

Lesson Topic: Metal Properties**Objective:**

Students will be able to:

1. Identify the properties of Metals.
2. Research the difference between metals, metalloids, and nonmetals.
3. Apply properties of metals to familiar items to see if they are metal.

Time Required: 65 minutes**Materials Needed:**

- Various small items (metal and nonmetal) for students to observe
- Ziplock baggies
- Teacher computer with internet access
- Projector/Smartboard
- 1 computer/laptop/iPad per student with internet access
- Metal Properties handout (attached)
- Metal Properties Video: [Physical Properties of Metals and Non Metals](#)

Teacher Preparation:

- Assign a Legends of Learning Content Review [Quick Play](#) playlist for the day(s) you will be teaching the lesson.
 - Content Review - Middle School - Metal Properties
- Make copies of Metal Properties Worksheet (1 per student)
- Prepare ziplock baggies full of small familiar items for students to observe (There should be metal and non metal items).
 - Suggestions: paperclip, safety pin, change (penny, nickel, dime etc), pencil eraser, pencil sharpener, piece of fabric, piece of wire, piece of jewelry, bobby pin, etc.
 - Around 6 items or so per bag

Engage (5 minutes):

1. Tell students “Today we are going to talk about the properties of metals. We will start off by watching a quick video clip. As you watch, when they start talking about the properties of metals, jot them down in your notebook.”
2. Play [Video](#).
3. Have students share out what they wrote down in their notes.

Explore (15 minutes):

1. Pass out the Metal Properties handout.
2. Tell students “In a moment, you and your partner will be receiving a baggie full of some small, familiar items. You will need to pick out each one and observe them, writing down their properties in the handout.
 - a. After answering each question for each item, you will need to decide if you think it is metal or not.
3. Pass out baggies of familiar objects.

4. Give students time to work with the objects and complete the handout.

Explain (15 minutes):

1. Tell students “Before we start, let’s write down some vocabulary in our handout.”
 - a. Luster - how shiny the material is: Metals are shiny when cut, scratched or polished).
 - b. Malleable - easily bent or shaped (metals are strong but malleable)
 - c. Ductile - drawn out to make wire (most metals can be used to make wire)
 - d. Conductivity - how well an object can conduct heat through electricity (metals are great conductors of heat).
2. Tell students “Take a look at the chart on your handout. You will see the typical properties of metals, nonmetals, and metalloids. Keep in mind there are always exceptions, but these are the usual behaviors.”
 - a. What do you notice about the properties of Metals and Nonmetals? (They are opposites).
 - b. How would you describe the properties of metalloids? (They are somewhere in between the properties of metal and a nonmetal).
3. Ask students “What connections can you make from the questions in the last activity to the properties of metals?” (Similar questions were asked in the last activity to help determine if the items were made of metal).
4. Ask students “Why would a scientist need to describe an element in this way?”
 - a. Answers may vary but could include:
 - i. Scientists ask these types of questions when they discover an unknown substance to help figure out if it is a metal, nonmetal etc.
 - ii. In fact, this is the process they went through when finding new elements to add to the periodic table. They wanted to classify the elements a certain way in the periodic table so they had to know each of the element’s properties.”

Elaborate (20 minutes):

1. Tell students “Look at the Periodic Table in your handout. Choose one metal, one metalloid, and one nonmetal. Then, do some research to fill in the chart and answer the questions.”
 - a. Answers will vary based on the elements students choose.
2. When all students finish, have them share their findings in small groups.

Evaluate (10 minutes):

1. Have your students [sign in to Legends of Learning](#). Instruct students to complete the Content Review playlist.
2. [Analyze student results](#) to determine what concepts need to be a focus for reteaching.

Additional Lesson Strategies:

- To use Legends for additional instruction, create a [custom playlist](#) with an [instructional game](#) and pre and post [assessment](#).
- To use Legends for a quick formative assessment, create a 5-question [assessment](#) in a [playlist](#).
- To use Legends for a student-directed experience, create a [targeted freeplay](#) playlist.



- Encourage students to play on their own at home in [Legends of Learning: Awakening](#) for a student-driven experience including avatars, battling, and quests all centered around topics they are covering in class.



Name: _____

Metal Properties

Observe Properties

Look at the items in your bag. Write the name of the item and then answer each question for each of the items in your bag to fill in the chart.

	Item 1	Item 2	Item 3	Item 4	Item 5	Item 6
Item name						
Is it shiny?						
Does it feel strong or flexible?						
What color is it?						
Is it a solid, liquid, or a gas?						
Do you think it's made of metal?						

