

SIMULATION EXAM 16 — QUESTIONS 1–100

1. The AVIXA standard governing display image size for 2D content is:

- A. ANSI/AVIXA V202.01
- B. ANSI/AVIXA A102.01
- C. ANSI/AVIXA F501.01
- D. ISO 9001

2. 4K UHD resolution is specifically:

- A. 1920×1080 pixels
- B. 4096×2160 pixels
- C. 3840×2160 pixels
- D. 7680×4320 pixels

3. HDCP stands for:

- A. High-Data Content Processing
- B. High-bandwidth Digital Content Protection
- C. Hardware Display Control Protocol
- D. Home Distribution Content Platform

4. The 4H rule establishes maximum viewer distance for Analytical Decision-Making content as:

- A. 2 times image height
- B. 6 times image height
- C. 3 times image height
- D. 4 times image height

5. The 6H rule establishes maximum viewer distance for Basic Decision-Making content as:

- A. 6 times image height
- B. 3 times image height
- C. 4 times image height
- D. 8 times image height

6. A 70V distributed audio system distributes audio as:

- A. Low-voltage unregulated DC
- B. AC power at audio frequencies only
- C. Audio signal at approximately 70V line level with per-loudspeaker tap transformers
- D. Single-phase 220V AC

7. HDMI 2.0 supports maximum bandwidth of approximately:

- A. 6 Gbps
- B. 12 Gbps
- C. 48 Gbps
- D. 18 Gbps

8. Dante is a:

- A. Video distribution protocol
- B. Proprietary audio-over-IP protocol from Audinate
- C. Network cable standard
- D. Consumer home audio protocol

9. AES67 is a:

- A. Standard for interoperability between audio-over-IP systems
- B. Consumer audio file format
- C. Video compression standard
- D. Network cable category

10. A common reference level for professional line-level audio is:

- A. -10 dBV
- B. 1 V peak
- C. +4 dBu, approximately 1.23 V RMS
- D. 0 dBFS digital

11. Category 6A cable supports ethernet speeds up to:

- A. 100 Mbps only
- B. 1 Gbps maximum
- C. 40 Gbps
- D. 10 Gbps over 100 meters channel length

12. NFPA 70 is commonly known as:

- A. The International Fire Code
- B. The National Electrical Code
- C. The Mechanical Code
- D. The Plumbing Code

13. The NC-30 noise criteria rating is appropriate for:

- A. Industrial manufacturing facilities
- B. Airport terminals
- C. Conference rooms and good speech communication environments
- D. Loud concert venues

14. A projector's ANSI lumens rating is measured using:

- A. 9-point averaging method standardized by ANSI
- B. Single-point peak brightness
- C. Manufacturer's marketing calculation
- D. Subjective brightness impression

15. The Dolby Vision HDR standard uses:

- A. Only 8-bit color
- B. Static metadata only
- C. Only standard dynamic range
- D. Dynamic scene-by-scene metadata for optimized tone mapping

16. HDR10 metadata type is:

- A. Dynamic metadata
- B. Static metadata applied once per program
- C. No metadata
- D. Only audio metadata

17. Chroma subsampling 4:4:4 represents:

- A. Full sampling of luma and both chroma components with no subsampling
- B. Half sampling of chroma
- C. Quarter sampling of chroma
- D. Black and white only

18. Chroma subsampling 4:2:0 represents:

- A. Full sampling of all three components
- B. Full luma and full chroma
- C. No video at all
- D. Full luma sampling with chroma subsampled at quarter horizontal and half vertical resolution

19. 1080p video resolution is:

- A. 720×480
- B. 3840×2160
- C. 1920×1080 with progressive scanning
- D. 1080×1920 rotated

20. Dynamic range compression in audio:

- A. Increases the difference between loud and soft passages
- B. Reduces the difference between loud and soft passages for consistent program level
- C. Has no effect on audio
- D. Only affects video signals

21. Acoustic echo cancellation (AEC) serves to:

- A. Amplify echo in a room
- B. Generate echoes intentionally
- C. Reduce noise level only
- D. Remove loudspeaker audio from the microphone input to prevent feedback during conferencing

22. The impedance of a single 8-ohm loudspeaker wired in parallel with another 8-ohm loudspeaker is:

- A. 16 ohms
- B. 4 ohms
- C. 2 ohms
- D. 8 ohms

23. The speed of sound in air at 20°C is approximately:

- A. 100 m/s
- B. 500 m/s
- C. 343 m/s or 1125 ft/s
- D. 1000 m/s

24. A wireless microphone's operational frequency band depends on:

- A. The microphone's color
- B. Regional regulatory allocations for wireless microphone use
- C. The microphone's price
- D. Any available frequency

25. An equipment rack unit (1U or RU) measures:

- A. 3 inches tall
- B. 0.5 inches tall
- C. 2 inches tall
- D. 1.75 inches (44.45 mm) tall

26. An 8-bit color depth provides:

- A. Infinite colors
- B. 256 shades per channel (approximately 16.7 million total colors)
- C. Only 100 colors total
- D. Monochrome only

