



CELL PHONE MINERALS **ANSWER KEY**

Cell phones are used for staying connected, Internet access, text messaging, playing games, various applications, entertainment and taking photos. They have mineral components that come from mining.

Think About It: Do cell phones have anything in common with rocks and minerals? Explain. _____

Minerals and Elements in Cell Phone Parts

Arsenic	Amplifier, receiver
Copper	Electrical circuitry
Gallium	Amplifier, receiver
Gold	Electrical circuitry
Indium	Liquid Crystal Display (LCD screen)
Magnesium compounds	Phone casing
Palladium	Electrical circuitry
Platinum	Electrical circuitry
Silver	Electrical circuitry
Tin	Liquid Crystal Display (LCD screen)
Tungsten	Electrical circuitry



Directions for Activity: The table below lists many of the mineral resources needed to make cell phones, the percentage of the mineral resource imported by the United States and major sources. Use this table to answer the questions on the back of this page. Note: NA means not available (insufficient data), so leave this out of any calculations. With two tied for #1, the next one would be ranked #3.

Cell Phone Mineral Resource Imports into the United States

Mineral Resource	Rank from lowest to highest % imported	Net % Imported	Major Sources	% Self Sufficiency (Subtract % imported from 100%)
ANTIMONY	15	87	China, South Africa, Bolivia, Russia	13
ARSENIC	19	100	China, Chile, Morocco, Russia	0
BAUXITE AND ALUMINA	19	100	Australia, China, Brazil, Indonesia	0
BERYLLIUM	4	10	United States, China, Mozambique	90
COPPER	5	35	Chile, China, Peru, United States	65
DIAMOND (dust, grit and powder)	14	85	Botswana, Congo (Kinshasa), Russia, Australia	15
GALLIUM	18	99	China, Germany, Kazakhstan, Ukraine	1
GOLD	1	0	China, Australia, United States, Russia	100
GRAPHITE	19	100	China, India, Brazil, North Korea	0
INDIUM	19	100	China, Canada, Japan, Republic of Korea	0
IODINE	16	88	Chile, Japan, China, Azerbaijan, Russia	12
IRON ORE	1	0	China, Australia, Brazil, India	100
LEAD	3	2	China, Australia, United States, Mexico	98
MAGNESIUM (compounds)	7	46	China, Russia, Turkey, Austria	54
MANGANESE	19	100	South Africa, Australia, China, Gabon	0
MICA, sheet	19	100	India, Russia	0
NICKEL	8	49	Phillipines, Indonesia, Russia, Australia	51
NIOBIUM (columbium)	19	100	Brazil, Canada	0
PALLADIUM	9	54	Russia, South Africa, Canada, United States	46
PLATINUM	17	91	South Africa, Russia, Zimbabwe, Canada	9
QUARTZ CRYSTAL (Industrial; cultured)	19	100	China, Japan, Russia (import sources)	0
RARE EARTHS	NA	NA	China, United States, Australia, India	NA
SILVER	10	57	Mexico, China, Peru, Australia	43
TANTALUM	19	100	Mozambique, Brazil, Congo (Kinshasa)	0
TIN	12	75	China, Indonesia, Peru, Bolivia	25
TITANIUM (mineral concentrates)	13	77	South Africa, Australia, Canada, China	23
TUNGSTEN	6	42	China, Russia, Canada, Austria, Bolivia	58
ZINC	11	72	China, Australia, Peru, United States	28



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Fun Facts:

- Cell phones are really radios.
- The first cell phone call was made on April 3, 1973, by Martin Cooper, a Motorola engineer and executive. He wanted to make a mobile phone after seeing Captain Kirk's "communicator" on the 1960's TV show *Star Trek*.



1. Does the United States have the resources to make cell phones without using any mineral resources from imported sources? **No.** Explain your answer. **Nine of the minerals used in cell phone production are 100% imported.**
2. Gold is important for electricity conduction in cell phones and computer circuit boards. What countries are major sources for gold? **China, Australia, United States, and Russia.** If you were going to be a gold miner in one of these countries, which one would you choose? Why? _____
3. What is the fewest number of countries needed to get the mineral resources to make a cell phone? **Three.** List the countries. **China, Russia, and Brazil.**
4. Are there any mineral resources in a cell phone that the United States could get solely from a domestic source? **Yes.** Explain. **The United States is a net exporter of iron and gold and could make a cell phone without having to import those minerals.**
5. Describe other uses you know for some of the mineral resources used in a cell phone. **Examples:**
Copper: used in automobile motors, radiators, and brakes; electric cables, wires and switches; plumbing pipes, heating, roofing, jewelry and brass in musical instruments.
Gold: used in computers, dental fillings, Olympic medals, Oscars, surgical instruments, jewelry and coins.
Iron: used in steel, magnets, auto parts, cosmetics and paints.
Quartz: used in glass, telescope lenses, watches, computers and paints.
Platinum: jewelry, dental crowns and bridges, automobile exhaust systems, chemotherapy and pacemakers.
Silver: used in coins, dental fillings, jewelry, silverware, photography, electrical switches, DVDs, batteries and solar panels.
Titanium: used in jet engines, armor-plated vehicles, fireworks, propeller shafts and other ship parts, satellites and spacecraft, and joint replacement.

For more ideas see:

- <http://www.MineralsEducationCoalition.org/minerals>
- <http://www.nma.org/index.php/minerals-publicatons/40-common-minerals-and-their-uses>
- <http://www.Geology.com/minerals>
- <http://www.chemicool.com/elements>

6. Explain why minerals and mining are important to you and your daily life. _____

Extension Activity

- Individually or in a small group, use the Internet to research how the minerals in a cell phone are mined. Create a diagram for each type of mining done to extract these minerals.
- Label stickers or "post-it" notes with the mineral resources listed in the table and place them on a world map to show the geographic distribution of major sources for the mineral resources needed to make cell phones.



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