System Requirements for Computer-Based Testing
AzMERIT

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This document contains basic technology requirements for online testing using American Institutes for Research's (AIR) systems for the 2018–2019 test administration. This document contains the following sections:

- [Supported Operating Systems for Student Testing](#)

- [Requirements for Peripheral Equipment](#)

- [Supported Web Browsers for all AIR Online Systems](#)

The following publications provide additional information:

- *Technical Specifications Manual for Computer-Based Testing* describes infrastructure requirements and operating system configurations.

- The *Secure Browser Installation Manual* describes how to install the secure browser for online testing.

- The *Test Administrator User Guide* provides information about securing a computer before a test session.

- The above resources, as well as secure browsers and user guides for other systems, are available on the AzMERIT portal (http://azmeritportal.org).

Section I. Supported Operating Systems for Student Testing

This section describes the supported operating systems for computer-based testing.

> ⚠️ **Warning: Support for New Desktop Operating Systems**
>
> Operating systems that become available but do not appear in the following tables are not supported. Do not upgrade to new operating systems on computers that will be used to administer online assessments without ensuring the updates meet the required specifications.

Desktops and Laptops

Table 1 lists the operating systems and hardware required for student testing. Computer-based testing functions effectively with the minimum requirements listed. However, the recommended specifications provide improved performance.

Table 1. Supported Desktop Operating Systems

Supported Operating Systems	Minimum Requirements[a]	Recommended Specifications
Windows 7 SP1[b] (Professional and Enterprise) 8 (Professional and Enterprise) 8.1 (Professional and Enterprise) 10[c] (Educational, Enterprise and Professional) Server 2008[b] R2, 2012 R2, 2016 R2 (thin client)	1 GHZ Processor 1 GB RAM (32-bit) 2 GB RAM (64-bit) 200 MB hard drive space	1.4 GHZ Processor 2 or more GB RAM 20 or more GB hard drive space
Mac OS X 10.9-10.14[d]	1 GHZ Processor 1 GB RAM (32-bit) 2 GB RAM (64-bit) 200 MB hard drive space	1.4 GHZ Processor 2 or more GB RAM 20 or more GB hard drive space

Supported Operating Systems	Minimum Requirements[a]	Recommended Specifications
Linux (64-bit or 32-bit) Fedora 27-28 LTS (Gnome) Ubuntu 14.04, 16.04 LTS (Gnome)	1 GHZ Processor 1 GB RAM (32-bit) 2 GB RAM (64-bit) 200 MB hard drive space Required libraries/packages: • GTK+ 2.18 or higher • GLib 2.22 or higher • Pango 1.14 or higher • X.Org 1.0 or higher (1.7+ recommended) • libstdc++ 4.3 or higher • libreadline6:i386 (required for Ubuntu only) • GNOME 2.16 or higher • NetworkManager 0.7 or higher • DBus 1.0 or higher • HAL 0.5.8 or higher In addition to the required libraries listed, the following should be installed: • NetworkManager 0.7 or higher • DBus 1.0 or higher • HAL 0.5.8 or higher	1.4 GHZ Processor 2 or more GB RAM 20 or more GB hard drive space
Linux (64-bit only) Ubuntu 18.04 LTS (Gnome)	1 GHZ Processor 2 GB RAM 200 MB hard drive space In addition to all libraries and packages listed above, Ubuntu 18.04 LTS (Gnome) also requires the following libraries: • Sox • Net-tools	1.4 GHZ Processor 2 or more GB RAM 20 or more GB hard drive space

[a] ARM-powered devices such as the Raspberry Pi are not supported for online testing.

[b] Windows 7 & Server 2008 will not be supported after the 2019-2020 school year. Further information is in the *End of Support* document located on the AzMERIT portal.

[c] Windows 10 S is not supported.

[d] Support for this version is anticipated upon the completion of testing following its release.

Tablets

Table 2 lists the supported tablets, operating systems, and related requirements. See the *Technical Specifications Manual for Computer-Based Testing* for information about configuring these devices for online testing.

