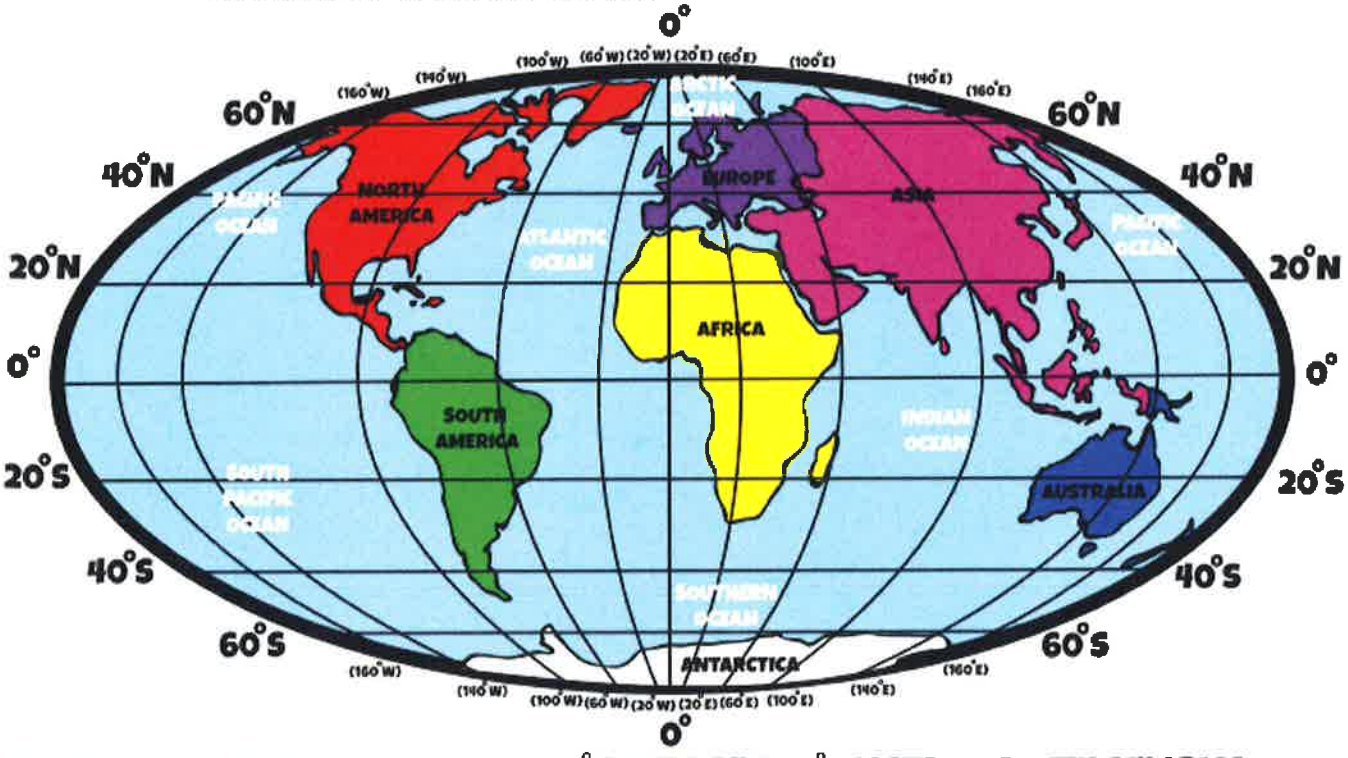
What is Latitude and Longitude, and How Do You Use It?

Some of this journey will take place over water. To navigate the ocean, you will have to understand latitude and longitude coordinates.

What is Latitude and Longitude?

