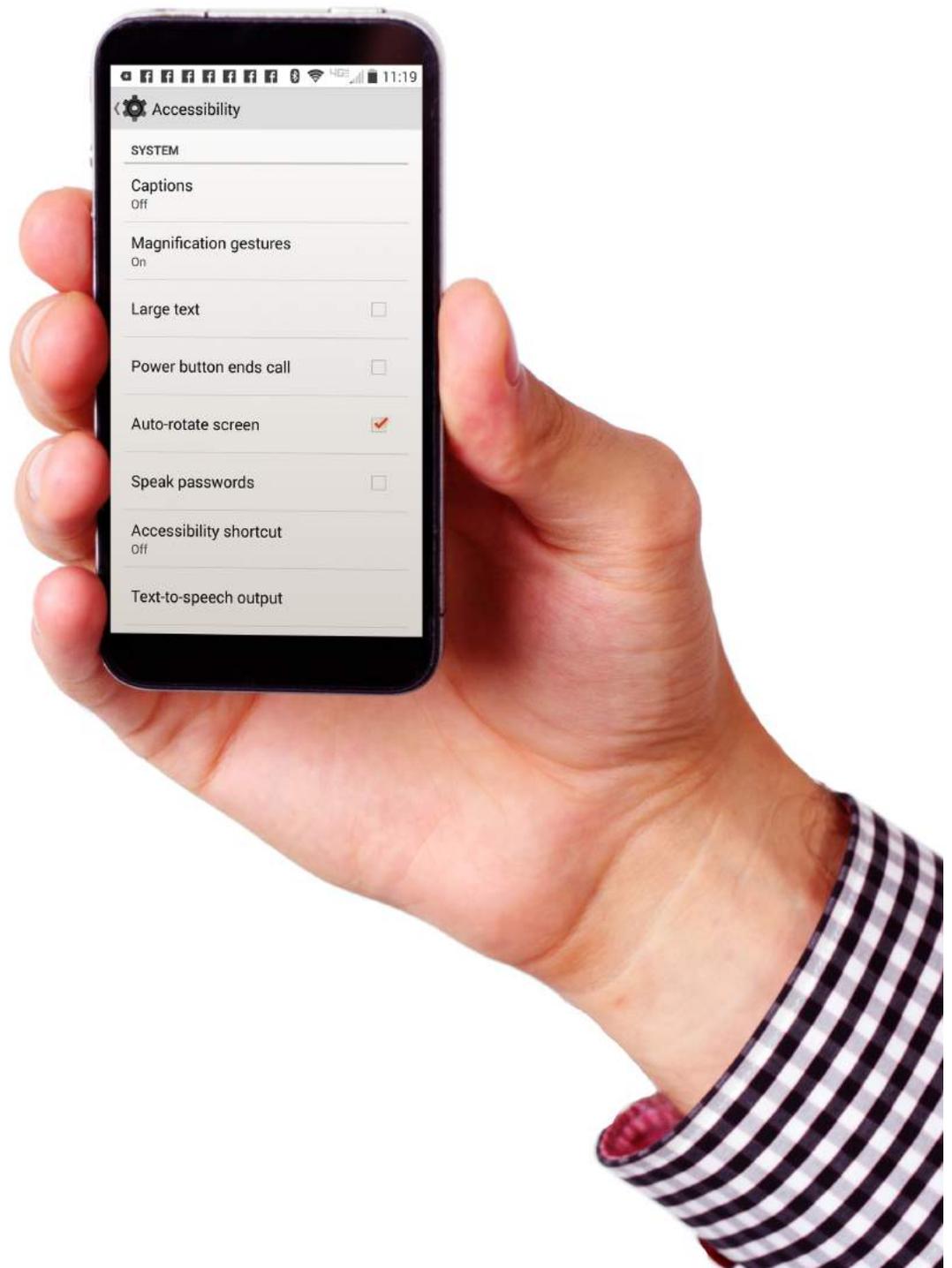


Making your Android phone & tablet easier to see, hear and use

Android Nougat Student Handbook





Mobile Accessibility for Android Phones & Tablets

Making Your Phone and Tablet Easier to See, Hear, and Use Student Workbook

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Welcome!

Welcome to Oasis Connections! We hope you find this class to be fun, interesting, and informative.

This course is an introduction to the basic accessibility options built into Android phones and tablets including:

- How to make text larger and reduce background clutter.
- How to increase contrast and use color inversion to enhance readability.
- How to configure audio for clarity.
- How to turn on captions.
- How to set up features that can help with dexterity and motor coordination issues.

Thanks for choosing Oasis and have fun learning!