27. A 10-bit color depth provides:

- A. The same number of colors as 8-bit
- B. Fewer colors than 8-bit
- C. No color at all
- D. 1024 shades per channel (approximately 1 billion total colors)

28. Sabine's equation relates reverberation time to:

- A. Only room volume
- B. Only wall color
- C. Only carpet thickness
- D. Room volume and total absorption

29. An ADA-compliant assistive listening system typically covers:

- A. Only the front row
- B. Only specific seats
- C. The listener area with uniform signal coverage
- D. Only the rear of the room

30. HDBaseT signal transport uses:

- A. Fiber-optic cable only
- B. Twisted-pair Category cable
- C. Coaxial cable only
- D. Consumer HDMI cable only

31. A 3 dB sound pressure level difference represents:

- A. Approximately doubled or halved acoustic power
- B. Doubled pressure
- C. 100x increase
- D. No change

32. A 6 dB sound pressure level difference represents:

- A. No change
- B. 10x pressure
- C. The level of inaudibility
- D. Doubled or halved sound pressure

33. The Rec. 709 color space is the standard for:

- A. Digital cinema content only
- B. Only audio signals
- C. Standard Dynamic Range HDTV content
- D. Only consumer film

34. DCI-P3 color space is:

- A. Wider than Rec. 709, used primarily in cinema and HDR displays
- B. Identical to Rec. 709
- C. Smaller than Rec. 709
- D. The same as sRGB

35. A 16:9 display's aspect ratio is:

- A. 16 pixels wide by 9 pixels tall
- B. A ratio of 16 horizontal units to 9 vertical units
- C. 16 megapixels to 9 megapixels
- D. 16% of the screen is visible

36. Refresh rate of 60 Hz means:

- A. The display operates for 60 minutes
- B. 60 pixels per second
- C. 60 hours of use
- D. The display refreshes its image 60 times per second

37. A pixel pitch of 2.5 mm indicates:

- A. Center-to-center distance between adjacent pixels is 2.5 mm
- B. The pixel is 2.5 mm thick
- C. The display is 2.5 mm wide
- D. The pixels are 2.5 inches apart

38. Three-phase electrical power is commonly found in:

- A. Residential outlets only
- B. Battery-powered devices only
- C. Industrial and commercial installations for equipment requiring greater power capacity
- D. Consumer electronics only

39. The NEC code requires separation between low-voltage cables and:

- A. Mid-voltage audio cables only
- B. Only ethernet cables
- C. Only fiber cables
- D. High-voltage branch circuits, per specific code provisions

40. An audio amplifier's THD+N specification measures:

- A. The amplifier's color
- B. Total harmonic distortion plus noise, indicating amplifier accuracy
- C. The total weight of the amplifier
- D. The price per watt

41. Plenum-rated (CMP) cable is required in:

- A. Air-handling spaces where standard cable insulation could release smoke
- B. Every installation regardless of location
- C. Underground installations only
- D. Residential applications only

42. Riser-rated (CMR) cable is appropriate for:

- A. Plenum spaces
- B. Exterior installations only
- C. Vertical runs between floors
- D. Flexible consumer extension use

43. An SDI (Serial Digital Interface) signal is used primarily in:

- A. Consumer video installations only
- B. Broadcast and professional video applications
- C. Residential Wi-Fi networks
- D. Telephone systems

44. A projector throw ratio of 2.0 means:

- A. The projector is 2 meters tall
- B. The image is 2 megapixels
- C. The lamp lasts 2000 hours
- D. The throw distance is 2 times the image width

45. Power over Ethernet (PoE) Type 3/4 delivers:

- A. Up to 60W or 100W respectively, over standard Category cable
- B. Exactly 1 watt
- C. Only data without power
- D. Only power without data

46. A UPS (Uninterruptible Power Supply) provides:

- A. Only AC power conditioning
- B. Only surge protection
- C. Short-duration battery backup power during outages
- D. Permanent primary power source

47. An OLED display technology:

- A. Uses CCFL backlighting
- B. Uses self-emissive pixels, each emitting its own light
- C. Uses LCD matrix with backlight
- D. Uses plasma cells

48. An LCD display:

- A. Uses liquid crystal layer modulated by transistor grid, illuminated by backlight source
- B. Uses self-emissive phosphors
- C. Uses mechanical shutters
- D. Projects from a light source through a lens

49. A DLP projector uses:

- A. Three LCD panels in series
- B. A plasma cell array
- C. An OLED array
- D. A digital micromirror device (DMD) array

50. Ambient light on a projection screen:

- A. Has no effect on image quality
- B. Improves image quality always
- C. Reduces perceived contrast by raising the minimum black level
- D. Only affects audio

51. The SMPTE standard for timecode is used in:

- A. Audio only
- B. Consumer gaming only
- C. Mobile phone networks only
- D. Video production for frame-accurate synchronization

52. CTS-I (Certified Technology Specialist—Installation) is:

- A. A specialty CTS certification for installers
- B. A different organization from AVIXA
- C. A consumer certification
- D. An outdated certification

53. CTS-D (Certified Technology Specialist—Design) is:

- A. A design-only certification from a different vendor
- B. A consumer certification
- C. A specialty CTS certification for designers
- D. A temporary replacement for CTS