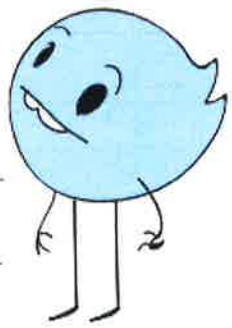
Latitude - lines that go around the globe (they go by the directions north and south)

Longitude - lines that point from top to bottom of the globe (they go by the directions east and west)



Example: What continent is at 20° south and 40° west? **South America**

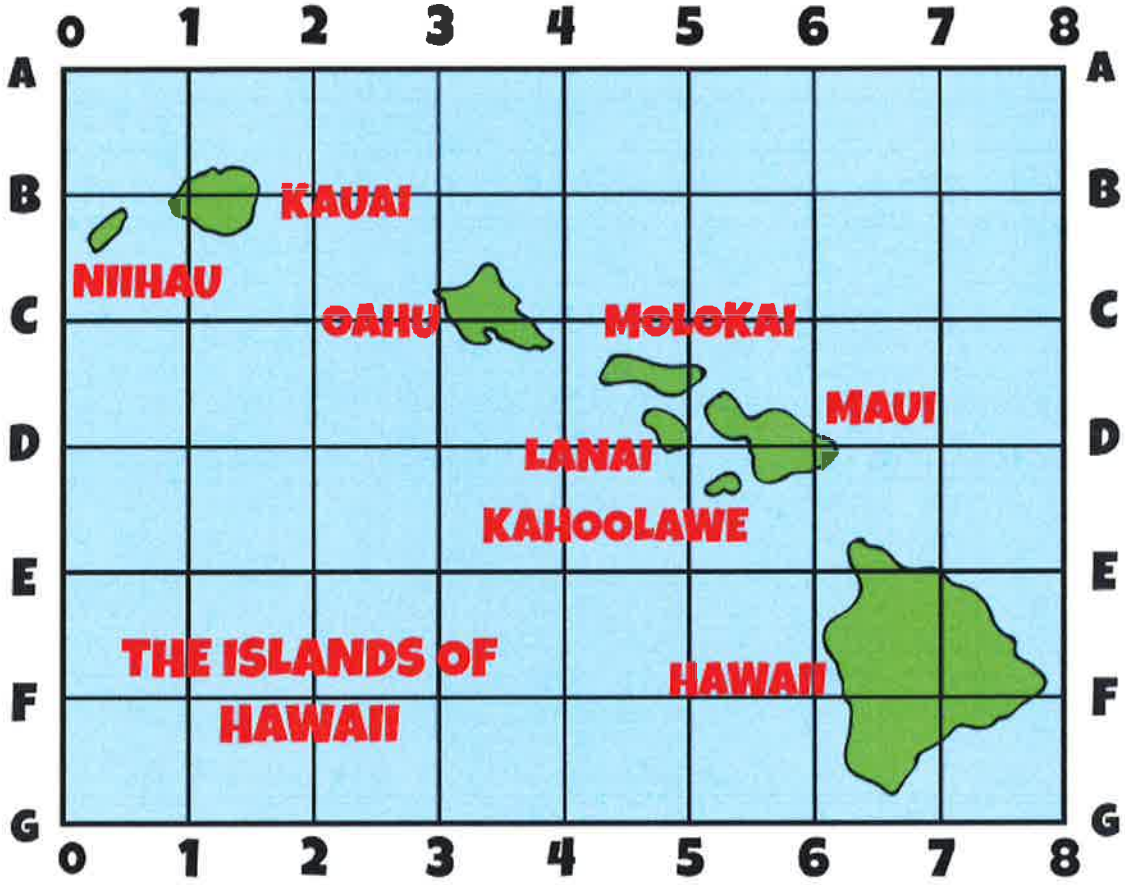
1. What continent is 40° north and 20° east? _____
2. What ocean is found at 20° south and 100° east? _____
3. What continent is at 20° south and 140° east? _____
4. What ocean is at 40° south and 160° west? _____
5. What continent is at 40° north and 100° east? _____



Answers: 1. Europe 2. Indian Ocean 3. Australia 4. South Pacific Ocean 5. Asia

How to Read a Map Using a Grid and Index

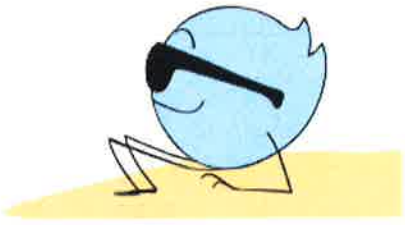
Before smart phones, map grids were how people traveled from one place to another. On your travels, you may not always get cell phone service, so you'll need to learn how to use map grids, too.