Table 2. Supported Tablets and Operating Systems

Supported Operating Systems	Supported Tablets
iOS (iPads) 10.3 11.4 12[a]	Fourth-generation (Retina Display) Fifth-generation (Retina Display) Sixth Generation (Retina Display) iPad Air iPad Air 2 iPad Pro
Android[b] 7.1 8.1 9[a]	Lenovo Yoga Tab 3 10 Samsung Galaxy Tab S3 Asus ZenPad Z10
Windows 8 (Professional and Enterprise) 8.1 (Professional and Enterprise 10[c] (Professional, Educational, and Enterprise)	AIR supports any tablet running these versions of Windows, but has done extensive testing only on Surface Pro, Surface Pro 3, Asus Transformer, and Dell Venue.

[a] Support for this version is anticipated upon the completion of testing following its release.

[b] Amazon Fire tablets are not supported for online testing.

[c] Windows 10 S is not supported.

Chromebooks and Chromebases

Table 3 lists the supported operating systems for Chromebooks and Chromebases.

About Chrome OS and Automatic Updates

While AIR actively works to support new versions of the Chrome operating system as they come out, we recommend disabling automatic updates until new versions are listed as supported. Disabling automatic updates allows AIR to review changes and address any updates that pose a potential risk to student testing.

Automatic update settings are configured in Google's admin console.

Table 3. Supported Chromebooks

Supported Operating Systems	Related Requirements
Chrome OS 67+	AIR will support any device that Google actively supports for auto-update. AIR will not support any device that Google does not support for auto-update. Information on Google's auto-update policy, including currently supported devices, can be found at https://support.google.com/chrome/a/answer/6220366.

Chromebooks Manufactured in 2017 or later

Due to recent changes by Google, users with Chromebooks manufactured in 2017 or later who do not have an Enterprise or Education license **will not** be able to use those machines for assessments. Google no longer allows users without these licenses to set up kiosk mode, which is necessary to run the AIR Secure Browser.

This change restricting kiosk mode does not affect the Chrome operating system. You can still use any version of Chrome OS on hardware manufactured in 2016 or earlier.

Thin Clients: NComputing and Terminal Servers for Windows

NComputing

Table 4 lists the supported hardware and software for NComputing solutions.

Table 4. Supported NComputing solutions

Supported Server Host	Supported Server Software	Supported Terminals
Windows Server 2008 R2	vSpace Server 8.4	L300, firmware version 1.12.xx
Windows Server 2012 R2 Windows Server 2016 R2 Windows 10	vSpace PRO 10	L300, L350, M300, firmware version 1.13.xx

Terminal Servers

Table 5 lists the supported terminal servers for use with a thin client machine.

Table 5. Supported terminal servers

Supported Terminal Servers	Supported Thin Client
Windows Server 2008 RT, 2012 RT, 2016 RT	Any thin client that supports a Windows Server.

Warning: Security Issues with Terminal Services or Remote Desktop Connections to Servers

Using a terminal services or remote desktop connection to access a Windows Server or workstation that has the secure browser installed is typically not a secure test environment.

Section II. Requirements for Peripheral Equipment

This section describes the requirements for peripheral equipment: monitors, screens, keyboards, and headphones.

Monitors and Screen Display Requirements

All supported computers, laptops, netbooks, and tablets must meet the following requirements.

Screen Dimensions

Screen dimensions must be 10" or larger (iPads with a 9.7" display are included). This means the following devices are **not** supported:

- Apple iPad Mini

- Google Nexus 7 and similar-sized Android tablets

- Netbooks with screen dimensions smaller than 10"

Screen Resolution

All devices must meet the following minimum resolution. Larger resolutions can be applied as appropriate for the monitor or screen being used.

- Desktops, laptops, and tablets: 1024 × 768

- Netbooks: 1024 × 600

Depending on the screen size, students may need to use vertical or horizontal scroll bars to view all test-related information. Students may also use the Zoom tool in the online test to enlarge the content on the screen.

Keyboards

External keyboards are required for tablets used for testing. Students may use wired mechanical or manual keyboards. Wireless or Bluetooth keyboards are not supported by AIR's technical Help Desk and they are not recommended for testing since some external keyboards have additional "shortcut" buttons that can create security issues. These buttons may allow students to open another application or the tablet's default on-screen keyboard. AIR strongly cautions against using keyboards that have these shortcut buttons.