About Oasis Connections

Oasis Connections is a technology curriculum designed for adult learners. Connections classes help tens of thousands of students stay in step with today's technology through partner organizations: libraries, job help centers, adult living and faith-based communities. If your organization would like more information about partnering with Oasis, contact the National Connections Manager at 314-862-2933 x 272.

Send errata, suggestions, and comments to courseupdates@oasisnet.org.

Introduction to mobile accessibility

Many of us have become dependent on our mobile devices. We use them to communicate with friends and family, complete work tasks, stay current with the news, take and share pictures, and even find and navigate to restaurants and entertainment venues. Mobile devices have a growing number of options to enhance their usability for anyone who has difficulty with vision, hearing, or manual dexterity. This manual will introduce you to some of the basic accessibility options of Android mobile devices.

Don't see a feature listed here on your phone?

If there is a feature listed in this manual that isn't in your phone or tablet, it may be that your operating system is out of date or the latest OS is not available for your device.

Operating Systems (OS)

Google makes the mobile device software we know as Android. Many different manufacturers, Motorola, Samsung, and LG to name a few, make phones and tablets that use the Android software. These manufacturers customize their devices so that, unlike Apple phones, Android devices vary widely. This manual is current as of Android version 7, affectionately known as Nougat. If you don't see a feature on your device, you may not have the latest operating system.

Android OS version history

Honeycomb	3+	February 2011	Discontinued
Ice Cream Sandwich	4+	October 2011	Discontinued
Jelly Bean	4.1 +	July 2012	Discontinued
KitKat	4.4 +	October 2013	Security Updates Only
Lollipop	5+	November 2014	Supported
Marshmallow	6+	October 2015	Supported
Nougat	7+	August 2016	Supported

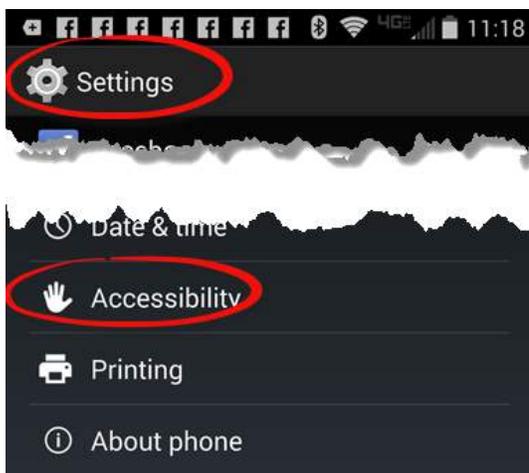
Introduction to Android accessibility

Android accessibility features vary by operating system version. Some of the features in this manual are only available on devices running Android version 7 Nougat and higher.

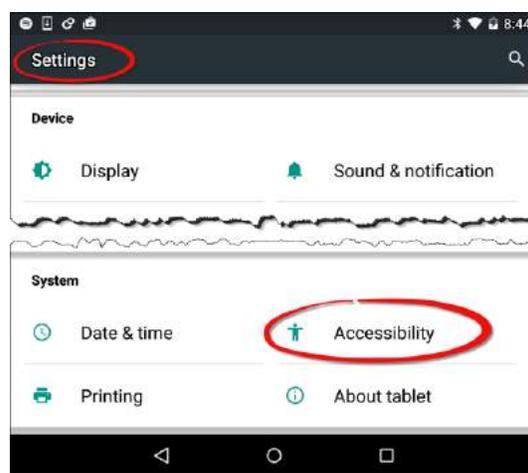
Most of the options you will need are under **Settings**  > **Accessibility** . However, be aware that there are additional features under **Sounds, Sound & notification**, **Display**, and **Keyboard** depending on your device model and Android version.

Here is how to open your accessibility options screen:

1. From your **Home** screen, touch **Settings** .
2. Scroll down to the **System** group and touch **Accessibility** . The icon is a hand  (prior to version 5) or a human figure . In the future, this sequence will be shown as **Settings**  > **Accessibility** .



