Astronomy Education Review

Astronomy Apps for Mobile Devices, A First Catalog

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Abstract

The explosion in mobile apps in the last few years has meant that many new astronomy applications have become available. This catalog is a first attempt to make a list of those of particular interest to astronomy educators. For each mobile app, we give the title, then the developer (in parentheses), the web address for downloading it, and a brief description. Please note that we do not list the devices (or operating systems) each app is available for, since this is changing very fast as developers catch up with the increasing popularity of a variety of smart phones and tablets. At the end, you can find a selection of astronomy app reviews, to help you distinguish among apps that have similar purposes—although the number of apps is fast outpacing the ability of reviewers to keep up. Suggestions and additions for this catalog are most welcome.

Catalog of Astronomy Apps for Phones and Tablets

APOD VIEWER (Sendmetospace):
http://itunes.apple.com/us/app/apodviewer-astronomy-picture/id292538105?mt=8
(Displays and manipulates the "Astronomy Picture of the Day" images)

ASTROAPP: SPACE SHUTTLE CREW (NASA):
http://itunes.apple.com/us/app/astroapp-space-shuttle-crew/id432366873?mt=8
(Information on and images of all the astronauts who flew on the Space Shuttle)

ASTROCK (Spoledge)
http://itunes.apple.com/app/astrock-astronomical-clock/id328998293?mt=8 or
http://spoledge.com/en/mobile-devices/astrock.html
(An astronomical clock that keeps track of the positions of the Moon and planets, plus sunrise, sunset, etc.)

ASTROGIZMO (EtherGizmos)
http://itunes.apple.com/us/app/astrogizmo/id327762668?mt=8
(A simple planisphere app that shows the sky right behind where you hold your phone)

ASTROLABE CLOCK (TwoNineEight Software)
http://itunes.apple.com/us/app/astrolabe-clock/id421777015?mt=8 or http://www.twonineeightsoftware.com/AstrolabeClock.html
(A modern astrolabe, showing information about both the day and night sky; takes some figuring out)

ASTROMIST (Cyrille Thieullet)
http://astromist.com or http://itunes.apple.com/us/app/astromist/id377782454?mt=8
(Planetarium program with charts, simulators, atlases and telescope control)

ASTROMO (Gandreas Software)
http://itunes.apple.com/us/app/astromo/id284533116?mt=8
(Basic planisphere, orrery, and ephemeris guide to show you what's in the sky from your current location or other cities)

ASTRONOMY PICTURE OF THE DAY (Sam Oakley)
http://www.appbrain.com/app/astronomy-picture-of-the-day/com.blork.anpod
(Downloads the astronomy picture of the day)

ASTRONOMY WHEREISIT (GalaxyPoint)
https://market.android.com/details?id=com.bt.whereisit&hl=en
(Calculates altitude & azimuth from RA & Dec; has catalog of well-known objects)

ASTROPLANNER (Maurice De Castro)
http://sites.google.com/site/astrosoftint/home/astro-planner or http://itunes.apple.com/us/app/astro-planner-lite/id412784164?mt=8
(Tool for planning amateur astronomy observations of deep-sky objects, including visibility charts, information about a variety of objects, rise, transit and set times, etc.)

ASTRO TOOLS (Raphael Lelant)
https://market.android.com/details?id=com.rafdev.astrotoolsalpha1&hl=en
(A basic planisphere app for which you can download an optional catalog of an additional 2.5 million stars – in case you want to make sure your celestial cup runneth over)

AU: THE SOLAR SYSTEM (Orb11)
http://orb11.com/software/au/ or http://itunes.apple.com/app/au-the-solar-system-on-sale/id307029626?mt=8
(Animation lets you move through the solar system; contains information and links on for each world and each planetary mission)

CASSINI (Jet Propulsion Laboratory)
http://itunes.apple.com/us/app/cassini/id450219408?mt=8#
(Images from the mission to Saturn and information about what the spacecraft is doing currently)

COSMOCALC (Eli Rykoff)
http://itunes.apple.com/us/app/cosmocalc/id334569654?mt=8
(Cosmological distance calculator, where you put in the cosmological framework and parameters you prefer and it converts red shift to distances or a lookback time; not for elementary students)