54. A mounting bracket for a display must be rated for:

- A. Decorative appearance only
- B. The display's weight with appropriate safety factor
- C. Random specifications
- D. Consumer-grade use only

55. The EDID in an HDMI signal:

- A. Communicates the display's capabilities to the source device
- B. Provides network authentication
- C. Encodes the video signal
- D. Manages audio delay only

56. H.265 (HEVC) video compression offers:

- A. No compression at all
- B. Worse compression than H.264
- C. Identical compression to H.264
- D. Approximately 50% bandwidth reduction compared to H.264 at equivalent quality

57. A projector's lens shift feature enables:

- A. Replacing the lamp faster
- B. Adjusting image position without geometric distortion within lens design limits
- C. Color correction
- D. Automatic image brightening

58. A video scaler primarily:

- A. Provides electrical power
- B. Adjusts audio levels only
- C. Converts input resolutions and refresh rates to match the display's native capabilities
- D. Replaces the need for cables

59. A video signal's bitrate indicates:

- A. The data rate at which the video is encoded, balancing quality and bandwidth
- B. The display's power consumption
- C. The cable thickness
- D. The aspect ratio

60. A delta-E (ΔE) value below 2 in display calibration:

- A. Has no significance
- B. Indicates a severe color error
- C. Means the display is broken
- D. Represents generally imperceptible color difference from the reference

61. A color temperature of 6500K represents:

- A. The physical temperature of the display
- B. The standard daylight reference used in most video calibration
- C. The room's ambient temperature
- D. The display's power consumption

62. Acoustic reverberation time is measured as:

- A. The room's ambient noise level
- B. The frequency response curve
- C. The time for sound pressure level to decay by 60 dB (RT60)
- D. The room's physical dimensions

63. An absorber's NRC value of 0.85 indicates:

- A. 85% absorption averaged across speech-critical frequencies
- B. 85% reflection
- C. 85% of the surface area
- D. The product's warranty years

64. A loudspeaker's sensitivity of 88 dB SPL/W/m means:

- A. 88 watts of power
- B. 88 dB of distortion
- C. The cost per loudspeaker
- D. 88 dB SPL output at 1 meter with 1 watt input

65. A loudspeaker's impedance typically:

- A. Varies with frequency, with a nominal rating provided by manufacturer
- B. Is always fixed at 1 ohm
- C. Is the same as resistance
- D. Has no frequency dependency

66. The quantity of watts required to increase SPL by 3 dB is:

- A. No increase required
- B. Doubled from previous power
- C. Halved from previous power
- D. 10 times previous power

67. An SPDIF digital audio interface:

- A. Is an analog interface only
- B. Supports only video signals
- C. Carries digital audio between devices, available in coaxial (S/PDIF) and optical (TOSLINK) variants
- D. Requires an Ethernet cable

68. The MIDI protocol communicates:

- A. Only audio samples
- B. Only video signals
- C. Power between devices
- D. Musical performance data between digital instruments and computers

69. A microphone's polar pattern of "cardioid" means:

- A. Omnidirectional pickup
- B. No pickup at all
- C. Sensitive in a heart-shaped front-facing pattern, rejecting sound from the rear
- D. Only rear-facing pickup

70. An omnidirectional microphone:

- A. Has equal sensitivity in all directions
- B. Only picks up sound from one direction
- C. Only picks up high frequencies
- D. Does not pick up any sound

71. An XLR connector is commonly used for:

- A. Only optical audio
- B. Balanced audio signals with three pins (pin 1 ground, pins 2 and 3 signal)
- C. Only HDMI signals
- D. Only consumer RCA audio

72. A 3.5 mm TRS connector:

- A. Is a fiber optic connector
- B. Carries only power
- C. Requires special protocols
- D. Is commonly used for stereo consumer audio (tip-ring-sleeve)

73. A BNC connector is commonly used in:

- A. Professional video, particularly SDI signals
- B. Only residential power
- C. Only fiber optic signals
- D. Only microphone audio

74. The RS-232 standard:

- A. Is only used in Ethernet networks
- B. Is an audio protocol only
- C. Is a serial communication standard commonly used for control in AV equipment
- D. Is a wireless standard

75. A VESA mounting pattern is a:

- A. Video display output format
- B. Standardized set of mounting hole patterns for display equipment
- C. Proprietary manufacturer pattern only
- D. Consumer-grade mounting only

76. A Kensington lock slot on AV equipment is:

- A. A physical security feature for locking equipment to a surface
- B. An audio input
- C. A video output
- D. A power connector

77. The ISO 9001 standard addresses:

- A. AV equipment standards
- B. Acoustic measurement
- C. Quality management system requirements for organizations
- D. Cybersecurity for IoT

78. The term "headroom" in audio refers to:

- A. The physical space above equipment
- B. The margin between nominal operating level and clipping to preserve audio quality during peaks
- C. The frequency of highest notes
- D. The room's ceiling height only

79. A pre-amplifier in an audio signal chain:

- A. Is only for video
- B. Only reduces signal level
- C. Has no purpose
- D. Provides initial signal amplification and matching to line-level stage