Android version 4

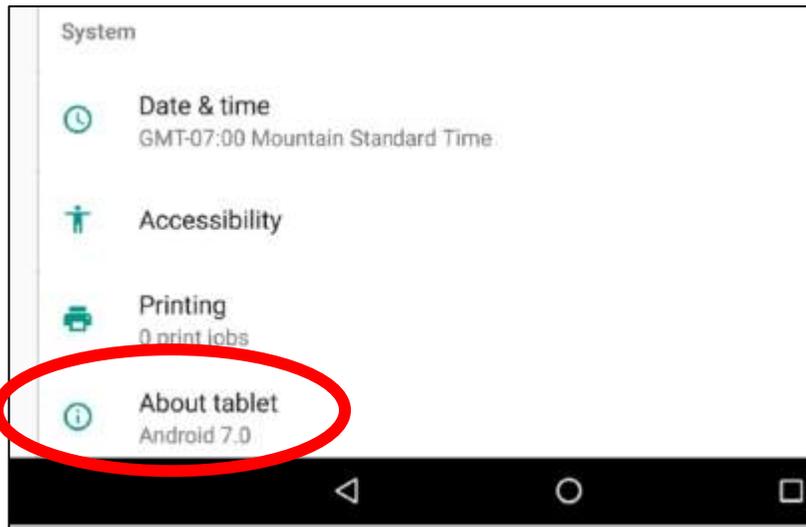


Android version 5+

Determining your Android version

To determine the OS version your Android device is currently running:

- Go to **Settings** , then scroll down to the **System** area and look for **About tablet** or **About phone**.



The device shown here is running Android's operating system (OS) version 7, known as Nougat. Contact your phone carrier (ATT, Verizon, Sprint, etc.) if you have questions about upgrading to a newer Android software version.

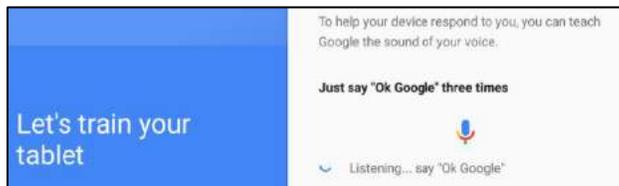
On older operating systems, you may have to go to **Settings**  > **About phone** > **Android version**.

Smart lock—easy alternatives for unlocking your device

*Applies to Android 6 (Marshmallow) and above. May not be available on all devices.

Android offers several alternatives to unlock your device without having to physically enter a password, pattern, or PIN. If your device is always in a safe place and you don't feel the need to lock it, then you can skip this section. But if you want to have a safely locked device, you can use one or more of the following:

- **On-body detection** — Enable on-body detection and your device will remain unlocked while you are carrying the device in your hand, pocket, or purse. It will lock automatically if it senses that it has been put down.
- **Trusted places** — Trusted places uses Google maps and location data to recognize safe areas, such as your home, school, or business. When you are in a trusted place, your device will remain unlocked.
- **Trusted face** — Some Androids have the capability to remember your face. This is probably the least secure way of locking your device.
- **Trusted voice** — You can train your device to open when it recognizes your voice model saying “Ok Google”.



- **Trusted device** — You can link a Bluetooth device like a watch or your car's stereo to your Android. When your device is near a linked device it will automatically unlock. You can also buy inexpensive Near Field Communication tags and program them to unlock your device.



NFC tags come in a variety of forms, including self-adhesive tags and key fobs.

To access Smart lock

1. Go to **Settings > Security > Smart Lock**.
2. Choose your preferred option(s) and follow the instructions.

Google voice control

The Google app lets you use your voice to send a message, add an event to your calendar, set an alarm, find directions, and search the internet — all without typing a single letter. Your Android device must be connected to the internet to use Google voice search.

Start a voice search

All Android devices by touch

- In the search bar at the top of each **Home** page, touch the microphone icon  and then speak.

OK Google

You can set up your device to respond to you saying "OK Google", (known as a "launch phrase".) Speaking this phrase aloud opens your device. OK Google works whenever the Google app is open, and can be configured to work on an Android device from the Home screen or even when the device is locked. Note that your Android device may differ from the following depending on the manufacturer.

Setting Android options for the launch phrase "OK Google"

1. Open the **Google**  app.
2. In the top left corner of the page, touch the Menu icon  then go to **Settings**  > **Voice** > **"Ok Google" detection** and select from the following options:
 - **From the Google app** — This feature is usually on by default and means that you can speak the launch phrase when the Google app is open and active (the app you are currently using.)
 - **From any screen** — Select this if you want the launch phrase "OK Google" to start a voice search from any screen if the device is on and unlocked.
 - **Always-on** — Google will respond when you say "OK Google" whether your screen is active or not.

Note: The **From any screen** setting may prevent other voice services that use launch phrases or wake up commands from working. For example, if you have a Samsung S6 and turn on S-Voice to use the wake up command "Hi Galaxy," it may not work if **From any screen** is turned on.

- **Trusted voice** — Will unlock your device if Google recognizes your voice when you say “OK Google”.
- **Personal results** — See personal results for your voice searches when your device is locked.
- **Train/Retrain voice model** — Teach Google to recognize your voice.

Using voice in apps

Many apps, including browsers, maps, and other apps with search boxes, often display a voice search (microphone) icon . Touch the icon to input using your voice rather than the keypad as shown on this screenshot of the Chrome browser on an Android device.