Vocabulary

Luster -

Malleable -

Ductile -

Conductivity -

Properties

Metal	Metalloid	Nonmetal
<ul style="list-style-type: none"> · Lustrous · Malleable · Strong · Excellent conductors of heat and electricity · High melting points · High densities (heavy for their size) · Solid at room temperature (except Mercury: liquid) · Opaque as a thin sheet (can't see through it). 	<p>All properties are somewhere in between a metal and a nonmetal</p> <ul style="list-style-type: none"> · Solid · Lustrous · Very brittle · Good semiconductors 	<ul style="list-style-type: none"> · Non-lustrous (dull) · Brittle · Bad conductors of heat and electricity · Lower boiling points · Low densities · Solids, liquids, or gases at room temperature · Transparent as a thin sheet (can see through)

1 H Hydrogen 1.008	2 He Helium 4.003																																																																																																																																																																																																																																																																																																																																																				
3 Li Lithium 6.94	4 Be Beryllium 9.012	5 B Boron 10.81	6 C Carbon 12.011	7 N Nitrogen 14.007	8 O Oxygen 15.999	9 F Fluorine 18.998	10 Ne Neon 20.180	11 Na Sodium 22.990	12 Mg Magnesium 24.305	13 Al Aluminum 26.982	14 Si Silicon 28.085	15 P Phosphorus 30.974	16 S Sulfur 32.06	17 Cl Chlorine 35.45	18 Ar Argon 39.948	19 K Potassium 39.098	20 Ca Calcium 40.078	21 Sc Scandium 44.956	22 Ti Titanium 47.867	23 V Vanadium 50.942	24 Cr Chromium 51.996	25 Mn Manganese 54.938	26 Fe Iron 55.845	27 Co Cobalt 58.933	28 Ni Nickel 58.693	29 Cu Copper 63.546	30 Zn Zinc 65.38	31 Ga Gallium 69.723	32 Ge Germanium 72.630	33 As Arsenic 74.922	34 Se Selenium 78.97	35 Br Bromine 79.904	36 Kr Krypton 83.798	37 Rb Rubidium 85.468	38 Sr Strontium 87.62	39 Y Yttrium 88.906	40 Zr Zirconium 91.224	41 Nb Niobium 92.906	42 Mo Molybdenum 95.95	43 Tc Technetium [97]	44 Ru Ruthenium 101.07	45 Rh Rhodium 102.906	46 Pd Palladium 106.42	47 Ag Silver 107.868	48 Cd Cadmium 112.414	49 In Indium 114.818	50 Sn Tin 118.710	51 Sb Antimony 121.760	52 Te Tellurium 127.60	53 I Iodine 126.904	54 Xe Xenon 131.29	55 Cs Cesium 132.905	56 Ba Barium 137.327	57-70 * Lanthanide series	71 Lu Lutetium 174.967	72 Hf Hafnium 178.49	73 Ta Tantalum 180.948	74 W Tungsten 183.84	75 Re Rhenium 186.207	76 Os Osmium 190.23	77 Ir Iridium 192.22	78 Pt Platinum 195.084	79 Au Gold 196.967	80 Hg Mercury 200.592	81 Tl Thallium 204.38	82 Pb Lead 207.2	83 Bi Bismuth 208.980	84 Po Polonium [209]	85 At Astatine [210]	86 Rn Radon [222]	87 Fr Francium [223]	88 Ra Radium [226]	89-108 ** Actinide series	103 Lr Lawrencium [262]	104 Rf Rutherfordium [261]	105 Db Dubnium [262]	106 Sg Seaborgium [263]	107 Bh Bohrium [264]	108 Hs Hassium [265]	109 Mt Meitnerium [266]	110 Ds Darmstadtium [267]	111 Rg Roentgenium [268]	112 Cn Copernicium [269]	113 Nh Nihonium [270]	114 Fl Flerovium [271]	115 Mc Moscovium [272]	116 Lv Livermorium [273]	117 Ts Tennessine [274]	118 Og Oganesson [274]	119	120	121	122	123	124	125	126	127	128	129	130	131	132	133	134	135	136	137	138	139	140	141	142	143	144	145	146	147	148	149	150	151	152	153	154	155	156	157	158	159	160	161	162	163	164	165	166	167	168	169	170	171	172	173	174	175	176	177	178	179	180	181	182	183	184	185	186	187	188	189	190	191	192	193	194	195	196	197	198	199	200	201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220	221	222	223	224	225	226	227	228	229	230	231	232	233	234	235	236	237	238	239	240	241	242	243	244	245	246	247	248	249	250	251	252	253	254	255	256	257	258	259	260	261	262	263	264	265	266	267	268	269	270	271	272	273	274	275	276	277	278	279	280	281	282	283	284	285	286	287	288	289	290	291	292	293	294	295	296	297	298	299	300	301	302	303	304	305	306	307	308	309	310	311	312	313	314	315	316	317	318	319	320	321	322	323	324	325	326	327	328	329	330	331	332	333	334	335	336	337	338	339	340	341	342	343	344	345	346	347	348	349	350	351	352	353	354	355	356	357	358	359	360	361	362	363	364	365	366	367	368	369	370

Atomic Number — 6

Symbol — C

Name — Carbon

Average Atomic Mass — 12.011

metals

nonmetals

metalloids

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Choose 3 Elements (1 metal, 1 metalloid, 1 nonmetal)

	Metal	Metalloid	Nonmetal
Name of Element			
Luster			
Malleability			
Ductility			
Conductivity			
Melting Point			
Density			
Solid, liquid, or gas at room temperature			
Color			
Opaque/Transparent			



KEY

Luster - how shiny the material is: Metals are shiny when cut, scratched or polished).

Malleable - easily bent or shaped (metals are strong but malleable)

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Conductivity - how well an object can conduct heat through electricity (metals are great conductors of heat).