80. An audio mixer (mixing console):

- A. Combines multiple audio sources with level, routing, and processing controls
- B. Only handles video
- C. Provides only power to devices
- D. Is only a physical enclosure

81. DSP (Digital Signal Processing) in audio:

- A. Only affects analog signals
- B. Has no practical function
- C. Performs computational audio processing including EQ, filtering, compression, and routing
- D. Is only a display technology

82. A limiter in audio processing:

- A. Removes all audio
- B. Prevents signal from exceeding a threshold level to protect equipment or listener safety
- C. Increases signal level
- D. Is only for video

83. A noise gate in audio processing:

- A. Adds noise to signals
- B. Is an electrical safety feature
- C. Is only for video
- D. Attenuates or mutes signals below a threshold to reduce unwanted background sounds

84. Acoustic feedback (howl) in sound reinforcement occurs when:

- A. The signal loop from microphone to loudspeaker to microphone has positive gain at a specific frequency
- B. The amplifier is off
- C. The microphone is disconnected
- D. The DSP has failed

85. A graphic equalizer:

- A. Only works in video
- B. Is only decorative
- C. Provides multiple frequency bands of signal level adjustment
- D. Only controls volume

86. A parametric equalizer:

- A. Provides adjustable frequency, bandwidth, and gain for each band
- B. Has only one fixed frequency
- C. Only works in video
- D. Is decorative only

87. A compressor in audio processing:

- A. Expands dynamic range
- B. Only affects video
- C. Does nothing useful

D. Reduces dynamic range by attenuating signals above a threshold

88. A digital audio format WAV:

A. Uncompressed linear PCM audio storage format

B. A compressed lossy audio format

C. Only video format

D. Only text data

89. The digital audio format MP3:

A. Uncompressed linear PCM

B. A compressed lossy audio format

C. An image format only

D. A text format

90. A digital audio format FLAC:

A. A lossy compressed format

B. An uncompressed format

C. A lossless compressed audio format

D. A video format only

91. A video codec H.264/AVC:

A. Is an audio format

B. Only works with SD video

- C. Is only for consumer use
- D. Is a widely-used video compression standard

92. A laser projector's light source:

- A. Provides typically tens of thousands of hours of life compared to lamp-based
- B. Requires replacement every 500 hours
- C. Is the same as lamp-based
- D. Cannot produce color

93. A 3D stereoscopic display technology:

- A. Uses the same image for both eyes
- B. Creates depth perception by delivering slightly different images to each eye
- C. Has no depth perception
- D. Only uses black and white

94. An IP address format IPv4:

- A. Uses alphanumeric identifiers only
- B. Is obsolete and unused
- C. Uses only 8 bits
- D. Consists of four octets (8 bits each), totaling 32 bits

95. An IP address format IPv6:

- A. Uses 8 bits

- B. Is the same as IPv4
- C. Uses 128 bits, providing dramatically expanded address space
- D. Only applies to consumer networks

96. A subnet mask in IP networking:

- A. Determines which portion of an IP address represents the network vs. the host
- B. Is only a security feature
- C. Only applies to fiber networks
- D. Has no practical use

97. An IP network's default gateway:

- A. Is optional and unused
- B. Is the router that forwards traffic to networks outside the local subnet
- C. Only applies to consumer networks
- D. Is only for the wireless network

98. A VLAN in networking:

- A. Is only used for audio
- B. Is a physical cable
- C. Only applies to fiber networks
- D. Creates a logical subdivision of a physical network for segmentation

99. An IGMP protocol is used in:

- A. Only fiber networks
- B. Only consumer networks
- C. Multicast group management for IP networks
- D. Only wireless networks

100. A TCP/IP networking model layer 3 (Network layer) handles:

- A. IP addressing and routing between networks
- B. Only physical cable connections
- C. Only session management
- D. Only application protocols

SIMULATION EXAM 16 — ANSWER

KEY AND FULL EXPLANATIONS

1. A — ANSI/AVIXA V202.01. This is the Display Image Size for 2D Content in Audiovisual Systems standard, which establishes the 4H and 6H rules governing the relationship between image height and viewing distance. A102.01 addresses audio coverage; F501.01 addresses cable labeling; ISO 9001 is a quality management standard.
2. C — 3840×2160 pixels. 4K UHD (Ultra High Definition) is defined as 3840×2160 — twice the horizontal and vertical resolution of 1080p (1920×1080). DCI 4K at 4096×2160 is the cinema variant, not the UHD consumer/commercial standard.
3. B — High-bandwidth Digital Content Protection. HDCP is the content protection standard that authenticates devices in digital video signal chains before allowing protected content to pass. Authentication failures produce blank screens or reduced-resolution output.
4. D — 4 times image height. The 4H rule for Analytical Decision-Making content establishes maximum viewer distance as four times the image height, ensuring detail resolvability for content requiring careful examination. Exceeding this distance means viewers cannot resolve detail the content was designed to show.
5. A — 6 times image height. The 6H rule for Basic Decision-Making content allows viewers up to $6 \times$ image height away, as BDM content doesn't require fine detail resolution. This drives display sizing for general-viewing content like wayfinding or presentation.
6. C — Audio signal at approximately 70V line level with per-loudspeaker tap transformers. 70V distributed audio uses step-up transformers at the amplifier and step-down transformers at each loudspeaker, enabling long cable runs with acceptable voltage drop. This is distinct from low-voltage DC or AC power distribution.
7. D — 18 Gbps. HDMI 2.0 supports up to 18 Gbps, enabling 4K60 at 4:4:4 8-bit or 4:2:0 with HDR. This represents a major increase over HDMI 1.4 (10.2 Gbps) but is significantly less than HDMI 2.1's 48 Gbps.
8. B — Proprietary audio-over-IP protocol from Audinate. Dante is Audinate's licensed audio-over-IP ecosystem with specific hardware requirements and licensing. It's widely adopted in professional audio but is distinct from open standards.

