Experimental Design
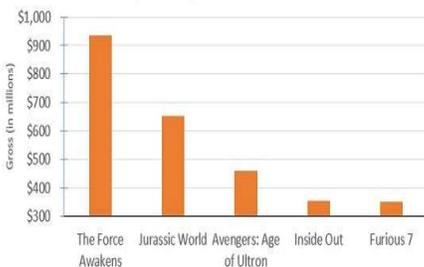## cheat sheet

Graphs

How to set up the graph

X-AXIS (horizontal) --> Independent variable
Y-AXIS (vertical) --> Dependent variable

*Always include axis labels with units of measure (ex: Concentrations of SO_2 in **ppm**)
*Space tick marks out evenly
*Write numbers at tick marks
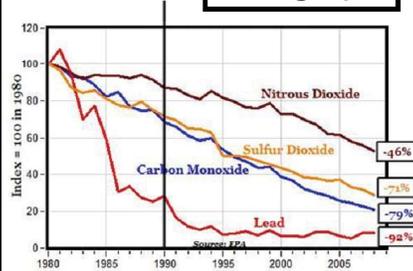*Axis numbers should be a number line and not your exact data points (ex: 2, 4, 6, 8, 10; not 1.2, 4.9, 6.1, 9.3)

Bar graph

Top Grossing U.S. Movies in 2015

*Bars don't touch (social distancing)
*Bars of the same set are same color
*Use when comparing different groups
*Use different colors only for multiple sets of data on same graph & include key/legend.

Line graph

Clean Air Act 1990
Nitrous Dioxide
Sulfur Dioxide   -46%
Carbon Monoxide   -73%
                    -79%
Lead   -92%
Source: EPA

*Represents continuous data that relates to itself.
*Connect data points for each data set with a line.
*different data sets need to be different color

Scatter plot

Outlier
Trend Line
Points

*Probably won't see on exam nor need to create.
*Shows possible correlation/relationship between 2 variables.
*Can have a "trend line" showing the average of the data.
*Do not connect the dots
*Closer the points to one another, closer the relationship

Analyzing Results

* Back up your statements specifically with data from the graph and make full connections for the reader to show full understanding of the topics.

Variables

Independent & Dependent

INDEPENDENT VARIABLE
What you are observing to see if it has an effect on the outcome of the experiment or what we are altering.

DEPENDENT VARIABLE
The outcome of the test or experiment. It is what we are measuring (the result) and is DEPENDENT upon the independent change.

Controls/Constants

CONTROLS
What you keep steady or controlled to keep from altering or influencing your experiment.

CONSTANTS
Things you keep the same between all of the tests or don't allow to change. Constants can also be controls.

Control Group(s)

CONTROL GROUP
Completely different from experiment controls & constants.
This is a test or group that you keep under normal conditions so that it can be compared to the test groups. This is done to see if the change (independent variable) made a measurable difference.
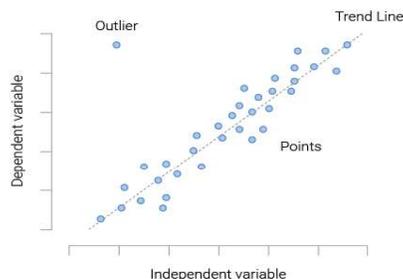
Bad experiment

*Changes multiple variables at once making it so you cannot tell what variable produced a change.
*Lacks experimental controls that lead to outside influences on your tests.
* Test groups of few individuals