CRATER SIZE XL (FSpace Publication)
http://itunes.apple.com/us/app/cratersizexl/id369535286?mt=8
(Lets you put in the parameters of a colliding asteroid or comet and a target world, and then calculates the size of the crater produced)

DAILY ASTRONOMY (Tropical PC Solutions)
https://market.android.com/details?id=com.tpcs.Astronomy&hl=en
(Shows the Astronomy Picture of the Day on your phone; lets you access older images on the Web)

DEEP SKY BROWSER (Astro Devices)
http://itunes.apple.com/au/app/dss-browser/id368881403?mt=8 or http://www.astrodevices.com/products/DSSBrowser/
(Provides information about and sky position for about 50,000 objects, including Messier, NGC, Caldwell objects and the Digital Sky Survey)

DISTANT SUNS 3 (First Light)
http://distantsuns.com/ or http://itunes.apple.com/us/app/distant-suns-3-astronomy-for/id363418936?mt=8
(Well-reviewed planisphere program that is GPS aware, tours of the solar system, constellation information, planetary data, Earth weather patterns, and much more)

EMERALD OBSERVATORY (Emerald Sequoia)
http://itunes.apple.com/us/app/emerald-observatory-for-ipad/id364904759?mt=8 or http://emeraldsequoia.com/eo/index.html
(A beautiful astronomical clock, moon phase indicator, day-night map, orrery, eclipse simulator, and more)

ESO TOP 100 (European Southern Observatory)
http://itunes.apple.com/us/app/eso-top-100/id426912449?mt=8
(A collection of images from large telescopes at the European Southern Observatory, with captions and music)

EXOPLANET (Hanno Rein)
http://itunes.apple.com/us/app/exoplanet/id327702034?mt=8
(Regularly updated database of all known extrasolar planets, with background information, visualizations, and links to technical papers)

FERMI SKY (Giacomo Saccardo)
http://itunes.apple.com/us/app/fermi-sky/id436036936?mt=8
(Provides reports on the work of the Fermi gamma-ray telescope in space, including news about observations of gamma-ray bursts, plus maps and videos)

GALAXY COLLIDER (Angisoft)
http://itunes.apple.com/us/app/galaxy-collider/id301086225?mt=8
(A graphic simulator for colliding galaxies)

GALAXY ZOO (Zooniverse)
http://itunes.apple.com/us/app/galaxy-zoo/id363499733?mt=8 or http://www.galaxyzoo.org/iphone
(Users can help classify galaxies in images from the Sloan Digital Sky Survey)

GOOGLE SKY MAP (Google)
http://google.com/mobile/skymap
(Shows you what is in the sky or lets you select a planet or deep-sky object and find where it is)

GO SAT WATCH (GoSoftWorks)
http://itunes.apple.com/us/app/gosatwatch-satellite-tracking/id300546718?mt=8
(Shows real time location of earth-orbiting satellites in the sky and can follow their orbits)

GO SKYWATCH PLANETARIUM (GoSoftWorks)
http://itunes.apple.com/us/app/goskywatch-planetarium-astronomy/id284980812?mt=8 or
http://gosoftworks.com/GoSkyWatch/GoSkyWatch.html
(Planisphere program that shows the sky currently above your device or on a selected date. Includes a red-light mode, and several large catalogs of information about objects)

GO STARGAZE (Astronomical Society of the Pacific)
http://itunes.apple.com/us/app/go-stargaze/id380833895?mt=8
(Regularly updated database of astronomy clubs and their public events – such as star parties – in the US; part of NASA's Night Sky Network project, managed by the ASP)

GRAIL (Jet Propulsion Laboratory)
http://itunes.apple.com/us/app/grail/id459858462?mt=8
(Provides updated information on the twin probes measuring the gravity field of the Moon; will provide images from a student-run Moon-Cam)

GRAVLENSHD (Ely Rykoff)
http://itunes.apple.com/md/app/gravlenshd/id318275930?mt=8
(Simulate gravitational lensing phenomena, and show how we get the multiple images and arcs shown in Hubble Space Telescope images; we assume needing to make gravitational lens calculations on the go is something of an acquired taste)

HUBBLESITE (Space Telescope Science Institute)
http://itunes.apple.com/us/app/hubblesite/id416759844?mt=8
(This free "app" is just a gallery of Hubble Space Telescope images as wall-paper, plus information about and from the Hubble)

