9-12

There are different traditions in science about what is investigated and how, but they all have in common certain basic beliefs about the value of evidence, logic, and good arguments. 1B/4… SI

Insist that the critical assumptions behind any line of reasoning be made explicit so that the validity of the position being taken—whether one's own or that of others—can be judged. 12E/4

Sometimes, scientists can control conditions in order to focus on the effect of a single variable. When that is not possible for practical or ethical reasons, they try to observe as wide a range of natural occurrences as possible to be able to discern patterns. 1B/3 SI

Hypotheses are widely used in science for choosing what data to pay attention to and what additional data to seek, and for guiding the interpretation of the data (both new and previously available). 1B/2 ST AB

6-8

Some aspects of reasoning have fairly rigid rules for what makes sense; other aspects don't. If people have rules that always hold, and good information about a particular situation, then logic can help them figure out what is true about it. 9E/1…

Notice and criticize the reasoning in arguments in which fact and opinion are intermingled or the conclusions do not follow logically from the evidence given. 12E/5…

Scientific investigations usually involve the collection of relevant evidence, the use of logical reasoning, and the application of imagination in devising hypotheses and explanations to make sense of the collected evidence. …1B/1 SI ST AB

Hypotheses are valuable, even if they turn out not to be true, if they lead to fruitful investigations. 12A/2 ST

3-5

Scientists do not pay much attention to claims about how something they know about works unless they are backed up with evidence that can be confirmed and with a logical argument. 1B/4

Reasoning can be distorted by strong feelings. 9E/2 AB

Seek better reasons for believing something than "Everybody knows that…" or "I just know" and discount such reasons when given by others. 12E/3

Buttress their statements with facts found in books, articles, and databases, and identify the sources used and expect others to do the same. 12E/1

Keep a notebook that describes observations made, carefully distinguishes actual observations from ideas and speculations about what was observed, and is understandable weeks or months later. 12C/3 SI ST

Sometimes scientists have different explanations for the same set of observations. That usually leads to their making more observations to resolve the differences. …1B/3 ST AB

to and from
HEREDITY AND EXPERIENCE SHAPE BEHAVIOR

Offer reasons for their findings and consider reasons suggested by others. 12A/2

K-2

People are more likely to believe your ideas if you can give reasons for them. 9E/1

Ask "How do you know?" in appropriate situations and attempt reasonable answers when others ask them the same question. 12E/1

People can often learn about things around them by just observing those things carefully, but sometimes they can learn more by doing something to the things and noting what happens. 1B/1 SI

When people give different descriptions of the same thing, it is usually a good idea to make some fresh observations instead of just arguing about who is right. 1B/4 ST AB

Raise questions about the world around them and be willing to seek answers to some of them by making careful observations and trying things out. 12A/1 SI ST

Describing things as accurately as possible is important in science because it enables people to compare their observations with those of others. 1B/3 SI

Describe and compare things in terms of their number, shape, texture, size, weight, color, and motion. 12D/1 SI

to and from
RATIOS AND PROPORTIONALITY

to AVERAGES AND COMPARISONS

Draw pictures that correctly portray at least some features of the thing being described. 12D/2 SI