented reflected glare, such as that off water, snow, and roads. This makes them ideal for outdoor and driving glare.

42. C — Ultraviolet radiation. Most photochromic lenses darken in response to UV exposure and lighten when UV is removed. This is why many darken less behind a windshield.

43. B — The highest Abbe value among common materials. Polycarbonate has a relatively low Abbe value (~30), so this is NOT one of its properties; it is impact resistant, UV-blocking, and lightweight. The low Abbe value is the trade-off for its safety advantages.

44. C — Intermediate distances like a monitor. The trifocal's middle zone serves arm's-length intermediate distances between distance and near. This is the gap a standard bifocal does not address.

45. B — An anti-reflective coating. An anti-reflective coating reduces surface reflections and increases light transmission to the eye. Its benefit is greatest on high-index lenses.

46. A — Polycarbonate or Trivex. Rimless drill-mount lenses are stressed at the holes, so impact-resistant polycarbonate or Trivex prevents cracking. Glass and brittle materials are inappropriate.

47. B — Darker at the top, lighter at the bottom. A gradient tint transitions from darker at the top to lighter at the bottom, unlike a uniform solid tint. This distinguishes it from a solid tint.

48. C — Titanium or a hypoallergenic material. A nickel-allergic patient should be fitted with a hypoallergenic material such as titanium. Nickel-containing alloys risk provoking the reaction.

49. C — An executive-style bifocal. The executive bifocal's full-width near segment gives the widest sustained near field for drafting work. Round segments and shallow progressives offer narrower zones.

50. A — Dilates the pupil while admitting UV. A dark non-UV lens dilates the pupil due to reduced brightness while letting UV reach the eye, which can be worse than no sunglasses. This is why UV protection must be confirmed separately.

51. B — They reliably correct astigmatism. OTC readers do NOT reliably correct astigmatism; they carry equal sphere power in both lenses with a fixed OC spacing. This makes the astigmatism claim the false statement.

52. D — An electronic video magnifier. An electronic video (CCTV) magnifier is a recognized low vision aid that enlarges and enhances contrast for reading. Routine coatings and standard lenses are not low vision aids.

53. A — Magnification and contrast enhancement. Low vision aids work primarily through magnification and contrast/glare control to maximize remaining vision. They do not restore acuity or reverse disease.

54. C — A semi-rimless nylon-cord frame. A semi-rimless nylon-cord mounting requires a groove cut in the lens edge to seat the cord. Full-rim uses a bevel and rimless uses drilled holes.

55. D — An aspheric lens. An aspheric lens is flatter and reduces magnification, making a high-plus wearer's eyes appear less enlarged. Steeper curves, larger blanks, and thicker centers worsen the effect.

56. C — The lowest cost among all materials. Titanium is lightweight, hypoallergenic, and corrosion resistant, but it is a premium material, NOT the lowest cost — so this is the false property. Its cost is the trade-off for its qualities.

57. A — A photochromic lens. A photochromic lens darkens outdoors in UV and lightens indoors, automatically adjusting its tint. This light-adaptive behavior is its defining feature.

58. A — A higher Abbe value. A patient sensitive to peripheral color fringing is better served by a higher-Abbe material, which produces less chromatic aberration. The trade-off is a thicker lens for the same power.

59. D — An occupational/computer lens. Full-time monitor and desk work is best served by an occupational/computer lens optimized for intermediate and near distances. A distance design would underperform.

60. B — Driving behind a windshield. Most photochromics activate via UV, which a windshield largely blocks, so they darken less while driving. This is a key limitation to disclose.

61. B — To make the lens scratch-proof. AR coating reduces reflections and glare but does NOT make a lens scratch-proof — that is a scratch coating's role, and even then no lens is fully scratch-proof. This is the false reason.

62. D — A metal frame with adjustable nose pads. Metal frames with adjustable nose pads allow the bridge fit to be fine-tuned after dispensing. Plastic frames have a largely fixed bridge.

63. B — A smaller, well-centered frame. For a –10.00 Rx with thick edges, the most effective step beyond high index is a smaller, well-centered frame. A large frame or wide bridge keeps edges thick.

64. B — The back vertex power of a lens. The lensmeter measures back vertex power — sphere, cylinder, axis, add, and prism — and locates the optical center. It is the central instrument for verifying finished lenses.

65. D — Surface curvature in diopters. A lens clock measures the curvature of a lens surface in diopters and is the primary tool for checking base curve. It reads one surface at a time, not total power.

66. C — Vertex distance to the cornea. The distometer measures the vertex distance — the gap from the back of the lens to the cornea. This is used for vertex compensation in higher-powered prescriptions.

67. A — Pupillary distance. A corneal reflex pupillometer measures the patient's PD using the corneal light reflex. PD determines optical-center placement.

68. B — Back vertex power. Spectacle power is specified as back vertex power, so the lens is placed back-surface against the lensmeter stop. Reversing it introduces error in higher powers.

69. A — Displacement of the target from the reticle center. Prism is indicated when the lensmeter target is displaced from the reticle center, with the amount and direction giving its magnitude and base. A centered target indicates the optical center.

70. B — Read curvature faithfully but give an inexact power value. A lens clock is calibrated to one assumed index, so on a different-index lens it measures curvature faithfully but the power reading is not exact. The curvature itself is read accurately.

71. B — Subtracting the distance reading from the near reading. The add power equals the near zone reading minus the distance zone reading, since the add is the additional near plus power. It is obtained by difference, not read directly.

72. D — The material's Abbe value. A digital measurement system captures position-of-wear data — PD, pantoscopic tilt, vertex distance, seg height — but not the material's Abbe value, which is a material property. This makes Abbe value the exception.

73. D — Optical center. A centered, undisplaced lensmeter target indicates the instrument is reading through the optical center, where no prism is present. Displacement would indicate prism.

74. B — Lens thickness and small linear dimensions. Calipers measure lens thickness and small linear dimensions in millimeters. They do not measure power, PD, or UV transmission.

75. D — Displays the readings electronically. An automatic lensmeter displays its readings electronically once the lens is positioned, reducing operator variability. It measures the same back vertex parameters as a manual instrument.

76. A — Warming them with a frame heater. Plastic (zyl) frames must be warmed before bending because cold plastic is brittle and can crack. The warmth lets the frame reshape and hold its new form.

77. C — The lens clock. A lens clock measures a lens's surface curvature in diopters and is the primary tool for checking base curve. The other instruments measure vertex distance, PD, or lens size.

78. C — It measures total back vertex power. A lens clock measures surface curvature one surface at a time, not total back vertex power — that is the lensmeter's role. This makes the back-vertex claim the false statement.

79. A — Angle and position the nose pads. Pad-adjusting pliers grip and angle the nose-pad arms to position the pads. Matching the plier to its task protects both the frame and the fit.

80. B — Cold at room temperature. Metal frames are generally adjusted cold, unlike plastic frames which must be warmed first. Knowing which to heat is a practical distinction.

81. A — Protect the frame finish from marring. Padded nylon-jaw pliers grip frame parts without scratching the finish. Metal jaws on cosmetic surfaces would mar the frame.

82. D — Size or perimeter. A circumference (lens) gauge measures a lens's size or perimeter, used in edging and sizing. It does not measure power, curvature, or thickness.

83. C — Facial asymmetry. Monocular PDs measure each eye separately from the bridge center, improving accuracy when the face is asymmetric. This ensures each optical center aligns with its own pupil.

84. D — Measuring the frame temple length. A lensmeter reads sphere, cylinder, axis, add, and prism — but not the frame temple length, a frame dimension. This makes temple length the exception.

85. D — Form curves and bends in metal components. Round-nose pliers are used to form curves and bends in metal frame parts. Each plier shape serves a specific adjustment task.

86. C — The patient's pupillary distance. A millimeter ruler measures linear distances such as PD and seg height. It cannot measure power, curvature, or dispersion.

87. D — Prescribed prism. A persistently displaced lensmeter target, even at the thickest point, indicates the lens contains prism. Coatings and treatments do not displace the target.

88. D — Lensmeter measures back vertex power. The lensmeter measures back vertex power; the other pairings are incorrect. Matching each tool to its true function is the testable skill.

89. C — A purely spherical lens. A lens reading sphere power with no cylinder is purely spherical, having one power in all meridians. A spherocylindrical lens would show a second power and an axis.

90. B — Distometer. The distometer measures vertex distance, the gap from the back of the lens to the cornea, used for compensating high-powered prescriptions. The other instruments measure curvature, PD, or lens size.

91. D — Nose and the two ears. The fitting triangle's three points of support are the nose (bridge or pads) and the two ears (temples). Even weight distribution across these produces a comfortable, stable fit.

92. B — The bridge or nose-pad fit and temples. A frame that slides down points to the fitting triangle's support points — the bridge/nose pads and temples. Restoring even three-point support resolves the slipping.

93. D — The lower edge of the lens sits closer to the face. Pantoscopic tilt is the vertical tilt in which the lens's lower edge sits closer to the face than the top. A modest tilt aligns the lens with the downward line of sight.

94. B — Lowered relative to the pupil. As pantoscopic tilt increases, the optical center is lowered (roughly 1 mm per 2° of tilt) to keep the line of sight near the OC. Tilt and OC height are linked.

95. C — Lower eyelid margin. For most flat-top bifocal fits, the segment top is set at the lower eyelid margin so the patient sees over it for distance and into it for near. Setting it too high or low compromises vision.

96. D — Center of the pupil in primary gaze. A progressive lens's fitting cross is aligned with the pupil center in primary gaze so the power zones sit correctly. Fitting it too low places the reading area too far down.

97. C — PD and optical-center placement. Headaches with correctly verified power suggest a centration error, so the optician checks PD and OC placement, which can induce prism. Centration is verified before blaming the prescription.

98. C — Base curve from the previous pair. A "swim" sensation with correctly verified power often signals a base-curve change from the patient's prior lenses. Matching the previous base curve helps a remake feel familiar.

99. A — Expected adaptation to the design. Mild initial peripheral blur in a first-time progressive wearer is normal adaptation, not a power error. Recognizing adaptation prevents an unnecessary remake.

100. A — Verify the lenses against the prescription. The most appropriate first troubleshooting step is to verify the lenses against the prescription on the lensmeter. Remaking, blaming the Rx, or changing the frame before verifying is premature.

101. C — Working distances and tasks drive selection. A lifestyle assessment matters because the patient's daily working distances and tasks, more than the prescription alone, determine the right lens design. The same Rx can call for different products.

102. A — Too high relative to the lower lid. A bifocal segment that intrudes on distance vision was set too high relative to the lower-lid reference. Correct seg height places the top near the lower lid.

103. A — Place the OC before the pupil and avoid induced prism. Correct centration places the optical center in front of the pupil so no unwanted prism is induced in primary gaze. This is the core purpose of accurate centration.

104. C — A centration error inducing prism. Double vision in correctly powered glasses most likely reflects a centration error inducing unwanted prism. Coatings, tints, and warranties do not cause diplopia.

105. B — An intermediate zone (trifocal or progressive). Good distance and near but blurry arm's-length vision indicates a missing intermediate zone, supplied by a trifocal or progressive. A tint or stronger distance does not address it.

106. B — Optically compensated for the wrap. Moving to a high-wrap frame with a strong prescription requires lenses optically compensated for the wrap to avoid peripheral distortion. Thickness changes and blank size do not address the wrap optics.

107. A — High (around 4.00 D or more). Vertex distance meaningfully affects effective power only in higher prescriptions, around 4.00 D and above. Low powers are not meaningfully affected.

108. A — Slab-off applied to one lens. Significant vertical imbalance from anisometropia is commonly corrected with a slab-off, which adds prism in the reading portion of one lens. This neutralizes the imbalance in down-gaze.

109. D — Less effective plus power than intended. Increasing the vertex distance on a high-plus lens reduces its effective power at the eye, so the patient receives less plus than intended. This is why vertex matters in strong plus prescriptions.

110. A — The pupillary distance. PD determines where each lens's optical center must be placed to align with the pupil. Accurate PD prevents unwanted induced prism.

111. D — Vertical (B) measurement depth. A progressive needs adequate vertical (B) depth to fit its distance, intermediate, and near zones. A too-shallow frame cuts off the near area.

112. D — The lens material's Abbe value. Pantoscopic tilt, wrap, and vertex distance are position-of-wear factors; the Abbe value is a material property, not a position-of-wear factor. This makes Abbe value the exception.

113. B — A smaller, well-centered frame. Beyond high-index material, a smaller, well-centered frame most effectively reduces edge thickness for a strong minus prescription. A large frame or wide bridge keeps edges thick.

114. B — Frame is sitting level and aligned. Objects appearing tilted with correct power point to frame alignment, which the optician checks after verification. A frame not sitting level can produce a tilted-image complaint.

115. C — Within the allowed tolerance for that value. A finished lens is acceptable under ANSI Z80 when each parameter falls within its allowed tolerance, not when it matches every number exactly. "Within tolerance" is the practical standard.

116. B — FDA. The FDA requires that dress eyeglass lenses be impact resistant, regulating eyewear as a medical device. This is distinct from the ANSI Z87 occupational standard.

117. A — Occupational and educational safety eyewear. ANSI Z87 governs occupational and educational safety eyewear, distinct from ANSI Z80 for dress lenses. It imposes stricter impact and protection requirements.

118. A — Is not rated as occupational safety eyewear. A patient using fashion sunglasses for a hazardous task must be warned that the eyewear is not rated as occupational safety eyewear. This is a core duty-to-warn obligation.

119. C — The frame manufacturer's public catalog. A manufacturer's public catalog is not protected health information; a patient's prescription, identifiers, and exam records are PHI. The catalog is therefore the exception.

120. D — EPA. The EPA most directly governs the disposal of chemical waste from an optical lab. HIPAA, the FDA, and ANSI address privacy and products instead.

121. A — Inform patients of product limitations and proper use. The duty to warn serves to inform patients of the limitations and proper use of their eyewear. It does not alter Abbe value, thickness, or the need for standards.

122. C — Cylinder power increases. ANSI Z80 tightens axis tolerance as cylinder power increases because the same axis deviation produces more visual blur with a stronger cylinder. Weak cylinders are more forgiving.

123. B — Sports and recreational protective eyewear. ASTM standards most directly govern sports and recreational protective eyewear, distinct from ANSI Z87 (occupational) and Z80 (dress). Matching the standard to the use is the testable skill.

124. A — Entitled to a copy of their own prescription. Patients are generally entitled to a copy of their own prescription. Withholding it or limiting them to a verbal summary is improper.

125. C — HIPAA privacy and security rules. An electronic medical record holding a patient's prescription and identifiers must comply with HIPAA's privacy and security rules. ANSI and FDA standards govern products, not records.