

# System Requirements for Computer-Based Testing

## AzMERIT

Updated February 16, 2018

This document contains basic technology requirements for online testing using American Institutes for Research's (AIR) systems for the 2017–2018 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	Recommended Specifications
<b>Windows</b> 7 (Professional and Enterprise) 8 (Professional and Enterprise) 8.1 (Professional and Enterprise) 10 <sup>a</sup> (Educational, Enterprise and Professional) Server 2008 R2, 2012 R2, 2016 R2 (thin client)	1.1 GHZ Processor 512 MB of RAM 200 MB hard drive space	1.4 GHZ Processor 2 or more GB RAM 16 or more GB hard drive space
<b>Mac OS X</b> 10.7–10.13	1.1 GHZ Processor 512 MB of RAM 200 MB hard drive space	1.4 GHZ Processor 2 or more GB RAM 16 or more GB hard drive space

Supported Operating Systems	Minimum Requirements	Recommended Specifications
<b>Linux</b> Fedora 25-26 <sup>b</sup> LTS (Gnome) Ubuntu 14.04, 16.04 LTS (Gnome)	1.1 GHZ Processor 512 MB of RAM 200 MB hard drive space Required libraries/packages: <ul style="list-style-type: none"> <li>• GTK+ 2.18 or higher</li> <li>• GLib 2.22 or higher</li> <li>• Pango 1.14 or higher</li> <li>• X.Org 1.0 or higher (1.7+ recommended)</li> <li>• libstdc++ 4.3 or higher</li> <li>• libreadline6:i386 (required for Ubuntu only)</li> <li>• GNOME 2.16 or higher</li> <li>• NetworkManager 0.7 or higher</li> <li>• DBus 1.0 or higher</li> <li>• HAL 0.5.8 or higher</li> </ul>	1.4 GHZ Processor 2 or more GB RAM 16 or more GB hard drive space

<sup>a</sup> Windows 10 S is not supported.

<sup>b</sup> 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
<b>iOS (iPads)</b> 9.3 10.3 11.1, 11.2	iPad 2 iPad 3 Fourth-generation (Retina Display) Fifth-generation (Retina Display) iPad Air iPad Air 2
<b>Android<sup>b</sup></b> 5.1, 6.0, 7.1	Google Nexus 10 Asus Transformer Pad Asus Memo Pad Dell Venue 10 HP Pro Slate 10 Samsung Galaxy Tab 4 Education

Supported Operating Systems	Supported Tablets
<b>Windows</b> 8 (Professional and Enterprise) 8.1 (Professional and Enterprise) 10 <sup>c</sup> (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.

<sup>a</sup> Support for this version is anticipated upon the completion of testing following its release.

<sup>b</sup> For a complete list of supported Android tablets, go to <https://support.google.com/edu/android/answer/6220366>.

<sup>c</sup> 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
<b>Chrome OS</b> 60+	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 <a href="https://support.google.com/chrome/a/answer/6220366">https://support.google.com/chrome/a/answer/6220366</a> .

## 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 1.11.xx
Windows Server 2012 R2	vSpace PRO 10	
Windows Server 2016 R2		
Windows 10		

## 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 strongly recommended for tablets used for testing. Students may use mechanical, manual, and Bluetooth-based keyboards. 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.
Senheiser 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 tablets are not supported. Wireless or 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 2016–2017 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
<b>Windows</b>			
7 (Professional and Enterprise)	Chrome 60+	✓	✓
	Firefox 52+	✓	✓
	Internet Explorer 11	✓	✓
8 RT	Internet Explorer 11	✓	
8 (Professional and Enterprise) 8.1 (Professional and Enterprise)	Chrome 60+	✓	✓
	Firefox 52+	✓	✓
	Internet Explorer 11	✓	✓
10 <sup>p</sup> (Educational, Enterprise, and Professional)	Chrome 60+	✓	✓
	Firefox 52+	✓	✓
	Internet Explorer 11, Edge	✓	✓
<b>Mac OS</b>			
10.7–10.8	Chrome 60+	✓	✓
	Firefox 45+	✓	✓
	Safari 7+	✓	✓
10.9–10.13	Chrome 60+	✓	✓
	Firefox 52+	✓	✓
	Safari 7+	✓	✓
<b>Linux</b>			
Fedora 25–26 <sup>a</sup> LTS (Gnome)	Chrome 60+	✓	✓
	Firefox 52+	✓	✓

Operating Systems	Browsers	TA Sites, Sample Test	TIDE, ORS
Ubuntu 14.04, 16.04 LTS (Gnome)	Chrome 60+	✓	✓
	Firefox 52+	✓	✓
<b>iOS</b>			
9.3	Safari 9	✓	
10.3	Safari 10	✓	
11.1, 11.2	Safari 11	✓	
<b>Android</b>			
5.1, 6.0, 7.1	Chrome 60+	✓	
<b>Chrome OS</b>			
60+	Chrome 60+	✓	

<sup>a</sup> Support for this version is anticipated upon the completion of testing following its release.

<sup>b</sup> Windows 10 S is not supported.

## 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 2016-2017 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
<b>Windows</b> 7 (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
<b>Mac OS X</b> 10.7–10.8 10.9–10.12 10.13	9.5 10 10.2
<b>Linux</b> Fedora 25–26 <sup>a</sup> LTS (Gnome) Ubuntu 14.04, 16.04 LTS (Gnome)	10

Supported Operating Systems	Secure Browser
<b>iOS (iPads)</b> 9.3 10.3 11.1, 11.2	AIRSecureTest Mobile Secure Browser
<b>Android</b> 5.1, 6.0, 7.1	AIRSecureTest Mobile Secure Browser
<b>Chrome OS</b> 60+	AIRSecureTest kiosk application

<sup>a</sup> 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 not taking a test 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
	IE 11	N	N	N	N	N	N
	Edge	N	N	N	N	N	N
	Chrome	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	Y	Y	Y	Y	N	N
Linux	Secure browser	Y	Y	Y	Y	Y	Y
	Firefox	Y	Y	Y	Y	N	N
	Chrome	Y	Y	Y	Y	N	N
iOS	Mobile secure browser	N	Y <sup>a</sup>	Y <sup>a</sup>	Y <sup>a</sup>	N	N
	Safari	N	N	N	N	N	N
Android	Mobile secure browser	N	N	N	N	N	N
	Chrome	Y	Y	Y	Y	N	N
Chromebook	Secure browser	N	Y	Y	Y	N	N
	Chrome	Y	Y	Y	Y	N	N

<sup>a</sup> Available for mobile secure browser version 3.4 or later.