You can also use your voice to dictate text messages and email — just about anywhere you would use a keypad to type in letters.

Some things to remember when using voice

- Speak in a normal indoor voice. Be aware that background noise and wind noise can interfere with Google being able to understand you.
- Google may ask a follow-up question(s) to understand your instruction. For instance, if you tell Google to set a reminder, Google will need additional information like time and date.

Some things you can do with Google

- Tell Google to call your contacts that you have defined a relationship with in Contacts. For instance, you can say “call my sister” if Google knows that relationship.
- Tell Google to call a person by name in your Contacts.
- Tell Google to call a number. Say, “dial” and then say the numbers.
- Navigate to a location with a command. Launch Google and say “navigate to” and add the location.
- Check your voicemail. Say, “Listen to voicemail.”
- Launch an application. Google can launch most installed apps. Say “launch” and the name of the app, e.g., “launch Facebook” or “launch Photos.”
- Set reminders, including location-based reminders. Say, “Remind me to buy coffee at Costco,” will create a reminder that will trigger when you are physically at and location Google knows is a Costco.
- Set alarms. Say “set an alarm for 11am” to create an alarm for that time.

- Ask questions. Ask what the temperature is somewhere, or what the current time is in another part of the world. Google will search the web and answer questions or provide websites that might answer your questions.
- Say, “OK Google, help me” for a list of commands.

Troubleshooting

If you are having problems with OK Google:

- Remember that background noise and blowing wind will make it hard for Google to understand you.
- If Google does not launch with your voice command, go to **Settings**  **> Search & Now > Voice > “Ok Google” detection** and make sure to turn on **From the Google app** and any other options you want.
- Devices on older operating systems may find their Ok Google settings in **Settings**  **> Touchless Control**.

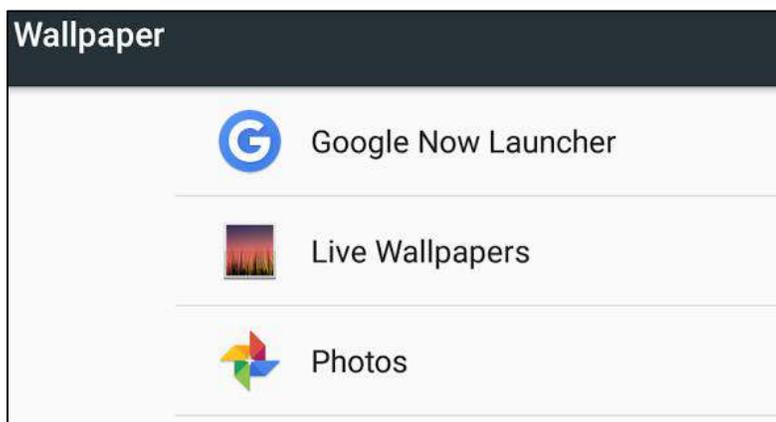
Android visual accessibility options

Wallpaper and backgrounds

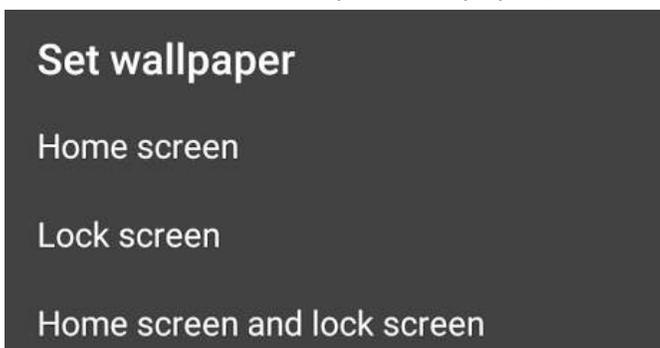
You can choose between several stock static (non-moving) and dynamic (moving) background options. Some backgrounds can obscure text and icons. You can pick the least distracting option or use a photo you take from your device. You can also take a picture of a white, gray, or black background to use as a plain color for your background if that makes viewing your Home screens easier. To set your wallpaper preference:

Nougat (7) and Marshmallow (6)

1. Go to **Settings**  > **Display** > **Wallpaper**.
2. Choose a wallpaper from the collections listed.



3. Choose where to install your wallpaper, Home screen, Lock screen, or both.



Lollipop

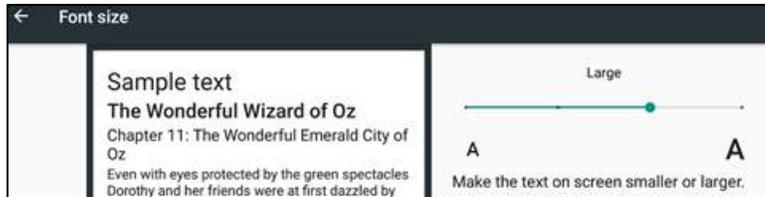
1. Go to **Settings**  > **Display** > **Wallpaper**.
2. Choose from the **Gallery**, **Wallpapers**, or **Photos** options and browse for your preference. Touch any to preview.