Directions:

Start with the letters along the sides of the map. That is the first part of the location. Then, use the numbers along the top and bottom of the map next. That is the second part of the location. Where the two lines meet, that is your destination.

1. B, 1 _____
2. E, 7 _____
3. D, 6 _____
4. D, 5 _____



Know the States

Use the map to answer the questions about the United States.

Which state is the smallest? _____

Which state borders only one other state? _____

How many states have the word "New" in their names? _____
Write their names:

_____

_____

Use the map to answer the questions about the United States.

Which four states share one common corner?
Hint: The corners meet in a shape of a +.

_____ _____

_____ _____

Which state is directly east of North Dakota? _____

Which state is directly west of North Dakota? _____

Which state is directly north of Tennessee? _____

Which state is directly south of Iowa? _____

Which two states are separate from the continental U.S.?

_____ _____

Which states border West Virginia?

_____ _____

_____ _____

_____

Which states border Arkansas?

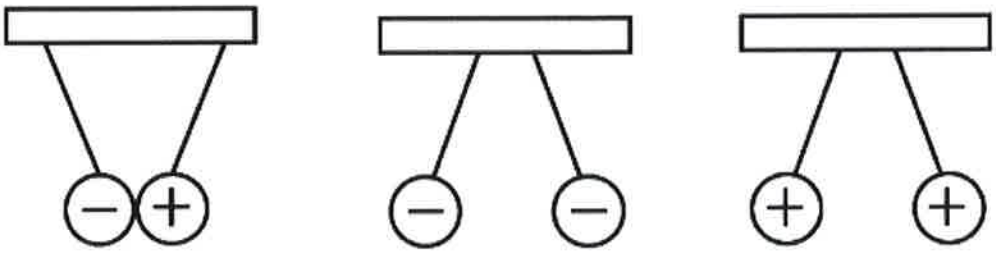
_____ _____

_____ _____

_____ _____

ESCAPING ELECTRONS!

An atom usually has the same number of protons and electrons, but the electrons can separate from atoms. You may have heard the expression "opposites attract". In the case of atoms, unlike charges attract each other and like charges repel each other. The attraction between like charges (positive + positive, negative + negative) causes the movement of electrons between two objects.



An object is neutral and has no charge when it has the same amount of protons and electrons. But when the object loses or gains electrons it becomes unbalanced, and electrically charged. If there are more protons than electrons, the object carries a positive charge. If there are more electrons than protons, the object carries a negative charge.

Some materials allow electrons to pass through more easily than others. **Conductors** hold onto electrons loosely. Electrons move easily through these materials. Metal is a good conductor.

Insulators hold onto electrons tightly. Electrons do not move easily through these materials. Plastic, cloth, and glass are good insulators.

Circle the word that makes each statement true.

An object with a positive (+) charge will **attract repel** an object with a negative (-) charge.

An object with a negative (-) charge will **attract repel** an object with a negative (-) charge.

An object that gains electrons will have a **positive negative** charge.

An object that loses electrons will have a **positive negative** charge.

An **insulator conductor** _____.

All About Circuits

In this two page worksheet, you will learn about circuits, including what they look like, how they work, how to draw a diagram of them, and how to make one.

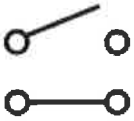
Circuits are all around us; they can be as simple as a battery connected to a lightbulb, and as complex as those found within computers. Circuits are like highways for electrons, which are particles that make up electricity. Electrons will always travel between positive and negative terminals of a power source, like a battery. Like people, electrons will never leave "home" unless they can get back; therefore, electrons will only flow through a circuit that has a complete path between positive and negative terminals. If the electrons dont flow, then power won't flow, and anything connected to the circuit will not turn on. In addition, electrons are lazy: they will always take the path of least resistance, or the easiest route between terminals. For example, if given the choice between a path with a lightbulb or a path without, they will take the path without the lightbulb.