9. A — Standard for interoperability between audio-over-IP systems. AES67 is an open interoperability standard that enables communication between different audio-over-IP systems (including Dante, Ravenna, and others). Dante can be made AES67-compliant.
10. C — +4 dBu, approximately 1.23 V RMS. Professional line level is +4 dBu, which equals approximately 1.23 V RMS. This is the standard interconnect level between professional audio devices, distinct from consumer -10 dBV level.
11. D — 10 Gbps over 100 meters channel length. Category 6A is the cable category rated for 10GBASE-T ethernet at the standard 100-meter horizontal channel length. Lower categories support 10 Gbps only at shorter distances or not at all.
12. B — The National Electrical Code. NFPA 70 is the NEC, which governs electrical installations in the United States, including requirements for low-voltage AV cable pathways, separation from power conductors, and safety standards.
13. C — Conference rooms and good speech communication environments. NC-30 represents background noise levels that support reliable speech communication without raised voices. Industrial, airport, and concert venues have much higher acceptable noise levels.
14. A — 9-point averaging method standardized by ANSI. ANSI lumens uses a 9-point measurement averaged across the screen, providing consistent comparison between projectors. Other rating methods (peak, marketing) can overstate actual useful brightness.
15. D — Dynamic scene-by-scene metadata for optimized tone mapping. Dolby Vision applies metadata per-scene, enabling display-specific tone mapping that optimizes HDR presentation across different displays. It also supports 12-bit color vs. HDR10's 10-bit.
16. B — Static metadata applied once per program. HDR10 applies metadata once per program, establishing the entire piece's peak and average brightness. This is simpler than Dolby Vision's dynamic metadata but less optimized per-scene.
17. A — Full sampling of luma and both chroma components with no subsampling. 4:4:4 preserves all color information — every pixel has luminance and both chroma values sampled fully. This is the highest-quality chroma configuration for color-critical applications.
18. D — Full luma sampling with chroma subsampled at quarter horizontal and half vertical resolution. 4:2:0 reduces bandwidth by approximately 50% by subsampling chroma, which remains visually acceptable for most content. This is the most common consumer video chroma configuration.
19. C — 1920 × 1080 with progressive scanning. 1080p specifies both resolution (1920 × 1080) and scan type (progressive, vs. interlaced "i"). This is a foundational HDTV format that remains common in current content.
20. B — Reduces the difference between loud and soft passages for consistent program level. Dynamic range compression in audio processing reduces the ratio between highest and lowest signal levels,

making content more consistent in level. This is distinct from audio compression for file size reduction.

21. D — Remove loudspeaker audio from the microphone input to prevent feedback during conferencing. AEC is a DSP function that mathematically subtracts the loudspeaker reference from the microphone input, allowing simultaneous microphone and loudspeaker operation in conferencing without feedback.
22. B — 4 ohms. Two 8-ohm loudspeakers in parallel: $1/(1/8 + 1/8) = 4$ ohms. This impedance reduction is why parallel loudspeaker wiring requires careful amplifier load rating verification.
23. C — 343 m/s or 1125 ft/s. Sound velocity in air at 20°C (standard reference temperature) is approximately 343 m/s (1125 ft/s). This value is foundational for delay calculations, array spacing, and acoustic analysis.
24. B — Regional regulatory allocations for wireless microphone use. Wireless microphones operate on frequencies allocated by regional authorities (FCC in the US, Ofcom in UK, etc.) with specific usable bands that vary by country. Available bands change as regulations evolve.
25. D — 1.75 inches (44.45 mm) tall. A single rack unit (1U or RU) is defined as 1.75 inches (44.45 mm) of vertical rack height. This standard enables equipment interchangeability across manufacturers.
26. B — 256 shades per channel (approximately 16.7 million total colors). 8-bit color = $2^8 = 256$ shades per channel; combined across RGB = 16,777,216 total colors. This is the baseline for consumer video.
27. D — 1024 shades per channel (approximately 1 billion total colors). 10-bit color = $2^{10} = 1024$ shades per channel; combined across RGB ≈ 1.07 billion total colors. The wider range reduces banding artifacts.
28. D — Room volume and total absorption. Sabine's equation: $RT60 = 0.161 \times V / A$ (metric) or $RT60 = 0.049 \times V / A$ (imperial), showing reverberation time proportional to room volume and inversely proportional to total absorption.
29. C — The listener area with uniform signal coverage. ADA-compliant ALS provides uniform coverage across the seating area with appropriate signal quality for users. Specific-seat or limited-area coverage doesn't meet ADA requirements.
30. B — Twisted-pair Category cable. HDBaseT uses twisted-pair cable (Category 5e/6) to carry video, audio, control, and Ethernet signals up to 100 meters. This enables long-distance HDMI extension using standard cable infrastructure.
31. A — Approximately doubled or halved acoustic power. Decibels are logarithmic — a 3 dB change represents a 2:1 ratio of power. A +3 dB change doubles power; a -3 dB change halves it. This is distinct from pressure doubling (which is 6 dB).