Keyboards with Android

The Android mobile secure browser requires the secure browser keyboard to disable predictive text. Therefore, any external keyboard that has a shortcut button to open the tablet's default

keyboard is not permitted, as this default keyboard will override the mobile secure browser keyboard.

AIR has determined that the EZOWare Slim Full Size Keyboard contains a shortcut button that opens the default keyboard and should NOT be used with Android tablets.

Headsets and Headphones

All students will need headphones for the ELA and math assessments. In addition to providing a quiet environment for student to work, headphones are necessary because:

- all ELA assessments contain listening passages that have recorded audio;

- all students can listen to the Help section in ELA and math sessions; and

- all students with text-to-speech accommodation can listen to stimuli or test items being read aloud for the writing and math assessments.

Test Coordinators should ensure that there is an adequate supply on hand. The table below lists the supported headphones and headsets.

Table 6. Supported Headphones and Headsets

Model	Connector	Microphone Included	Hardware
Logitech 390	USB (wired)	Yes	All supported desktops, laptops, and Chromebases with USB port.
Panasonic RP-HT21	XBS	No	All supported desktops, laptops, and Chromebases with XBS port.
Logitech analog	3.5 mm	No	iOS, Android tablets with 3.5 mm port.
Plantronics 326	3.5 mm*	Yes	All supported desktops, laptops, and Chromebases with 3.5 mm port—except NComputing terminals.
Sennheiser PC 151	3.5 mm*	Yes	All supported desktops, laptops, and Chromebases with 3.5 mm port—except NComputing terminals.
Plantronics 355	3.5 mm*	Yes	All supported desktops, laptops, and Chromebases with 3.5 mm port—except NComputing terminals.
Generic headphones	3.5 mm	No	All supported desktops, laptops, and Chromebases with 3.5 mm port—except NComputing terminals.
Generic headphones	USB (wired)	No	All supported desktops, laptops, and Chromebases with USB port.

*These models have two connectors, one each for headphone and microphone. They require a 3.5 mm headphone splitter when used with a computer having a single speaker-microphone port.

Note: Wired headphones with a 3.5 mm connector or USB headphones (wired or wireless) are recommended over Bluetooth, as they provide better clarity and accuracy.

Wired headphones are recommended, as they are typically plug-and-play devices.

Text-to-speech requires the use of the secure browser. Students who require text-to-speech for the practice tests should use the secure browser.

Mice

Mice on mobile devices are not supported. Wired two- or three-buttoned mice that are compatible with the operating system on desktops and laptops are supported. No other mice should be used, especially mice equipped with a "browser back" button that could potentially kick users out of a test.

Section III. Supported Web Browsers for all AIR Online Systems

This section lists the supported web browsers for 2018–2019 and AIR's secure browsers.

Supported Web Browsers by Operating System

Table 7 lists the supported operating systems and corresponding web browsers for each AIR application. AIR recommends using recent versions of supported web browsers on all sites for maximum functionality. Each application requires disabling pop-up blocking software and enabling JavaScript. Be sure to use the correct combination of operating system and web browser. For example, Windows 10 requires Internet Explorer 11 or Edge.

Table 7. Supported Web Browsers by Operating System

Operating Systems	Browsers	TA Sites, Sample Test	TIDE, ORS
Windows			
7 SP1[a] (Professional and Enterprise)	Chrome 67+	✓	✓
	Firefox 52+	✓	✓
8 (Professional and Enterprise)	Chrome 67+	✓	✓
8.1 (Professional and Enterprise)	Firefox 52+	✓	✓
10[b] (Educational, Enterprise, and Professional)	Chrome 67+	✓	✓
	Firefox 52+	✓	✓
	Edge	✓	✓
Mac OS			
10.9–10.14	Chrome 67+	✓	✓
	Firefox 52+	✓	✓
	Safari 7+	✓	✓
Linux			
Fedora 27-28 LTS (Gnome)	Chrome 67+	✓	✓
	Firefox 52+	✓	✓
Ubuntu 14.04, 16.04, 18.04 LTS (Gnome)	Chrome 67+	✓	✓
	Firefox 52+	✓	✓
iOS			
10.3	Safari 10	✓	
11.4	Safari 11	✓	
12[c]	Safari 12 [c]	✓	