Symbols used to represent circuit parts:

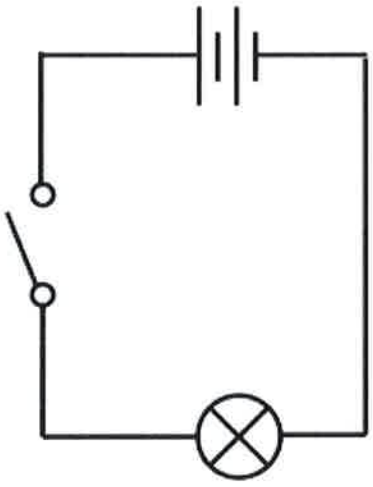
BATTERY: 

WIRE:

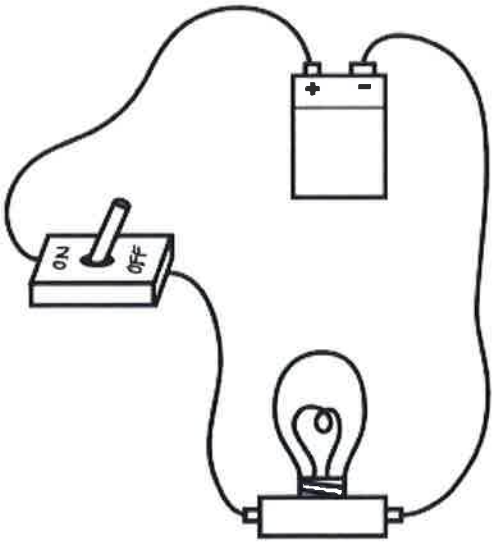
LIGHTBULB: 

SWITCH: 

Circuit Diagram:

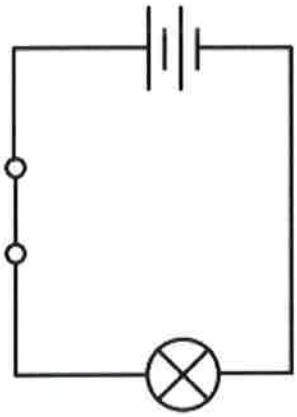


Drawing of Circuit:

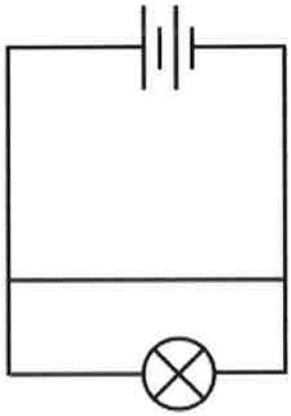


Will the Lightbulb Turn on?

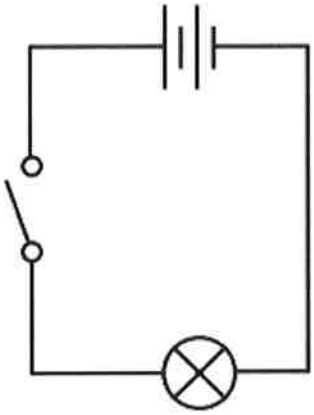
On this second page, specify whether you think the lightbulb in each circuit will be on or not. The first two circuit diagrams are examples.



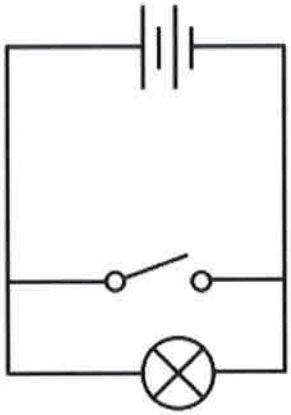
The lightbulb in this circuit will be on because the switch is closed, allowing electricity to flow throught it to the lightbulb.



