

How To Spot Science Notes for the Teacher

This resource can be used in multiple ways:

1. Use the card sort as a warm up activity prior to having students read and analyze an article, website, or social media post of your choice for the purpose of determining bias.
2. Use the card sort as a stand-alone activity.
3. Use the card sort with the writing activity. Have students complete both and then participate in a group or whole class discussion to defend a position as to whether or not each scenario reveals possible, probable, or no bias. Students may find that they “weigh” possible sources of bias more or less than other students. Students may reveal confirmation bias during their discussion.

It is recommended that you print the cards on heavy cardstock paper for greatest durability. Save paper by laminating the cards. This will make it possible to re-use the cards for many years. Consider printing sets on different colors of card stock so that they can be more easily sorted if sets are mixed together. The cards can be stored in zip-close bags for easy organization.

How To Spot Bad Science online and on social media

1

Why did you click?

Ask yourself what made you click on the story or image. Are you hoping it's true? Does it say something you already believe? Do you feel a strong emotion?

This is called Confirmation Bias. We are more likely to click on something that appears to agree with what we already believe. If that's what made you click be careful to control your own bias.

Look for the words "promoted" or "sponsored". They mean someone paid money for you to get the post in your feed.

Why is it showing up in your feed?

Check to see where the post came from originally. Is it from a well known scientific organization, an established educational institution, or a respected scientist?

2

3

What does the domain name or URL tell you?

Click through to the site. Domain names that end with ".io" are often biased. URLs that end with ".com.co" should be seen as suspicious.

URLs ending with ".edu" are associated with schools or universities and are often trustworthy sources for accurate science information but sometimes schools get research money from companies who profit if the experiment turns out to be good news for their product. Always consider the source of the research funding.

If there is no "About" section **be extremely suspicious** about the accuracy of the information. Reputable sources aren't afraid to tell you about themselves.

What does the headline look like?

Be suspicious if the headline uses ALL CAPS or contains words like "SHOCKING!", "REVEALED!" OR "PROVES!"

4

5

Is there an "About" link?

If so, read it to learn if the source has the scientific credentials to be trustworthy. Be wary of political, religious, or business sources because they may be biased. Be wary of groups that have a "cause".

Words in all caps or followed by exclamation points are never used by reputable science sources. Scientists rarely use the word "prove" when talking about scientific research or experiments. They will speak of evidence, but not proof.

How To Spot Bad Science online and on social media

6

How about the pictures?

Did the author(s) use photographs lifted from the internet? Use a site like www.tineye.com to find the original source of the photos.

Reputable sources use photographs they own or will cite the photographer in a caption. If photos have no source, or the original photo was used without permission or in a misleading way, the website or social media post shouldn't be considered reliable.

This is the opposite of real science. Real scientists share their results and their methods. They don't claim to be the only person or group who knows the "truth" or has "the facts". They don't brag. They share credit.

Is an unusual claim made?

Fake science sources often claim to be sharing secrets or information that **only** they know or that others want to hide from you. If it sounds like a conspiracy theory it's not good science.

7

8

Are facts and data shown?

If the information is related to an experiment, is the data included or are there links to the scientific data or additional facts?

Look for language like "may result" or has an effect "up to"... Those are vague promises. If there is no data, don't trust the truth of the claim.

If you see exaggerated language like a claim that new data "destroyed" previous ideas - **it's bad science.**
Reliable scientists would just say that their results are different, or that the evidence they found raises questions about previous ideas.

Is the language precise ?

Good science is described with very careful and precise language. It doesn't have to be difficult to understand but it won't exaggerate claims or use emotional language.

9

10

Are there links to other studies?

Unbiased reporting includes links to information about competing claims or differences of opinion.

Most reputable scientific work will include information about other studies, even if the other studies give evidence of an opposite viewpoint.

Directions: Cut out the cards along the dotted lines. Make three columns: 1) Probably Biased 2) Possibly Biased and 3) Probably Not Biased. Sort each card into one of the three columns. Refer to the two-sided poster on bias to help you decide where each card belongs.

A social media post includes a picture of a scientist shaking hands with a businessman who has been convicted of fraud. The headline says the scientist was bribed by the businessman to fake evidence that the businessman's product worked better than it really did. There is no information about the photo. **1**

An advertisement for a weight loss pill claims that people who took the pill lost up to 20 lbs. in 20 days without exercising. There is no link to any data about the number of people who participated in the experiment or how much weight they lost. **2**

You see this headline on a website:

“SHOCKING new proof that NASA LIED about moon landing!!”