Android large text and display settings

Android Nougat features the ability to enlarge the size of both text and display.

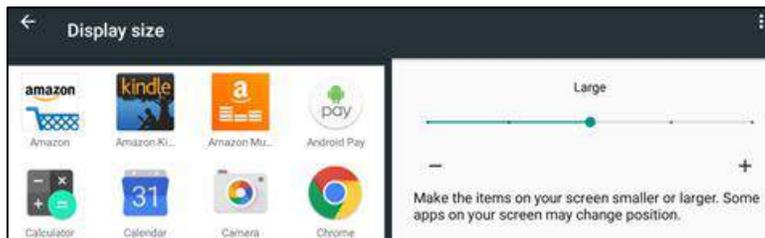
To access options to make text larger

1. Go to **Settings**  > **Accessibility** (or Display)  > **Font size**.
2. Use the slider to choose a font size that is comfortable for you to read.



To access display size options (icons, buttons, etc.)

1. Go to **Settings**  > **Accessibility** (or Display)  > **Display size**.
2. Use the slider to choose a display size that makes the icons and display easy to read.



Older operating systems (Marshmallow, Lollipop and earlier) were limited to making text larger using **Settings**  > **Accessibility** > **Large text**.

You'll notice that not all text is resized using Android's accessibility settings. Some apps have settings of their own. The Google Chrome browser is an example. Chrome has its own settings to increase text size as follows:

1. Open the **Chrome** browser , then touch the **Menu**  button in the upper right corner.
2. Touch **Settings** > **Accessibility** .
3. Drag the slider to the desired text size. Watch the text under the slider bar to judge when you have a comfortable size selected.
4. Touch the checkbox next to **Force enable zoom** to make all websites zoom to your desired level, overriding the website's settings if necessary.

Android magnification gestures

Turn on magnification gestures to enable a zoom box that you can adjust to see a specific part of the screen. To turn on magnification gestures:

1. Go to **Settings**  > **Accessibility**  .
2. Touch **Magnification gestures** and turn on the button.

Tap the screen quickly 3 times with one finger to toggle magnification on and off. When magnification is toggled on, you will see a blue or orange border around the screen and the contents will be enlarged. Use two fingers to drag the focus area around the screen. Use a 2-finger pinching motion to either enlarge or decrease the zoom level.

You can also use magnification to temporarily zoom in on an area. Triple-touch and hold your finger down on the last touch. Magnification will turn on and you can drag your finger around to look at different parts of the screen. Once you release, magnification will turn off and your normal view will return.

High contrast text

Applies to Android 5+ only. This feature is still experimental and your results may vary.

1. Go to **Settings**  > **Accessibility**  .
2. Touch **High contrast text**.

High contrast text turns gray text black in some cases. It will also outline some colored or white-on-color text with a dark border. This feature is still experimental and you may find it is more or less useful depending on the app. Bordered text is usually more difficult to read than solid colors.

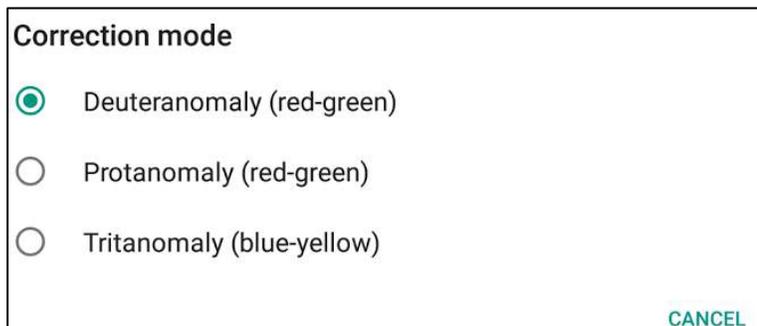


Color correction

Applies to Android 5.0+ (Lollipop and newer.)

Color correction manipulates colors to compensate for color blindness. You can set the feature for different correction modes as follows:

1. Go to **Settings**  > **Accessibility**  > **Color correction**.
2. Set the switch to on and select the correction mode:



Color inversion

Applies to Android 6 (Marshmallow) and 7 (Nougat.) This feature is experimental and may affect your device's performance.