32. D — Doubled or halved sound pressure. A 6 dB change represents a 2:1 ratio of pressure (or 4:1 ratio of power). This is the standard free-field distance loss per doubling of distance from a point source.
33. C — Standard Dynamic Range HDTV content. Rec. 709 (ITU-R BT.709) defines the color space, primaries, and gamma for standard-dynamic-range HDTV. This is the baseline for most current broadcast and streaming content.
34. A — Wider than Rec. 709, used primarily in cinema and HDR displays. DCI-P3 has approximately 25% more gamut area than Rec. 709, commonly used in digital cinema and HDR applications. It approaches but doesn't reach Rec. 2020's wider gamut.
35. B — A ratio of 16 horizontal units to 9 vertical units. Aspect ratio describes the proportional width-to-height of the displayed image. 16:9 is the current HDTV standard; older content used 4:3.
36. D — The display refreshes its image 60 times per second. Refresh rate in Hertz is updates per second. Higher refresh rates (120 Hz, 240 Hz) enable smoother motion rendering for appropriate content.
37. A — Center-to-center distance between adjacent pixels is 2.5 mm. Pixel pitch measures center-to-center spacing — this is a fundamental specification for LED walls that determines minimum viewing distance.
38. C — Industrial and commercial installations for equipment requiring greater power capacity. Three-phase power provides more efficient power delivery at higher capacities, common in industrial and commercial installations. Residential installations typically use single-phase.
39. D — High-voltage branch circuits, per specific code provisions. NEC specifies separation requirements between low-voltage communications cables and branch-circuit power wiring, for both safety and EMI reasons.
40. B — Total harmonic distortion plus noise, indicating amplifier accuracy. THD+N combines harmonic distortion and noise into a single metric, expressed as a percentage of output signal. Lower THD+N values indicate more accurate amplifier reproduction.
41. A — Air-handling spaces where standard cable insulation could release smoke. Plenum-rated (CMP) cable has low-smoke, low-flame-spread construction required in return-air plenums above suspended ceilings. Standard PVC-jacketed cables release toxic smoke when burned, failing fire safety requirements in plenum spaces.
42. C — Vertical runs between floors. Riser-rated (CMR) cable resists flame propagation along vertical pathways between floors, addressing the specific fire safety concern of vertical fire spread.
43. B — Broadcast and professional video applications. SDI (Serial Digital Interface) uses coaxial cable to carry uncompressed digital video with tightly controlled timing — standard in broadcast, production, and professional video applications.

44. D — The throw distance is 2 times the image width. Throw ratio = throw distance / image width. A 2.0 ratio means projecting from 20 feet produces a 10-foot-wide image. This relationship enables projector placement calculations.
45. A — Up to 60W or 100W respectively, over standard Category cable. PoE Type 3 (802.3bt) delivers up to 60W, and Type 4 up to 100W, over standard Category cable. This enables high-power device deployment without separate power wiring.
46. C — Short-duration battery backup power during outages. UPS systems provide battery-backed power for brief outages (minutes), bridging to generator backup or allowing clean shutdown. They're not primary power sources or long-duration backup.
47. B — Uses self-emissive pixels, each emitting its own light. OLED technology has each pixel produce its own light, enabling true blacks (pixels completely off) and high contrast without backlight. This is fundamentally different from LCD's backlit architecture.
48. A — Uses liquid crystal layer modulated by transistor grid, illuminated by backlight source. LCD technology uses a backlight passing through a liquid crystal matrix that modulates the light through polarized filters. The backlight is always on, limiting black level performance.
49. D — A digital micromirror device (DMD) array. DLP (Digital Light Processing) projectors use arrays of microscopic tilting mirrors that direct light to or away from the screen. This is Texas Instruments' technology, distinct from LCD or OLED approaches.
50. C — Reduces perceived contrast by raising the minimum black level. Ambient light hitting a projection screen adds to the minimum luminance the display must overcome to show dark scene detail. This is why projection performs best in controlled lighting.
51. D — Video production for frame-accurate synchronization. SMPTE timecode (HH:MM:SS:FF format) enables frame-accurate synchronization across video, audio, and related signals. This is foundational for broadcast, post-production, and live event work.
52. A — A specialty CTS certification for installers. CTS-I is AVIXA's specialty certification for AV installation professionals, building on the base CTS credential with installation-focused competencies.
53. C — A specialty CTS certification for designers. CTS-D is AVIXA's specialty certification for AV designers, building on the base CTS with design-focused competencies in system architecture and specification.
54. B — The display's weight with appropriate safety factor. Mounting hardware must support the display's static weight plus appropriate safety factor for dynamic loads. Consumer-grade or decorative-only specifications don't meet professional mounting requirements.