Operating Systems	Browsers	TA Sites, Sample Test	TIDE, ORS
Android			
7.1, 8.1, 9[c]	Chrome 67+	✓	
Chrome OS			
67+	Chrome 67+	✓	

[a] Windows 7 & Server 2008 will not be supported after the 2018-2019 school year. Further information is in the *End of Support* document located on the AzMERIT portal.

[b] Windows 10 S is not supported.

[c] Support for this version is anticipated upon the completion of testing following its release.

Secure Browsers for Online Testing

Table 8 lists the AIR secure browsers for each operating system and device. A secure browser must be downloaded and installed on each computer used for student testing. Districts that installed a secure browser with an older version than the versions listed below must uninstall it before installing the secure browser for the 2018-2019 school year. For instructions on downloading and installing the secure browsers, refer to the *Secure Browser Installation Manual*.

Table 8. Secure Browsers

Supported Operating Systems	Secure Browser
Windows 7 SP1 (Professional and Enterprise) 8 (Professional and Enterprise), 8.1 (Professional and Enterprise) 10 (Educational, Enterprise, and Professional) Server 2008 RT, 2012 RT, 2016 RT (thin client)	10.4
Mac OS X 10.9-10.14[a]	10.4
Linux Fedora 27-28 LTS (Gnome) Ubuntu 14.04, 16.04, 18.04 LTS (Gnome)	10.4
iOS (iPads) 10.3, 11.4, 12[a]	AIRSecureTest Mobile Secure Browser 5
Android 7.1, 8.1, 9[a]	AIRSecureTest Mobile Secure Browser 5
Chrome OS 67+	AIRSecureTest kiosk application 5

[a]Support for this version is anticipated upon the completion of testing following its release.

Delaying Firefox Updates

AIR conducts quality assurance on the most recent Firefox versions for each system except the Student Testing Site (which requires the secure browser). You should wait before installing new versions of Firefox, which could impact system performance. Delaying updates allows AIR time to review changes and verify each system works correctly with the new version.

For the Student Sample Test Site, if you update Firefox to a new version that has not been thoroughly tested, you will receive a warning message. To learn how to disable auto-updates for Firefox, see https://support.mozilla.org/en-US/kb/forum-response-turning-auto-update. You may need to disable auto-updates again after installing a newer version.

Available Audio Settings by Browser

Students need to access audio during testing. If the student is taking Practice test not through the Secure Browser, Table 9 lists the browsers and their associated capability to modify such settings. Use Table 9 to ensure that you deploy a browser with the required capability.

Table 9. Available Audio Settings by Browser

Operating System	Browser	System Volume	TTS Volume	TTS Pitch	TTS Rate	Pause	Resume
Windows	Secure browser	Y	Y	Y	Y	Y	Y
	Edge	N	N	N	N	N	N
	Chrome[a]	Y	Y	Y	Y	N	N
	Firefox	N	Y	Y	Y	N	N
OS X	Secure browser	Y	Y	Y	Y	Y	Y
	Safari	N	N	N	N	N	N
	Chrome[a]	Y	Y	Y	Y	N	N
Linux[b]	Secure browser	Y	Y	Y	Y	Y	Y
	Firefox	Y	Y	Y	Y	N	N
	Chrome[a]	Y	Y	Y	Y	N	N
iOS	Mobile secure browser	N	Y	Y	Y	N	N
	Safari	N	N	N	N	N	N
Android	Mobile secure browser	N	N	N	N	N	N
	Chrome[a]	Y	Y	Y	Y	N	N
Chromebook	Secure browser	N	Y	Y	Y	N	N
	Chrome[a]	Y	Y	Y	Y	N	N

[a] TTS features for practice tests are available on Chrome only if the client explicitly enables them.

[b] TTS Tracking is not available on Linux.