HUBBLE SPACE TELESCOPE (Luyen)
https://market.android.com/details?id=com.vanluyen.HubbleSpaceTelescope&hl=en
(Collects and organizes the many Hubble images)

HUBBLE TOP 100 (European Southern Observatory)
http://itunes.apple.com/us/app/hubble-top-100/id426922803?mt=8
(Slide show of 100 Hubble images, set to music, with links to captions)

IMOONU (Microseconds)
http://itunes.apple.com/us/app/imoonu/id291335435?mt=8
(Displays phases of the moon for any date and provides moon-phase calendars)

THE INVISIBLE UNIVERSE (Xperia Studio)
https://market.android.com/details?id=com.lbi.iu
(Done with the assistance of Hubble Fellow Joshua Peek – currently at Columbia – this unusual app lets you point your device and see not the visible but non-visible images of the sky above you)

ISOLARSCAPE (Hopping Bird Productions)
http://itunes.apple.com/md/app/isolarscape/id315155506?mt=8 or http://www.isolarscape.com
(Observing guide for your current location, simulator, and background information about the Sun, Moon, and planets; includes real-time information about several NASA missions)

ISTELLAR (AstroArts Inc.)
http://itunes.apple.com/us/app/istellar/id293118835?mt=8
(Planisphere program in English and Japanese, showing stars, planets, comets, etc., and taking advantage of the touchscreen functions of the smart phone)

JUPITER ATLAS (Horsham Online Limited)
http://itunes.apple.com/us/app/ju[iter-atlas/id352033947?mt=8
(Displays position and globes (with features) of Jupiter and its four Galilean moons)

KEPLER (Hanno Rein)
http://itunes.apple.com/us/app/kepler/id430616551?mt=8
(Updated list of extra-solar planets discovered by the Kepler mission, plus background information and visualization; notifies you when there is a new data release from the project)

LIVING EARTH (Moshen Chan)
http://itunes.apple.com/us/app/living-earth-hd-world-clock/id379869627?mt=8
(Shows a nice Earth globe with the weather based on satellite data; also a world clock, alarm; calculates sunrise and sunset for each city)

LUAN (Celtic Code Craft)
http://itunes.apple.com/us/app/id305665185?mt=8 or http://celticcodecraft.com/apps/luan
(Moon phase chart and lunar calendar, with moon set/rise/transit times at your location)

LUMINOS (Wobbleworks)
http://itunes.apple.com/us/app/luminos-astronomy-simulator/id404664336?mt=8
(Rich planisphere and simulator, with many catalogs and information about a wide range of objects. Can be set up to match your sky or to show you the sky from any time or location)

MARS ATLAS (Horsham Online Limited)
http://itunes.apple.com/us/app/mars-atlas/id303482394?mt=8
(You can explore a globe of Mars with 1600 named features shown)

MARS GLOBE (Midnight Martian)
http://itunes.apple.com/us/app/mars-globe/id324185998?mt=8
(Also shows a globe of Mars where you can zoom in on features)

MERCURY ATLAS (Horsham Online Limited)
http://itunes.apple.com/us/app/mercury-atlas/id347553216?mt=8
(A globe of Mercury, where you can zoom in and explore features)

MESSIER LIST (Scot Spencer)
http://itunes.apple.com/us/app/messier-list/id364899443?mt=8
(Descriptions, positions, and photos of Messier's list of nebulae, clusters, and galaxies)

MOBILE OBSERVATORY (KreApp Development)
https://market.android.com/details?id=com.kreappdev.astroid&hl=en
(Planisphere app with point and view function, can be set for any location or time; includes calendar, rise and set times, solar image, view of solar system, eclipse info, etc.)

MOON (CDV Concepts)
http://itunes.apple.com/us/app/moon./id409619991?mt=8
(Gives lunar phase, rise and set times, azimuth and altitude, and distance for current or any time)

MOON ATLAS (Horsham Online Limited)
http://itunes.apple.com/us/app/moon-atlas/id302171459?mt=8
(Explore a 3-D globe of the Moon, showing phases, libration, features, landing sites, etc.)