55. A — Communicates the display's capabilities to the source device. EDID (Extended Display Identification Data) is a structured description of the display's capabilities (resolutions, refresh rates, audio formats) that the source reads to configure its output.
56. D — Approximately 50% bandwidth reduction compared to H.264 at equivalent quality. H.265 (HEVC) achieves approximately 50% better compression efficiency than H.264 at equivalent perceived quality, enabling 4K streaming and storage improvements.
57. B — Adjusting image position without geometric distortion within lens design limits. Lens shift physically moves the projection lens, repositioning the image without keystone distortion. This contrasts with digital keystone correction, which introduces scaling artifacts.
58. C — Converts input resolutions and refresh rates to match the display's native capabilities. Scalers adapt diverse input signals to the display's native specification, enabling compatibility. Quality scaling preserves image integrity; poor scaling introduces artifacts.
59. A — The data rate at which the video is encoded, balancing quality and bandwidth. Bitrate determines the quality-bandwidth tradeoff in compressed video. Higher bitrates improve quality at the cost of bandwidth.
60. D — Represents generally imperceptible color difference from the reference. Delta E below 2 is considered the threshold of perceptibility for trained observers. Lower values indicate more accurate calibration; values above 3-5 are generally visible to trained eyes.
61. B — The standard daylight reference used in most video calibration. 6500K (D65) is the standard daylight reference for video — the white point used in Rec. 709 and most broadcast calibration. It's not a physical temperature but a color-temperature description of light.
62. C — The time for sound pressure level to decay by 60 dB (RT60). Reverberation time measures how quickly sound dies out in a room — specifically the time for a 60 dB decay. In practice, T20 or T30 are often measured and extrapolated to RT60.
63. A — 85% absorption averaged across speech-critical frequencies. NRC (Noise Reduction Coefficient) is an averaged absorption measurement expressed as a decimal. NRC 0.85 means 85% average absorption across the measured frequency bands.
64. D — 88 dB SPL output at 1 meter with 1 watt input. Sensitivity is the standard loudspeaker efficiency specification in dB SPL at 1 meter with 1 watt input — the baseline for calculating SPL at other power levels and distances.
65. A — Varies with frequency, with a nominal rating provided by manufacturer. Loudspeaker impedance varies significantly with frequency due to driver electromechanical characteristics. The nominal rating is a representative value, but actual impedance can range widely — sometimes to very low values that stress amplifiers.

66. B — Doubled from previous power. Each 3 dB SPL increase requires doubling the power input to the loudspeaker. This is the logarithmic relationship between power and SPL.
67. C — Carries digital audio between devices, available in coaxial (S/PDIF) and optical (TOSLINK) variants. SPDIF (Sony/Philips Digital Interface Format) is a digital audio interface with two physical forms — coaxial and optical (TOSLINK). It's common in consumer and prosumer audio.
68. D — Musical performance data between digital instruments and computers. MIDI (Musical Instrument Digital Interface) carries performance data (note on/off, velocity, pitch bend, etc.) rather than audio samples. It's fundamental to digital music production.
69. C — Sensitive in a heart-shaped front-facing pattern, rejecting sound from the rear. Cardioid microphones have maximum sensitivity forward and minimum sensitivity behind. This rejection pattern reduces pickup of unwanted sounds and is useful for feedback control.
70. A — Has equal sensitivity in all directions. Omnidirectional microphones have approximately equal sensitivity across all directions, producing spherical pickup. They're useful for ambient capture but don't reject off-axis sound.
71. B — Balanced audio signals with three pins (pin 1 ground, pins 2 and 3 signal). XLR connectors are the professional standard for balanced audio, with Pin 1 for ground, Pin 2 for hot (non-inverting), and Pin 3 for cold (inverting). Balanced interconnect rejects induced noise over long runs.
72. D — Is commonly used for stereo consumer audio (tip-ring-sleeve). The 3.5mm TRS connector carries stereo consumer audio — tip for left, ring for right, sleeve for ground. It's the standard for headphone and consumer line-level connections.
73. A — Professional video, particularly SDI signals. BNC connectors are standard for SDI (Serial Digital Interface) in professional video installations, providing the bayonet-lock mechanical engagement required for coaxial video signal runs.
74. C — Is a serial communication standard commonly used for control in AV equipment. RS-232 is a serial communication standard common in AV control — used for commands between control systems and equipment like projectors, matrix switchers, and DSPs.
75. B — Standardized set of mounting hole patterns for display equipment. VESA (Video Electronics Standards Association) mounting patterns (e.g., 200x200mm, 400x400mm) standardize the hole spacing for display mounting brackets, enabling interchangeable hardware.
76. A — A physical security feature for locking equipment to a surface. Kensington lock slots are standardized physical security openings that accept locking cables to secure equipment against theft. Common on laptops, displays, and some AV equipment.

77. C — Quality management system requirements for organizations. ISO 9001 is the international standard for quality management systems — addressing organizational quality practices, not AV-specific technical specifications.
78. B — The margin between nominal operating level and clipping to preserve audio quality during peaks. Headroom is the amount of level margin available above normal operating level before clipping. Adequate headroom prevents distortion during signal peaks.
79. D — Provides initial signal amplification and matching to line-level stage. Preamplifiers boost low-level signals (microphones, phono cartridges) to line level suitable for mixing, processing, and further amplification.
80. A — Combines multiple audio sources with level, routing, and processing controls. Mixing consoles combine multiple audio sources with individual level, routing, and processing controls, producing the final mixed output. They're central to any multi-source audio system.
81. C — Performs computational audio processing including EQ, filtering, compression, and routing. DSP (Digital Signal Processing) performs various audio operations in the digital domain — EQ, filtering, dynamics, routing, delay compensation, and more. Modern DSP enables complex audio systems to be configured in software.
82. B — Prevents signal from exceeding a threshold level to protect equipment or listener safety. Limiters cap signal level at a defined threshold, protecting equipment from overload and listeners from excessive SPL. They're essential safety devices in sound reinforcement.
83. D — Attenuates or mutes signals below a threshold to reduce unwanted background sounds. Noise gates attenuate or mute signals below a threshold, reducing pickup of quiet background sounds between active speech. They're commonly used on microphones to reduce ambient noise when the source isn't active.
84. A — The signal loop from microphone to loudspeaker to microphone has positive gain at a specific frequency. Feedback occurs when the acoustic loop has gain greater than 1 at any frequency, causing oscillation. This is purely a gain/geometry issue, not equipment failure.
85. C — Provides multiple frequency bands of signal level adjustment. Graphic equalizers have fixed frequency bands with adjustable level — typically 1/3 octave (31 bands) for speech/music work. The name comes from the visual slider arrangement that resembles a frequency response curve.
86. A — Provides adjustable frequency, bandwidth, and gain for each band. Parametric equalizers have adjustable center frequency, bandwidth (Q), and gain for each band, providing precise tonal shaping. They're more flexible than fixed-band graphic EQs.
87. D — Reduces dynamic range by attenuating signals above a threshold. Compressors reduce the difference between loud and soft passages by attenuating signals above a threshold, making

program material more consistent in level. They're widely used in broadcast, music, and sound reinforcement.

88. A — Uncompressed linear PCM audio storage format. WAV (Waveform Audio File Format) stores audio as uncompressed linear PCM samples. It's the standard for broadcast and production master audio, with perfect fidelity but large file sizes.
89. B — A compressed lossy audio format. MP3 (MPEG-1 Audio Layer III) is a lossy compressed audio format that removes "perceptually inaudible" information to achieve much smaller file sizes at the cost of some quality degradation.
90. C — A lossless compressed audio format. FLAC (Free Lossless Audio Codec) compresses audio without losing information, achieving approximately 50-60% file size reduction compared to WAV while preserving perfect fidelity on decompression.
91. D — Is a widely-used video compression standard. H.264/AVC is the most widely-deployed video codec, used in streaming, broadcast, Blu-ray, and many other applications. It's the baseline codec for compatibility across devices.
92. A — Provides typically tens of thousands of hours of life compared to lamp-based. Laser projection offers 20,000+ hours of light source life vs. 2,000-4,000 hours for lamps. It also provides instant-on operation and consistent brightness over the life of the source.
93. B — Creates depth perception by delivering slightly different images to each eye. 3D stereoscopic display exploits human binocular vision by presenting slightly different images to each eye, producing depth perception. This requires specific display technology and typically glasses.
94. D — Consists of four octets (8 bits each), totaling 32 bits. IPv4 uses 32-bit addresses in four-octet dotted-decimal format (e.g., 192.168.1.1). The total 32-bit address space provides approximately 4.3 billion unique addresses — less than needed for current internet scale.
95. C — Uses 128 bits, providing dramatically expanded address space. IPv6 uses 128-bit addresses, providing 340 undecillion unique addresses. This addresses IPv4 exhaustion and simplifies some networking protocols.
96. A — Determines which portion of an IP address represents the network vs. the host. Subnet masks separate the network portion from the host portion of an IP address, defining which IPs are in the local subnet. This is fundamental to IP routing.
97. B — Is the router that forwards traffic to networks outside the local subnet. Default gateway is the router that handles traffic destined for networks outside the local subnet. Without it, a device can only communicate with other devices in its own subnet.
98. D — Creates a logical subdivision of a physical network for segmentation. VLANs (Virtual LANs) logically segment a physical network, separating traffic for security, performance, or management reasons. AV often uses dedicated VLANs for isolation.

99. C — Multicast group management for IP networks. IGMP (Internet Group Management Protocol) manages multicast group membership — enabling endpoints to subscribe to and unsubscribe from multicast streams. IGMP snooping on switches is essential for efficient AV-over-IP multicast.
100. A — IP addressing and routing between networks. Layer 3 (Network layer) of the OSI/TCP-IP model handles logical addressing (IP) and routing between networks. This is where IP routing, subnets, and NAT operate.