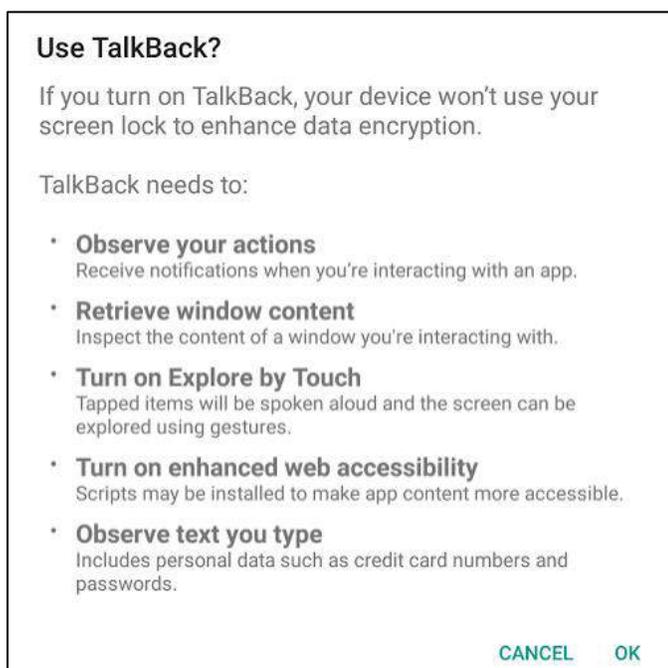
Color inversion reverses white and black as well as other colors on the scale. This feature can make reading at night (in low light) easier by dimming bright colors. To turn color inversion on:

1. Go to **Settings**  > **Accessibility**  > **Color inversion**.
2. Set the switch to on.

TalkBack

TalkBack is a screen reader that speaks the names of items you are touching on the screen, reads text, and announces alerts like incoming phone calls. Because TalkBack describes what you are touching, single touches are disabled, requiring users to learn a new set of gestures. If TalkBack is not installed on your phone or tablet, you may be able to download it from the Google Play Store. To enable TalkBack:

1. Go to **Settings**  > **Accessibility** .
2. Depending on your Android version, enable the **TalkBack** checkbox or slide the switch (Android 4 return to previous screen and enable **Explore by touch**).
3. Confirm and allow TalkBack access to your device.



To enable TalkBack, confirm that you will allow the app to observe your actions — things like the buttons you are touching and the text you type.

The first time you enable TalkBack will also open a training tutorial with hands-on practice of the gestures required to use the app.

Action	Gesture
Move to first item on screen	Up then down
Move to last item on screen	Down then up
Open local context menu	Up then right
Open global context menu	Down then right
Home button	Up then left
Back button	Down then left
Recent apps	Left then up
Notifications	Right then down
Scroll to next screen	Two-finger swipe left or up
Scroll to previous screen	Two-finger swipe right or down

If you are using TalkBack you might want to lock the screen in either the landscape or portrait position.

Note: Turn off **Speak passwords**, also in Accessibility settings, if you don't want TalkBack audibly announcing passwords as you enter them.

Android system sounds and vibration

Android devices can provide audio and vibration (haptic) feedback when you touch icons, buttons, and keyboard items. Some of these are accessed in Settings, and others “in-app” or through the settings offered in the app rather than Android system settings. These settings differ between the latest Android OS (Nougat) and prior versions (KitKat and prior.)

Vibration notification for calls

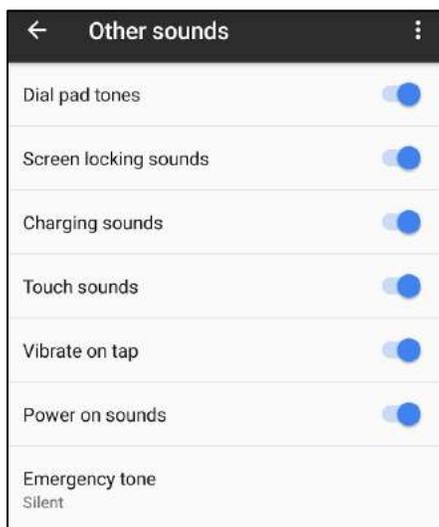
There are two ways to make your Android phone vibrate when receiving an incoming call.

- Press and hold the volume-down button until you feel the phone vibrate. This silences any ring, but your phone will vibrate with any incoming phone call. Your status bar (top of the screen) will display the Vibrate icon . (Press the volume-down button again to turn off vibrate AND silence the phone).
- If you want your phone to vibrate with all incoming calls regardless of ringer volume, go to **Settings**  > **Sound** (or **Sound & Notification**) and turn on **Also vibrate for calls**.

System sounds

Your Android can provide audible feedback for touches, lock screen, and other system actions as follows:

1. Go to **Settings**  > **Sound** (or **Sound & Notification**).
2. Touch **Other sounds** to open a menu of options.



Vibrate on taps

Android also offers a haptic (vibratory) feedback for tapping or touching keys on the Google keyboard, and the Home, Back, and Menu buttons. To activate:

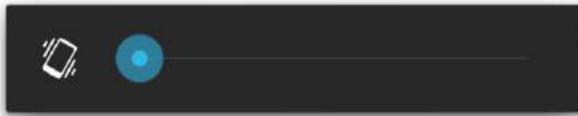
1. Go to **Settings**  > **Sound (or Sound & Notification)** > **Other sounds**.
2. Turn on **Vibrate on tap** (or **Vibrate on touch**.)

Android earlier versions

Most of the system audio and vibratory feedback options for earlier versions of Android (Lollipop and earlier) are accessed as follows:

3. Go to **Settings**  > **Sound**.
4. Choose from the following: **Vibrate when ringing**; **Touch Sounds**; **Dial pad touch tones**; **Screen lock sound**; and **Vibrate on touch**.

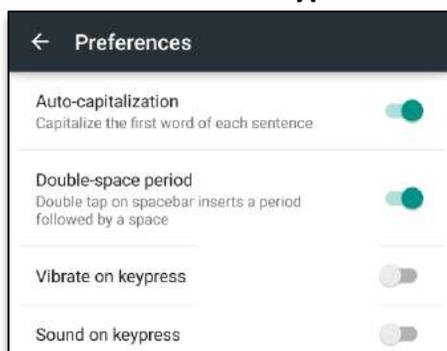
App notifications are controlled from the app settings. To use the vibration notification feature, turn down the volume (using the external down-volume button) until sound is turned off and vibration alerts are turned on. You'll see a vibration icon to the left of the volume bar as shown here:



Lollipop keyboard

You can set both audio and vibratory feedback for the standard Google keyboard in Android Lollipop as follows:

1. Go to **Settings**  > **Language & input** > **Google Keyboard** > **Preferences**.
2. Activate **Sound on keypress** and **Vibrate on keypress** as desired.

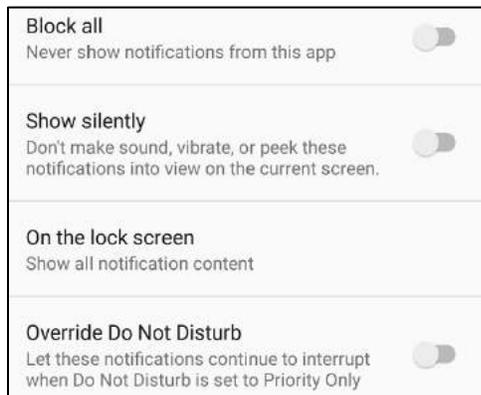


Notifications

Properly setting up notifications can help keep you informed with alerts that display on your lock screen or in “peek” mode — a short visual notification on any screen.

Notifications in Nougat

Go to **Settings**  > **Notifications** to view the list of installed apps on your device.



Notifications in Marshmallow & Lollipop

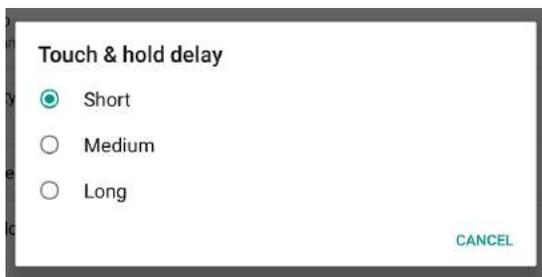
Go to **Settings**  > **Sound & Notification** > **App notifications** to view the list of installed apps on your device. Options are the same as above.

Android manual dexterity options

Touch & hold delay

Sometimes you need to press and hold an icon or section of text to complete an action. Selecting a longer Touch & hold delay can be helpful for those with dexterity issues that might cause inadvertent touches or movements on the screen. By default, the delay is set to short. To change the timing:

1. Go to **Settings**  > **Accessibility**  .
2. Touch **Touch & hold delay** and select **Short**, **Medium**, or **Long**.