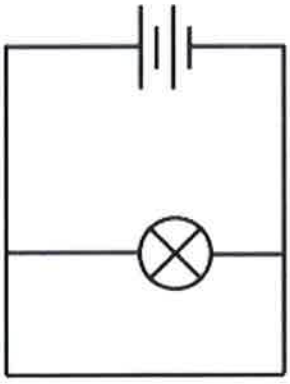
The lightbulb in this circuit will not be on because there is another wire bypassing the lightbulb, and since electricity takes the path of least resistance, it will not pass through the bulb and turn it on.



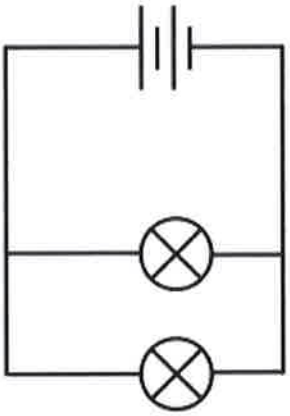
A



B



C



D

NIKOLA TESLA

Nikola Tesla is often considered a real-life mad scientist! He did many experiments with electricity and made several groundbreaking discoveries about how it works and how it can be used.

Born in what is now Croatia in the mid-1800s, Tesla was always a curious and intelligent person. He attended university where he studied math and science. While in school, he came up with the idea for a new kind of motor and was hired by electric companies across Europe to improve their machines. It was there that he began forming the idea for the alternating current – AC. At age 28, he moved to New York City and was hired by Thomas Edison. However, Tesla and Edison had different ideas about how electricity should be used and ended up becoming rivals in the "War of Currents," a debate over which type of electricity should be used. Tesla was in favor of AC, but Edison thought DC was better. In the end, Tesla's AC triumphed – AC is now the standard form of electricity delivered to homes and businesses.

Tesla is remembered for conducting experiments on a grand scale and for his eccentric ideas, which, though considered outlandish at the time, lead to important discoveries. Tesla's legacy is everywhere: not only are all modern homes run on AC, but he paved the way for scientific research in hydroelectric power, radio, robotics and wireless communication.

Name three places you might see electricity, wireless communication, or robotics today.

_____

_____

_____

By the end of his life, Tesla held over 100 patents!
In the space below, design an invention that uses AC.

ELECTRIFYING WORD SEARCH

Find the words related to electricity and magnetism in the word search below!

E L E C T R I C I T Y U A
H S W I N S U L A T O R H
J F G L D I R Y Y I W S G
C E A M I Z C H S R G T N
T S L R K I S B O R B L I
F I V O A V T E S L A R N
B U A S P D Q V N K S X T
N G N R G L A S E O T U H
S T I O V N F Y R K O O G
D O R O T C U D N O C D I
M N A Y V J X J S E Z U L
A G P M S I T E N G A M B
C Z Y S T A T I C I H L R

WORDS

INSULATOR
FARADAY
STATIC
ELECTRICITY
MAGNETISM
GALVANI
TESLA
LIGHTNING
CONDUCTOR

Number Chart (1 to 200)

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100
101	102	103	104	105	106	107	108	109	110
111	112	113	114	115	116	117	118	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

12× Multiplication Table

×	1	2	3	4	5	6	7	8	9	10	11	12
1	1	2	3	4	5	6	7	8	9	10	11	12
2	2	4	6	8	10	12	14	16	18	20	22	24
3	3	6	9	12	15	18	21	24	27	30	33	36
4	4	8	12	16	20	24	28	32	36	40	44	48
5	5	10	15	20	25	30	35	40	45	50	55	60
6	6	12	18	24	30	36	42	48	54	60	66	72
7	7	14	21	28	35	42	49	56	63	70	77	84
8	8	16	24	32	40	48	56	64	72	80	88	96
9	9	18	27	36	45	54	63	72	81	90	99	108
10	10	20	30	40	50	60	70	80	90	100	110	120
11	11	22	33	44	55	66	77	88	99	110	121	132
12	12	24	36	48	60	72	84	96	108	120	132	144

Courtesy of MathsIsFun.com

Notes: