100 Questions

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You will choose one of these questions (or a variation on one) to be the center of your inquiry. You will not be encouraged to answer this question! Instead please come up with good questions to ask and start thinking about the inquiry you would make to demonstrate the hypothese that emerge after considering the question and making some initial inquiry.

id.	category	question
1.	structure	What kind of symmetry can crystals have?
2.	structure	Can you describe the arrangement of salt crystals? What makes you think so? How will you test your theory?
3.	structure	Is glass a crystal?
4.	structure	What makes elastic stretchy--is the attraction mechanical, magnetic, chemical or something else?
5.	structure	Do sugar crystals have a regular structure?
6.	structure	How does a saw cut wood?
7.	structure	What makes glass transparent?
8.	structure	Do all crystals have symmetry? What kinds of symmetry are possible? How does symmetry inform the expressiveness of materials?
9.	structure	You are carrying a large stone (granite) in a small boat in a pool. You toss the stone into the pool. Does the level of water in the pool change? If so, did it go up or down?
10.	structure	It is possible to fill a glass above its sides. What holds the water in?
11.	mechanical properties	What makes a material rough? Why are some materials smooth?
12.	mechanical properties	Why are some materials cold to the touch? Why do some materials feel warm to the touch?
13.	mechanical properties	Why doesn't milk separate?
14.	mechanical properties	What holds paper together? Is it the same mechanism that holds felt together?
15.	mechanical properties	What holds iron together?
16.	mechanical properties	What holds salt together?
17.	mechanical properties	Can you describe the interaction between a pencil and paper on a microscopic level?
18.	mechanical properties	Does ice form crystals? What do they look like?
19.	mechanical properties	How does symmetry in crystals relate to the structures we see in salt?
20.	mechanical properties	What holds metal alloys together? Please use bronze as an example.
21.	mechanical properties	Is glass more like salt or felt? How can you tell?
22.	mechanical properties	What are the crystals you see in galvanized metal?
23.	mechanical properties	Why are some metals magnetic?
24.	mechanical properties	The Eiffel Tower is 324 meters tall. It is made of (wrought) iron and subject to temps from -24 to 40 deg C. How much can we expect the tower to expand?

25.	mechanical properties	How does a knife cut?
26.	mechanical properties	Why do some materials cut more easily in one direction than another?
27.	mechanical properties	What is the difference between ice, water and water vapor?
28.	mechanical properties	Can ice be compressed? Can water? How about water vapor?
29.	resonance	What happens when a material resonates?
30.	resonance	How do you find the resonance of a material?
31.	resonance	How does crystal packing inform resonance?
32.	resonance	Do all materials have a resonance point?
33.	resonance	Why do some materials resonate better (or longer) than others?
34.	resonance	Can you talk about the resonance we see in archival films on the Tacoma Narrows bridge failure?
35.	resonance	It was recently discovered that conversations vibrate thin films like the ones used in potato chip bags. How would you listen in on these conversations?
36.	resonance	Can you describe the different kinds of waves produced by an earthquake?
37.	resonance	Some (earthquakes) waves are more destructive then others. Can you demonstrate why?
38.	resonance	Where does a cat's purr come from?
39.	strength	How might you measure the strength of a material? List several ways.
40.	strength	What is deformation? Can you show us? How would you measure it?
41.	strength	What is elasticity? Can you show us? How would you measure it?
42.	strength	What is brittleness? Can you show us? How would you measure it?
43.	strength	What is ductility? Can you show us? How would you measure it?
44.	strength	What is plasticity? Can you show us? How would you measure it?
45.	strength	What is viscosity? Can you show us? How would you measure it?
46.	strength	Are composite materials stronger than elements?
47.	friction	What determines the friction between two surfaces?
48.	friction	Are some materials 'stickier' than others? What makes them sticky?
49.	friction	What holds bricks and mortar together?
50.	friction	How would reduce the friction between two materials?
51.	friction	Do fat tires help a car stick to the road (more then skinny tires made of the same material)?
52.	friction	You have a two blocks of salt: one the size of a sugar-cube, the other sized for a brick. Put them both on a board and raise the board. Will they slide at the same time?
53.	density	Is a total vacuum even possible in this universe?
54.	density	What is the difference between ice, water and steam from the standpoint of density?
55.	density	What is the relationship between the speed of sound and the density of a material? Can you demonstrate?
56.	density	Mix one pound of salt into ten pounds of water. How does the weight of the water change after the salt is mixed in?
57.	density	Mix one cup of salt into ten cups of water. How does the volume of water change after the salt is mixed in? Does it vary as the salt concentration increases?
58.	density	Does sound travel at different rates through different materials?
59.	density	How quickly does sound travel in water? Does this velocity vary with the temperature of the water?
60.	density	Why do Helium balloons want to go up?
61.	density	Close the cab of your car. Tie a balloon to the hand brake and accelerate. Which way will the ballon drift?
62.	density	Now brake the car with the Helium balloon. Which way does the ballon go?
63.	light	Can you compare the optical properties of crystals (fluorite for example, diamond, or salt)?
64.	light	Are rainbows material?
65.	light	What are the colors of the rainbow?

66.	light	Do the colors of the rainbow continue beyond the visible spectrum?
67.	light	Are the colors of the rainbow evenly distributed?
68.	light	Why are there seven colors of the rainbow? Are they evenly distributed? Could you make a case for more (or less)?
69.	light	How is the shape of a rainbow related to the shape of vapor droplets?
70.	light	How do color (gel) filters work?
71.	light	How many ways can you think of to isolate pure colors from white light?
72.	light	Why is the spectrum in an oil slick different than the rainbow?
73.	light	Why is the sky blue?
74.	light	What makes the sun turn red at evening?
75.	light	Can you describe two ways to make orange light?
76.	light	Can orange light be split into red and yellow light?
77.	light	Why are the primary colors of transmissive and reflective color wheels different?
78.	light	What gives black crow feathers a blue sheen? Similarly, why might you see many colors in a pigeon's feathers?
79.	light	Are clouds material?
80.	manufacturing	Why do we define pre-history by materials (Stone age, Iron age, Bronze age, etc.)?
81.	manufacturing	What is stainless steel? What makes it stainless?
82.	manufacturing	Weathering steel (trademark COR-TEN steel) rusts to a specific depth. What keeps this steel from rusting all the way through?
83.	manufacturing	What prevents galvanized metals from rusting?
84.	manufacturing	How does Rustoleum paint keep rust from forming on iron?
85.	manufacturing	How do we make plastics?
86.	manufacturing	What is a polymer? How do polymers relate to plastics?
87.	manufacturing	What does oil (petroleum) have to do with plastic production?
88.	color	What makes the juice of the cochineal so red?
89.	color	How would you make pink with red and white pigments?
90.	color	How are stains different than paint?
91.	color	How would you make a pink stain?
92.	energy	Why do some materials conduct electricity more readily than others?
93.	energy	Can animals store (and use) electricity?
94.	energy	Can you think of alternative ways to store energy?
95.	energy	Where does the heat come from when you burn wood? Could you return the energy to the wood?
96.	energy	How would you calculate the energy stored in a lump of coal, a cup of gasoline and a cube of sugar?
97.	organics	Why is carbon so strongly associated with life on this planet? Is life possible without carbon?
98.	organics	What happens when you caramelize sugar? Could this reaction be reversed?
99.	organics	How does chemical reversibility characterize materials?
100	organics	. What makes blood red? Are there any animals that have different colored blood? What is the difference?