The website URL is www.sciencetruth.com.co **3**

You read an article on NBC's website that says weather scientists have discovered an error in how ocean temperatures are measured for experiments on climate change. The article contains links to the NOAA and National Weather Service websites where the same problems are reported. **4**

On your social media feed you see an ad for an acne cream. The ad says it was created by a celebrity plastic surgeon whose clients are Hollywood stars. The ad says he discovered a REVOLUTIONARY new plant extract that clears up acne in “as little as two days after your first use.” **5**

On a university website ending with .edu you read that a prescription drug for one disease may be unexpectedly curing a different disease. The prescription drug has just recently been released for sale. The study was funded by the prescription drug manufacturer. **6**

On Facebook you see a post about your favorite professional athlete who was paralyzed in an accident. The post says he's making a “stunning” recovery in his ability to walk because of stem cell treatments he obtained in a clinic in Europe. You can't find information online about the clinic or the research. **7**

You see a “sponsored” link on CNN to a website called Parents Against Vaccines. There are many posts on the website about children with autism by parents who believe vaccines caused autism in their children. On the website there are links to books and articles about the risk of vaccines. **8**

A local online newspaper prints a story claiming that your state is experiencing the “worst drought in state history”. The article quotes the scientist who made the claim and provides a link to a climate study he wrote. The article also includes a quote from a scientist who disagrees, and provides a link to his research. **9**

You see an article about an “exciting” technology - LED lights being used to kill germs in water. A caption near a photo of the lights says the photo is the property of the university where the research was done. At the bottom of the article there are many links to scientific papers about the new technology. **10**

Online, you read an article that says people who take high doses of vitamin E are more likely than other people to die of heart failure. The article contains links to several studies by different scientists. The “About” section on the website says the author of the article writes books on nutrition. **11**

A social media post claims that a drop in average temperature for the past year (announced by NASA) proves that climate change is “a hoax”. The website's “About” section says that it provides news and opinion. Neither the owner of the site nor the author of the article has any science experience. **12**

**Probably
Biased**

**Possibly
Biased**

**Probably
Not Biased**

NAME _____
CLASS _____

Student Worksheet

How To Spot **Bad** Science



For each example given, decide if the claim is probably biased, possibly biased, or probably not biased. Then explain the evidence that supports your opinion.

1. Probably biased Possibly biased Probably Not Biased

Evidence to support my opinion _____

2. Probably biased Possibly biased Probably Not Biased

Evidence to support my opinion _____

3. Probably biased Possibly biased Probably Not Biased

Evidence to support my opinion _____

4. Probably biased Possibly biased Probably Not Biased

Evidence to support my opinion _____

5. Probably biased Possibly biased Probably Not Biased

Evidence to support my opinion _____

6. Probably biased Possibly biased Probably Not Biased

Evidence to support my opinion _____





7. Probably biased Possibly biased Probably Not Biased

Evidence to support my opinion _____

8. Probably biased Possibly biased Probably Not Biased

Evidence to support my opinion _____

9. Probably biased Possibly biased Probably Not Biased

Evidence to support my opinion _____

10. Probably biased Possibly biased Probably Not Biased

Evidence to support my opinion _____

11. Probably biased Possibly biased Probably Not Biased

Evidence to support my opinion _____

12. Probably biased Possibly biased Probably Not Biased

Evidence to support my opinion _____

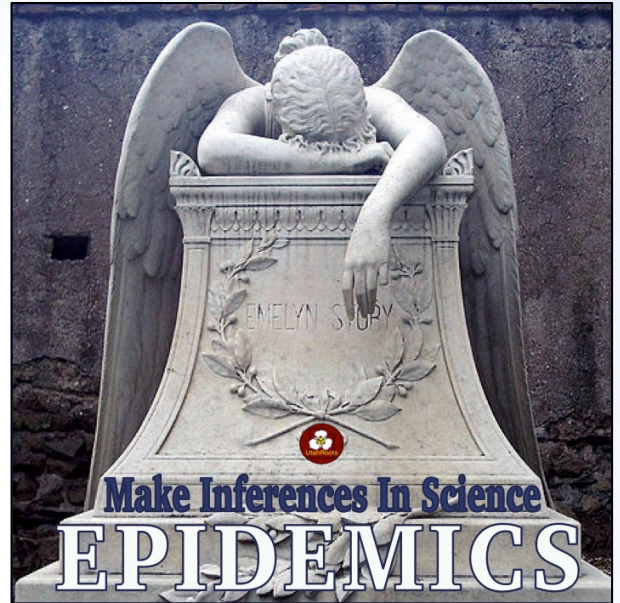
Make Inferences In Science

The Elements

You might also be interested in these additional resources to support literacy in science.

Make Inferences In Science

Natural Disasters!



FOLDABLE GUIDES for

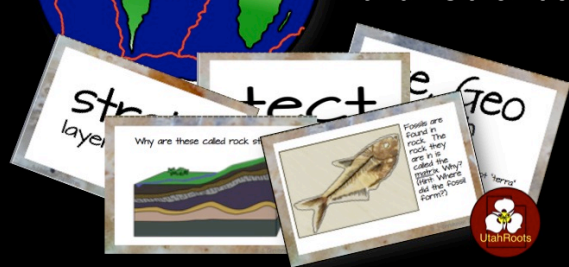
READING and WRITING in Science

CAUSE & EFFECT . SEQUENCE . DESCRIPTION
PROBLEM & SOLUTION . COMPARE &
CONTRAST

Root Word



Root Word



About the Author

I am a retired science teacher, instructional coach, college adjunct instructor, and author. My curriculum materials are designed to integrate science, art, and literacy.



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