MOON GLOBE (Midnight Martian)
http://itunes.apple.com/us/app/moon-globe/id333180321?mt=8 or http://midnightmartian.com/MoonGlobe
(Another program to view the Moon from Earth or as a spinning globe with features and other information)

MOONLIGHT (Dark Giraffe)
http://itunes.apple.com/us/app/moonlight/id296504109?mt=8
(Shows moon phases for any date and lets you view the Moon from anywhere on Earth)

MOON PHASE PRO (Udell Enterprises)
https://market.android.com/details?id=com.daylightmap.moon.pro.android&hl=en or http://daylightmap.com
(Shows phases on a Moon globe and information for the present time, or for any time or location you choose; can also make moon-phase calendars)

NASA APP HD (NASA Ames)
http://itunes.apple.com/us/app/nasa-app/id334325516?mt=8 or
https://market.android.com/details?id=gov.nasa or http://www.nasa.gov/centers/ames/iphone/nasa_app_hd.html
(Download updated NASA information: Launches, mission status reports, "Astronomy Picture of the Day", NASA TV live-stream video, etc)

NASA: BE A MARTIAN (Open Source software)
http://beamartian.codeplex.com/
(Mars map, images, news, community discussion board)

NASA IMAGE ARCHIVE (NGO)
https://market.android.com/details?id=com.vanluyen.NASAImagesArchive&hl=en
(Simple app for downloading and displaying NASA images)

NASA LUNAR ELECTRIC ROVER SIMULATOR (NASA)
http://itunes.apple.com/us/app/nasa-lunar-electric-rover/id35542143?mt=8
(Lets you drive a rover on the Moon in a taste of future exploration)

NASA NOW (Neil Kelly)
http://itunes.apple.com/us/app/nasa-now/id428269406?mt=8
(A basic presentation of NASA news-feed information as a regularly updated mini-website on your phone)

NASA SPACE WEATHER MEDIA VIEWER (Ideum)
http://itunes.apple.com/us/app/nasa-space-weather-media-viewer/id398687618?mt=8
(Near real-time imagery from a number of NASA missions that observe the Sun, plus video interviews and visualizations)

NASA TELEVISION (NASA)
http://itunes.apple.com/us/app/nasa-television/id434439506?mt=8
(Live or on-demand TV programming from NASA's TV channel)

NIGHT SKETCH (Ubiquitous Corporation)
http://itunes.apple.com/us/app/night-sketch/id325894443?mt=8
(A very basic planisphere program – showing the sky above your device – that lets you connect stars to make your own constellation figures)

ORBIT ARCHITECT (a. i. solutions)
http://itunes.apple.com/us/app/orbit-architect/id392291462?mt=8
(Using the touch interface, you can change the parameters of satellite orbits and then see an animation of the results)

PARTICLE ZOO (Richard Burgess)
http://itunes.apple.com/us/app/particle-zoo/id325403123?mt=8
(Catalog of subatomic particles, shown as cartoon plush toys)

PLANETFACTS (Kevin Rye)
http://itunes.apple.com/us/app/planetfacts-plus/id335836069?mt=8
(Catalog of information about the bodies in the solar system, with maps to show scale)

PLANETS (Q Continuum)
http://itunes.apple.com/us/app/planets/id305793334?mt=8
(A planishere program which shows you the location and orbital paths of planets, Sun, Moon in the sky and gives visibility information for your location)

PLANISPHERE (Horsham Online Limited)
http://itunes.apple.com/us/app/planisphere/id331897327?mt=8
(Planisphere app that shows the sky above the phone or for any location; shows rise and set times; can zoom in and also get a red light view)

POCKET UNIVERSE: VIRTUAL SKY ASTRONOMY (Craic Design)
http://itunes.apple.com/us/app/pocket-universe-virtual-sky/id306916838?mt=8
(A planisphere that will tell you what celestial objects you're looking at and show the sky, constellation outlines, lunar phases, moons of Jupiter and Saturn, and much more)

PORTAL TO THE UNIVERSE (European Southern Observatory)
http://itunes.apple.com/us/app/portal-to-the-universe/id417035377?mt=8
(Provides on-the-go access to the consolidator web site organized by ESO/IAU/ESA, bringing news from many institutions and observatories around the globe)

REDSHIFT-ASTRONOMY (United Soft Media)
http://itunes.apple.com/us/app/redshift-Astronomy/id390436752?mt=8
(Sophisticated planisphere app, shows sky above your device, includes large catalog of objects, 3-D tours of solar system and nearby stars, red-light mode, etc.)

SATURN ATLAS (Horsham Online Limited)
http://itunes.apple.com/us/app/saturn-atlas/id352038051?mt=8
(Includes current views of Saturn and 7 moons, with globes of the moons that show features)

SKYMASTER (iCoder)
http://itunes.apple.com/us/app/sky-master/id356567346?mt=8
(Planisphere app that shows the sky at any time; includes solar system simulator)

SKY ORB (RealtechVR)
http://itunes.apple.com/us/app/skyorb/id338051358?mt=8
(Planisphere app, with ephemeris information, sun clock, a search engine, etc.)

SKYQ (Celestron)
http://itunes.apple.com/us/app/skyq/id445142851?mt=8
(A planisphere program from a major telescope manufacturer; point your device to the sky and see what's up; also audio tours, moon phases, Jupiter and Saturn's moon positions, and more)

SKY SAFARI (Southern Stars)
http://itunes.apple.com/us/app/skysafari-lite/id321419308?mt=8 or http://www.southernstars.com/
(Planisphere app, shows sky above your device, has catalog of thousands of objects; comes in regular and lite versions. A review can be found in *Sky & Telescope*, Dec. 2011, p. 54.)

SKYVIEW (Terminal Eleven)
http://itunes.apple.com/us/app/skyview-explore-the-universe/id404990064?mt=8 or http://www.terminaleleven.com/skyview/iphone
(Planisphere app: shows objects you point the device at, or the sky at any time, has artificial satellite paths, 3D graphics, facts about objects, etc.)

SKY WEEK (Sky & Telescope)
http://itunes.apple.com/us/app/s-t-skyweek/id398252674mt=8
(Interactive version of the magazine's "This Week's Sky at a Glance"; helps plan your observing program; shows sky for your location, has zoomable star maps)

SOLAR DYNAMICS OBSERVATORY (ASTRA)
https://Market.android.com/details?id=com.astra.solarapp&feature=seach_result
(View video and images of the sun from the SDO satellite)

SOLAR MAX (Ghost Leopard Software)
https://market.android.com/details?id=com.ghostleopard.solar&hl=en
(Shows images of the Sun from the SOHO satellite)

SOLAR WALK (Vito Technology)
http://itunes.apple.com/us/app/solar-walk-3d-solar-system/id347546771?mt=8
(Dynamic solar system model that you can fly through or show for any date, with movie mode and music, and 3-D TV capability if you have 3-D glasses)

SPACE IMAGES (Jet Propulsion Laboratory)
http://itunes.apple.com/us/app/space-images-for-ipad/id431166828?mt=8
(Includes hundreds of images and videos from NASA/JPL with captions)

SPACE JUNK (Cass Everitt)
https://market.android.com/details?id=us.xyzw.star3map&hl=en
(Shows position of International Space Station and other artificial satellites in the sky for your location, shows background of constellations and planets, or an earth view.)

STAR & PLANET FINDER (Nir Alperovitch)
http://itunes.apple.com/us/app/star-planet-finder/id361753588?mt=8
(Select a celestial object and this app will help you find it using a pointer; planets are free, stars are available for a small fee)

STAR CHART (Escapist Games)
https://market.android.com/details?id=com.escapistgames.starchart&hl=en
(Planisphere app with point and view feature, Hevelius constellation outlines, zoon, search, etc.)

STAR CHARTS BY WIL TIRION (Astrovisuals)
http://itunes.apple.com/us/app/star-charts-by-wil-tirion/id411822062?mt=8
(18 charts based on an atlas by a respected celestial cartographer)

STARMAP 3D (Sanville Software)
http://itunes.apple.com/us/app/starmap-3d/id324038407?mt=8
(Straightforward star chart program that shows the sky for your location and gives information for selected objects)

STARMAP (Fredd)
http://itunes.apple.com/us/app/starmap/id284408099?mt=8
(Planisphere app to show sky above device or any time; calendars, animation, night vision mode, etc.)

STAR ROVER (EEfan)
http://itunes.apple.com/us/app/star-rover/id386628906?mt=8 or http://www.eefan.net/star
(Planisphere app with point and view function, many stars, moon phases, planets, etc.)