Hang up with the power button

You can add the option to end phone calls with a press of the power button. To enable:

1. Go to **Settings**  > **Accessibility**  .
2. Touch **Power button ends call**.

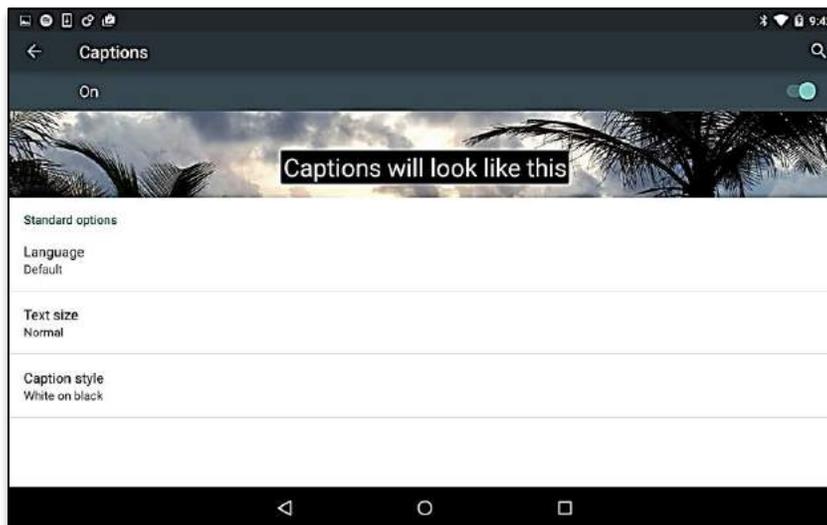
Android features for people with hearing impairments

Captions

Applies to Android 4.4+ only

Closed Captioning (CC) adds visual text to describe the full context of a video including descriptions of sounds (like screams and crashes) and music. Captions work with some apps but often you need to turn captions on in the apps themselves. To turn captions on for your device:

1. Go to **Settings**  > **Accessibility**  .
2. Set the **Captions** switch to **On**.



Choose the **Text size** and **Caption style** options you prefer from the default options. You can also create your own style in **Caption style > Custom** settings.

Mono audio

Android 7+ only

Mono audio combines the two parts of a stereo signal and sends it to both earphones/speakers.

1. Go to **Settings**  > **Accessibility**  .
2. Turn on **Mono audio**.

3rd Party Apps

Apps are software programs that perform a specific function on your device. Examples of apps that came with your device are the Internet browser, the camera, and the email program. Most apps that come with your device have accessibility features that you access in the device's settings.

Android devices are customized by the manufacturer (Motorola, HTC, etc.) as well as the carrier (AT&T, Verizon, T-Mobile, etc.) and can vary widely.

Android devices also allow you to download and install third-party apps that are helpful for those with disabilities. The Aipoly app is an example. This free app uses your mobile device's camera and artificial intelligence to audibly announce what the camera is pointed at.



Apps extend your device with social media, games, entertainment, and more

There are millions of apps available for Apple and Android mobile devices. There are apps for entertainment, learning, communication, and more. Some of these apps will have accessibility settings of their own, accessible from within the app's settings. We won't talk about those here, but you can look at any app's settings and see if there are enhancements that make it easier to use.

Third-party apps that are mentioned in this manual are not an endorsement or recommendation for installation.

External devices

You can connect external devices, like hearing aids, TTY machines, and switches, to your phone or tablet to make it easier to see and use. Most of these are beyond the scope of this manual, but here are some devices to consider:

- Bluetooth keyboards, mice, and touchpads can make navigation and typing easier.
- Chromecast mirrors (projects) your device's screen to a large TV or monitor.
- Hearing aids that pair with specific mobile devices have a wide range of options to enhance sound at higher volumes. Some also connect to your TV!
- Switches that connect to the device and support specific actions that may otherwise be difficult for those with motor coordination issues.
- TTY and braille devices that empower communication via your mobile device.

More resources

There are excellent resources online including:

- **American Foundation for the Blind (AFB):** AFB has a database of devices and apps for the visually impaired. Look for them at www.afb.org.
- **AccessWireless:** AccessWireless is a service of The Wireless Association (CTIA) and is a great resource for researching devices and services. Visit the website at www.accesswireless.org/.
- **Hearing Loss Association of America:** This organization has a wealth of information about electronic hearing devices including implantable devices and cochlear implants. You can find out more at www.hearingloss.org.
- **GARI:** The GARI site can help you find both devices and apps that can help you with accessibility questions. It features comparative search functions for devices and apps at www.gari.info.

For more help

Need more information about your Android device? Try your owner's manual and your cellular phone provider's website. You can also access information through Google's Android Accessibility Help website at <https://support.google.com/accessibility/android>. Finally, you can download Google's free Android Quick Start books at the Google Play Store.

Your opinion is important to us!

Please complete a short online survey and tell us what you think about the Connections handbook you just used. We value your feedback and use the suggestions to improve classes and course material. It will only take a few minutes:

<http://bit.ly/SurveyAccessMobile>

Thank you!