STAR WALK (Vito Technology)
http://itunes.apple.com/us/app/star-walk-5-stars-astronomy/id295430577?mt=8
(Planisphere that is point and view or you set the time; includes satellite tracking, calendar, moon phases, even the Astronomy Picture of the Day; has red light mode)

STELLARIUM (Leonid Froenchenko)
http://itunes.apple.com/us/app/stellarium/id382624365?mt=8 or http://www.stellarium.org
(A version of the popular open-source planisphere program)

SUNDROID PRO SUNRISE SUNSET (Visalia Mobile)
https://market.android.com/details?id=uk.co.sundroid&hl=en
(Calculates Sun, Moon, and planet rise and set times; twilight, lunar phases, future eclipses, solstice and equinox dates, etc.)

SWIFT EXPLORER (Jamie Kennea)
http://itunes.apple.com/us/app/nasa-swift/id465669299?mt=8
(A basic app that provides information from and about NASA's Swift mission, searching for gamma-ray bursts.)

TERRA TIME (Udell Enterprises)
https://market.android.com/details?id=com.daylightclock.android.license&hl=en
(Real-time interactive Earth globe, showing day/night, weather, moon phase and rise time, twilight times, etc.)

3D SUN (Tony Phillips)
http://itunes.apple.com/us/app//3d-sun/id347089078?mt=8 or http://3dsun.org/
(Lets you manipulate a Sun model based on STEREO spacecraft images; has phone alerts if there are major updates, such as large solar flares)

VARIABLE STAR (Diatom Software)
http://itunes.apple.com/us/app/variable-stars/id405791918?mt=8
(Searchable catalog of over 183,000 variable stars, with educational materials from the American Association of Variable Star Observers)

VENUS ATLAS (Horsham Online Limited)
http://itunes.apple.com/us/app/venus-atlas/id317310503?mt=8
(3D globe of Venus with over 2000 features shown; shows the phase of Venus from your location)

WHAT'S UP (Craic Design)
http://itunes.apple.com/us/app/whats-up/id393023070?mt=8
(Very basic app that shows location of Sun, Moon, and planets in the sky; shows moon phase)

WHERE IS IO (Sean Dague)
https://market.android.com/details?id=net.dague.astro&hl=en
(Presents a graph of the current positions of the Galilean moons, rise and set times for planets, and information about solar system objects)

WOLFRAM ASTRONOMY COURSE ASSISTANT (Wolfram Alpha LLC)
http://itunes.apple.com/us/app/wolfram-astronomy-course-assistant/id4281038833?mt=8
(From the makers of the *Mathematica* software, this app includes facts, formulas, and tools for helping with intro astronomy courses; H-R diagrams with 100,000 stars, sky phenomena, Drake equation, etc.)

ZENITH MOBILE TELESCOPE (Wikitude)
https://market.android.com/details?id=com.mobilizy.zenith&hl=en
(Very basic point and view planisphere app)

Reviews of Astronomy Apps

"Apps for Stargazing": http://appadvice.com/appguides/show/astronomy-apps (anonymous web article reviewing a selection of apps)

Howes, Nick "Rise of the Robots" in *Astronomy Now*, March 2011, p. 84. Reviews four planetarium apps for Android platforms in the main British amateur astronomy magazine.

Radhakrishnan, Balachandar "Top Apps for Stargazing": http://www.brighthub.com/mobile/iphone/articles/72289.aspx (reviews only two apps)

Schroeder, Dan "Star Charting Apps for iPhone and iPod Touch": http://physics.weber.edu/schroeder/iphonestarapps/ (Detailed review and comparison of planetarium/planisphere apps for Apple products as of Dec. 2009)

Shubinsky, R. "There's an Astro App for That" in *Astronomy*, Aug. 2011, p. 59. Reviews 13 apps of particular interest to amateur astronomers.

Tedeschi, Bob "When You Wish Upon a Star, Now You Can Call it by Name" in *The New York Times*, Apr. 28, 2010: http://www.nytimes.com/2010/04/29/technology/personaltech/29smart.html (reviews a number of planetarium apps for Apple and Android platforms)

Workman, Robert "A Rundown of the Best IPad Astronomy Apps" in *The Christian Science Monitor*, May 24, 2010: http://www.csmonitor.com/Science/2010/0524/A-rundown-of-the-best-iPad-astronomy-apps (reviews 7 apps of various kinds)

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